# Paraprofessional Test Preparation

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**Test-Taking Strategies**

# Curriculum Guide

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# Paraprofessional Test Preparation (PTP) Project: Introduction

The Illinois Community College Board (ICCB), in partnership with the Illinois State Board of Education (ISBE), is pleased to present the Paraprofessional Test Preparation Curriculum Guide to assist educators throughout Illinois in preparing paraprofessionals to meet the requirements of the No Child Left Behind (NCLB) federal legislation.

This manual is comprised of content that represents items found on both of the state-endorsed assessment exams: the American College Testing (ACT) *WorkKeys* and the Educational Testing Service's (ETS) *ParaPro*. The curriculum is intended to prepare individuals to be successful regardless of the exam they choose to take in response to NCLB requirements.

The manual will be distributed to each community college and Regional Office of Education (ROE) in Illinois, as well as the state presidents of the two education unions—the Illinois Education Association (IEA) and the Illinois Federation of Teachers (IFT). It will also be available to other education entities upon request. The intent of the statewide curriculum is to provide consistent, quality preparation for all paraprofessionals in Illinois. There is no cost for the manual.

## Background

Out of a growing concern for the quality of education received by all children in our nation, the reauthorization of the federal Elementary-Secondary Education Act, otherwise known as NCLB, was enacted on January 8, 2002. This legislation had a significant impact on teacher aides/assistants in Illinois and throughout the country. Under NCLB, education paraprofessionals (teacher aides/assistants) hired after January 8, 2002, to assist in schools and/or programs that receive Title I funds must have . . .

- Completed two years of study at an institution of higher education;
- Obtained an associate's degree or higher; or
- Met a rigorous standard of quality through a formal local or state assessment.

Title I paraprofessionals who are currently employed have until 2006 to meet these requirements.

ISBE and ICCB recognized the importance of assisting paraprofessionals in meeting the new requirements of NCLB, and in the summer of 2002, developed a partnership to meet those needs.

The partnership is comprised of staff from both agencies, as well as a comprehensive team of education stakeholders from higher education, the K-12 community, ROEs, and education unions.

The first phase of the project focused on developing a statewide model for both a Paraprofessional Certificate and an Associate of Applied Science (AAS) degree. This phase was completed in April 2003.

While the partnership's work was highly successful and served to provide a pathway to NCLB qualification through college coursework, a need remained in the area of paraprofessional test preparation.

In May 2003, ISBE awarded a grant to ICCB to coordinate an effort to develop a statewide test preparation curriculum for both the ETS ParaPro and ACT WorkKeys assessments. The curriculum is intended to serve as a diagnostic tool for identifying academic strengths and weaknesses in math, reading, and writing, and strengthening test-taking skills as well as subject area knowledge. The curriculum will be available in both on-site and online formats.

## Project Impact

This initiative, commonly referred to as the Paraprofessional Test Preparation (PTP) Project, is a collaboration of representatives from community colleges, the K-12 community, ROEs, education unions, and staff from ICCB and ISBE. It includes a variety of advisory, development, and review committees, which provide guidance and feedback for various stages of development and implementation. The individuals who have contributed to the project are listed in the following "Acknowledgments" section.

The PTP project is unique because of its design and systemic structure. Through the financial support provided by ISBE, paraprofessionals throughout Illinois will be able to access the statewide test preparation curriculum *at no cost*. This became an early priority of the project due to the overwhelming feedback from school district personnel concerning the financial constraints of paraprofessionals in the workforce.

A significant component of the project's design includes the formation of local partnerships across the state to serve as the delivery agents of the curriculum. The project calls for local partnerships to consist of three primary entities: (1) a community college, (2) an ROE, and (3) an education union. Additional school district partners are encouraged, as well.

Through a Request for Proposals (RFP) process, partner applications were solicited. Submissions were received from throughout the state showing strong relationships across education entities and a commitment to providing services to paraprofessionals. Financial awards were provided to all those who applied. These mini-grants were then used to offset the cost of instruction and delivery of the statewide curriculum.

The following map reflects the extent to which the paraprofessional test preparation curriculum is being delivered throughout Illinois:

# Paraprofessional Test Preparation Partners

Jo Daviess
Stephenson
**Highland**
Winnebago
Boone
**Lake County**
Lake
Carroll
Ogle
**Rock Valley**
DeKalb
**Kishwaukee**
**Elgin**
Kane
**DuPage**
DuPage
Cook
City Colleges of Chicago
Whiteside
Lee
**Sauk Valley**
**Waubonsee**
Moraine Valley
South Suburban
Rock Island
**Black Hawk**
Henry
Bureau
**Illinois Valley**
LaSalle
Kendall
Mercer
Putnam
Kankakee
**Kankakee**
Henderson
Warren
Knox
Stark
Marshall
**Carl Sandburg**
Woodford
Livingston
Iroquois
McDonough
**Spoon River**
**Illinois Central**
Tazewell
**Heartland**
Ford
Hancock
Fulton
Mason
McLean
Vermilion
**Danville**
Schuyler
Logan
DeWitt
Champaign
**Parkland**
Brown
Cass
Menard
Piatt
Lincoln Land
Sangamon
**Richland**
Macon
Douglas
Edgar
Morgan
Moultrie
Coles
Scott
Christian
Shelby
**Lake Land**
Clark
Greene
Macoupin
Montgomery
Cumberland
Lewis & Clark
Jersey
Fayette
Effingham
Jasper
Crawford
Madison
Bond
Lawrence
**Illinois Eastern**
Clay
Richland
**Kaskaskia**
Clinton
Marion
Edwards
Wabash
St. Clair
Washington
Jefferson
Wayne
**Southwestern**
Monroe
Randolph
Perry
Hamilton
White
Franklin
**John A. Logan**
Jackson
Williamson
Saline
Gallatin
Union
Johnson
Pope
Hardin
**Shawnee**
Alexander
Pulaski
Massac

## Project Staff

## Acknowledgments

Lanita Koster, Illinois Federation of Teachers
Margaret Lehner, Moraine Valley Community College
Connie McKenna, School District 105
Susie Morrison, Taylorville School District
Martine Nickols, Rural Champaign County Special Education Cooperative
John Noak, Lincoln Land Community College
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## Additional Resources
For more information about the Paraprofessional Certificate and AAS Degree, and/or ACT WorkKeys and ETS ParaPro testing dates and locations, access the following link:
•     http://www.iccb.org/HTML/what/pro_plan_accountability.html

More information about NCLB can be found at the U.S. Department of Education's website:
•     http://www.ed.gov/offices/OESE/esea/

For more information about ISBE guidelines for paraprofessionals, access the following website:
•     http://www.isbe.net/nclb/htmls/paraprof.htm

For more information about this project, or to request a copy of the curriculum guide, contact . . .
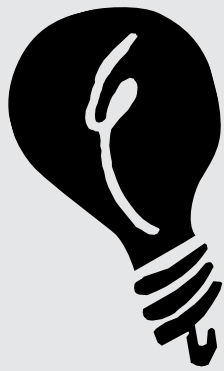Rebecca Miller
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# Tips from the Field Tests

# Tips from the Field Tests

A pilot of this curriculum was conducted in July and August 2003. Paraprofessional groups at Lewis and Clark Community College, Moraine Valley Community College, Spoon River College, and the Chicago Teacher's Union Quest Center were introduced to the curriculum and asked to respond to evaluation questions related to the course. The following tips are based upon comments from instructors and paraprofessionals that were involved with the curriculum pilot. They are shared with potential instructors of the curriculum in order to provide advice for implementation of a Paraprofessional Test Preparation course that will be responsive to student needs.

This curriculum is intended to serve as a refresher/review course for paraprofessionals that have learned the subject matter earlier in their educational experience. Some paraprofessionals that access the test preparation course are in need of extensive training or remedial classes in certain subject matter areas. These individuals should be guided to enroll in subject matter classes or gain access to tutoring services rather than continue in the Paraprofessional Test Preparation course. As one field test instructor stated, "The curriculum simply is not a tool for teaching skills. It is a tool for refreshing skills."

Time spent in preparing to instruct with the curriculum ranged from 2 to 30 hours. It is important to review the modules carefully prior to instruction in order to determine which activities and handouts the instructor will use with a particular group. It may not be necessary to cover every activity in each module. This decision should be made using data from the group's pre-test results as well as information on which test the participants plan to take following completion of the course.

Instructors expressed a comfort level with 15-25 students per class.

The curriculum is divided into five modules: (1) About the Assessments, (2) Reading, (3) Writing, (4) Math, and (5) Test-Taking Strategies. It was developed with the intent that each module would require no more than three hours to complete, thus creating a 15-hour course. Comments from participants in the field tests point to the fact that some modules took less than three hours time, while math required more than three hours in most cases. A majority of paraprofessionals and instructors believed that more time is needed to cover the math module. It was also suggested by instructors that math could be taught in two sections—covering the basic skills sections first, and covering the advanced math sections at a later time. It might be beneficial to teach a portion of the math module, then teach reading or writing, and finally finish the rest of the math module. An approach that worked well in one field test was to teach the first part of the math module, have a weekend break, and teach the remainder of the math module following the break. It was believed that the weekend break allowed participants time to assimilate the information and be better prepared to tackle the remaining math concepts the next week.

Comments from instructors and paraprofessionals demonstrated that the course lessened test anxiety for most paraprofessionals. As one individual expressed, "My anxiety level was decreased. I learned that I am not alone. Lots of people feel the same." Paraprofessionals expressed appreciation for the opportunity to be a part of the project and "took the course very seriously," as one instructor stated. Instructors commented that one of the benefits of the course was that paraprofessionals learned about the origins of new requirements through the NCLB section of the curriculum. Another benefit was that paraprofessionals learned what they didn't know and thus realized what they needed to focus upon in their preparation for the final test. When asked what was of the most value in the curriculum, one paraprofessional said, "That I could get the help I needed." Another paraprofessional said, "It was a great way to review skills I'd forgotten." Although one paraprofessional did not feel quite prepared to take the final assessment following the field test, she also said: "I was not aware that I knew so little! Although I do not use a lot of what we went over, I may need it in the future. One can never know too much. I do feel I learned a lot in the math area. I feel confident that I can learn even more. I know where I need help and have the help I need to get it." Beyond helping the paraprofessionals, the use of this curriculum seems to assist instructors in its own way. All of the field test instructors expressed their appreciation for the opportunity to work with the paraprofessionals in the project. One instructor summed up her evaluation comments by saying " . . . I'm glad they are in the classroom working with children."

*Thank you for contributing your efforts towards assisting paraprofessionals in Illinois. The Illinois Community College Board and the Illinois State Board of Education hope that this manual will serve as a valuable resource in helping you accomplish this important task.*

# About the Assessments?

# Module 1 – About the Assessments
*Part 1: Overview of the Entire Module*

## Overview
In Module 1, Part 1, the paraprofessionals will learn about the following:
- Part 1: Overview of the Entire Module
- Part 2: Introduction, Purpose, and Objectives of the Five-Module Course
- Part 3: No Child Left Behind (NCLB) Act
- Part 4: Characteristics of the Two Assessments: WorkKeys and ParaPro
- Part 5: Pretest
- Part 6: Learning Styles and Test Anxiety
- Part 7: Concerns

## Objectives
Following completion of Module 1, the paraprofessionals will . . .
- know how the NCLB legislation affects teacher aides nationwide and themselves personally.
- know the characteristics of the WorkKeys and ParaPro Assessments.
- be more familiar with the types of questions asked by the two assessments.
- determine their learning styles and appropriate study strategies for their styles.
- be more aware of their level of test anxiety.
- be aware of their own and other's concerns regarding the assessment of paraprofessionals.

## Lessons and Activities
The lesson and activities of Module 1 coincide with the overview listed above. Each of the seven parts will begin with an instructor outline that has an overview of the module part, objectives, lessons and activities, and evaluation.

## Sample Test Questions
In Module 1, all students take a Pretest comprised of reading, writing, and math questions modeled after WorkKeys and ParaPro questions.

## Evaluation
Students will be evaluated in Module 1 based on their Pretest scores. An evaluation of learning style and test anxiety is also included in this module. There are several short quizzes to assess understanding.

## Supplemental Resources
For more information on NCLB, see the following resources:
- www.isbe.net/nclb
- www.ed.gov/nclb

## About the Assessments ❓

For information on the ParaPro Assessment, see the following resources:
- www.ets.org/parapro
- *ParaPro Assessment Study Guide* (available for $25)

For information on the WorkKeys Assessment, see the following resources:
- www.act.org/workkeys
- Key Train individual training program for WorkKeys (available at www.keytrain.com for $50 plus $5 shipping and handling)

The deliverer of this module can add local resources here.

# Module 1 – About the Assessments
*Part 2: Introduction, Purpose, and Objectives of the Five-Module Course*

## Overview
In Module 1, Part 2, the paraprofessional will learn about the following:
*   The instructor and other paraprofessionals in the class
*   Purpose of the class
*   Objectives of the five-module course

## Objectives
Following completion of Module 1, Part 2, the paraprofessionals will . . .
*   Know names and a little about the instructor and their classmates.
*   be able to state in their own words the purpose of this five-module course and at least two of the objectives.

## Lessons and Activities

### The Instructor and Other Paraprofessionals in the Class
It is important to take a few minutes at the beginning of this five-module course to introduce the instructor and the students to one another. This can be done in a variety of ways. There are many icebreakers available. Asking students to introduce themselves or to introduce someone in the class that they have briefly interviewed is a simple way to achieve this. Asking the paraprofessionals to identify their favorite and least favorite aspects of their work can get the discussion going. Providing name tags, taking roll, completing required forms, and providing an orientation to the course facility are all activities that can take place in the first minutes of the class.

### Purpose of the Class
The purpose of the paraprofessional test preparation course is to review basic skills previously learned, to learn test-taking strategies geared toward standardized tests, and to make an informed decision when deciding whether to take the ParaPro Assessment or the WorkKeys Assessment.

The emphasis of this test preparation course is to review skills that the paraprofessional already has. A test preparation course cannot teach mathematics, reading, and writing. It can, however, provide a review of the basic skills and refresh the principles of mathematics, reading, and writing in the mind of the learner.

According to the Illinois State Board of Education, this test preparation module will "serve as diagnostic tools and prepare individuals to be successful on either of the state-endorsed paraprofessional exams" (http://www.isbe.net/nclb/htmls/testprep.htm). Content and test-taking tips will be reviewed. This course also gives the paraprofessional the opportunity to evaluate his or her own strengths and weaknesses in the process of making a decision about which test to take.

### *Objectives of the Five-Module Course*

The paraprofessional will be able to . . .
- make an informed decision about which of the two tests to take.
- review basic principles in reading, math, and writing.
- recognize different testing questions.
- apply test-taking strategies to the assessment that they choose.

## Sample Test Questions

There are no sample test questions in this part of Module 1.

## Evaluation

See the handout "Purpose Post Quiz for Paraprofessionals." Paraprofessionals should be able to state why they are taking this test preparation course and the purpose of the course in their own words.

## Supplemental Resources

For ice breaker suggestions, visit <http://www.glencoe.com/ps/teachingtoday/weeklytips.phtml/11>.

The deliverer of this module can add local resources here.

## Module 1, Part 2 Handout
- "Purpose Post Quiz for Paraprofessionals"

## Purpose Post Quiz for Paraprofessionals

1.	Why are you taking this course (your purpose)?




2.	What is the purpose of this course (stated purpose from Module 1, Part 1)?

# Module 1 – About the Assessments
*Part 3: No Child Left Behind (NCLB) Act*

## Overview
In Module 1, Part 3, the paraprofessionals will learn about the following:
*   NCLB Act
*   How the NCLB Act affects them
*   Reason they are here

## Objectives
Following completion of Module 1, Part 3, the paraprofessionals will . . .
*   show increased understanding of the NCLB act through class discussion and questions.
*   be able to list three ways that the NCLB act affects them.
*   access available resources for continued review and learning of skills in reading.

## Lessons and Activities

### NCLB Act
President Bush signed into law the NCLB Act of 2001 on January 8, 2002. Its goal is to close the achievement gap between minority students, students from lower socioeconomic levels, and others. There are four major principles that it covers:
(1) increased accountability with an emphasis on results, (2) increased flexibility with more local control, (3) more options for parents, and (4) an emphasis on looking at methods of teaching that have been tested and that work. NCLB is a revision of the 1965 Elementary and Secondary Education Act (ESEA). NCLB's goals are that . . .

*   All students will reach high standards, at a minimum attaining proficiency or better in reading and mathematics by 2013-2014.
*   By 2013-2014, all students will be proficient in reading by the end of the third grade.
*   All limited English proficient students will become proficient in English.
*   By 2005-2006, all students will be taught by highly qualified teachers.
*   All students will be educated in learning environments that are safe, drug free, and conducive to learning.
*   All students will graduate from high school (http://www.isbe.net/nclb/htmls/ highlights.htm).

### How NCLB Affects the Paraprofessional
*Who is affected?*
If you are a paraprofessional and work in a program supported by subpart A of Title I and you provide instructional support, then you will need to meet the qualification requirement. Title I schools are schools that offer "targeted assistance" and/or have "schoolwide programs" (more than 40% of the students are low income).

## About the Assessments ❓

If you are in a targeted assistance school, these requirements apply to those whose salary is funded by Title I. If you are in a schoolwide program school, all paraprofessionals are affected and must meet the requirements.

*What is a paraprofessional?*
Do you . . .
Provide one-on-one tutoring at times when students would not otherwise be taught by a teacher? Help manage the classroom? Help with computer instruction? Help in the library? Instruct under a teacher's supervision? Then you are considered a paraprofessional.

*What is required of paraprofessionals?*
There are three choices open to paraprofessionals who must meet the NCLB requirements. They can complete two years at an institution of higher education (college, community college, university). Illinois has translated this into 60 semester hours of postsecondary education. They can earn an associate's degree. They can show that they meet a standard of quality by taking an assessment that tests their ability to assist in the instruction of reading, writing, math, or in reading readiness, writing readiness, or math readiness.

The paraprofessional in this class has chosen the third option and is preparing to take one of two assessments, ParaPro Assessment or WorkKeys Assessment.

*Timing*
If the paraprofessional was hired before January 8, 2002, he or she must meet the requirements by January 8, 2006.

## Sample Test Questions
There are no sample test questions in this part of Module 1.

## Evaluation
Paraprofessionals will be evaluated based on completion of the "NCLB Post Quiz" Handout.

## Supplemental Resources
For more information about the topics covered in Part 3, see the following resources:
- http://www.ed.gov/offices/OESE/esea/
- http://www.isbe.net/nclb/pdfs/paraprofreq.pdf
- http://www.isbe.net/nclb/pdfs/paraprofqual.pdf
- http://www.isbe.net/nclb/htmls/highlights.htm
- http://www.ed.gov/index.jsp

The deliverer of this module can add local resources here.

## Module 1, Part 3 Handout
- "NCLB Post Quiz"

## NCLB Post Quiz

1.   What do the letters, NCLB, represent?

2.   How does NCLB affect you personally?

3.   What is your opinion about having to meet these requirements?

4.   Do you see any positives? List these here.

5.   Do you see any negatives? List these here.

# Module 1 – About the Assessments
## *Part 4: Characteristics of the Two Assessments: WorkKeys and ParaPro*

## Overview
In Module 1, Part 4, the paraprofessionals will learn the characteristics of both the ParaPro and WorkKeys Assessments.

## Objectives
Following completion of Module 1, Part 4, the paraprofessionals will become more familiar with the WorkKeys and ParaPro Assessments in terms of . . .
• formats and lengths of the tests.
• passing scores.
• evaluation rubrics (from the WorkKeys Assessment).
• securing the score reports.

## Lessons and Activities

### *Characteristics of WorkKeys and ParaPro Assessments*
Included in this section are two handouts: "Characteristics of the ParaPro Assessment" and "Characteristics of the WorkKeys Assessment." These handouts are slightly different in format due to the difference in the assessments. The WorkKeys handout includes the writing evaluation rubric and the math formula sheet. The students will have more opportunities to discuss and use these in Modules 3 and 4.

Use the two handouts to lead a lecture and discussion session. If paraprofessionals have questions not covered on the handouts, check the appropriate websites at the end of this outline.

## Sample Test Questions
There are no sample test questions in this part of Module 1.

## Evaluation
No formal evaluation instrument is included in this module, but the instructor is highly encouraged to do an informal classroom assessment through which the paraprofessionals can share questions or confusion. An example of an informal classroom assessment is "The Muddiest Point." In this activity, the paraprofessionals write the most confusing aspect for them regarding the two paraprofessional assessments on a note card without revealing names. The instructor then takes the note cards and has a question-and-answer session with the class to clear up everyone's muddiest point.

## Supplemental Resources
For more information on NCLB, see the following resources:
• www.isbe.net/nclb
• www.ed.gov/nclb

For more information on the ParaPro Assessment, see the following resources:
- www.ets.org/parapro
- *ParaPro Assessment Study Guide* (available for $25)

For more information on the WorkKeys Assessment, see the following resources:
- www.act.org/workkeys
- Key Train individual training program for WorkKeys (available at www.keytrain.com for $50 plus $5 shipping and handling)

The deliverer of this module can add local resources here.

## Module 1, Part 4 Handouts
- "Characteristics of the ParaPro Assessment"
- "Characteristics of the WorkKeys Assessment"

# Characteristics of the ParaPro Assessment
*From <www.ets.org/parapro> and the* ParaPro Assessment Study Guide

The ParaPro Assessment, developed by Educational Testing Service (ETS), for prospective and practicing paraprofessionals measures skills and knowledge in reading, mathematics, and writing, as well as the ability to apply those skills and knowledge to assist in classroom instruction. The ParaPro Assessment is available in English only. There is both a paper/pencil version and an Internet-based computerized version.

## Format and Length of the Test
The tests consist of 90 multiple-choice questions across three subject areas of reading, mathematics, and writing. Approximately two-thirds of the questions in each subject area focus on basic skills and knowledge, and the remaining questions focus on the application of those skills and knowledge in a classroom setting. The length of the assessment is 2.5 hours. Fifteen of the questions in the test (five in each subject) are Pretest questions and do not count toward the examinee's score. The test questions are arranged by subject area, with reading first, then mathematics, and then writing.

## Passing Score
Illinois has established a minimum qualifying score of 460. Fifteen other states have set a minimum qualifying score. The range of those scores is from 455 to 464.

## Topics Covered
The reading, math, and writing topics evaluated in the ParaPro Assessment will be covered in Modules 2, 3, and 4 of this course.

## Test Dates
The paper/pencil test is offered six times per school year.

The test dates for 2003-2004 are as follows:

| Test Date | Registration must be received by . . . |
| --- | --- |
| September 13, 2003 | August 12, 2003 |
| November 15, 2003 | October 14, 2003 |
| January 10, 2004 | December 9, 2003 |
| March 6, 2004 | February 3, 2004 |
| April 17, 2004 | March 16, 2004 |
| June 12, 2004 | May 11, 2004 |

The Internet-based test is offered with more flexibility. The Internet-based test is administered only in participating school districts. There is no preregistration for the Internet-based test. The test is scheduled at the convenience of you and the participating school district.
More test registration and location information is given in Module 5.

## Getting Your Score Report

- Paper/pencil – Your score report will be mailed approximately four weeks after the test date. Your score will automatically be reported to your designated recipient.
- Internet-based – Your unofficial scores are available onscreen and can be printed out at the conclusion of your test session. (You'll see more about this in Module 5: Test-Taking Strategies.) You will receive your official score report approximately two weeks after the test date. Your score will automatically be reported to the school district that purchased the assessment.

A copy of your scores will automatically be sent to the State of Illinois Title I office.

## Qualifying Score Needed to Pass ParaPro Assessment

When you receive your official score report in the mail, you will receive both your score and a reminder of the qualifying score for Illinois, which is 460. This will allow you to determine whether you passed.

# Characteristics of the WorkKeys Assessment
*From <www.act.org/workkeys>*

## General Information About the WorkKeys Assessment

The WorkKeys Assessment tests skills in reading, writing, and math. All paraprofessionals take the Reading for Information and Applied Mathematics tests. The computer-based Reading for Information and Applied Mathematics tests are 55 minutes each and 45 minutes each for the paper/pencil version. Paraprofessionals choose between the Business Writing and the Writing tests. Business Writing is computer-delivered and takes 30 minutes to complete. Writing is paper/pencil, audiocassette delivered, and takes 40 minutes.

A paraprofessional's ability to apply these skills in the classroom is evaluated by the workplace supervisor using the Instructional Support Inventory.

Some paraprofessionals may have taken the Prairie State Achievement Test while still in high school, which includes the Reading for Information and Applied Mathematics tests. If so, they will need to request scores from ACT, take the Writing test, and have their supervisor complete the Instructional Support Inventory. Participants can use scores up to five years old to meet requirements provided they are at the passing level.

## Passing Scores

To receive the certificate, you must meet or exceed Level 4 of Reading for Information, Level 4 of Applied Mathematics, Level 3 of Writing, and Acceptable on the Instructional Support Inventory.

## Topics Covered

### Writing

The Writing portion of the Listening and Writing assessment measures a person's skill in writing work-related messages. Test takers act as employees who write messages to relay information from customers, coworkers, or suppliers to another person. After listening to an audio message, they must write a summary based on the information they heard and the notes they took during the message and its repetition. A specified amount of time is given for writing before the next message in the assessment is given.

A test taker's skill level score is based on writing mechanics (such as sentence structure and grammar) and writing style used for the written responses. It is not based on the accuracy or completeness of the information, although the responses must be related to the provided message and convey the information clearly. (See the scoring criteria below.) Skill levels range from 1 to 5, and each skill level incorporates the skills assessed at the preceding levels.

The assessment contains six increasingly complex messages. The taped messages reflect various workplace settings and are given by male and female speakers of differing ages with various accents.

### Writing Scoring Criteria

Scoring of the Writing portion is based on the writing mechanics (i.e., sentence structure and grammar) and the writing style used in the examinee's written messages. It is not based on the accuracy or completeness of the information (these skills are assessed in the Listening assessment).

## About the Assessments ❓

The following is a summary of the criteria used in scoring each individual response to the Writing portion of the Listening and Writing assessment. Responses, which are scored holistically, do not always fall precisely into any one score point; therefore, this summary should be used as an overall guide, not as a checklist.

**Score 5**
- Conveys message clearly
- Highly appropriate for the business setting of the prompt
- No mechanical errors
- Good sentence structure
- Smooth and logical style

**Score 4**
- Conveys message clearly
- May have a few minor mechanical errors that do not interfere with comprehension
- Good sentence structure (e.g., all sentences complete)
- Adequate style; sentences may be somewhat choppy. Overall message may not be completely smooth or logical.

**Score 3**
- Conveys message clearly
- Some mechanical errors – Problems with spelling, punctuation, etc., do not interfere with comprehension.
- Adequate sentence structure (e.g., most sentences complete)

**Score 2**
- Conveys message adequately
- Many mechanical errors – Problems with spelling, punctuation, etc., interfere with comprehension.
- Weak sentence structure – Incomplete sentences or poorly structured sentences (e.g., comma splices, fused sentences)

**Score 1**
- Conveys message inadequately
- Gross mechanical errors – Problems with spelling, punctuation, etc., may make deciphering difficult.
- Overall lack of proper sentence structure – May be very difficult to decipher

**Score 0**
- An attempt is made at the message, but the response is completely garbled, with no recognizable sentence structure; one or more comments within the response are grossly inappropriate (e.g., swear words, threats); message is off-topic; page is blank; message is completely illegible; or message is not in English.

### Applied Mathematics
The Applied Mathematics assessment measures a person's skill in using mathematical reasoning to solve work-related problems. Test takers set up and solve problems like those that actually occur in a workplace. A calculator may be used, and a formula sheet (see below) is provided.

The assessment contains 33 multiple-choice questions at five levels of complexity with Level 7 being the most complex. Although Level 3 is the least complex, it still assesses a level of mathematical skill well above no skill at all. The levels build on each other by incorporating the skills assessed at the preceding levels. In order to pass the paraprofessional assessment in the state of Illinois, a Level 4 score is required.

### *Applied Mathematics Formula Sheet*

**Distance**
1 foot = 12 inches
1 yard = 3 feet
1 mile = 5,280 feet
1 mile = 1.61 kilometers
1 inch = 2.54 centimeters
1 foot = 0.3048 meters
1 meter = 1,000 millimeters
1 meter = 100 centimeters
1 kilometer = 1,000 meters
1 kilometer = 0.62 miles

**Area**
1 square foot = 144 square inches
1 square yard = 9 square feet
1 acre = 43,560 square feet

**Volume**
1 cup = 8 fluid ounces
1 quart = 4 cups
1 gallon = 4 quarts
1 gallon = 231 cubic inches
1 liter = 0.264 gallons
1 cubic foot = 1,728 cubic inches
1 cubic yard = 27 cubic feet
1 board foot = 1 inch by 12 inches by 12 inches

**Weight**
1 ounce = 28.350 grams
1 pound = 16 ounces
1 pound = 453.592 grams
1 milligram = 0.001 grams
1 kilogram = 1,000 grams
1 kilogram = 2.2 pounds
1 ton = 2,000 pounds

**Rectangle**
perimeter = 2(length + width)
area = length x width

**Rectangular Solid (Box)**
volume = length x width x height

**Cube**
volume = (length of side)$^3$

**Triangle**
sum of angles = 180°
area = $\frac{1}{2}$ (base x height)

**Circle**
number of degrees in a circle = 360°
circumference = 3.14 x diameter
area = 3.14 x (radius)$^2$

**Cylinder**
volume = 3.14 x (radius)$^2$ x height

**Cone**
volume = $\frac{3.14 \text{ x (radius) x height}}{3}$

**Sphere (Ball)**
volume = $\frac{1}{3}$ x 3.14 x (radius)$^3$

**Electricity**
1 kilowatt-hour = 1,000 watt-hours
amps = watts volts

**Temperature**
°C = 0.56(°F − 32) or $\frac{5}{9}$ (°F − 32)

°F = 1.8(°C) + 32 or ($\frac{9}{5}$ x °C) + 32

**Note:** Problems on the WorkKeys Applied Mathematics assessment should be worked using the formulas and conversions on this formula sheet found at <http://www.act.org/workkeys/assess/math/formulas/html>.

### Reading for Information

The Reading for Information assessment measures a person's skill in reading and using work-related information including instructions, policies, memos, bulletins, notices, letters, manuals, and governmental regulations. These printed materials represent actual workplace conditions in which reading materials are not necessarily well-written or adapted to meet the needs of the reader. They are unlike those used in most reading instruction because they were not produced or selected to facilitate reading.

The assessment contains 33 multiple-choice questions at five levels of complexity with Level 7 being the most complex. Although Level 3 is the least complex, it still assesses a level of reading skill well above no skill at all. The levels build on each other by incorporating the skills assessed at the preceding levels. The minimum passing level for the state of Illinois for paraprofessionals is Level 4.

### Reading for Information, Level 4

At Level 4, the workplace documents are more complex than those at lower levels. They contain more detail and describe procedures that involve a greater number of steps. Some documents describe policies and procedures with a variety of factors that must be considered in order to decide on appropriate behavior. The vocabulary, while elementary, includes words that are more difficult than those at Level 3. For example, the word *immediately* may be used at this level, while at Level 3 the phrase *right away* would be used. At this level, the questions and answers are paraphrased from the document.

Persons with Level 4 skills can . . .
* identify important details that are not obvious.
* recognize the application of more complex instructions, some of which involve several steps, to described situations.
* recognize cause-effect relationships.
* determine the meaning of words that are not defined in the document.

In Reading for Information Level 4, . . .
* sentences are more complex, although still direct and clear: The bus will run 15 minutes early, so be at your stop early.
* sentence structure is varied—some introductory phrases are used: At stops where the snow has been piled deeply at the curb, be prepared to board out in the street.
* there are a greater number of details—which stops will be closed, where to board on a hill, where to listen for cancellation notices.
* information needed is still directly and clearly stated—the examinee does not need to read between the lines or draw any conclusions.

### Instructor Support Inventory

While the ParaPro Assessment includes classroom application questions to assess instructional support skills, the WorkKeys Assessment uses the Instructional Support Inventory as the tool to evaluate classroom skills of the paraprofessional. This inventory is completed by an onsite supervisor of the paraprofessional.

The inventory covers four domains of practice and contains 12 items divided across the domains. Examples of tasks that a paraprofessional might perform are provided for each item in order to further clarify the skill. The task examples are provided to enhance and further explain the items. They are not intended to be all-inclusive or to restrict the definition of the items.

The domains and skills assessed are shown below:

**Domain 1: Assist with presentation of organized and planned instructional activities.**
Skill 1.1: Prepares appropriate resources
    Task example: prepares handouts, instructions, schedules, transparencies, and other documents in accordance with scheduled learning activities

Skill l.2: Prepares students for instructional activities
    Task example: secures student attention

Skill 1.3: Gives clear directions
    Task example: gives concise and sufficient directions

Skill 1.4: Assists with presentation of instructional activities to students
    Task example: emphasizes main idea, central themes

**Domain 2: Monitor student performance, and provide feedback.**
Skill 2.1: Monitors student performance during instructional activities and provides assistance
    Task example: walks around classroom to assess whether students understand assignments

Skill 2.2: Interacts with students to determine their understanding of instruction and material
    Task example: asks appropriate levels of questions requiring comprehension, application, and evaluation of the concepts, skills, or instructions

Skill 2.3: Provides feedback to students about performance
    Task example: affirms correct response

Skill 2.4: Assists with correcting student work
    Task example: assists with correcting or providing feedback on assigned student activities, homework, and in-class tests

**Domain 3: Manage student behavior.**
Skill 3.1: Communicates rules and procedures to students
    Task example: provides clarification to students regarding rules and regulations

Skill 3.2: Monitors and requires student adherence to rules and regulation
    Task example: uses intervention strategies consistently to redirect student conduct and remains calm

**Domain 4: Communicate within the school environment.**
Skill 4.1: Discusses students' progress and problems with teacher, staff, and administration, where appropriate
    Task example: identifies signs of delay in student academic abilities

Skill 4.2: Assists the teacher in providing feedback to students and parents or guardians regarding student performance
    Task example: gathers necessary documents and prepares specific points for discussion prior to a conference or home visit as directed by the teacher

### *Getting Your Score Report*
Computer-based testing scores are available immediately followed by an official, more detailed score report within 24 hours.

Paper/pencil scoring can take place at a WorkKeys Value-Added Reseller (VAR), ACT Center, or directly through ACT. In general, assessments are scored and reports shipped within ten working days after the date ACT receives the assessments.

# Module 1 – About the Assessments
### *Part 5: Pretest*

## Overview
In Module 1, Part 5, the paraprofessionals will cover the following:
- Pretest based on the ParaPro and WorkKeys Assessments
- Feedback on initial strengths and weaknesses

## Objectives
Following completion of Module 1, Part 5, the paraprofessionals will . . .
- be familiar with the types of questions asked on the two assessments.
- have a preliminary assessment of strengths and weaknesses in reading, writing, and math.

## Lessons and Activities

### *Pretest*
Included in this section are the Pretest and Answer Sheet. This practice Pretest should be carefully timed for 50 minutes. After 50 minutes, all students should stop the test, and the test should be scored.

### *Scoring the Paraprofessional Pretest*
There are a variety of ways to accomplish scoring the test, depending on the size of the class. These include having each person score his or her own, trading answer sheets with another student, or having the instructor score each one quickly. It is important to complete the scoring as quickly and accurately as possible.

Protect the integrity of the Pretest (and Posttest) included in this course by collecting (and, at the end of the course, destroying) the used copies of test questions and answer sheets. In Module 5, you will be referred back to the Pretest to pass back and discuss.

The paraprofessionals will have the opportunity to practice with a variety of questions in Modules 2, 3, 4, and 5.

| Reading Test Answers | Math Test Answers | Writing Test Answers |
|---|---|---|
| 1. d. | 1. a. | 1. b. |
| 2. c. | 2. c. | 2. c. |
| 3. b. | 3. c. | 3. d. |
| 4. d. | 4. c. | 4. b. |
| 5. b. | 5. c. | 5. c. |
| 6. d. | 6. d. | 6. b. |
| 7. d. | 7. d. | 7. c. |
| 8. c. | 8. a. | 8. a. |
| 9. c. | 9. a. | 9. b. |
| 10. b. | 10. b. | 10. Use rubric. |

### *Feedback About Reading, Writing, and Math Skills*

Encourage students to make some generalizations about their strengths and weaknesses and what Modules in this course will be review for them and what Modules may require some additional study. There will be another opportunity to do this in Module 5: Test-Taking Strategies and to determine the progress made.

### Sample Test Questions

In Module 1, Part 5, all students take a Pretest comprised of reading, writing, and math questions modeled after WorkKeys and ParaPro Assessment questions.

### Evaluation

In Module 1, Part 5, the students will be evaluated by the Pretest and will be encouraged to self-evaluate their reading, writing, and math strengths and weaknesses.

### Supplemental Resources

For more information on the NCLB Act, see the following resources:
- www.isbe.net/nclb
- www.ed.gov/nclb

For more information on the ParaPro Assessment, see the following resources:
- www.ets.org/parapro
- *ParaPro Assessment Study Guide* (available for $25)

For more information on the WorkKeys Assessment, see the following resources:
- www.act.org/workkeys
- Key Train individual training program for the WorkKeys Assessment (available at www.keytrain.com for $50 plus $5 shipping and handling).

The deliverer of this module can add local resources here.

### Module 1, Part 5 Handouts
- "Reading Pretest"
- "Math Pretest"
- "Writing Pretest"

# Reading Pretest
*(from the* ParaPro Assessment Study Guide, *pages 135-145)*

**Directions:** Each of the questions or incomplete statements below is followed by four suggested answers or completions. Select the one that is the best in each case.

Questions 1 and 2 are based on the following passage from a short story by Toni Cade Bambara.

The puddle was frozen over, and me and Cathy went stompin in it. The twins from next door, Tyrone and Terry, were swingin so high out of sight we forgot we were waitin our turn on the tire. Cathy jumped up and came down hard on her heels and started tap-dancin. And the frozen patch splinterin every which way underneath kinda spooky. "Looks like a plastic spider web," she said. "A sort of weird spider, I guess, with many mental problems." But it really looked like the crystal paperweight Granny kept in the parlor.

1.    The excerpt primarily describes children . . .
    a.    talking with their grandmother
    b.    disagreeing over the rules of a game
    c.    ice-skating on a pond
    d.    playing outdoors

2.    The narrator of the excerpt thinks that the splinters in the frozen puddle are like . . .
    a.    tap-dancing steps
    b.    a spider web
    c.    a crystal paperweight
    d.    tire tracks

Questions 3 and 4 are based on the following passage.

Until the 1970s, most literature published by Native American women was poetry. The publication of Janet Campbell Hale's *The Owl's Song* (1974) and Leslie Silco's *Ceremony* (1977), however, added a new genre—the novel—to the body of literature by Native American women. Elizabeth Cook's *Then Badger Said This* (1977) introduced yet another approach, a combination of poetry and prose. As contemporary Native American women writers begin to reshape Native American literature, they no longer express themselves exclusively in traditional forms. Instead, they are reworking traditional structures as they continue the process of articulating Native American experiences.

3.    The passage is primarily concerned with . . .
    a.    discussing a novel that strongly influenced the work of Native American literary tradition
    b.    describing developments in the Native American literary tradition
    c.    challenging a theory about the work of a particular Native American author
    d.    contrasting the works of three Native American authors

4.    In the context of the passage, the word *body* (line 3) most nearly means . . .
    a.    organization
    b.    size
    c.    human being
    d.    collection

5.   The passage suggests that Hale, Silko, and Cook are . . .
     a.   primarily interested in writing poetry
     b.   helping to reshape Native American literature
     c.   better at writing short stories than novels
     d.   working exclusively with traditional literary forms

6.   Some of the first movies were based on children's books. By 1920, when movies were still in their infancy, there were four screen versions of *Alice in Wonderland*. There were also three films based on *Robinson Crusoe* and two on *The Adventures of Tom Sawyer*. It seems appropriate the motion-picture industry in its own youth should turn for inspiration to the literature of childhood.

     Which sentence from the passage is most clearly an expression of opinion rather than a statement of fact?
     a.   "Some of…children's books"
     b.   "By 1920…*in Wonderland*."
     c.   "There were…*Tom Sawyer*."
     d.   "It seems…of childhood."

7.   In 1620, a group of English people crossed the North Atlantic to establish a small colony in what is now called New England. The story of these Pilgrims has become an important part of the history of the United States. At the time, however, the colony was simply a part of the spread of European culture. For more than a century, the nations of western Europe had been establishing colonies and trading posts around the world.

     The primary purpose of the passage is to . . .
     a.   describe the experience of daily life in the colony established by the Pilgrims.
     b.   explain how several colonies in New England were established and governed.
     c.   describe how trade routes between Europe and the United States were developed and how they have changed.
     d.   point out that the colony established by the Pilgrims was only one of many European colonies.

Questions 8-10 are based on the following excerpt adapted from a book that students are reading.

*Amy Goes Fishing*
Chapter 1: Worms

It was Saturday morning. Amy and her family were having breakfast. Amy's brother, Bill, got up.

"Goodbye," he said with his mouth full of pancakes. "I'm going to a baseball game."

Then Amy's sister, Meg, got up.

"Goodbye," she said. "My Girl Scout meeting starts at ten."

Amy's mother pushed back her chair. "I have to work today," she said. "Goodbye, Amy. Goodbye, Dan. Don't forget to take out the garbage."

Amy wished she had a good place to go.

Clang! She dropped her fork.

"What was that?" her Dad asked. He looked at the empty chairs. "Everyone is gone except you and me," he said.

"What can we do?" Amy asked.

8. Students are learning to make predictions about a story using clues from the title of the story, the chapter headings, and what happens in the story itself. The paraprofessional asks students what Amy and her Dad will most likely do next. Which response from the students shows the strongest understanding of the clues?
   a. Amy and her Dad will make pancakes together.
   b. Amy and her Dad will go to Bill's baseball game.
   c. Amy and her Dad will go fishing.
   d. Amy and her Dad will find jobs of their own.

9. Students have been given a mixed up list of things that happen in the story. Here is the mixed up list:
   1. Meg says goodbye.
   2. Amy asks her father what they should do.
   3. Amy's mother says goodbye.
   4. Amy drops her fork.
   5. Bill says goodbye.

   The students are asked to put the events in the order in which they happen in the story. What is the correct order?

   a. 1, 5, 3, 4, 2
   b. 2, 3, 1, 5, 4
   c. 5, 1, 3, 4, 2
   d. 5, 3, 1, 2, 4

10. Students are learning how to recognize and pronounce words that begin with blended consonant sounds, such as the word *frog*, which begins with the blending of /f/ and /r/ consonant sounds. Which word from the story is the clearest example of a word that begins with a blended consonant sound?
    a. *Baseball*
    b. *Clang*
    c. *Fork*
    d. *Garbage*

## Math Pretest

Choose the best answer for each.

1.  What value below is NOT equivalent to $\frac{6}{4}$?
    a.  $\frac{2}{3}$
    b.  150%
    c.  $\frac{12}{8}$
    d.  1.5

2.  If 5<12, then which of the following statements is true?
    a.  Five minus 12 is a positive number.
    b.  Twelve divided by 5 equals 7.
    c.  The sum of five and a positive number is equal to 12.
    d.  Five times a whole number equals 12.

3.  What digit is in the thousandths place of the number 61,798.5402?
    a.  1
    b.  7
    c.  0
    d.  2

4.  The answer to 892 ÷ 4.8 is approximately . . .
    a.  2
    b.  20
    c.  200
    d.  2,000

5.  Find the area of the right triangle below.



8 ft

5 ft
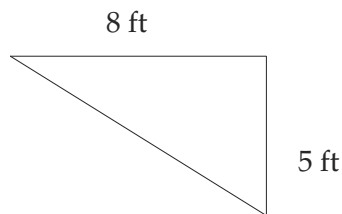
    a.  1.6 sq ft
    b.  13 sq ft
    c.  20 sq ft
    d.  40 sq ft

6.  The answer to $1\frac{1}{2} \times 5\frac{2}{3}$ is . . .
    a.  $5\frac{1}{3}$
    b.  $7\frac{1}{6}$
    c.  $3\frac{7}{9}$
    d.  $8\frac{1}{2}$

7.  Shawn needs to have a 90% average for his exam grade to make an A for the quarter. If there are three tests in the quarter and his first two exam percentages were 91% and 87%, what score must he get on the third exam to obtain a 90% average?
    a.   100%
    b.   85%
    c.   95%
    d.   92%

8.  Josh is having trouble evaluating expressions and shows you the following:

    $-2^2 + 3(5-7)^2 + 4$

    $-4 + 3(5-7)^2 + 4$

    $-1(5-7)^2 + 4$

    $-(-2)^2 + 4$

    $-4 + 4$

    $0$

    What, if anything, is wrong with his work?
    a.   Josh incorrectly evaluated an addition before multiplication.
    b.   Josh incorrectly evaluated a multiplication before an exponent.
    c.   Josh incorrectly evaluated an exponent before an addition.
    d.   Nothing is wrong. The problem is worked correctly.

9.  Michelle has trouble converting from one unit of measure to another. She is asked to convert 40 feet per second to miles per hour and shows you the following work:

    $$\frac{40 \text{ feet}}{1 \text{ second}} \cdot \frac{60 \text{ seconds}}{1 \text{ hour}} \cdot \frac{1 \text{ mile}}{5280 \text{ feet}} = \frac{5}{11} \text{ miles per hour}$$

    Which of the following would you tell Michelle to help her with this problem?
    a.   There are 3,600 seconds in 1 hour.
    b.   There are 3 feet in 1 yard.
    c.   There are 1760 yards in 1 mile.
    d.   Nothing; she did the conversion correctly.

10. Debbie needs a total of 143 book covers to cover all the textbooks she will use during the school year. If she has 37 book covers left from last year, how many book covers does she need to order?
    a.   37
    b.   106
    c.   143
    d.   180

# Writing Pretest

Certain parts of the following sentences are underlined and labeled as a., b., c., or d. One of these underlined parts is an error in grammar or word use. Identify the error, and circle the correct answer.

1.    Traffic experts <u>believe</u> that the new technology available in automobiles often <u>distract</u>
           a.                                                                                                                                    b.
      drivers, <u>causing</u> them to take <u>their</u> eyes off the road for a few critical seconds.
                      c.                                   d.

2.    The athletes <u>stood</u> at attention, hands over <u>their</u> hearts, as their <u>countries</u> flag was <u>raised</u>.
                           a.                                                   b.                                c.                                    d.

Only one of the following sentences has correct punctuation. After identifying the sentence with correct punctuation, circle the correct answer.

3.    Which of the following sentences has correct punctuation?
      a.    The local theater group which includes both students and adults, performed an original musical.
      b.    The local theater group, which includes both students, and adults, performed an original musical.
      c.    The local theater group, which includes both students, and adults; performed an original musical.
      d.    The local theater group, which includes both students and adults, performed an original musical.

Questions 4-6 are based on the following paragraph written by a student.

When you have decided on the best response, circle the correct answer on the answer sheet.

*Being Kind to Others*
By Kaylee

(1) When we are kind to others, we feel better about ourselves. (2) We know in our hearts that we have done the right thing. (3) Even if our friends or classmates want us to tease other students or pick fights. (4) Another reason to be kind is that the world becomes a better place. (5) One good act leads to another. (6) Then we spread good will to everyone we know and meet. (7) Someday another person might be kind to us because our society was made kinder by our actions.

4.    Kaylee wants to write an opening sentence that introduces her main point. Which sentence would best introduce her main point?
      a.    Sometimes kids gang up on one person and tease them.
      b.    Being kind benefits everyone.
      c.    Someone who is weaker or different might be teased or bullied.
      d.    Teasing brings bad feelings to everyone involved.

5.    Kaylee needs to correct one of her sentences. Which sentence should be revised?
      a.    Sentence 1
      b.    Sentence 2
      c.    Sentence 3
      d.    Sentence 4

6.    Kaylee wants to combine sentences 5 and 6. Her new sentence should be concise and
      grammatically correct. Which of the following sentences would be a correct revision?
      a.    One good act leads to another, then we spread good will to everyone we know and
            meet.
      b.    One good act leads to another, spreading good will to everyone we know and meet.
      c.    We spread good will to everyone we know and meet, one good act leads to another.
      d.    One good act leads to another; good will to everyone we know and meet.

7.    Which word is not spelled correctly?
      a.    *achieve*
      b.    *believe*
      c.    *neice*
      d.    *siege*

8.    Tombstone, an old frontier town, is a popular tourist attraction.
       In the sentence above, the underlined word is being used as . . .
      a.    a noun.
      b.    a verb.
      c.    an adjective.
      d.    an adverb.

9.    The train to Chicago was almost always on time.
      In the sentence above, the underlined word is being used as . . .
      a.    an adjective.
      b.    an adverb.
      c.    a preposition.
      d.    a pronoun.

10.   Paraprofessional Writing Sample
      You are a paraprofessional in a third-grade classroom. The teacher asks you to assist Sam
      with his math facts. Write a brief paragraph to show how you will help Sam.

## Answer Sheet

| **Reading Test** | **Math Test** | **Writing Test** |
| --- | --- | --- |
| 1.  a. b. c. d. | 1.  a. b. c. d. | 1.  a. b. c. d. |
| 2.  a. b. c. d. | 2.  a. b. c. d. | 2.  a. b. c. d. |
| 3.  a. b. c. d. | 3.  a. b. c. d. | 3.  a. b. c. d. |
| 4.  a. b. c. d. | 4.  a. b. c. d. | 4.  a. b. c. d. |
| 5.  a. b. c. d. | 5.  a. b. c. d. | 5.  a. b. c. d. |
| 6.  a. b. c. d. | 6.  a. b. c. d. | 6.  a. b. c. d. |
| 7.  a. b. c. d. | 7.  a. b. c. d. | 7.  a. b. c. d. |
| 8.  a. b. c. d. | 8.  a. b. c. d. | 8.  a. b. c. d. |
| 9.  a. b. c. d. | 9.  a. b. c. d. | 9.  a. b. c. d. |
| 10.  a. b. c. d. | 10.  a. b. c. d. | 10.  Use back of paper. |

# Module 1 – About the Assessments
*Part 6: Learning Styles and Test Anxiety*

## Overview
In Module 1, Part 6, the paraprofessionals will learn about the following:
• Learning styles
• Test anxiety

## Objectives
Following completion of Module 1, Part 6, the paraprofessionals will . . .
• know their learning style and appropriate study strategies.
• be more aware of their level of test anxiety.

## Lessons and Activities

### Learning Styles
Included in this section are two handouts: a "Learning Style Inventory" that the paraprofessionals can self score and a handout entitled "Adapting Study Strategies to Learning Styles." The paraprofessionals can complete and score the inventory independently. Use the "Adapting Study Strategies to Learning Styles" handout to generate a group discussion. Be sure to stress that for most people, learning style is a preference. One can learn in other modalities, but most people have a preference. If the scores for each modality are equal (or nearly equal), this indicates a "balanced" learner, someone who can learn equally well in more than one modality.

The two paraprofessional assessments are mostly visual; however, the writing portion of the WorkKeys Assessment requires the paraprofessional to listen to an audiotape and take dictation in order to determine writing skills. Those paraprofessionals with a low preference for auditory learning style should take this into consideration when choosing which assessment to take.

### Test Anxiety
A "Test Anxiety Survey" is also included in this section. The paraprofessionals can complete and score the inventory independently. In Module 5: Test-Taking Strategies, a number of strategies to reduce or minimize test anxiety will be discussed. The purpose for taking the "Test Anxiety Survey" at this stage in the course is to heighten the awareness of the physical and emotional symptoms of test anxiety.

## Sample Test Questions
There are no sample test questions in this part of Module 1.

## Evaluation
In this section, the paraprofessionals will have determined their learning style and level of test anxiety using two survey instruments.

## Supplemental Resources

For more information on NCLB, see the following resources:
- www.isbe.net/nclb
- www.ed.gov/nclb

For more information on the ParaPro Assessment, see the following resources:
- www.ets.org/parapro
- *ParaPro Assessment Study Guide* (available for $25)

For more information on the WorkKeys Assessment, see the following resources:
- www.act.org/workkeys
- Key Train individual training program for WorkKeys (available at www.keytrain.com for $50 plus $5 shipping and handling.

The deliverer of this module can add local resources here.

## Module 1, Part 6 Handouts
- "Learning Style Inventory"
- "Adapting Study Strategies to Learning Styles"
- "Test Anxiety Survey"

## Learning Style Inventory

**Directions:** Check the statements that apply to you.

Z _____ 1. I keep written records of things to do.

X _____ 2. I would rather have someone read instructions to me aloud, step-by-step, when I assemble something.

Y _____ 3. I like to build things or do crafts and handiwork.

Y _____ 4. I am an out-of-doors person.

X _____ 5. I keep up with the news by listening to the radio.

Z _____ 6. I can put things together correctly by following written directions and/or illustrations.

X _____ 7. I talk to myself.

Y _____ 8. I can't sit still for too long without becoming restless.

Z _____ 9. I usually read billboards and signs when driving or riding.

X _____ 10. I would learn more if I could hear textbook material on a cassette rather than reading the book myself.

Z _____ 11. I like to rewrite notes or write summaries to prepare for tests.

Y _____ 12. I could learn (or did learn) to type without looking at the keys easily.

Y _____ 13. Keeping physically fit is not difficult for me.

X _____ 14. In my spare time, I like to talk to others.

Z _____ 15. I can learn zip codes or phone numbers best if I write them down a few times.

Y _____ 16. In my spare time, I like to do physical activities.

X _____ 17. I can easily concentrate on what others are saying.

X _____ 18. I could learn to play a musical instrument "by ear" faster than by reading music.

Z _____ 19. I prefer a map to oral instructions when trying to find my way to an unfamiliar place.

Y _____ 20.   I learn new physical skills rapidly.

Z _____ 21.   I prefer a written job description and directions from my employer.

X _____ 22.   I prefer that my employer or instructor give me oral directions.

Y _____ 23.   When walking through stores, I like to feel the textures of fabrics or other materials.

Z _____ 24.   I can easily follow written directions when I cook.

X _____ 25.   I prefer to stop and ask directions when in unfamiliar places.

X _____ 26.   I learn zip codes and phone numbers best when I say them aloud a few times.

Y _____ 27.   I am, generally speaking, well coordinated.

Z _____ 28.   When waiting around for appointments, etc., I tend to read anything that is around.

Z _____ 29.   I like to read in my spare time.

Y _____ 30.   I doodle and draw on any available paper.

Scoring: Count your *X*s, *Y*s, and *Z*s and fill in the chart below. The explanation of your learning style is on the handout, "Adapting Study Strategies to Learning Styles."

|   | Your Score | Your Learning Style |
|---|---|---|
| X | _____ | Auditory |
| Y | _____ | Kinesthetic/Tactile |
| Z | _____ | Visual |

# Adapting Study Strategies to Learning Styles

Each of us has a preferred learning style, and studying efficiency will improve if you adapt your study strategies to your preferred style.

**Auditory (more Xs):** Repeating material orally helps you to learn. Discussing material also helps your comprehension of what you are trying to learn. Attending lectures and listening is essential for you to learn and understand new concepts. You may want to consider taping lectures and class discussions.

**Kinesthetic/Tactile (more Ys):** You learn well when physical activity is required for learning. You learn by doing. You find it hard to sit still for a long time.

**Visual (more Zs):** You learn things when you see them; however, you must see the entire picture of what you are to learn before you begin. If you don't view the whole picture from the beginning, you will have difficulty organizing and mastering the material. Making graphs and charts helps you learn, and diagrams on the board really clarify things for you.

## Some Suggestions for Adapting Your Study Style to Your Learning Style

### *Auditory*
- Say your notes *out loud*.
- Lip-read to yourself.
- Study *orally* with a friend.
- Study in a quiet place so that noise doesn't distract you.
- Explain the material to someone who knows nothing about it.
- Tape a review of the material, and listen to it often.
- Whisper or say letters while writing words.
- Paraphrase directions and ideas.
- Subvocalize, or move lips while reading.
- "Talk through" problems on the way to solutions.
- With new activities, talk about what to do, how to do it, and why it's done that way.
- Talk about illustrations and diagrams in texts.
- Use rhymes to help memorize.
- Talk to a pillow to practice speeches.
- Talk to self while painting or drawing.
- Listen to tapes while driving to work or school.

### *Kinesthetic/Tactile*
- Take frequent breaks.
- *Move around* when you are studying.
- Chew gum.
- Attach an ongoing reward to studying (e.g., a soda when the chapter is done).
- Try to "beat the clock" by setting up a 40-50 minute study period.
- Try to go over a specific amount of material and then take a break.
- Use your fingers to name off items or ideas that you are reviewing.
- If you can also learn auditorily and you have a walkman, tape your lectures and then listen to them when you are doing some physical activity.
- Move your body in response to music.

- Use your finger to write in the air.
- Use two fingers to underline whole sentences for "tracking" while reading.
- Study by writing on a chalkboard or dry erase board, using larger body muscles to learn.
- Use plastic letters and a magnetic board during your study sessions.
- Write and rewrite words, phrases, and formulas to commit them to memory.

### *Visual*
- Study in a "clutter-free" environment.
- Use index cards and "sticky notes."
- Highlight your notes; use colors creatively (color code).
- Visualize your notes.
- Think in "pictures."
- Make lists; draw symbols and diagrams.
- Make use of visuals in your textbooks.
- *Write out* your notes from lectures and texts.
- Make charts; organize notes into meaningful units.
- Outline texts and notes.
- Write up "mock tests."
- Watch a movie or tape related to the topic you're studying.
- *Draw* the situation, particularly where math story problems are concerned.
- Write down directions.

**Hint:** Remember that you may have to vary your learning style to the beat of your ability depending upon the demands of different classes. You may have to *learn* to use an additional mode depending upon the style of the instructor. Learning styles are preferences; most people can learn in many ways.

# Test Anxiety Survey

How much test anxiety do you have? Circle "True" or "False" for each question. Scoring instructions are at the end of the test.

|  | A | B |
|---|---|---|
| While taking an important exam, I find myself thinking of how much smarter the other students are than I am. | True | False |
| If I were to take an intelligence test, I would worry a great deal before taking it. | True | False |
| While taking an important exam, I perspire a great deal. | True | False |
| During class examinations, I find myself thinking of things unrelated to the actual course material. | True | False |
| I get to feeling very panicky when I have to take a surprise exam. | True | False |
| During a test, I find myself thinking of the consequences of failing. | True | False |
| After an important test, I am frequently so tense that my stomach gets upset. | True | False |
| I freeze up on things like intelligence tests and final exams. | True | False |
| Getting good grades on one test doesn't seem to increase my confidence on the second. | True | False |
| I sometimes feel my heart beating fast during important exams. | True | False |
| After taking a test, I always feel I could have done better than I actually did. | True | False |
| I usually get depressed after taking a test. | True | False |
| I have an uneasy, upset feeling after taking a test. | True | False |
| When taking a test, my emotional feelings do not interfere with my performance. | False | True |
| During a course examination, I frequently get so nervous that I forget facts I really know. | True | False |
| I seem to defeat myself while working on important tests. | True | False |
| The harder I work at taking a test or studying for one, the more confused I get. | True | False |

| | A | B |
|---|---|---|
| As soon as an exam is over, I try to stop worrying about it, but I just can't. | True | False |
| During exams, I sometimes wonder if I'll ever get through school. | True | False |
| I would rather write a paper than take a test for my grade in a course. | True | False |
| I wish tests did not bother me so much. | True | False |
| I think I could do much better on tests if I could take them alone and not feel pressured by time limits. | True | False |
| Thinking about the grade I may get in a course interferes with studying and performing on tests. | True | False |
| If examinations could be done away with, I think I would actually learn more. | True | False |
| On exams I take the attitude, "If I don't know it now, there's no point in worrying about it." | False | True |
| I really don't see why some people get so upset about tests. | False | True |
| Thoughts of doing poorly interfere with my performance on tests. | True | False |
| I don't study any harder for final exams than for the rest of my coursework. | False | True |
| Even when I'm well prepared for a test, I feel very anxious about it. | True | False |
| I don't enjoy eating before an important test. | True | False |
| Before an important examination, I find my hands or arms trembling. | True | False |
| I seldom feel the need for "cramming" before an exam. | False | True |
| Schools should recognize that some students are more nervous than others about tests and that this affects their performance. | True | False |
| It seems to me that test periods should not be made such intense situations. | True | False |
| I start feeling very uneasy just before getting a test paper back. | True | False |
| I dread courses in which the instructor has the habit of giving a "pop" quiz. | True | False |

**Add Column Totals**

Scoring: The total circled in Column A is your test anxiety score.

27+ = Very high test anxiety
20-27 = High test anxiety
15-20 = Medium test anxiety
Less than 15 = Low test anxiety

Scoring 15 or greater is a good indication that you experience discomfort about taking tests.

A high test anxiety score is not cause for alarm. Scoring in the medium to high range indicates that developing some test anxiety strategies would be useful for you. Test anxiety can be controlled.

# Module 1 – About the Assessments
*Part 7: Concerns*

## Overview
In Module 1, Part 7, the paraprofessionals will learn about the following:
- Concerns he or she may have about taking this test preparation course or about taking one of the two assessments and concerns others may have
- Possible ways to address these concerns
- The paraprofessional as expert

## Objectives
Following completion of Module 1, Part 7, the paraprofessionals will have . . .
- expressed their concerns about the five modules and the two assessments verbally and in writing.
- listened to others in the class express their concerns.
- listed three ways that he or she is an expert paraprofessional.

## Lessons and Activities

***Concerns About Taking This Test Preparation Course or One of the Two Assessments***
Use the handout "Your Concerns" to prepare for a group discussion about what the paraprofessionals in the classroom are concerned about at this juncture. The instructor should help the paraprofessionals generate their own solutions to these concerns, give them information, or refer them to a resource that can help them obtain the information they need.

***Possible Ways to Address These Concerns***
There are a variety of issues that may come up in this discussion. Some paraprofessionals may have issues about NCLB and the fact that they have to take this exam. Some may have test anxiety or be worried about losing their jobs. Some may express anxiety or anger. Some may be worried because they scored poorly on the Pretest or because they feel lost. Some may feel inadequate or threatened by the process.

The purpose of this section of Module 1 is to give the paraprofessionals a chance to air these feelings and to ask the questions that they may have at this point. Hopefully, this discussion will help clear the air so that the intense review of materials in the content areas can proceed less inhibited by worry or anxiety.

It will be up to each individual instructor to field the questions and concerns that are brought up by each individual class. One suggestion is to write all of the concerns/questions on the board or overhead. When the paraprofessionals have finished sharing, the instructor can work with the class to categorize the list. After the list is categorized, the instructor can work with the class to brainstorm solutions or to just acknowledge the concern. Sometimes it helps when members of a class feel they have been heard.

## About the Assessments ❓

*The Paraprofessional as Expert*
The purpose of this section is to help the paraprofessionals realize that they already have great knowledge that they bring to the table. One reason that people do poorly on exams is that they visualize failure and do not have the self-confidence that they need to keep them focused on the test. The instructor should write the words "The Paraprofessional as Expert" on the board or overhead. Ask the class to respond in writing and verbally to that prompt. Some questions that can be asked include the following:

- "What expertise do you bring to this process?"
- "Are you an expert? In what areas?"
- "What does it mean to be an expert?"
- "How does one become an expert at his or her job?"

Encourage the class to see that they do not come to this test preparation course empty-handed. They are here with years of experience, years of examples, years of funny and touching stories. They can utilize that knowledge that they already have to pass the assessment that they choose. This test preparation course is designed to help them review the knowledge that they already have. Remind the class to draw upon their own expertise as they work their way through the five-module course.

## Sample Test Questions
There are no sample test questions in this part of Module 1.

## Evaluation
Paraprofessionals will be evaluated based on participation in the discussion.

## Supplemental Resources
The deliverer of this module can add local resources here.

## Module 1, Part 7 Handout
"Your Concerns"

## Your Concerns

**Directions:** Please think about the following questions, and answer quickly and honestly. Be prepared to share your answers with a partner and the rest of the class.

So far, you have learned about the NCLB Act, the options available to you to meet the requirements of that act, and the characteristics of the two assessments. You have also had the opportunity to take a Pretest. At this juncture, what are your three greatest concerns? What worries you about this process? What questions do you have for the instructor or for your classmates. Write these below. When you are finished, get together with a neighbor, and share your concerns.

# Reading
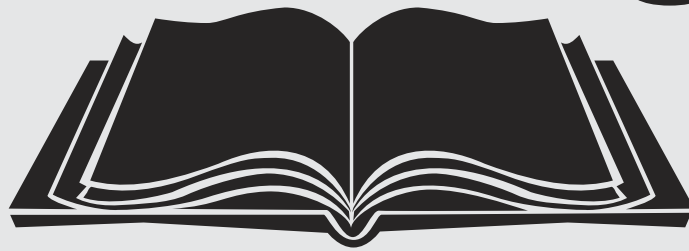
# Module 2 – Reading
*Part 1: Overview of the Entire Module*

## Overview
In Module 2, Part 1, the paraprofessionals will learn about the following:
- Part 1:   Overview of the Entire Module
- Part 2:   Reading as Communication
- Part 3:   Basic Reading Principles (ParaPro Assessment)
- Part 4:   Basic Reading Principles (WorkKeys Assessment)
- Part 5:   ParaPro Assessment Application and WorkKeys Instructional Support Inventory
- Part 6:   Differences Between ParaPro and WorkKeys Assessments
- Part 7:   Review and General Reading Tips

## Objectives
Following completion of Module 2, the paraprofessionals will be able to . . .
- state the differences between the ParaPro and WorkKeys Assessments.
- feel more comfortable with the types of questions asked on each of the assessments through completion of practice questions.
- recognize various question types (main idea, detail, fact and opinion, inference, and application type of reading test questions).
- understand basic reading principles and how these apply to classroom situations (ParaPro Assessment).
- access available resources for continued review and learning of skills in reading.

## Lessons and Activities
The lessons and activities of Module 2 coincide with the overview listed above. Each of the seven parts will begin with an instructor outline that has an overview of the module part, objectives, lessons and activities, and evaluation.

## Sample Test Questions
In Module 2, all paraprofessionals will answer questions similar to questions from the two assessments. Feedback will be given immediately.

## Evaluation
Evaluation will be based on practice test questions throughout the module, group discussions, and handouts.

## Supplemental Resources
At the end of each module part, there will be a list of Internet resources that the student or instructor could access for additional information and instruction.

The deliverer of this module can add local resources here.

## Module 2, Part 1 Handout
"Student Outline"

# Student Outline

## Overview
In Module 2, Part 1, you will learn about the following:

- Part 1: Overview of the Entire Module
- Part 2: Reading as Communication
- Part 3: Basic Reading Principles (ParaPro Assessment)
- Part 4: Basic Reading Principles (WorkKeys Assessment)
- Part 5: ParaPro Assessment Application and WorkKeys Instructional Support Inventory
- Part 6: Differences Between ParaPro and WorkKeys Assessments
- Part 7: Review and General Reading Tips

## Objectives
Following completion of Module 2, you will be able to . . .
- state the differences between the ParaPro and WorkKeys Assessments.
- feel more comfortable with the types of questions asked on each of the assessments through completion of practice questions.
- be more familiar with the layout of each of the assessments.
- recognize various question types (main idea, detail, fact and opinion, inference, and application type of reading test questions).
- understand basic reading principles and how these apply to classroom situations.
- access available resources for continued review and learning of skills in reading.

## Lessons and Activities
The lessons and activities of Module 2 coincide with the overview listed above. Each of the seven parts will begin with an instructor outline that has an overview of the module part, objectives, lessons and activities, and evaluation.

## Sample Test Questions
In Module 2, you will answer questions similar to questions from the two assessments. Answers will be given immediately. This feedback will help you quickly assess your areas of strength and weakness.

## Evaluation
Practice test questions throughout module

## Supplemental Resources
Each part will conclude with a list of Internet resources that you can access for further practice and information.

You may want to ask the agency that is delivering this class about local resources available to you.

# Overhead of Module 2

In Module 2, Part 1, the paraprofessionals will learn about the following:

Part 1:     Overview of the Entire Module

Part 2:     Reading as Communication

Part 3:     Basic Reading Principles (ParaPro Assessment)

Part 4:     Basic Reading Principles (WorkKeys Assessment)

Part 5:     ParaPro Assessment Application and WorkKeys Instructional Support Inventory

Part 6:     Differences Between ParaPro and WorkKeys Assessments

Part 7:     Review and General Reading Tips

# Module 2 – Reading
*Part 2: Reading as Communication*

## Overview
In Module 2, Part 2, the paraprofessionals will learn about the following:
- Reading
- The various components of reading

## Objectives
Following completion of Module 2, Part 2, the paraprofessionals will have . . .
- defined reading using their own words.
- interacted with their neighbors.
- listed three or four components of reading that will be tested on the ParaPro Assessment.

## Lessons and Activities

### What Is Reading?
This brief section is designed to give paraprofessionals a broad overview of the concept of reading. Because it is taught at such a young age and because reading is such a common activity, most people do not look at it analytically. This section is also meant for paraprofessionals to begin to interact with each other. The instructor can lead a discussion about what reading is in general. A sample lead statement follows:

> Most people, when confronted with the concept of "reading" as an adult, say, "Hey! I already know how to read. Why do I need this stuff?" And, it is true. You do know how to read. You are reading this text right now. However, reading is not as simple as it at first seems. There are some facts that you can brush up on, some tricks you can learn, and some test-taking skills that can help make this portion of the test easier for you. First, let's take a look at reading in general.

A group discussion at this point may help the group feel more comfortable with speaking up in front of the class. Ask the students to briefly define reading. Try to elicit that it is more about communicating ideas than reading every single word on a page. There is a "What Is Reading?" Handout available for the instructor to use if he or she finds it helpful.

The following important ideas need to be communicated to the class:
- To be able to identify why that author wrote the piece is of key importance.
- Think about this: if you understand each and every single word, yet do not get the author's point, you are not really reading.
- Also, you can get the main point without understanding each and every single word.

### Various Components of Reading
The next step is to encourage the paraprofessionals to further analyze and break down the concept of reading into its various components. What are the types of things people do when they are trying to figure out what an author is saying?

The instructor can use the optional "Steps to Understanding Text" Handout or simply discuss with the class the various components of reading. Hopefully, the class will generate some of the components listed below. These components of reading are part of what the ParaPro Assessment covers.

When I read to understand, I try to . . .
- find the main idea.
- understand why the author wrote the piece (purpose).
- locate the supporting details.
- look at how the reading is organized.
- figure out an unfamiliar word by looking at the words around it (context).
- read between the lines to understand what the author means even if he or she doesn't say it directly.
- determine whether something is fact or opinion.
- look at pictures, tables, and graphs to increase my understanding.

## Sample Test Questions
There is an optional post quiz on the "Short Post Quiz" Handout.

## Evaluation
- Level of class participation and interaction
- Post quiz

## Supplemental Resources
For more information about the topics covered in Part 2, see the following resources:
- http://www.reading.org/
- http://www.pagebypagebooks.com/title.html

The deliverer of this module can add local resources here.

## Module 2, Part 2 Handouts
- "What Is Reading?"
- "Steps to Understanding Text"
- "Post Quiz"

# What Is Reading?

1.  Take a few minutes to jot down what you think reading really is.

2.  When you are done, get into small groups and see how closely your definitions match.

3.  What do your definitions have in common?

4.  What is different?

5.  Discuss with the class, and try to come to an agreement. What is reading? What does it mean to read something? Can the entire class come to one definition?

# Steps to Understanding Text

1.  What are the types of things you do when you are trying to figure out what an author is saying?

2.  List these and compare with your neighbor. Similarities? Differences? Discuss with each other.

3.  Make a list on the board or overhead of all of the different methods you use to understand text.

# Post Quiz

1. Define *reading* in your own words.


2. List as many of the reading components that your class identified as you can remember.

# Module 2 – Reading
*Part 3: Basic Reading Principles (ParaPro Assessment)*

## Overview
In Module 2, Part 3, the paraprofessionals will learn about the following:
- Main idea
- Purpose
- Supporting details
- Organization
- Context clues
- Implied or inferred meaning
- Fact and opinion
- Graphics

## Objectives
Following completion of Module 2, Part 3, the paraprofessionals will be able to . . .
- recognize different test question types.
- feel more comfortable with reading test questions through practice.
- list three or four components of reading that will be tested on the ParaPro Assessment.

## Lessons and Activities

### Main Idea
- "The Main Idea and Topic" Handout gives the paraprofessional a visual to look at as the instructor explains what a main idea is. The main idea is the point the author is trying to make. The main idea can be anywhere in a sentence, but often is the first sentence or in the first third of a paragraph. Sometimes a main idea is not stated in a passage (Implied or inferred meaning).

- The "Difference Between Topic and Main Idea" Handout gives the paraprofessional a little practice differentiating between a topic and a main idea. There is often confusion about the topic and the main idea. Ask students to practice on a sample paragraph. The topic is what the paragraph is about in general. In this case, it is about piano lessons or memories of piano lessons. The main idea is that piano lessons taught the author how to play the piano and many important lessons about life as well.

- The "Paragraphs and Sample Question Types" Handout goes over the different types of questions asked on the ParaPro Assessment. The instructor should use this worksheet throughout this part of the module. Each time a new reading component is taught, there is a sample question for practice. For each of the components, it is important that the paraprofessional has a chance to review the correct answer and discover why he or she got it right or wrong.

- "Answers to the Sample Questions" Handout is intended for the instructor and can be shared with the class after they have worked through each of the sample questions.

- The "Questions by Type" Handout can be used to look at the typical types of questions asked about each of the different reading components. If a paraprofessional can recognize

the type of question that is being asked, he or she will better be able to answer that question. The instructor could ask the class what they think the different questions would look like and have them generate ideas, or the instructor could present the samples provided in the handout.

- Extra! Extra! Read all about it! Test takers should be aware that they are looking at the overall passage, not just parts of it. Just because an answer looks important, or something is directly quoted from the passage, does not necessarily mean that it is true. At times, the opinion of the test taker and the main idea may be different. Make sure the paraprofessional answers the test questions and does not state his or her opinion.

### Purpose
- The purpose is the reason the author wrote the passage. Some examples of purposes include the following: to entertain, to inform, to persuade, to define, to describe, or to predict. To find the purpose, think about what the author wanted to achieve by writing the passage. What did the author want to accomplish? The paraprofessionals can practice on a paragraph from ParaPro Assessment Test at a Glance (Use the "Paragraphs and Sample Question Types" Handout again and for the rest of the reading components).

- Extra! Extra! Read all about it! Think about what the author wanted to do when he or she wrote the article. Why would the author sit down and write this passage? What was his or her motivation? What was he or she trying to accomplish? Think about the reasons (e.g., to persuade, to entertain, to define, etc.).

### Supporting Details
- The "Supporting Details Practice" Handout is for paraprofessionals to use if they would like to practice on a sample paragraph. It is fairly simple. The supporting details are basically just what they are called. They are details that support the main idea. It sounds simple, but many readers confuse the details and the main idea. Some examples of supporting details are dates, facts, definitions, and statements. Details point to and support the overall main idea. Usually when you answer a question about a detail, you can find it in the passage.

- A main idea is often mentioned more than once. The main idea answers the question, "What is the real meaning of the entire passage?" Sometimes a reader will have to read between the lines and infer the meaning of the main idea. Details are found anywhere in the passage but are usually mentioned only once or twice. Detail questions are about a part of the article, not the entire article. Detail questions can be answered by referring to the passage. Detail questions on the ParaPro Assessment ask that you find information and look at similarities or differences between different parts of a passage.

- Extra! Extra! Read all about it! Detail answers can often be found in the passage. Look back at the passage, but remember, it is important not to spend too much time on any one question. Try to think of the answer before you look at the answer choices. Eliminate choices that do not make sense or that are not accurate with what was presented in the passage.

## *Organization*

- What is it and how do you find it? Authors have many choices as to where to put each sentence. How they put the sentences and paragraphs together is called the organization of the passage. Suggest that the paraprofessionals think about how they organize their closet; the way they organize their belongings says something about them and the relative importance of their things. The same is true for a written passage.

- There are different ways that organization questions are asked. The question may be about why an author included a particular sentence in the passage. These kinds of questions look at the paraprofessionals' understanding of how the passage is held together. Some examples of answers to that type of question are as follows: "Sentence 2 is included in the passage because it supports the main idea, further defines the topic, provides the opposite or a contrasting viewpoint, or gives an example." Other types of organization questions ask how the entire passage is constructed. Other questions may look at how different paragraphs are related to one another. For example, some paragraphs support and back up other paragraphs. Some paragraphs present opposing viewpoints.

- Extra! Extra! Read all about it! According to the ParaPro Assessment, it would be helpful for the paraprofessionals to know a few words before taking the assessment. (See the "Some Vocabulary Used on the ParaPro Assessment" Handout). Consult a dictionary if necessary. It would be best if the class could define the terms together using their own words. This sheet could also be added to throughout the modules as the paraprofessionals run across unfamiliar words that may appear on the assessments.

- Organization and purpose are closely related. Transition words, such as *however*, *also*, and *for example* are very helpful in determining how a passage is organized. If transition words are present, the paraprofessional should pay close attention to them. Sometimes, there are no transition words to help guide the paraprofessional. He or she should pay attention to the purpose of the piece and then look carefully at how each sentence contributes to the overall purpose of the passage.

## *Context Clues*

- The "Different Kinds of Context Clues" Handout and corresponding overhead were designed to teach the class about context clues. The exercises on the handout are for practice. The paraprofessional will not need to know which type of context clue is being used on the assessments; however, the information is available to the instructor if he or she feels it would be helpful.

  Most of the time when people think of learning the meaning of a new word, they think of looking it up in the dictionary. That is one approach. It is not the approach that will be the most helpful for the ParaPro Assessment. Another way of learning new words is by looking at the context. The context of a passage, according to ParaPro Assessment, "is the specific situation described in the passage" (*ParaPro Assessment Study Guide*, Test Codes 0755 and 1755, ETS). A word's meaning can change depending on the context.

  *Paraprofessional Activity*
  Ask the paraprofessionals to get into small groups and create at least three definitions for the word *hot*. Have them share with the group. Elicit from the group how one word

can have many meanings. Remind them that phrases have more than one meaning as well. An example of this is "It is raining cats and dogs." The ParaPro Assessment will ask paraprofessionals about different words and phrases in context. Enough information will be given to help paraprofessionals determine the meaning of the word or phrase.

- Extra! Extra! Read all about it! The context questions look at the paraprofessional's ability to determine the meaning of a word in a particular context. He or she should think about the word or phrase in relation to the passage. He or she should not pick the first choice that seems right. Remember the *hot* example. All of the answers could have been right. The work in these types of questions is to determine which answer is correct for that particular passage.

### Drawing Inferences or Understanding Implied Meaning

- The "Inferences" Handout can be used to give the paraprofessionals practice in writing paragraphs that have implied meaning and practice figuring out implied meaning. Remind the class that sometimes one can figure out the main idea of a passage by pointing to a sentence that states what it is, but at other times, the author does not directly state the main idea. It is up to the reader to infer what the author is saying. The author may imply the meaning; he or she may give the reader hints. It is a little like being a detective. One has to put two and two together to get four.

  Most people are experts at implied meaning in day-to-day interactions. For example, when someone walks in with a wet coat and an umbrella and there are no windows in the room, most people infer that it is raining outside. We also "read" what people say through their body language and other unspoken, subtle gestures.

  Authors use implied meaning for a number of reasons. Imagine reading a book in which each and every paragraph starts with the main idea. It would become very boring, very quickly. Real life does not hit us on the head with main ideas, and authors mimic real life. Sometimes it is more powerful to not say something. Sometimes the reader will learn more and be more impacted by a passage that does not state what the answer is in the first sentence. When the paraprofessional decides what the author implied, he or she should make sure it does not contradict the major or minor points of the passage.

- Extra! Extra! Read all about it! This is another area of the test in which the paraprofessional should think about the answer before looking at the answer choices. The paraprofessional should be careful about making inferences that are too far out in left field. He or she should think about what one could reasonably assume from the passage. Sometimes it is helpful to look back at the text to find information that supports the inference.

### Fact and Opinion

- What are they? Facts can be proven to be true or false. They tend to be presented in a straightforward manner. Opinions cannot be proven to be true or false. They are beliefs that people hold or judgments that they have made. Facts can be verified. Facts are objective. Facts often consist of statistics, dates, and other research. Opinions cannot be proven. Opinions cannot be verified. Opinions are subjective. Opinions often contain words like *should* or *ought*.

- Extra! Extra! Read all about it! It may seem easy to determine whether something is fact or opinion; however, many people struggle with this concept. If the paraprofessional feels strongly about a topic, it is more difficult to separate from it enough to make a clear distinction between fact and opinion. According to the ParaPro Assessment Test at a Glance, some words that may indicate an opinion are *probably*, *perhaps*, *feel*, *believe*, *best*, and *worst*.

### Interpreting Pictures, Tables, and Graphs to Increase Understanding (Graphics)

- What are they, and why use them? There are all kinds of graphic texts. For example, pictures, graphs, charts, diagrams, flowcharts, indices, and bar graphs. They say, "A picture is worth 1,000 words." Sometimes a graphic is the most effective way to convey information. An example the instructor can use to illustrate this point is to ask the class to imagine an author trying to write about changes in temperature in St. Louis from 1900-1990 in paragraph form. It would be very long (and very boring). A chart could get that same information across to the reader efficiently and effectively. There are several different types of graphics that are used in the ParaPro Assessment: pie charts, bar graphs, indices, tables of contents, and line graphs.

- Extra! Extra! Read all about it! The instructor should point out that the paraprofessionals should take the title of the graphic into account. Usually words or phrases that are indented to the right are of less importance than those further left. These test questions will need to be read very carefully. They are full of details, and the assessment will be testing the paraprofessionals' ability to locate a particular answer. Pay close attention to the legend. It is the key to the graphic and is located in a small box close to the graphic.

## Sample Test Questions

Sample test questions are offered throughout this part of Module 2. In addition, there are several handouts and activities that the instructor can use.

## Evaluation

- Answers and reactions to sample test questions
- The "Reading Pretest Questions and Answers" Handout covers the questions and answers from the reading Pretest in more detail. It also indicates the question type of each question.
- Post quiz – Recognizing Different Test Questions

## Supplemental Resources

For more information about main ideas, see the following resources:

- http://english.glendale.cc.ca.us/topic.html
- http://writing.colostate.edu/references/documents/abstract/list3.cfm
- http://www.smcps.k12.md.us/mbms/writing/pyramid.html
- http://www.daltonstate.edu/faculty/mnielsen/main_idea_practice_2.htm
- http://www.toefl.org/toeflsup/rc-pq.html

For more information about supporting details, see the following resources:

- http://vclass.mtsac.edu/amla-51/Supporting%20Details/details.htm
- http://elearn.mtsac.edu/amla/51/
- http://www.cobblestonepub.com/pages/TGDIGCatalhoyukpt5.html
- http://www.hrw.com/language/eolang/peonline/course_3/ch01/activities/lg13cm01007.pdf

For more information about organization, see the following resources:
- http://www.angelfire.com/ks/teachme/patterns.html
- http://faculty.washington.edu/ezent/impo.htm
- http://www.uwec.edu/asc/Competency%20Exam%20Workshops/patterns_of_org_in_writing.htm

For more information about context clues, see the following resources:
- http://ol.scc.spokane.edu/jstrever/fall100/context_clues.htm
- http://wps.ablongman.com/long_licklider_vocabulary_1/0,1682,11839-,00.html

For more information about fact and opinion, see the following resources:
- http://www.manatee.k12.fl.us/sites/elementary/palmasola/rcfo1.htm
- http://cuip.uchicago.edu/www4teach/97/jlyman/default/quiz/factopquiz.html

For more information about inferences, see the following resources:
- http://www.interventioncentral.org/htmdocs/interventions/rdngcompr/qgen.shtml
- www.ets.org/parapro
- *ParaPro Assessment Study Guide* (available for $25)

The deliverer of this module can add local resources here.


## Module 2, Part 3 Handouts
- "The Main Idea and Topic"
- "Difference Between Topic and Main Idea"
- "Paragraphs and Sample Question Types"
- "Answers to Sample Questions"
- "Questions by Type"
- "Supporting Details Practice"
- "Some Vocabulary Used on the ParaPro Assessment"
- "Different Kinds of Context Clues"
- "Inferences"
- "Reading Pretest Questions and Answers"
- "Recognizing Different Test Questions"

# The Main Idea and Topic
*(Gist, Central Focus, Main Point, What the Author is Trying to Get Across)*

## Topic vs. Main Idea
The topic is the general subject; it is a broader category than the main idea. The topic answers the question, "What is this about?"

The main idea is more pointed. It is why the author has written the piece. It answers the question, "What is the author trying to tell me?"

### How to Find the Topic
1. Ask yourself, "What is this about in general?"
2. Make sure your answer is broad enough to include all that the author talks about in the passage.
3. If you heard a group of people talking, and you kept hearing your name come up, you would be curious. Your name would be the topic.

### How to Find the Main Idea
1. Find the topic.
2. Find the major supporting details.
3. Think about what the details are saying about that topic. What is the point the sentences together are trying to make?
4. If you heard people saying your name, you would want to know what they were saying about you. That would be the main idea.

### How to Find the Important Details
1. Look for sentences that point the piece in a certain direction.
2. Do not include every detail.

Topic + Most important point author is trying to make about the topic = Main idea sentence

### How to Find an Implied or Inferred Main Idea
A passage has an implied main idea when the author gives the information needed to understand his or her main point but does not state the main idea directly in one sentence.

The reader must, therefore, use this information to infer the main idea and formulate one sentence that expresses it.

## Difference Between Topic and Main Idea

Look at the following paragraph:

> When I was a little girl, I took piano lessons every Monday after school. I walked to Mrs. Siever's house with my tattered sheet music in my school lunch stained hands. She taught me the scales, the proper way to hold my small fingers, and the theme song from *The Pink Panther*. She also taught me much more. From her I learned the necessity of practice, the importance of patience, and the joy of achieving a goal after hard work. She also gave me the gift of music. All of that was learned in a half hour lesson on Monday afternoons in Jerseyville, Illinois.

1.  What is the topic?

2.  What is the main idea?

3.  What is the difference between a topic and a main idea?

4.  Compare with your neighbor and see whether you have similar answers.

# Paragraphs and Sample Question Types

This handout contains sample ParaPro Assessment test questions. Please answer to the best of your ability. Your instructor will provide you with feedback. Work on one question type at a time.

### *ParaPro Assessment Test at a Glance Practice Paragraph*

Early scientists believed that all dinosaurs, like most reptiles, laid and then immediately abandoned their eggs. The newly hatched young were left to take care of themselves. However, the recent discovery of a group of nests has challenged this belief. The nests, which contained fossilized baby dinosaurs that were not newborn, provided evidence that dinosaur parents actually cared for their young. For some time after birth, the babies would stay at their nest while the parents brought back plant matter for food. The young stayed at home until they were large enough to roam safely on their own.

### *Main Idea Question Type*

What is the main idea of this passage?

a.  Most reptiles abandon their eggs.
b.  The newly hatched young were left to take care of themselves.
c.  The recent discovery of a fossilized dinosaur nest has provided evidence that dinosaur parents cared for their young.
d.  The young stayed at home until they were large enough to roam safely on their own.

### *A Purpose Question Type*

The passage above is primarily concerned with . . .

a.  contrasting dinosaurs with modern reptiles.
b.  explaining why dinosaurs became extinct.
c.  discussing recent findings about dinosaurs' behavior.
d.  providing new information about what dinosaurs ate.

### *A Supporting Detail Question Type*

Here is the example from ParaPro Assessment Test at a Glance. Possible answers are below. Which one do you think is the correct answer?

The discovery of a group of dinosaur nests challenged the idea that dinosaurs . . .

a.  fed their young with plant matter.
b.  hatched few eggs.
c.  migrated in search of food.
d.  deserted their young.

*An Organization Question Type*
Which statement best describes the organization of the passage as a whole?
a.     A problem is presented, and then two solutions are given for that problem.
b.     A phenomenon is described, and then the effects of that phenomenon are provided.
c.     A statement is presented, and then a contrasting new theory is offered with examples.
d.     A phenomenon is given, and then three explanations for that phenomenon are given.

*A Vocabulary Question Type (simplified example)*
In the context of this passage, *home* (line 8) most nearly means . . .
a.     a brick home.
b.     the dinosaur nest.
c.     home base.

*Inference Question Type*
This passage suggests that . . .
a.     scientists had wrongly assumed that dinosaurs were very much like other reptiles.
b.     early dinosaurs were meat eaters.
c.     current scientists are suggesting hypothesis that are inaccurate.
d.     the young stayed at home until they were large enough to roam safely on their own.

*Fact or Opinion Question Type*
Edna St. Vincent Millay was a famous American poet. She published the poem "Renascence" in 1912 and became a well known poet. She was born in 1892 and raised by her mother, Cora. She overcame great poverty, and many say that her poems ignited a new generation of Americans. Her books sold well, even during The Great Depression. A new biography about Ms. Millay, *Savage Beauty*, has recently been published. Ms. Millay should be proclaimed the greatest poet ever.

Which sentence in the passage is an expression of opinion rather than a statement of fact?
a.     first sentence
b.     Sentence 3
c.     Sentence 5
d.     last sentence

*Graphics Question Type*

*Japanese American Businesses (1900-1909)*
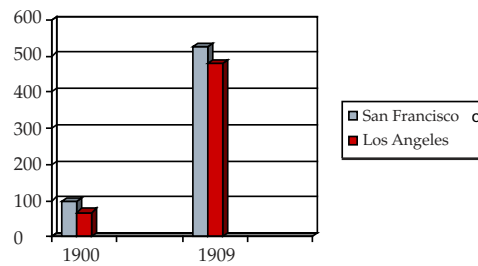


The numbers on the left side of the graph represent the number of businesses.

What conclusion can be drawn from the data presented in the graph?

a.   Japanese American businesses were more successful in California than in other states in 1909.

b.   The number of Japanese American businesses in Los Angeles and San Francisco increased greatly from 1900-1909.

c.   In 1909, there were more Japanese American businesses in Los Angeles than there were in San Francisco.

d.   In 1909, most Japanese American businesses in Los Angeles and San Francisco were large companies.

# Answers to the Sample Questions (for the instructor)

1.  Feedback on Main Idea Practice Question: The correct answer is c. Answers a., b., and d., are details about why scientists believed that dinosaurs did not take care of their young.

2.  Feedback on Purpose Practice Question: The correct answer is c. This passage tells the reader about a recent discovery of nests and then goes on to look at what this discovery means in regards to how dinosaurs took care of their young. The purpose of this passage was to discuss recent findings about the dinosaur. The passage does contrast dinosaurs with modern reptiles (a.), but that is not the primary purpose of the passage. Choice b. is incorrect because the passage is not about why dinosaurs became extinct. Choice d. is incorrect because it is not stated that the plant matter brought to the young was a new discovery.

3.  Feedback on Supporting Detail Practice Question: The correct answer is d. The discovery provided evidence that the dinosaur parents cared for their young. The discovery must have also challenged the idea that the dinosaurs deserted their young. Answer a. was not challenged by the recent discovery but supported by it. Answer b. was not stated in the passage. Answer c. is not the best choice because the passage does not address migration issues.

4.  Feedback on Organization Practice Question: The correct answer is c. The statement that dinosaurs were believed to be like reptiles and therefore did not care for their eggs was given. The word, *However*, is a clue that a contrasting viewpoint is presented next. This viewpoint is supported with examples.

5.  Feedback on Vocabulary Practice Question: The answer is b. *Home* in this context is a dinosaur nest. This is a simplified example.

6.  Feedback on Inference Practice Question: The correct answer is a. It can be inferred that the earlier assumptions about dinosaurs raising their young like reptiles were incorrect. Answer b. was not stated and not implied. They may have been meat eaters, but this particular passage does not suggest that. Answer c. is also not stated or implied. Answer d. is a direct quote from the passage. It is true, but it is not suggested by the passage.

7.  Feedback on Fact and Opinion Practice Question: The correct answer is d. The last sentence uses the word *should* and describes something that cannot be proven to be true. The other sentences in the passage are all factual in nature. They do not contain points that cannot be proven.

8.  Feedback on Graphic Practice Question: The correct answer is b. Answers a. and d. are incorrect because they are referring to information that cannot be obtained from this chart. It does not tell the reader anything about other cities, and it doesn't give any detail about the types of businesses. Answer c. is incorrect because it gives false information.

# Questions by Type

1.   Examples of main idea questions include the following: What is the main idea of this passage?; What is the point the author is trying to make in this passage?; The author believes that . . .

2.   Examples of purpose questions include the following: The purpose of this passage is . . .; The main purpose of this passage is . . .; The author's purpose in writing this passage is . . .

3.   Examples of detail questions include the following: The passage states that one of the reasons scientists believed that dinosaurs abandoned their nests was . . .; According to the passage, reptiles . . .; This passage mentions all of the following except . . .

4.   Examples of organization questions include the following: How does the author organize the information in this passage? The author mentions that dinosaurs are like reptiles in order to . . . ?; Which of the following statements best describes the organization of the passage?

5.   Examples of vocabulary questions include the following: In the context of this passage, *home* would mean . . .; The author uses the phrase_____ to mean . . .; The author most likely uses the word *roam* in the last line to mean . . .

6.   Examples of inference questions include the following: The author suggests (or implies) that . . .; The passage suggests that_____ will happen next; It can be inferred that the author believes . . .

7.   Examples of fact and opinion questions include the following: Which sentence in the passage is an expression of opinion rather than a statement of fact? (from ParaPro Assessment)

8.   Examples of graphic questions (from ParaPro Assessment Test at a Glance) include the following: What conclusion can be drawn from the data presented in the graph? According to the chart, X is larger than . . .; On which page would you find . . .; The table of contents is organized by . . .

## Supporting Details Practice

Look at the paragraph below. Identify the main idea, the three supporting details, and the conclusion.

> There are many benefits to exercise. It helps your health; it gives you more energy; and it helps you control your weight. It helps your health by working your heart. Your heart is thus better able to supply your body with oxygen. It gives you more energy by helping your body to work more efficiently. Finally, there is no better way to keep your weight under control than to exercise. These are some of the benefits to exercise.

Main Idea:


Supporting Detail 1:


Supporting Detail 2:


Supporting Detail 3:


Conclusion:

# Some Vocabulary Used on the ParaPro Assessment

1.   define

2.   compare

3.   refute

4.   summarize

5.   criticize

6.   analogy

7.   generalization

8.   theory

9.   hypothesis

10.   phenomenon

11.   cause and effect

12.   chronological

# Different Kinds of Context Clues

**Definition Clue**
(Other words that define the unknown word, often after a comma) Look for words and phrases such as *is identified as*, *is called*, *is*, *is known as*, *that is*, *refers to*, *means*, and *the term*.

**Synonym Clue**
(Words that mean basically the same thing as the unknown word) Look for words and phrases such as *in other words*, *or*, *that is to say*, *also known as*, and *by this we mean that*.

**Contrast Clue**
(Words that mean the opposite of the word you are trying to define) Look for words and phrases such as *instead of*, *but*, *in contrast*, *on the other hand*, *however*, *unlike*, *although*, and *even though*.

**Example Clue**
(Words that provide an example of your unknown word) Look for an example somewhere near the word.

**Experience Clue**
Look for situations that you have information on already.

**Clue from Another Sentence (or Paragraph)**
Sometimes there are clues from other areas of the passage that will point to the meaning of the word you are trying to figure out.

## *Practice*

1. When trying to lose weight for his high school reunion, he was told to eschew sweets. "Just give it up!" was his friend's advice.

   What does *eschew* mean? How do you know? What type of clue is it?

2. The air was redolent, or fragrant, with the scent of perfume.

   What does *redolent* mean? How do you know? What type of clue is it?

3. I did the math homework incorrectly and instead of helping me in math, they were actually deleterious.

   What does *deleterious* mean? How do you know? What type of clue is it?

4. Disneyfy is defined as a process in which you create or alter something to make it more simple, sentimental, or contrived.

   What does *Disneyfy* mean? How do you know? What type of clue is it?

5. She enjoyed spending time with her cronies, like her best friend, Martha; her close cousin, Susan; and her work friend, Alison.

   What does *cronies* mean? How do you know? What type of clue is it?

***Answers: (*Webster's College Dictionary, *April 2000, Random House)*

1.   Eschew – to abstain or keep away from; avoid, shun

2.   Redolent – having a pleasant odor, fragrant

3.   Deleterious – harmful or injurious

4.   Disneyfy – creating or altering something to make it more simple, sentimental, or contrived

5.   Crony – close friend or associate

# Different Kinds of Context Clues

**Definition Clue**
(Other words that define the unknown word, often after a comma) Look for words and phrases such as *is identified as, is called, is, is known as, that is, refers to, means,* and *the term.*

**Synonym Clue**
(Words that mean basically the same thing as the unknown word) Look for words and phrases such as *in other words, or, that is to say, also known as,* and *by this we mean that.*

**Contrast Clue**
(Words that mean the opposite of the word you are trying to define) Look for words and phrases such as *instead of, but, in contrast, on the other hand, however, unlike, although,* and *even though.*

**Example Clue**
(Words that provide an example of your unknown word) Look for an example somewhere near the word.

**Experience Clue**
Look for situations that you have information on already.

**Clue from Another Sentence (or Paragraph)**
Sometimes there are clues from other areas of the passage that will point to the meaning of the word you are trying to figure out.

# Inferences

Inferences are guesses that are based on evidence. If your friend comes in after a blind date smiling from ear to ear, you will infer that the date went well. We infer things all of the time. When you infer something when you read, it is like reading between the lines.

Sometimes the author does not state the main idea. You have to figure it out from the clues that have been given to you.

### *Exercise*

Work with a partner to write a short paragraph that describes a situation or a person. Do not state the main idea, what the situation is, or who the person is. Exchange your paragraph with another paired group in your class. See whether you can determine what the main idea is by reading between the lines. See if the other group can figure out your paragraph. Good luck!

## Reading Pretest Questions and Answers
*(from the* ParaPro Assessment Study Guide, *pages 135-145)*

Each of the questions or incomplete statements below is followed by four suggested answers or completions. Select the one that is the best in each case.

The following passage is from a short story by Toni Cade Bambara.

The puddle was frozen over, and me and Cathy went stompin in it. The twins from next door, Tyrone and Terry, were swingin so high out of sight we forgot we were waitin our turn on the tire. Cathy jumped up and came down hard on her heels and started tap-dancin. And the frozen patch splinterin every which way underneath kinda spooky. "Looks like a plastic spider web," she said. "A sort of weird spider, I guess, with many mental problems." But it really looked like the crystal paperweight Granny kept in the parlor.

1.  The excerpt primarily describes children . . .
    a.  talking with their grandmother.
    b.  disagreeing over the rules of a game.
    c.  ice-skating on a pond.
    d.  playing outdoors.

    Answer:
    Type of question: Reading skills/Main idea

    The correct answer is d. The first sentence states that they were playing on a puddle and the other kids were swinging on a tire swing.

2.  The narrator of the excerpt thinks that the splinters in the frozen puddle are like . . .
    a.  tap-dancing steps.
    b.  a spider web.
    c.  a crystal paperweight.
    d.  tire tracks.

    Answer:
    Type of question: Reading skills/Supporting details

    The correct answer is c. The narrator is the one telling the story, and she thought it looked like Grandma's paperweight. Cathy thought it looked like a spider web. This type of question one can answer by looking back at the passage. Be aware that all of the choices were mentioned in the passage (tires, tap-dancin, spider web, and paperweight). Detail questions are tricky because one has to pay close attention to them. This is not an overall thinking type of question but one that is concerned with a particular part of the passage. One way to find the answer is to find the part that talks about splinters of the frozen pond and then reread from there.

Until the 1970s, most literature published by Native American women was poetry. The publication of Janet Campbell Hale's *The Owl's Song* (1974) and Leslie Silco's *Ceremony* (1977), however, added a new genre—the novel—to the body of literature by Native American women.

Elizabeth Cook's *Then Badger Said This* (1977) introduced yet another approach, a combination of poetry and prose. As contemporary Native American women writers begin to reshape Native American literature, they no longer express themselves exclusively in traditional forms. Instead, they are reworking traditional structures as they continue the process of articulating Native American experiences.

3. The passage is primarily concerned with . . .
   a. discussing a novel that strongly influenced the work of Native American literary tradition.
   b. describing developments in the Native American literary tradition.
   c. challenging a theory about the work of a particular Native American author.
   d. contrasting the works of three Native American authors.

   Answer:
   Type of question: Reading skills/Main idea or purpose

   The correct answer is b. The passage discusses how in the past Native American literature was primarily composed of poetry and then further describes how this is changing or developing. Answers a. and c. are incorrect because they both focus on one novel or one theory and the passage covers more than that. Answer d. is incorrect because the passage points to the similarities, not their differences.

4. In the context of the passage, the word *body* (line 3) most nearly means . . .
   a. organization.
   b. size.
   c. human being.
   d. collection.

   Answer:
   Type of question: Reading skills/context clues

   The correct answer is d. It refers to an entire group of works.

5. The passage suggests that Hale, Silko, and Cook are . . .
   a. primarily interested in writing poetry.
   b. helping to reshape Native American literature.
   c. better at writing short stories than novels.
   d. working exclusively with traditional literary forms.

   Answer:
   Type of question: Reading Skills/inferences

   The correct answer is b. because the passage states that they are publishing literature that is different from what came before it, and "no longer express themselves exclusively in traditional forms." One can infer that they are helping reshape Native American literature.

Some of the first movies were based on children's books. By 1920, when movies were still in their infancy, there were four screen versions of *Alice in Wonderland*. There were also three films based on *Robinson Crusoe* and two on *The Adventures of Tom Sawyer*. It seems appropriate the

motion-picture industry in its own youth should turn for inspiration to the literature of childhood.

6. Which sentence from the passage is most clearly an expression of opinion rather than a statement of fact?
   a. "Some of . . . children's books"
   b. "By 1920 . . . *in Wonderland*."
   c. "There were . . . *Tom Sawyer*."
   d. "It seems . . . of childhood."

   Answer:
   Type of question: Reading skills/fact and opinion

   The correct answer is d. The first three can be proven. The last one cannot. The word *seems* is a clue as well.

Questions 7-9 are based on the following excerpt adapted from a book that students are reading.

*Amy Goes Fishing*
Chapter 1: Worms

It was Saturday morning. Amy and her family were having breakfast. Amy's brother, Bill, got up.

"Goodbye," he said with his mouth full of pancakes. "I'm going to a baseball game."

Then Amy's sister, Meg, got up.

"Goodbye," she said. "My Girl Scout meeting starts at ten."

Amy's mother pushed back her chair. "I have to work today," she said. "Goodbye, Amy. Goodbye, Dan. Don't forget to take out the garbage."

Amy wished she had a good place to go.

Clang! She dropped her fork.

"What was that?" her Dad asked. He looked at the empty chairs. "Everyone is gone except you and me," he said.

"What can we do?" Amy asked.

7.   Students are learning to make predictions about a story using clues from the title of the story, the chapter headings, and what happens in the story itself. The paraprofessional asks students what Amy and her Dad will most likely do next. Which response from the students shows the strongest understanding of the clues?
a.   Amy and her Dad will make pancakes together.
b.   Amy and her Dad will go to Bill's baseball game.
c.   Amy and her Dad will go fishing.
d.   Amy and her Dad will find jobs of their own.

Answer:
Type of question: Reading application/prereading

The answer is c. This asks the paraprofessional which answer shows that the student has understood the passage. What is really being asked is whether or not the paraprofessional has understood the question. Breakfast is over so a. is incorrect. Only Bill is getting ready for the game so b. is incorrect. The title and the subheading point to answer c.

8.   Students have been given a mixed up list of things that happen in the story. Here is the mixed up list:
1.   Meg says goodbye.
2.   Amy asks her father what they should do.
3.   Amy's mother says goodbye.
4.   Amy drops her fork.
5.   Bill says goodbye.

The students are asked to put the events in the order in which they happen in the story. What is the correct order?
a.   1, 5, 3, 4, 2
b.   2, 3, 1, 5, 4
c.   5, 1, 3, 4, 2
d.   5, 3, 1, 2, 4

Answer:
Question type: Reading Application/making accurate observations

The correct answer is c. This is like a detail question. Sometimes it helps to go through these one by one. Eliminate the obviously incorrect answer choices. Answers a. and b. are incorrect because it is easy to see that Meg doesn't say goodbye first nor does Amy ask her father what they should do first. Next, you would need to decide between the other two choices. This is best done by going through them step by step until one of them has something in an incorrect order.

9.  Students are learning how to recognize and pronounce words that begin with blended consonant sounds, such as the word *frog*, which begins with the blending of /f/ and /r/ consonant sounds. Which word from the story is the clearest example of a word that begins with a blended consonant sound?
    a.  *Baseball*
    b.  *Clang*
    c.  *Fork*
    d.  *Garbage*

    Answer:
    Question type: Reading application/sounding out words

    The correct answer is b. It begins by blending /c/ and /l/. You do not need to go back to the passage to answer a question like this. You do not need to remember what a blended consonant sound is because the question itself defines it for you. Look at the answer choices, and see which one fits the definition that is given.

In 1620, a group of English people crossed the North Atlantic to establish a small colony in what is now called New England. The story of these Pilgrims has become an important part of the history of the United States. At the time, however, the colony was simply a part of the spread of European culture. For more than a century, the nations of western Europe had been establishing colonies and trading posts around the world.

10. The primary purpose of the passage is to . . .
    a.  describe the experience of daily life in the colony established by the Pilgrims.
    b.  explain how several colonies in New England were established and governed.
    c.  describe how trade routes between Europe and the United States were developed and how they have changed.
    d.  point out that the colony established by the Pilgrims was only one of many European colonies.

    Answer:
    Type of Question: Reading skills/purpose

    The correct answer is d. Answers b. and a. talk about subjects not really covered by the passage. Answer c. is too broad.

In the United States, the ocelot, a type of wild cat found in Texas, has been an endangered species since 1982. The most important cause of the ocelot's decline is loss of its habitat. Almost 95% of the native land cover of south Texas has been altered, and the ocelot has been unable to adapt to the resulting decrease in the thick vegetation that provides its shelter. Hope for the ocelot's survival rests on restoring a portion of south Texas to its natural state.

11. The passage suggests that the ocelot needs a habitat that . . .
    a.    provides areas sheltered by plants.
    b.    has little variation in temperature.
    c.    is home to few other animals.
    d.    has been altered by human activities.

    Answer:
    Type of question: Reading skills/inferences

    The correct answer is a. There are two points to consider from this passage: (1) The ocelot population is decreasing due to loss of habitat and (2) there has been a significant decrease in natural cover, and the ocelots can't adapt. One can infer, therefore, that the ocelot needs an area sheltered by plants.

# Recognizing Different Test Questions

**Directions:** Below is a list of the type of test questions the ParaPro Assessment may use to test your reading knowledge. Following is a list of what basic reading component this question is testing. Write the letter of the component next to the test question.

### *Typical ParaPro Assessment Questions*

1. _____ How does the author organize the information in this passage?

2. _____ The author most likely uses the word *diaphanous* in line 12 to mean . . .

3. _____ The main idea of this passage is . . .

4. _____ The main purpose of this passage is . . .

5. _____ According to the chart, X is larger than\_\_\_?

6. _____ Which sentence in the passage is an expression of opinion rather than a statement of fact?

7. _____ This passage suggests that . . .

8. _____ This passage mentions all of the following except . . .

### *Basic Reading Component*

a. Main idea

b. Purpose

c. Supporting details

d. Organization

e. Context clues

f. Implied or inferred meaning

g. Fact or opinion

h. Graphics

# Answer Sheet

1. d.

2. e.

3. a.

4. b.

5. h.

6. g.

7. f.

8. c.

# Module 2 – Reading
## *Part 4: Basic Reading Principles (WorkKeys Assessment)*

## Overview
In Module 2, Part 4, the paraprofessional will learn about the following:
- Sample questions
- Introduction to WorkKeys Assessment
- Description of levels in WorkKeys Assessment

## Objectives
Following completion of Module 2, Part 4, the paraprofessional will . . .
- be more familiar with the layout of the WorkKeys Assessment.
- recognize question types used in the WorkKeys Assessment.
- understand basic reading principles as focused on in the WorkKeys Assessment.
- feel more comfortable with the types of questions asked through practice.
- access available resources for continued review and learning of skills in reading.

## Lessons and Activities
(based on WorkKeys Test Descriptions Reading for Information section, ACT 2002, pages 67-77 )

### *Sample Questions*
The "WorkKeys Sample Test Questions" and "WorkKeys Sample Test Answers" Handouts supply the paraprofessional with sample test questions and feedback for practice. There is one question per level. One suggestion is to have the students take this as a Pretest. After the answers have been shared, the paraprofessionals can get into groups or discuss with the full group how they arrived at the answers that they chose. If the paraprofessionals can share the steps they used in order to come to the correct answer with the rest of the class, the paraprofessionals can learn from the mistakes and successes of their classmates.

### *Introduction to WorkKeys Assessment*
Refer to the "WorkKeys Sample Test Questions" Handout. The paraprofessionals can use the examples given in this handout to follow the information presented below. Answers are provided. One suggestion is to have the paraprofessionals use this handout as a Pretest. Level 4 is the passing level. Afterwards, the class can go over the answers together. One of the differences between the ParaPro Assessment and the WorkKeys Assessment, is that WorkKeys is based on items one might find in the workplace (hence, the name). Examples of passages used are memos, letters, signs, directions, notices, policies, regulations, procedures, and announcements. As opposed to the ParaPro Assessment, there are no graphics. This test is primarily based on work text. It is a multiple-choice test, and the skills required in the lower levels are also used in the higher levels. The test is meant to measure ability to read work text. It also provides the state with a measure of the paraprofessional's abilities.

*Levels*

The "Levels of WorkKeys" Handout is a table that describes each of the levels in WorkKeys. It may be helpful for the paraprofessional to look at this table while also looking at the sample test questions. That will help make the dry descriptions a little clearer.

The "WorkKeys Levels: What is Required of You?" Handout is a table that describes what paraprofessionals are required to do by level. The instructor should let the class know that each level requires that the paraprofessional be able to do all of the preceding levels as well. Again, it may be helpful for the paraprofessional to look at the sample test questions while reviewing this table.

## Sample Test Questions

The Sample Test Questions can be found in the "WorkKeys Sample Test Questions" Handout.

## Evaluation

The instructor should monitor the progress and understanding of the paraprofessionals in the class as they practice on the examples given.

## Supplemental Resources

For more information about the topics covered in Part 4, see the following resources:
- www.act.org/workkeys
- Key Train individual training program for WorkKeys (available at www.keytrain.com for $50 plus $5 shipping and handling)

The deliverer of this module can add local resources here.

## Module 2, Part 4 Handouts
- "WorkKeys Sample Test Questions"
- "WorkKeys Sample Test Answers"
- "Levels of WorkKeys"
- "WorkKeys Levels: What Is Required of You?

# WorkKeys Sample Test Questions

**Directions:** Work through the following examples of WorkKeys Assessment questions. Your instructor will give you feedback. Later, when your instructor describes the various levels of WorkKeys, you can use this handout to see an example of each level.

## Level 3

### *Memo*

To:     All businesses in Logan City Mall
From:   Phillip Charles, Logan City Mall Manager
Re:     New garbage collection rules

Logan City mall has hired a new garbage collection company. Speedy Sanitation, Inc. will be collecting garbage from all businesses starting next Monday. Collection days will not change. The pick-up time will be one hour later.

Each business will be given one blue garbage can to use. Each business may ask for two extra garbage cans. You may have a total of three garbage cans. You will not need yellow collection tags anymore. Full garbage cans must weigh less than 30 lbs. Put your garbage in bags before putting it in the garbage cans. Put your garbage cans in the alley behind your business's back door.

1.    Based on the memo shown, starting next Monday, what is the greatest number of garbage cans each business is allowed to have?
      a.    1
      b.    2
      c.    3
      d.    15
      e.    30

## Level 4

### *Greenfield Memorial Hospital*

During and after a snowstorm, there will be both route and schedule changes for the hospital employee bus. The bus will run 15 minutes early, so be at your stop early. The bus will not stop at Bellevue Square or the Stadium. Employees usually boarding at those places will be picked up at the Eastdale Mall stop. Olive Street will be closed, so people usually picked up at that stop must walk to the Spring Street stop. If your stop is on a hillside, wait at the city bus stop closest to the top of the hill, so that the driver can stop safely. At stops where the snow has been piled deep at the curb, be prepared to board out in the street. Ice storms may cause the shuttle service to be canceled for a period of time. Listen to your local radio station after an ice storm. Any cancellations will be announced regularly.

2. Bellevue Square is your usual stop. According to the instructions shown, after a
   snowstorm, you should go to which stop?
   a. Bellevue Square
   b. Eastdale Mall
   c. Olive Street
   d. Spring Street
   e. The Stadium

## Level 5

Goldberg's Auto Parts is served by more than 50 different accounts, each with its own sales
representative, company name, corporate address, and shipping address. As a shipping
and receiving clerk at Goldberg's, you are required to return defective merchandise to the
manufacturer.

Standard procedure for returning an item begins with your written request to the company for
authorization. Always send the request to the corporate address, not to the shipping address.
Unless the company file folder contains a form for this procedure, write a business letter to the
manufacturer supplying the item's stock number, cost, and invoice number; the date it was
received; and the reason for its return. The manufacturer's reply will include an authorization
number from the sales representative, a sticker for you to place on the outside of the box to
identify it as an authorized return, and a closing date for the company's acceptance of the
returned item. If you do not attach the provided sticker, your returned box will be refused by
the manufacturer as unauthorized, and you will need to obtain a new letter, authorization,
sticker, and closing date. Always send a returned box to the shipping address, not to the
company's corporate address.

3. According to the policy shown, what should you do if you lose an authorization sticker?
   a. Send a request for a return authorization along with the rejected part directly to the
      manufacturer's shipping address.
   b. Send a request for a return authorization along with the rejected part directly to the
      manufacturer's corporate address.
   c. Repeat the standard procedure to obtain a new letter, authorization, sticker, and
      closing date.
   d. Use a sticker from another company's folder.
   e. Send the rejected part to your sales representative.

## Level 6

### Section 113.18

A lawful fence shall consist of . . .

- Three rails of good substantial material fastened in or to good substantial posts not more than ten feet apart. OR

- Three boards not less than six inches wide and three-quarters of an inch thick, fastened in or to good substantial posts not more than eight feet apart. OR

- Three wires, barbed, with not less than 36 iron barbs of two points each on each rod of wire; or four wires, two thus barbed and two smooth. The wires are to be firmly fastened to posts not more than two rods apart, with not less than two stays between posts, or with posts not more than one rod apart without such stays, the top wire to be not more than 54 or less than 48 inches in height. The bottom wire should be not less than 12 or more than 18 inches above the ground. The middle wire should be not less than 12 or more than 18 inches above the bottom wire.

- Wire either wholly or in part substantially built and kept in good repair, the lowers or bottom rail wire or board to be not more than 20 or less than 16 inches from the ground, the top rail, wire, or board, between 48 and 54 inches in height; and the middle rail, wire, or board, not less than 12 or more than 18 inches above the bottom rail, wire, or board.

4. A farmer's fence has three barbed wires attached to posts spaced two rods apart with two stays between pasts. The top wire is 49 inches in height. The bottom wire is 10 inches above the ground. Based on the regulations shown, why is the fence *not* lawful under Section 113.18?
   a. The fence must have four wires, two smoothed and two barbed.
   b. The fence posts should be spaced closer together.
   c. The top wire should be higher.
   d. There should be more stays.
   e. The bottom wire should be higher.

## Level 7

### Section 108

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- the collections of the library or archive are open to the public or available not only to researchers affiliated with the library or archive with the institution of which it is a part, but also to other persons doing research in a specialized field.

- the reproduction or distribution of the work includes a notice of copyright

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5.  Based on the information given, which of the following conditions would prohibit a city employee from photocopying an unpublished manuscript?
    a.  If the city library is accessible to any and all citizens and researchers
    b.  If the city library's original copy of the manuscript is in danger of damage through use
    c.  If the employee makes only one copy of the manuscript as a secure transcription
    d.  If the photocopy is to be sent to a public research library that does not have a copy of the manuscript
    e.  If the photocopy would not produce any income for the city library

# WorkKeys Sample Test Answers

1.     Answer and explanation – question 1, Level 3

The answer is 3 or c. This is stated in two ways. The memo states that you will be given 1 and then you can ask for 2 more (total = 3). It also directly states that "You may have a total of three garbage cans."

As you can see, Level 3 is very simple and direct.

2.     Answer and explanation – question 2, Level 4

The answer is b., the Eastdale Mall. This is clearly stated in the third and fourth sentences.

3.     Answer and explanation – question 3, Level 5

The answer is c. "If you do not attach the provided sticker, your returned box will be refused by the manufacturer as unauthorized, and you will need to obtain a new letter, authorization, sticker, and closing date."

4.     Answer and explanation – question 4, Level 6

The answer is e. The bottom wire needs to be higher. The article states that the bottom wire needs to be 12-18 inches above the ground. This one is only 10 inches off of the ground.

5.     Answer and explanation – question 5, Level 7

The answer is d. This condition is not acceptable as can be seen in the second paragraph. The copies can be sent only if the other research library already has a copy of the manuscript.

## Levels of WorkKeys

| Level | Description |
|---|---|
| 3 | • Least difficult<br>• Uses short sentences and short directions<br>• No implied meaning questions at this level<br>• Subject first and then the verb<br>• The tasks they ask the paraprofessional to think about are simple and direct.<br>• Easy everyday vocabulary<br>• Very basic material<br>• Short and simple sentences<br>• There is nothing hidden at Level 3. The reader does not have to make conclusions. Everything is directly stated.<br>• The questions and the sample that paraprofessionals have to read use the same words. |
| 4 | • A little more difficult than Level 3<br>• The sentences in the passage are longer but still fairly simple.<br>• A few more challenging words are introduced.<br>• The paraprofessional has to follow several step directions that require him or her to make choices based on changing conditions (If this changes, then what must I do next?). |
| 5 | • The sentences and the difficulty increase with each level.<br>• Many steps are stated, and the paraprofessional must be able to take different facts presented into consideration to correctly answer the question.<br>• There is increased difficulty in the language used (words, jargon, and specialized terms). |
| 6 | • Information is very complicated (e.g., legal documents).<br>• The information that the paraprofessional will need to answer the question is difficult to understand and not clearly stated.<br>• The language used is more formal and difficult to understand.<br>• To correctly answer a question, the paraprofessional must apply information to new situations and the information and instructions he or she is given is very complicated. |
| 7 | • The language used is more complex with longer sentences.<br>• There are a lot of details that the paraprofessional must follow.<br>• To correctly answer a question, the paraprofessional must apply information to new situations and the information, and instructions they are given is very complicated.<br>• Technical jargon is used.<br>• Makes one appreciate lawyers a little more |

# WorkKeys Levels: What Is Required of You?

| Level | What You Will Be Required to Do for Each Level |
|---|---|
| 3 | • Read a short passage, which will tell you to do something. You have to be able to follow simple directions in the correct order.<br>• Pick out main ideas and details.<br>• Define words that are defined in the passage.<br>• You will not have to transfer knowledge to a new situation. You may have to apply what you learned in the passage to a similar situation. |
| 4 | • Pick out details even if they are not directly stated.<br>• Use context clues to define words from the passage that are not directly defined.<br>• Be able to follow directions that include "if/then." This is a little more complicated than the directions you had to follow in Level 3.<br>• Follow directions that include more than one step. |
| 5 | • Figure out the meaning of the word from context clues.<br>• Figure out the meaning of acronyms (these are defined in the document).<br>• Use terms that are technical or other "jargon." These will be defined for you in the passage.<br>• Follow more complex directions.<br>• In the lower levels, you do not have to apply knowledge to new situations. At this level, you will have to apply the instructions to new situations; however, the situations will be similar to the ones presented, and the directions will be simple. |
| 6 | • You will need to be able to understand the concept of implied meaning at this level and use it to understand various details in the passage.<br>• You will need to understand context clues and be able to use them to define harder words.<br>• As the level of difficulty increases, you will need to apply knowledge to newer questions.<br>• You will need to understand aspects of the passage that are not stated. The example given by WorkKeys Test Descriptions is to "figure out the principles" and "explain rationale behind" policies, procedures, rules and, communications (p. 74). |
| 7 | • Use context clues to define harder words.<br>• Define technical words and jargon.<br>• Students will need to understand a passage to the extent that they can figure out what the principles are behind the policies presented in the passage. They will then need to apply these principles in new situations. |

# Module 2 – Reading
*Part 5: ParaPro Assessment Application and WorkKeys Instructional Support Inventory*

## Overview
In Module 2, Part 5, the paraprofessionals will learn about the following:

- The ParaPro Assessment application section, "Application of Reading Skills and Knowledge to Classroom Instruction ("ARSKCI")
  - Description
  - Reading foundations
  - Reading process

- The WorkKeys Instructional Support Inventory (Four Domains)

## Objectives
Following completion of Module 2, Part 5, the paraprofessional will be able to . . .
- identify application type of test questions from the ParaPro Assessment.
- understand the four domains of the observation component of the WorkKeys Assessment.
- write a short description of the ParaPro Assessment application section and the WorkKeys Inventory/observation.
- access available resources for continued review and learning of skills in reading.

## Lessons and Activities

### The ParaPro Assessment Application Section
Description: This portion of the test looks at classroom specific situations. (Pretest questions 8-10 were examples of these types of questions.) Because this is the reading portion, the typical question in this section looks at helping students who are reading or who are learning to read. This portion of the exam uses paragraphs that show an example of something that might happen in a classroom, and the paraprofessional is asked what he or she would do in that type of situation to help the student. The questions are written in a multiple-choice format. The basic reading principles that were reviewed earlier will come in handy during this portion of the assessment. In addition to an application of reading principles in a classroom setting, this portion also looks at the skills needed to complete common classroom tasks, such as following directions, alphabetizing, and helping students. The focus of these questions is how a paraprofessional applies what he or she knows about reading to help students in a classroom setting.

### Reading Foundations
The purpose of "Foundations of Reading" Handout (primarily modeled on the *ParaPro Assessment Study Guide*, pages 38-49) is designed to help the paraprofessionals create a list of skills that their students need to learn to read. If they can generate this list by themselves or as a group, they will be more likely to relate to it and remember it than if it is handed to them by the instructor. Hopefully, the paraprofessionals in your class will generate a list similar to the one below. According to the ParaPro Assessment, the skills and knowledge considered to be the foundation skills are the following: sounding out words; breaking down words into parts; using context clues; understanding synonyms, homonyms, and antonyms; and alphabetizing.

## Reading

This part of the ParaPro Assessment looks at how paraprofessionals help students acquire these skills. The following is a review of each. **Note:** Paraprofessionals should study those areas that are confusing to them before the exam.

Refer to the handout "Knowledge and Skills Your Students Need to Read—How Do You Help Your Students Do It? What Are the Skills They Need to Know?" Ask paraprofessionals to work together to break down the process of how they teach their students the following: how to sound out words; break down words into parts; use context clues; understand synonyms, homonyms, and antonyms; and alphabetize. Hopefully, the group will generate similar techniques to the ones suggested by ParaPro. Again, the purpose of this handout is to help the paraprofessionals generate their own ideas about how they do their jobs. If they come up with ideas that are entirely different to the ones listed below, praise their efforts and redirect. If there is time, the instructor could write down all of the suggestions. This section of Module 2 should be conducted more like a workshop, drawing on the many years of expertise that the paraprofessionals in the class bring to the table.

"ParaPro Assessment Suggested List of Reading Foundations" Handout lists the reading foundations that ParaPro will be testing.

The "Word Parts" Handout can be used if the instructor feels that the class needs and has time for some additional work on word parts.

### The Reading Process

"The Reading Process" Handout can be used to lead a discussion about the four parts of ParaPro's reading process. **Note:** #4 on the handout is about following directions. The directions of this handout indicate that the paraprofessional should do #4 first. After the class has completed this handout, ask how many did #4 first. This can lead into a discussion about directions and the importance of paying attention to detail.

Ask students to discuss the strategies they use to help students read. Those listed below are from the *ParaPro Assessment Study Guide*, pages 44-49:

- Assess student answers. Paraprofessionals need to be able to tell how well a student understands what he or she is reading. Paraprofessionals cannot do this without understanding the material themselves.

- Ask questions to help guide students. Paraprofessionals need to be able to ask specific and direct questions that will help point students in the right direction while they are reading. If they are missing the main point, the paraprofessional will need to ask the student a question that will lead the student to the main point. They need to be able to ask questions that will help the student understand the passage he or she is reading.

- Help the students to use the dictionary.

- Follow directions, and help students follow directions.

### WorkKeys Instructional Support Inventory (2003 ACT)
The application of knowledge questions that ParaPro uses and that were covered in this part of Module 2 are covered in a different way by WorkKeys. WorkKeys has an observation component in which the paraprofessional is evaluated by a supervisor in four domains and on 12 total items. This was covered in Module 1. WorkKeys uses a five-point scale (1 = not acceptable, 3= acceptable, 5 =exceptional).

### The Four Domains
"The Four Domains: What Do You Do to Help Students in Each Domain Area?" Handout is a way for the paraprofessional to make sense of the four statements listed below. They should refer back to the explanation of the domains and the 12 items from Module 1 to complete this handout.

- "Assist with presentation of organized and planned instructional activities."
- "Monitor student performance, and provide feedback."
- "Manage student behavior."
- "Communicate within the school environment."

## Sample Test Questions
The questions on the "Sample Test Questions and Answers (ParaPro Application Type)" Handout were taken from the *ParaPro Assessment Study Guide*, pages 46-49, and can be used for practice on application-type questions.

## Evaluation
Evaluation for Part 5 will be based on the following criteria:
- Sample test questions provided in "Sample Test Questions and Answers (ParaPro Application Type)" Handout
- Completion of handouts and group participation
- Another possibility: Ask the paraprofessionals to write a short description of the ParaPro Assessment application section and the WorkKeys Inventory/Observation section.

## Supplemental Resources
For more information about the topics covered in Part 5, see the following resources:
- www.act.org/workkeys
- Key Train individual training program for WorkKeys (available at www.keytrain.com for $50 plus $5 shipping and handling)
- www.ets.org/parapro
- *ParaPro Assessment Study Guide* (available for $25)

The deliverer of this module can add local resources here.

## Module 2, Part 5 Handouts

- "Foundations of Reading"
- "Knowledge and Skills Students Need to Learn How to Read – How Do You Help Your Students Do It? What Are the Skills They Need to Know?"
- "ParaPro Assessment Suggested List of Reading Foundations"
- "Word Parts"
- "The Reading Process (ParaPro Assessment)
- "The Four Domains (WorkKeys): What Do You Do to Help Students in Each Domain Area?"
- "Sample Test Questions and Answers (ParaPro Application Type)"

# Foundations of Reading

Think about how a child learns to read. What do you believe are the foundations of that process? (Example: sounding out words) Try to break it down into parts. List these below, and then share with the rest of the group.

# Knowledge and Skills Students Need to Learn How to Read— How Do You Help Your Students Do It? What Are the Skills They Need to Know?

## Sounding Out Words

- Imagine you are helping a student learn to read. He is at the point where he is trying to sound out words. What are some ways to help your student? If you do not work with students of this age group, what do you imagine you would do to help them learn to sound out words? Write these down, and then share with the group.

- What do you believe are the knowledge and skills students need to sound out words? Try to break these down to their basics. After you are finished, share with the group, and compare answers. Your instructor will share with you the skills and knowledge tested by ParaPro.

## Breaking a Word into Its Parts

- Imagine you are helping a student learn to read. She is at the point where she is trying to break words into parts. What are some ways to help your student? If you do not work with students of this age group, what do you imagine you would do to help them learn to break words into parts? Write these down, and then share with the group.

- What do you believe are the knowledge and skills students need to break words into parts? Try to break these down to their basics. After you are finished, share with the group, and compare answers. Your instructor will share with you the skills and knowledge tested by ParaPro.

## Context Clues

- Imagine you are helping a student learn to read. He is at the point where he is trying to use context clues. What are some ways to help your student? Write these down, and then share with the group.

- What do you believe are the knowledge and skills students need to use context clues? Try to break these down to their basics. After you are finished, share with the group, and compare answers. Your instructor will share with you the skills and knowledge tested by ParaPro.

## Synonyms, Homonyms, and Antonyms

- Imagine you are helping a student learn to read. She is at the point where she is trying to use synonyms, homonyms, and antonyms. What are some ways to help your student? Write these down, and then share with the group.

- What do you believe are the knowledge and skills students need to use synonyms, homonyms, and antonyms? Try to break these down to their basics. After you are finished, share with the group, and compare answers. Your instructor will share with you the skills and knowledge tested by ParaPro.

## Alphabetizing

- Imagine you are helping a student learn to read. He is at the point where he is alphabetizing words. What are some ways to help your student? Write these down, and then share with the group.

- What do you believe are the knowledge and skills students need to alphabetize words? Try to break these down to their basics. After you are finished, share with the group, and compare answers. Your instructor will share with you the skills and knowledge tested by ParaPro.

# ParaPro Assessment Suggested List of Reading Foundations

## Sounding Out Words

- Help students with the vowel and consonant, as well as long and short vowel sounds.

- Help students with combinations of vowels and combinations of consonants such as *oo*, *ou*, *ai*, *ie*, *ea*, *eigh* or *th*, *sh*, *gh*, *-ct*, *-ck*, *sl*, and *tr*.

- Help students with rhyming words. *Pie* and *tie* look alike, and they rhyme. *Rough* and *tough* look alike, and they rhyme. Other words look alike (*rough* and *though*), but they do not rhyme.

## Breaking Down Words into Parts

- Prefixes – words added to the beginning of the word that change its meaning. Common examples noted by ParaPro are *anti* meaning "against," *mal* meaning "wrong," *non* meaning "not," and *post* meaning "after."

- Suffixes – groups of letters placed at the end of a word that change its meaning. Common examples noted by ParaPro are *-acy* meaning "state or quality," *-men*t meaning "condition of," *-ize* meaning "cause to become," and *–less* meaning "without."

- Root words – the base word. Words have "roots" in other languages such as Greek, Latin, or German. Common examples noted by ParaPro are *audi* meaning "to hear," *manu* meaning "hand," *sent* meaning "to feel," and *vac* meaning "empty."

- Compound words – words created by putting two other words together. There are three examples in the following sentence: My *roommate* did a *cartwheel* when he got invited to the *tailgate* party.

- Syllables – one of the most common ways students break down words as they are learning to read. These are the separate sounds that each word makes. Being able to do this makes understanding all of the above much easier. ParaPro notes that words are broken down into syllables in the dictionary if you need to check how to do it.

## Context Clues (Refer back to handouts on context clues from Part 3 if necessary.)

- Words around the word one is trying to define that point to the meaning of that word

## Synonyms, Antonyms, and Homonyms

- Synonyms – words that have a similar meaning
- Antonyms – words that have the opposite meaning
- Homonyms – words that sound alike but have different meanings

## Alphabetizing

Alphabetizing is a very important skill, which is used to help students learn to read. It is also used by paraprofessionals to keep classrooms organized and functioning. Check with the paraprofessionals in the class to determine whether any of them have difficulty with alphabetizing; if so, review the principles of alphabetizing with them.

# Word Parts

**Directions:** Use the prefixes and roots listed below to complete this worksheet. If you can come up with other words that also use that root, add those to your list.

Mono – one
Gamy – marriage
Bi – two
Micro – small
Pre – before
Post – after
Un, non, im, il, a, in, ir – no, not
Maxi – most
Mini – least
Biblio – book
Bio – life
Chron – time
Dic, dict – to say
Graph – write
Homo – same
Hetero – different
Mo, mort – die
Cide – to kill
Pathos – feeling
Phobia, phobi – fear
Port – carry
Psych – mind, soul
Scope, spec – see
Sui – self
Fratri – brother
Thermo – heat
Viv – live, lively
Nym – name
Pseudo – false
Vert – to turn
Bi, di – two
Ped – foot

**Directions:** Write the words in the spaces provided.

1.  Having one marriage _____
2.  Having two marriages _____
3.  Afraid of confined places _____
4.  Machine to see small things _____
5.  To kill oneself _____
6.  To kill one's brother _____
7.  In order by time _____
8.  A written list of your sources (books) _____

9.  Looking at something beforehand _____

10. Something you can carry _____

11. To make something alive again _____

12. A lack of feeling _____

13. Feeling for someone _____

14. A container for coffee that keeps it warm _____

15. Having two feet _____

16. Not in accordance with the law _____

17. A fake name _____

# The Reading Process (ParaPro Assessment)

**Directions:** Look at the four reading processes below. Share with the class the different ways you complete each of the processes. Maybe your answer will help someone in the class learn a new technique. Do #4 first.

The ParaPro Assessment tests the paraprofessional on the following four activities:

Can you adequately . . .
1.    Assess student answers? Paraprofessionals need to be able to tell how well a student understands what he or she is reading. Paraprofessionals cannot do this without understanding the material themselves. This goes back to understanding the main idea.
    •    How do you know if a student has understood a question?
    •    How do you assess student answers?

2.    Ask questions to help guide students? Paraprofessionals need to be able to ask specific and direct questions that will help point students in the right direction while they are reading. If they are missing the main point, the paraprofessional will need to ask students a question that will lead them to the main point. They need to be able to ask questions that will help students understand the passage they are reading.
    •    What are some ways that you ask questions to help guide students?
    •    How do you determine what they are missing so you can lead them in the right direction?

3.    Help the students to use the dictionary?
    •    What are the basic ways you use a dictionary?
    •    How do you help students look up words?
    •    What are guide words?
    •    How are your alphabetization skills? How can you improve?
    •    When you get a chance, take a look at a dictionary. There is a lot of extra information in there that could help you and your students.

4.    Follow directions and help students follow directions?
    •    What does it take to follow directions?
    •    How do you help students follow directions?
    •    Did you do this one first? Why or why not?

# The Four Domains (WorkKeys): What Do You Do to Help Students in Each Domain Area?

The WorkKeys Assessment has a section in which you are evaluated by a supervisor in four domains:

1. "Assist with presentation of organized and planned instructional activities."
2. "Monitor student performance, and provide feedback."
3. "Manage student behavior."
4. "Communicate within the school environment."

While referring back to Module 1 and the 12 areas under each domain, discuss with a partner how you help students in each of these four domains.
- Are there any areas in which you are particularly strong?
- Are there any areas in which you are particularly weak?

## Sample Test Questions and Answers (ParaPro Application Type)
### (From ParaPro Assessment Study Guide, *pages 46-49*)

Questions 10-11 are based on the following passage from a book students are reading in class.

> *Camping Close to Home*
> Chapter 1: Getting Ready
>
> Cindy took a careful look at her checklist. Her brother and sister were taking her camping. She had everything she needed piled on the kitchen floor. She'd even found the compass she had bought at the Grand Canyon last year.
>
> "What if I get hungry?" she asked Ryan.
>
> "We're bringing lots of food," he said.
>
> "But what if we run out?" she asked.
>
> "Then I'll come back to the kitchen."
>
> "Promise?" Cindy asked as she stuffed a candy bar into her purple backpack.
>
> "I promise, "Ryan said.
>
> Just then, Alice dashed in through the back door. "Okay, I've got the tent set up," she said.
>
> Did you stake it down?" Ryan asked.
>
> "Absolutely," Alice said. "Its not going anywhere."
>
> "But we are," Cindy said.
>
> "We sure are," Ryan said. "So let's get started."
>
> Laughing, Cindy followed him out to the backyard.

10. Students are learning how to make predictions about a story by using clues from the title of the story, the chapter headings, and what happens in the story itself. The paraprofessional asks students where Cindy will be camping. Which response from the students shows the best understanding of the clues?
    a.    Cindy is going to camp at the Grand Canyon.
    b.    Cindy is going to camp at a campground.
    c.    Cindy is going to camp in her backyard.
    d.    Cindy is going to camp in the Rocky Mountains.

11. Students are learning about compound words (words made up of two or more whole words joined together). Which word from the story is a compound word?
    a. *camping*
    b. *checklist*
    c. *compass*
    d. *kitchen*

Questions 12-14 are based on the following passage from a textbook that students are reading in small groups.

People have long known that food spoils at warm temperatures but not at cold temperatures. In fact, in 1626 an English scientist, Sir Francis Bacon, successfully preserved a chicken by stuffing it with snow. But the reason food spoils was not understood until after 1683, when the microscope was invented. For the first time scientists could see tiny living creatures—bacteria and molds—that we call microbes. Some microbes are helpful, but others are harmful. Most are killed by very hot temperatures, multiply rapidly in warm temperatures, and do not multiply much in cold temperatures.

12. The paraprofessional asks the students why the author mentions Sir Francis Bacon. Which response from the students is the most accurate?
    a. To explain why food spoils at warm temperatures
    b. To indicate when microbes, such as bacteria and molds, were first discovered
    c. to provide an example of the kinds of food that were eaten in England in the 1600s
    d. To support the claim that people had long known that food does not spoil at cold temperatures

13. What question could the paraprofessional ask the students that would help them understand why food spoils at warm temperatures?
    a. How do people benefit from helpful microbes?
    b. What happens to bacteria and molds at different temperatures?
    c. Why are some foods cooked and others eaten raw?
    d. When did people first know that food could be preserved at cold temperatures?

14. A paraprofessional is working with a student who is having trouble understanding the word *microbes* (line 5). What would be the most effective strategy the paraprofessional could use to help the student understand those words?
    a. Have the student research the time period during which the microscope was invented.
    b. Encourage the student to sound out the word and proactively spell it out loud.
    c. Ask the student what purpose the phrase *tiny living creatures* (line 4) serves in the passage.
    d. Suggest that the student reread the first sentence to find clues about the meaning of the word.

# Answer Key

*Answers to ParaPro Application Sample Test Questions*

10. Though this question is presented as an application question, it is really asking the paraprofessional about his or her understanding of the main idea of the story. The answer is c. The main idea can be found by looking at the clues given to the reader in the title and subheading. The question itself tells the paraprofessional on what clues to focus.

11. This question is also presented as an application question; however, it gives the paraprofessional the clue he or she needs to answer the question in the question itself. The question defines what a compound word is. The paraprofessional taking this test would not have to go back to the original story to find the answer. He or she would merely have to apply the definition of a compound word to the answer choices. The correct answer is b.

12. The answer is d. This question is not asking what the main idea of the passage is. It is asking how the detail (i.e., Sir Francis Bacon) fits in with the rest of the passage. The question is asking what the author's purpose was in including the detail about Sir Francis Bacon. One way to answer a question like this is to look at the sentence that contains the detail. Read it thoroughly. Also, look at the sentence before and after that sentence. Look at the context in which Sir Francis Bacon was presented.

13. The answer is b. The question, "What happens to bacteria and molds at different temperatures?" leads the student to the sentence that deals the most with why food spoils at room temperature. The other answers do not deal with food spoilage.

14. The question addresses the best way for a student to find out the meaning of an unfamiliar word. Answer a. doesn't address defining a word. It looks at history. Answer b. is not accurate because the question is asking the paraprofessional to help the student define the word, not say the word. Answer d. is incorrect because the first sentence doesn't deal with microbes. The answer is c.

# Module 2 – Reading
## Part 6: Differences Between ParaPro and WorkKeys Assessments

## Overview
In Module 2, Part 6, the paraprofessionals will learn about the following:
- The difference between the two tests (reading portions)
- Their strengths and weaknesses in reading

## Objectives
Following completion of Module 2, Part 6, the paraprofessional will have . . .
- reviewed test questions from both assessments in order to begin the decision of which test to take.
- compared ParaPro and WorkKeys Assessments in reading.
- begun exploration of strengths and weaknesses in reading.
- accessed available resources for continued review and learning of skills in reading.

## Lessons and Activities

### Differences Between the Two Tests
- What do the paraprofessionals see as the differences? The class has now looked at both tests. The "Compare and Contrast: ParaPro and WorkKeys Assessments in Reading" Handout is a visual to help the paraprofessional review and compare the two assessments so that each person can make the right decision as to which test he or she should take. Ask students to get into small groups (or partners depending on the size of the class). A group discussion may be helpful after the students have worked in small groups. The instructor could write all of student input on an overhead or board and lead the discussion.

- The "Differences Between ParaPro and WorkKeys in Reading" Handout contains a summary of some of the differences. This information may be the same as what the paraprofessionals discover while doing the activity discussed in the "Compare and Contrast" Handout above. This handout should be used as a continuation of the "Compare and Contrast" Handout. The paraprofessional can add to the handout if the class generated other or better ideas.

### Individual Students' Strengths and Weaknesses
- Refer to the "My Strengths and Weaknesses in Reading" Handout. Once the paraprofessionals have been exposed to the two assessments, they will need to be able to accurately judge which test would be best for them to take. In addition to understanding the text, they need to understand themselves and their strengths and weaknesses in reading. Ask paraprofessionals to work alone on their strengths and weaknesses. Ask them to share their information. **Note:** You may want to suggest to the class that by listening to their classmates' descriptions of their strengths and weaknesses, they may come up with ideas to add to their own list.

- The "Some Things to Think About When Deciding Which Test to Take" Handout goes over some of the topics that students should think about when they are deciding which test to take. There are "Answer Ideas" attached for the instructor.

## Sample Test Questions
Module 2, Part 6 will not have separate sample test questions. The questions students will look at are the ones presented in the previous parts.

## Evaluation
Evaluation for Part 6 will be based on the following:
- Self-evaluative handouts given in this part of Module 2 – "My Strengths and Weaknesses" and the "Some Things to Think About" Handouts
- "Post Quiz" about the differences of the two assessments

## Supplemental Resources
For more information regarding the topics covered in Part 6, see the following resources:
- www.act.org/workkeys
- Key Train individual training program for WorkKeys (available at www.keytrain.com for $50 plus $5 shipping and handling)
- www.ets.org/parapro
- *ParaPro Assessment Study Guide* (available for $25)

The deliverer of this module can add local resources here.

## Module 2, Part 6 Handouts
- "Compare and Contrast: ParaPro and WorkKeys Assessments in Reading"
- "Differences Between ParaPro and WorkKeys in Reading"
- "My Strengths and Weaknesses in Reading"
- "Some Things to Think About When Deciding Which Test to Take"
- "Answer Ideas"
- "Post Quiz"
- "Answer Key"

# Compare and Contrast:
# ParaPro and WorkKeys Assessments in Reading

Break into small groups or partners. Look back over the materials covered so far. Pay special attention to the sample test questions. Try to discover as many of the differences and similarities as you can. This handout will help you begin the process of making the best decision regarding which test you should choose.

1.    What are the differences between the two tests? List these below.

      ParaPro

      WorkKeys

2.    Do you see any similarities? What are they?

      Both tests . . .

3.    Share your information with the entire group. Be sure to note any similarities or differences that you may have missed.

# Differences Between ParaPro and WorkKeys in Reading

| ParaPro | WorkKeys |
|---|---|
| ParaPro tests students on various reading principles (e.g., main idea, details, context clues, inference, implied meaning, fact, opinion, and purpose). | As opposed to the ParaPro Assessment, WorkKeys is based on items you might find in the workplace (hence, the name). Examples include memos, letters, signs, directions, notices, policies, regulations, procedures, legal documents, and announcements. |
| Has a graphics section | WorkKeys is primarily based on work text. It does not have a graphics section. |
| ParaPro tests students using what would be considered the more common reading test questions. In the skills and knowledge section, ParaPro uses paragraphs. In the application section, ParaPro uses scenarios that a paraprofessional might encounter in classroom setting. | WorkKeys tests professionals by having them look at examples of text they might encounter in a work setting. They will be required to find the main idea; use context clues; and in the higher levels, be able to infer meaning and the purpose of a piece. The questions, however, will be asked in a less direct manner. |
| Might ask what the purpose of a passage is | WorkKeys would ask that a paraprofessional apply knowledge from the passage to a separate situation. In order to do this, the paraprofessional may have to understand the purpose of the passage. |
| The paraprofessional will need to understand basic reading concepts. | In general, though WorkKeys does not ask the student the type of reading questions most students think of as traditional standardized test questions, they will need to know some of the same concepts. |
| ParaPro has separate skills/knowledge questions and application questions. | WorkKeys focuses more on the application of reading to everyday work scenarios. |
| ParaPro's questions are more directly related to reading skills (e.g., "What is the main idea of this passage?") | WorkKeys questions are more directly related to how one would use that skill to get a work or real-life task accomplished (e.g., "According to this memo, where would passengers from the Seattle train need to disembark?") |
| ParaPro has two types of questions. (This should be a review from Module 1):<br>1. Questions pertaining to reading principles<br>2. Questions pertaining to how paraprofessionals help students in their classroom with their reading | WorkKeys has two portions:<br>1. A test portion, which asks application questions using text commonly found in various work settings<br>2. A performance portion during which the paraprofessional is observed and evaluated by an administrator using an inventory based on four domains |

# My Strengths and Weaknesses in Reading

Complete the statements below. The purpose of this exercise is to encourage you to reflect about your own learning as you begin the process of making the decision about which test to take.

1.    My strengths in reading are . . .

2.    My weaknesses in reading are . . .

3.    I feel my best about reading when I . . .

4.    I feel my worst about reading when I . . .

5.    The test that seems to fit me in reading the best is . . .

6.    I feel this way because . . .

# Some Things to Think About
# When Deciding Which Test to Take

Think about the following statements as they apply to reading. Below each statement, write a short comment about how you feel about each of the statements. Your instructor will go over your answers after you are finished.

1.  I do well on standardized tests.


2.  I perform well when I am being observed.


3.  I understand basic reading principles.


4.  I am comfortable with the types of questions asked on the ParaPro Assessment.


5.  I am comfortable with the types of questions asked on the WorkKeys Assessment.


6.  I have test anxiety.


7.  I have performance anxiety.


8.  The reading selections from the ParaPro Assessment seemed easier to me.


9.  The questions asked on the ParaPro Assessment made sense to me.


10. The questions asked on the WorkKeys Assessment seemed easier to me.


11. The questions asked on the WorkKeys Assessment made sense to me.

# Answer Ideas

1. The ParaPro Assessment is more like the typically standardized test.

2. The WorkKeys Assessment has an observation portion; ParaPro does not.

3. Basic reading principles are covered more in the ParaPro Assessment.

4. Each student must decide which test feels more comfortable to him or her.

5. Same as above

6. The questions asked in the ParaPro Assessment are more like the typical standardized tests. If students have had very negative experiences with standardized tests, ParaPro may intimidate them.

7. Some people become very anxious when being observed or evaluated. The WorkKeys Assessment has an observation component. The ParaPro Assessment does not.

8-11. Each student will need to make their own decisions on these items.

**Note:** The reading portion is only one of the subjects that will be tested. The paraprofessionals will need to make their decision based on all of the subjects covered. This module's intent is to give them basic background information about reading and to help them make a decision about the reading portion only.

# Post Quiz
### *Differences Between the Two Assessments*

1. Which of the two tests is based on items you might find in the workplace such as memos, letters, signs, directions, notices, policies, regulations, procedures, legal documents, and announcements?
   a. WorkKeys
   b. ParaPro

2. Which test has a graphics section?
   a. WorkKeys
   b. ParaPro

3. Which test is primarily based on work text?
   a. WorkKeys
   b. ParaPro

4. Which test asks students questions on various reading principles (e.g., main idea, details, context clues, inference, implied meaning, fact, opinion, and purpose)?
   a. WorkKeys
   b. ParaPro

5. Which test might ask the question, "What is the main idea of this passage?"
   a. WorkKeys
   b. ParaPro

6. Which test might ask the question, "According to this memo, where would passengers from the Seattle train need to disembark?"
   a. WorkKeys
   b. ParaPro

7. Which test would ask that a student apply knowledge from the passage to a separate situation?
   a. WorkKeys
   b. ParaPro

8. Which test asks the type of reading questions most students think of as traditional standardized test questions?
   a. WorkKeys
   b. ParaPro

9. Which test focuses more on application of reading to everyday work scenarios?
   a. WorkKeys
   b. ParaPro

10. Which test is more directly related to reading skills?
    a. WorkKeys
    b. ParaPro

11. In which test are you observed and evaluated while working?
    a. WorkKeys
    b. ParaPro

# Answer Key

*Answers to Post Quiz for Module 2, Part 6: Differences Between the Two Assessments*

1.  a.

2.  b.

3.  a.

4.  b.

5.  b.

6.  a.

7.  a.

8.  b.

9.  a.

10. b.

11. a.

# Module 2 – Reading
*Part 7: Review and General Reading Tips*

## Overview
In Module 2, Part 7, the paraprofessional will review the following:
- The material covered in Module 2 (i.e., the seven parts and the objectives)
- General reading tips

## Objectives
Following completion of Module 2, Part 7, the paraprofessional will have . . .
- briefly summarized the seven parts of Module 2.
- noted which of the objectives for this module were met.
- formulated at least one question about reading before moving on to the next module.
- stated at least one general reading tip.
- accessed available resources for continued review and learning of skills in reading.

## Lessons and Activities

### Review of Module 2
Ask paraprofessionals to use the "Review of Module 2" Handout as a way of summarizing in their own words the various lessons they learned in this module. A lot of material was covered in a brief time period. It is important for the class to take the time to reflect on their learning while answering the three questions on the handout. Ask for any questions they might have at this point.
- Part 1: Overview of Entire Module
- Part 2: Reading as Communication
- Part 3: Basic Reading Principles (ParaPro Assessment)
- Part 4: Basic Reading Principles (WorkKeys Assessment)
- Part 5: ParaPro Assessment Application and WorkKeys Instructional Support Inventory
- Part 6: Differences Between ParaPro Assessment and WorkKeys Assessments
- Part 7: Review and General Reading Tips

The "Objectives of Module 2" Handout is to help the paraprofessional reflect on what he or she has learned in Module 2. This handout asks each paraprofessional to reflect back upon the objectives for Module 2 and to answer whether the objectives listed below were accomplished.
- State the differences between the ParaPro and WorkKeys Assessments.
- Feel more comfortable with the types of questions asked on each of the assessments through completion of practice questions.
- Recognize various question types (e.g., main idea, detail, fact and opinion, inference, and application type of reading test questions).
- Understand basic reading principles and how these apply to classroom situations (ParaPro Assessment).
- Access available resources for continued review and learning of skills in reading.

*General Reading Tips*
The instructor can use the "General Reading Tips" Handout after the students discuss the tips that they know. The last tip, practice, also (hopefully) leads the paraprofessional to think about increasing his or her reading time. Paraprofessionals may be able to add to this list through a class discussion. They may have some tips that would be helpful to the other members of the class.

Questions? Ask the paraprofessionals to generate at least one question about Module 2. They can turn these in anonymously, and the instructor can answer them as part of a class discussion.

## Sample Test Questions
Module 2, Part 7 will not have separate sample test questions.

## Evaluation
Evaluation for Part 7 will be based on the following:
• Two reflective handouts – "Review of Module 2 Parts" and "Objectives of Module 2"
• Individuals' ability to write down one general reading tip

## Supplemental Resources
For more information about the topics covered in Part 6, see the following:
• http://www.collegetransition.org/counseling/reading.html
• http://www.brad.ac.uk/acad/civeng/skills/reading.htm

The deliverer of this module can add local resources here.

## Module 2, Part 7 Handouts
• "Review of Module 2"
• "Answer Key"
• "Objectives of Module 2"
• "General Reading Tips"

# Review of Module 2

**Directions:** While looking at your handouts, can you summarize in your own words what was covered in each of the parts of this module? You have learned a lot about both the ParaPro and the WorkKeys Assessments. You have also learned a lot about reading. See if you can put it together on this sheet. Work with two or three classmates.

Three questions to look at per part: (1) What was covered in each part? (2) What was the most important thing you learned in each part? (3) What questions remains uppermost in your mind at this point?

Part 1:  Overview of the Entire Module

Part 2:  Reading as Communication

Part 3:  Basic Reading Principles (ParaPro Assessment)

Part 4:  Basic Reading Principles (WorkKeys Assessment)

Part 5:  ParaPro Assessment Application and WorkKeys Instructional Support Inventory

Part 6:  Differences Between ParaPro and WorkKeys Assessments

Part 7:  Review and General Reading Tips

# Answer Key

**Part 1: Overview**
This was an overview of the entire module.

**Part 2: Reading as Communicating**
This part went over the definition of reading and the various components that make up the act of reading.

**Part 3: Basic Reading Principles, ParaPro Assessment**
This part went over the components that ParaPro identified as the foundations of reading and provided practice test questions.
• Main idea
• Purpose
• Supporting details
• Organization
• Context clues
• Implied or inferred meaning
• Fact or opinion
• Graphics

**Part 4: Basic Reading Principles, WorkKeys Assessment**
This part reviewed the five levels of WorkKeys and gave sample test questions.

**Part 5: ParaPro Application and WorkKeys Inventory**
This section covered the application to the classroom type of questions on ParaPro, and briefly touched on the WorkKeys Inventory (the evaluated/performance piece of the WorkKeys assessment).

**Part 6: Differences Between ParaPro Assessment and WorkKeys Reading**

**Part 7: Review and General Reading Tips**

# Objectives of Module 2

**Directions:** Work alone, and think about what you have learned in this module. The following is a list of objectives that were to be covered in this module.

1.  Can you state the differences between the ParaPro and WorkKeys Assessments?

2.  Do you feel more comfortable with the types of questions asked on each of the assessments through completion of practice questions?

3.  Can you recognize various question types (e.g., main idea, detail, fact and opinion, inference, and application type of reading test questions)?

4.  Do you understand basic reading principles and how they apply to classroom situations (ParaPro Assessment)?

5.  Can you access available resources for continued review and learning of skills in reading?

# General Reading Tips

## Focus
A lot of what the two tests are asking for can be achieved by focusing on the question. Test-Taking tips will be taught in Module 5.
- Eat a good breakfast the day of the test (protein).
- Get a good night's sleep (very basic and very important).
- Do not worry about what others in the class are doing. Assume that some are going to do better and some are going to do worse.
- If you find your mind wandering, shake your head, or give yourself a pinch and refocus your efforts.
- Somehow make yourself very interested in the topic of the passage.

## Imagine
People tend to do better in reading when they can picture what they are reading. Some suggestions are as follows:
- Look at the title or the heading if there is one. Briefly think about what you already know about this topic.
- If there is no title or heading, look at the words that are repeated. Figure out the general topic. Think about how you are connected to this topic. What do you already know about it? No matter how tenuous the connection, it will help you to remember what is in the passage.
- Get yourself interested in each and every passage, even if it is a topic that would not normally interest you. This is a test, not a cocktail party. Don't let yourself mentally walk away from the ones that bore you.
- Imagine what the people in the passage look like or the place. Make it as vivid as you can.

## Pace
It will help if you read at a pace at which you can understand the text and still finish the questions.
- Think about your normal reading pace. Can you go faster and still understand the text? Practice at home.
- Read at a fast enough pace that you will finish, but not so fast that you cannot comprehend and you have to reread it several times.
- Do not panic during the test and read so fast that it is all a blur. Do not go so slowly that you do not finish the test.

## Practice
One of the best ways to improve in reading is to simply read! Answer the following questions:
- What do you like to read now?
- Can you spend more time reading?
- What times can you read?
- Where can you get books or magazines?

Remember . . . your reading and your writing will improve if you spend some free time reading.

# Writing

# Module 3 – Writing
*Part 1: Overview of the Entire Module*

## Overview
In Module 3, Part 1, the paraprofessionals will learn about the following:
- Part 1: Overview of the Entire Module
- Part 2: Preparation for the ParaPro Assessment
- Part 3: Application of Writing Skills to Classroom Instruction (ParaPro Assessment)
- Part 4: Application in a Writing Sample (WorkKeys Assessment)
- Part 5: Review (Student Activities)

## Objectives
Following the completion of Module 3, the paraprofessional will be able to . . .
- take either the ParaPro Writing Assessment or WorkKeys Writing Assessment.
- identify basic grammatical errors in Standard English.
- identify errors in word usage and punctuation.
- identify parts of a sentence.
- identify parts of speech.
- identify errors of speech.
- use pre-writing to generate and organize ideas.
- draft and revise.
- edit written documents for clarity, grammar, sentence structure, usage, spelling, and punctuation.
- write for different audiences and purposes.
- recognize and write in different modes and formats (e.g., persuasive, descriptive, narrative, letters).

## Lessons and Activities
The lessons and activities of Module 3 coincide with the overview above. Each of the five parts will begin with an overview of the module part, objectives, and an instructor outline. Audiotapes, and handouts will augment some lessons.

## Sample Test Questions
In Module 3, all students will answer questions similar to questions from the two assessments. Answers will be given immediately. This feedback will help the students learn from their mistakes.

## Evaluation
Evaluation for Part 1 will be based on the following:
- Practice test questions given throughout this module
- A Posttest to assess retention of the module lessons

## Supplemental Resources

For more information on the ParaPro Assessment, see the following resources:
*   www.ets.org/parapro
*   *ParaPro Assessment Study Guide* (available for $25)

For more information on the WorkKeys Assessment, see the following resources:
*   www.act.org/workkeys
*   Key Train individual training program for WorkKeys (available at www.keytrain.com for $50 plus $5 shipping and handling).

The deliverer of this module can add local resources here.

**Note: All materials included in this part of Module 3 may be reproduced for instructional purposes/handouts.**

# Module 3 – Writing
### *Part 2: Writing Skills, Preparation for the ParaPro Assessment*

Whether the paraprofessional chooses to take the ParaPro Assessment or the WorkKeys Assessment, he or she will need to review the basic structure of the English sentence, common grammatical errors that result in faulty sentences, and some principles of punctuation. The paraprofessional should recognize errors in written communication that interfere with clear communication.

## Overview
In Module 3, Part 2, the paraprofessionals will learn about the following:
- Parts of speech
- Parts of a sentence and grammatically incorrect sentences
  - Subject and predicate
  - Sentence fragments
  - Comma splices
  - Run-on sentences
- Errors in grammar
  - Subject-verb agreement
  - Verb tense
  - Parallelism
  - Noun-pronoun agreement
- Punctuation
  - Comma use
  - Semicolons
  - Apostrophes
- Incorrect word usage and spelling errors

## Objectives
Following the completion of Module 3, Part 2, the paraprofessionals will have . . .
- reviewed the various components of a grammatically correct sentence.
- identified the elements of a sentence.
- identified errors in grammar, punctuation, word usage, and spelling.
- recognized these elements or errors in the test questions or written examples.
- developed their skills in responding to test items.
- recognized elements of grammar and mechanics that will be represented on the ParaPro Assessment.
- recognized errors in grammar and mechanics that will affect their score on the WorkKeys Assessment.

## Lessons and Activities

### Parts of Speech

A basic understanding of the parts of speech will help the paraprofessional improve writing skills, assist students in the classroom, edit written work, and prepare for the exams. Neither exam requires that the paraprofessional define the parts of speech, but the test taker should be able to identify them in sentences.

The paraprofessional will review these parts of speech:
- noun
- verb
- adjective
- adverb
- pronoun
- preposition

### Examples

From "Sample Test Questions," ParaPro Assessment (0755):

- Because there are no refrigerators on the United States space shuttles, all of the food the astronauts eat must be in a <u>nonperishable</u> form.

  In the sentence above, the underlined word is being used as . . .
  a. a noun.
  b. a verb.
  c. an adjective.
  d. an adverb.

  According to the ParaPro Assessment, the correct response is c. *Nonperishable* modifies or describes the noun *form*. An adjective modifies a noun or pronoun by describing, identifying, or quantifying.

- The destruction of the world's rain forests will <u>seriously</u> disrupt the food chain and cause the extinction of numerous species of animals.

  In the sentence above, the underlined word is being used as . . .
  a. a noun.
  b. a verb.
  c. an adjective.
  d. an adverb.

  The correct response is d. *Seriously* modifies or describes the verb *disrupt*. Adverbs can modify verbs, adjectives, and other adverbs. They often end in *-ly*.

### Learning Activities

- In the following passage, taken from "Sample Test Questions," ParaPro Assessment (0755), certain words are underlined and numbered. Either in a group or individually, the paraprofessional will identify the part of speech and explain the response.

Early scientists (1) <u>believed</u> that all dinosaurs, (2) <u>like</u> most reptiles, laid and then (3) <u>immediately</u> abandoned their eggs. The newly hatched (4) <u>young</u> were left to take care of (5) <u>themselves</u>. However, the recent discovery of a group of nests has challenged this belief. The nests, which contained (6) <u>fossilized</u> baby dinosaurs that were not newborn, provided evidence that dinosaur parents actually cared for their young.

Correct Responses
(1)   verb
(2)   preposition
(3)   adverb
(4)   noun
(5)   pronoun
(6)   adjective

- In the same passage, the paraprofessional will identify one additional example of each of the following parts of speech:
  - noun
  - verb
  - adjective
  - adverb
  - pronoun
  - preposition

  Possible Responses
  - Examples of nouns: *scientists*, *dinosaurs*, *reptiles*
  - Examples of verbs: *laid*, *abandoned*
  - Examples of adjectives: *hatched*, *recent*
  - Examples of adverbs: *newly*, *actually*
  - Examples of pronouns: *their*, *this*
  - Examples of prepositions: *of*, *for*

### Parts of a Sentence

A sentence is a group of words that expresses a complete idea and is punctuated as an independent unit. Most sentences have a subject (the doer of the action) and a predicate (the action or the assertion about the subject). Recognizing complete sentences is critical to avoiding major sentence faults (e.g., fragments, run-on sentences, and comma splices). This review will also be the key to understanding the correct use of semicolons.

The paraprofessional will identify the following in a sentence or written example:
- subject
- predicate
- sentence fragment
- comma splice
- run-on sentences

*Examples*
From *ParaPro Assessment Study Guide*, Chapter 6

- For more than half a century, California has led the nation in agricultural output.

  What is the subject of the sentence above?
  a.  century
  b.  california
  c.  nation
  d.  output

  The correct answer is b. The verb in this sentence is *has led*. Answering the question "Who has led?" leads to the subject *California*.

- Which of the following are not grammatically correct sentences?

  a.  Since I left so early and forgot my books and pens in my rush.
  b.  Companies often reduce the weight of a product, for example, a " half-gallon" tub of ice cream may weigh 12% less than it used to.
  c.  Dr. Chaudry is a professor of education at Northern Illinois University she believes that children should read every day for at least fifteen minutes.
  d.  The Naskapi, a semi-nomadic people, live a hard life in a bleak and almost barren landscape.

  Correct Response
  Only sentence d. is correct. The paraprofessional should recognize that a., b., and c. are faulty sentences. Sentence a. is an incomplete sentence or sentence fragment. Sentence b. might be corrected with a semicolon before *for example*. Sentence c. consists of run-on sentences. The writer should use a period between *University* and *she*.

*Learning Activities*
- This paragraph contains sentence errors, which the paraprofessional should identify and explain:

  *Being Kind to Others*
  (1) When we are kind to others, we feel better about ourselves. (2) We know in our hearts that we have done the right thing. (3) Even if our friends or classmates want us to tease other students or pick fights. (4) Another reason to be kind is that the world becomes a better place. (5) One good act leads to another, then we spread good will to everyone we know and meet. (6) Someday another person might be kind to us because our society was made kinder by our actions.

  Correct Response
  The paraprofessional should recognize that sentences (3) and (5) are faulty sentences. Sentence (3) is a sentence fragment. Sentence (5) is a comma splice.

- The paraprofessional will rewrite parts of the paragraph, correcting the sentence errors.

  Possible Responses
  Combine sentences (2) and (3): "We know in our hearts that we have done the right thing, even if our friends or classmates want us to tease other students or pick fights."

  Use a semicolon in sentence (5): "One good act leads to another; then we spread good will to everyone we know and meet."

  Rewrite sentence (5) to form two sentences: "One good act leads to another. Then we spread good will to everyone we know and meet."

*Grammar*
Common grammatical errors will be identified. The paraprofessional will only need to identify these for the ParaPro Assessment, but should be able to correct them in his or her own writing for the WorkKeys Assessment.

*Examples*
The paraprofessional will identify the errors in the following sentences.

1.  The popularity of ginseng supplements and products <u>have increased</u>, <u>despite</u> the <u>lack of</u>
    <span>a.</span>    <span>b.</span>    <span>c.</span>
    scientific proof that ginseng <u>has</u> medicinal powers. (*ParaPro Assessment Study Guide*).
    <span>d.</span>

2.  When students <u>have</u> goals, they <u>could</u> discipline <u>themselves</u> to do the <u>required</u> work.
    <span>a.</span>    <span>b.</span>    <span>c.</span>    <span>d.</span>

3.  Taraq <u>loves</u> to <u>swim</u>, <u>play</u> tennis, and <u>reading</u> books about space exploration.
    <span>a.</span>  <span>b.</span>  <span>c.</span>    <span>d.</span>

4.  When a child <u>feels</u> left out of class <u>activities</u>, <u>they</u> may lose interest in the <u>subject</u> matter.
    <span>a.</span>    <span>b.</span>  <span>c.</span>    <span>d.</span>

The paraprofessional should identify the errors as follows:
1.  a. The error in subject-verb agreement can be corrected with the verb *has increased*.
2.  b. The shift in verb tense can be corrected with the present tense *can*.
3.  c. The error can be corrected with the parallel form *read*.
4.  c. The error in noun-pronoun agreement may be corrected with a singular *he or she*.

*Learning Activities*
- The following passage, adapted from "Sample Test Questions," ParaPro Assessment (0755), contains grammatical errors, which the paraprofessional should identify and explain.

(1) Early scientists believed that all dinosaurs, like most reptiles, laid and then immediately abandon their eggs. (2) The newly hatched young were left to take care of itself.

(3) However, the recent discovery of a group of nests have challenged this belief. (4) The nests, which contained fossilized baby dinosaurs that were not newborn, provided evidence that dinosaur parents actually cared for, fed, and were protecting their young. (5) For some time after birth, the babies would stay at the nest while the parents brought back plant matter for food. (6) The young stayed at home until they were large enough to roam safely on their own.

Correct Response
The paraprofessional will identify errors in sentences (1), (2), (3), and (4) as errors in
- verb tense (1).
- noun-pronoun agreement (2).
- subject-verb agreement (3).
- parallelism (4).

- The paraprofessional will suggest corrections for the paragraph.

Correct Responses
In sentence (1), change *abandon* to past tense *abandoned* for consistency in verb tense.
In sentence (2), change *itself* to *themselves* to agree with the plural noun *young*.
In sentence (3), change *have* to *has* to agree with the singular noun *discovery*.
In sentence (4), change *were protecting* to *protected* to complete a series of parallel verbs.

*Punctuation*
Although he or she will not be asked to repeat or explain the conventions governing punctuation use, the paraprofessional should be able to recognize common errors that might appear in the ParaPro Assessment.

In preparation for the ParaPro Assessment, the paraprofessional will review the following:
- the four major uses of the comma
  - with a coordinating conjunction, which joins two independent clauses
  - after an introductory element preceding the subject of the sentence
  - before and after a clause or phrase that provides additional, nonessential information
  - between items in a series

- a semicolon between two independent clauses

- apostrophes showing possession

*Examples*
- The paraprofessional should recognize that commas are appropriate in the underlined portion of each of the following sentences (in the same order as the bulleted list above):

  1. The methods they use vary greatly____but the results are always the same.

  2. Stunned by what we had heard____we walked home in silence.

3. The Naskapi____who are semi-nomadic____inhabit a bleak and almost barren landscape.

4. She shopped for clothing____shoes____household appliances____and tools.

- The paraprofessional should recognize that semicolons are required in the underlined portion of each of the following sentences:

5. Let us not shrink from the difficult task at hand____let us not fail those who will come after us.

6. He doesn't have the necessary experience____nevertheless, he is being considered for the position.

- The paraprofessional should recognize that apostrophes are required in the following sentences:

7. The dogs aggressive behavior worried the neighbors. (dog's or dogs')

8. The childrens parents were eager to meet with the teachers. (children's)

*Learning Activities*
- The paraprofessional will discuss the use of commas, semicolons, and apostrophes in the following sentences. The punctuation may be correct, incorrect, or missing.

1. They loved the apartment, so they signed the lease immediately.

2. He could not understand the reason for the dogs' behavior, in fact, he was completely unaware that the animal's had been abused.

3. While I was reaching, over the counter for the cake I noticed a banana cream pie.

4. The student demonstrated her capacity for hard work, long hours, and challenging courses.

5. Mr. Lopez, a man who had never been late suddenly became ill and was not there in the morning.

Correct Responses
Sentence (1): Correct. The comma is used before the coordinating conjunction *so*, which joins two independent clauses.

Sentence (2): Incorrect. A semicolon is required after the word *behavior* in order to separate two independent clauses. Also the apostrophe in *animal's* should be deleted in the plural form.

Sentence (3): Incorrect. The comma should be deleted after *reaching*. A comma should be used after the word *cake*, which is the last word of the introductory element (a subordinate clause).

Sentence (4): Correct. The commas separate items in a series.

Sentence (5): Incorrect. Add a comma after the word *late* to set off the additional, nonessential information about Mr. Lopez—*a man who had never been late*.

### *Word Usage and Spelling*

The paraprofessional will identify words that are used incorrectly because they sound alike or because of their similarity. Perhaps the best way to approach this writing problem is to review some commonly confused words:

- *then/than*
- *your/you're*
- *there/their/they're*
- *its/it's*
- *except/accept*
- *break/brake*
- *affect/effect*
- *countries/country's*
- *babies/baby's*

The paraprofessional will find it helpful to study contractions (*you're*, *it's*, *they're*) and possessive forms (*country's*, *baby's*), comparing them to their counterparts. Since the examinee will not be required to provide the correct word, he or she needs only to be alert to possible errors.

As in the case of errors in word usage, spelling errors in the ParaPro Assessment need not be corrected, only recognized. The paraprofessional may review some common spelling rules, which help in recognizing questionable spellings. Many handbooks and websites offer a survey of these rules.

### *Examples*
Correct the underlined words:

- I am taller <u>then</u> my sister.
  (*Than* is used for comparisons.)

- The breed is known for <u>it's</u> gentleness with children.
  (*Its* is the possessive form of the pronoun.)

- The <u>countries</u> flag has changed with each regime.
  (*Country's* is the possessive form of the noun.)

- He <u>excepted</u> her offer and signed the papers that evening.
  (The correct word is the verb *accepted*.)

- When we <u>compair</u> the two books, we find that the novel is not suitable for children.
  (*Compare* is the correct spelling.)

- The <u>affects</u> of the medicine wore off quickly, and his fever returned.
  (*Effects* is the correct word in this context.)

*Learning Activities*
- The paraprofessional will identify one misspelled word in each of the groups. (These examples are adapted from the *ParaPro Assessment Study Guide.*)

  1.  likely
      justifiable
      rateing
      stopped

  2.  reasonible
      receive
      recognize
      resolve

  3.  garage
      muscle
      preamble
      practicle

  Correct Response
  The paraprofessional should identify *rateing*, *reasonible*, and *practicle* as misspelled.

- The following paragraph adapted from the *ParaPro Assessment Study Guide* contains errors in usage or spelling, which the paraprofessional should identify:

  (1) Some people think its a good idea to have one vary close friend, but I think its best to have lots of friends. (2) If you have allot of friends, you get to know many diferent kinds of people. (3) This can help you throughout you're life. (4) Some things are more fun to do with a group of friends. (5) Some things I can think of are going to a ball game or haveing a party. (6) I can understand why some people take the other point of veiw and want just one close friend. (7) If you have just one close friend, you have more time to understand how another person thinks. (8) Secrets that you share with just one friend have a better chance of staying secret.

  Sentence (1): *its* should be the contraction *it's*, and *vary* is confused with *very*.

  Sentence (2): *allot* should be *a lot*, and *different* is misspelled.

  Sentence (3): *you're* should be the pronoun *your*.

  Sentence (5): *having* is misspelled.

  Sentence (6): *view* is misspelled.

## Sample Test Questions

1. The <u>destruction</u> of the world's rain forests will seriously disrupt the food chain and cause the extinction of numerous species of animals.

   In the sentence above, the underlined word is being used as . . .
   a. a noun.
   b. a verb.
   c. an adjective.
   d. an adverb.

2. On September 5, 1882, when some 10,000 workers assembled in New York City, America experienced its first Labor Day parade. (Adapted from the *ParaPro Assessment Study Guide*)

   What is the simple predicate in the sentence above?
   a. On
   b. when
   c. assembled
   d. experienced

3. Which word is *not* spelled correctly? (Adapted from ParaPro Assessment [0755])
   a. compair
   b. hardware
   c. repair
   d. scare

### Directions for Questions 4-9

In each of the following sentences, four portions are underlined and identified with a letter. Select the underlined portion that is an error in grammar, usage, or punctuation. There is only *one* error in each sentence. (Adapted from the *ParaPro Assessment Study Guide*.)

4. The role of technology in the <u>nation's</u> public schools <u>have</u> been increasing <u>steadily</u> for
                      a.                  b.              c.
   more <u>than</u> 20 years.
        d.

5. The athletes <u>stood</u> at attention, hands over <u>their</u> hearts, as their <u>countries</u> flag was <u>raised</u>.
                 a.                  b.           c.          d.

6. Women pilots, from Amelia Earhart <u>to</u> contemporary pilot Doris Lockness <u>; </u>have <u>been</u>
                           a.                  b.    c.
   flying <u>since</u> 1908.
        d.

7. Strawberries <u>are</u> expensive <u>to grow</u>, but <u>they</u> can yield more profits per acre <u>then</u> almost
             a.           b.     c.                  d.
   any other crop.

8.  The common housefly <u>breeds</u> more <u>frequent</u> when the humidity <u>is</u> low and temperatures
                a.            b.                  c.
    are <u>warm</u>.
         d.

9.  <u>When</u> the student <u>responds</u> to the alarm, <u>they</u> should leave all books and materials <u>behind</u>.
       a.               b.            c.                     d.

10. This sentence from the *ParaPro Assessment Study Guide* is followed by a question and four suggested answers.

    Many bicyclists used goggles and other sports clothing during the bicycling craze that occurred in the United States in the 1890s.

    What is the subject of the sentence above?
    a.  bicyclists
    b.  goggles
    c.  clothing
    d.  craze

## Evaluation

1.  The correct response is a. *Destruction* is a noun. The word is the name of a person, place, thing, or concept. *Destruction* is also the subject of the sentence.

2.  The correct response is d. Although c. is a verb, it is the verb in an introductory dependent clause ("when some 10,000 workers assembled in New York City"). The verb for the independent clause ( "America experienced its first Labor Day parade") is *experienced*.

3.  The correct answer is a. *Compare* is misspelled.

4.  The sentence error occurs at b. Because *role* is the subject and is a singular noun, the verb should be the singular form *has been increasing*.

5.  The error occurs at c. The word *countries* should be the possessive form *country's*.

6.  The error is b., the semicolon. The phrase "from Amelia Earhart to contemporary pilot Doris Lockness" is used to give additional, nonessential information about "women pilots." Commas should be used both before and after the phrase.

7.  The error is d., the word *then*. The word *than* should be used when making a comparison. These are commonly confused words that the paraprofessional should watch for when taking the ParaPro Assessment.

8.  The error is b., the word *frequent*. The adverb *frequently* should be used to modify the verb *breeds*.

9. The error is c., *they*. The pronoun must agree with its antecedent, *student*, which is singular. This match is called "agreement in number." The pronoun *they* can be replaced by he nor she, or the entire statement can be revised, referring to the plural throughout.

10. The correct answer is a., *bicyclists*. The main verb of the sentence is *used*; the subject of that verb is *bicyclists*.

## Supplemental Resources

For more information on parts of speech, grammar, punctuation, usage, and spelling, see the following resources:

- http://webster.commnet.edu/grammar
  - In the pull-down menu for "Word & Sentence Level," select the part of speech to review.
  - The Index will allow the paraprofessional to find punctuation and other relevant topics.
  - Activities and quizzes are also available.

- http://owl.english.purdue.edu (Owl Online Writing Lab)
  - Use the search function, entering the term, such as "fragment" or "adverb." Definitions, examples, and quizzes are available. Also check the "Handouts and Materials" menu.

- *ParaPro Assessment Study Guide*, Chapter 6, available from the Educational Testing Service

- Ruszkiewicz, Hairston, & Seward. (2002). *S F Writer* (2nd ed.). Longman. (ISBN 0-321-12560-6). Especially useful are the "Glossary of Grammatical Terms," the "Glossary of Usage," and "Chapter 40," which covers spelling principles.

The deliverer of this module can add local resources here.

**Note: All materials included in this part of Module 3 may be reproduced for instructional purposes.**

# Module 3 – Writing
*Part 3: Application of Writing Skills to Classroom Instruction*
*(ParaPro Assessment)*

The writing application questions on the ParaPro Assessment measure the paraprofessional's ability to help students with the writing process. The examinee will be asked to select the best responses to questions about the unity, organization, and development of sample paragraphs. The paraprofessional should also recognize grammatical errors, such as fragments and run-on sentences. The examinee will not be asked to write an original piece for the ParaPro Assessment.

## Overview
In Module 3, Part 3, the paraprofessionals will learn about the following:
- Paragraphs
  - Topic sentence
  - Identifying unrelated ideas
  - Appropriate supporting ideas
  - Paragraph breaks
  - Outlining
- Reference materials
- Proofreading and editing
- Sample test questions

## Objectives
Following the completion of Module 3, Part 3, the paraprofessionals will have . . .
- reviewed the organization of the paragraph.
- identified supporting ideas that are consistent with the subject and purpose of the paragraph.
- identified the purpose and audience for a writing sample.
- identified appropriate reference materials.
- recognized grammatical errors, such as fragments and run-on sentences in a writing sample.
- developed their skills in responding to test items on the ParaPro Assessment.

## Lessons and Activities

### Paragraphs
Well-organized and unified paragraphs focus on a single main idea, usually stated in an opening topic sentence. Examples such as the following will develop the paraprofessional's ability to identify the main point and thus recognize appropriate topic sentences. When the paraprofessional identifies the main point, he or she will also develop skill at recognizing relevant supporting sentences as well as those that are not relevant and disrupt the unity of the paragraph.

*Examples and Activities*

- The following paragraph is adapted from "Sample Test Questions," ParaPro Assessment (0755):

*How to Teach Your Dog to Sit*
First hold a dog biscuit so the dog pays attention. Say "sit!" When you say it, use a loud and firm voice. Move the hand holding the biscuit over the dog's nose, but don't let him grab it. You may have to give a light backwards tug on the dog's leash. When the dog sits down, give him the treat and lots of praise. Repeat this a few times, and he'll probably understand the command.

1. Which would be the best introductory or topic sentence for the paragraph?
   a. Dogs are naturally very intelligent and obedient.
   b. Your dog probably likes some dog biscuits better than others.
   c. It is easy to teach your dog the command "Sit!"
   d. Nobody likes a dog that can't play catch.

The correct answer is c. The sentences in the paragraph discuss the process for teaching a dog to sit. All of the sentences support the main idea stated in sentence C.

2. The paraprofessional will discuss why the other three choices are *not* appropriate. According to "Sample Test Questions," ParaPro Assessment (0755) . . .
   - A is too general.
   - B concerns a minor point, not the primary focus of the paragraph.
   - D concerns playing catch, which is not related to the other sentences in the paragraph.

3. The paraprofessional should recognize that papers have a specific purpose (e.g., to describe, to persuade, to explain, to instruct, or to compare). In a group or individually, the paraprofessional will discuss the purpose of the paper "How to Teach Your Dog to Sit."

   Suggested Response: The paragraph's purpose is to instruct the reader.

- The following paragraph is adapted from the *ParaPro Assessment Study Guide*.

This activity will help the paraprofessional identify main ideas and topic sentences and thus, recognize when a paragraph break should occur.

*Giant Kelp*
(1) Giant kelp is the largest seaweed in the ocean. (2) It can grow to a length of 200 feet. (3) Giant kelp also grows faster than any other plant in the ocean world. (4) When these king-size seaweeds grow close together, they form huge kelp beds. (5) A kelp bed has a major effect on the ocean and sea creatures around it. (6) It provides food and shelter for countless sea creatures. (7) It also offers them shade from bright light, or a safe place to hide. (8) A kelp bed softens the action of ocean waves, making the water calmer close to shore.

1. The student has been instructed to revise this report, dividing it into two paragraphs. Which would be the best topic sentence for the second paragraph?

   a. Sentence (2).   It can grow to a length of 200 feet.
   b. Sentence (5).   A kelp bed has a major effect on the ocean and sea creatures around it.
   c. Sentence (6).   It provides food and shelter for countless sea creatures.
   d. Sentence (7).   It also offers them shade from bright lights, or a safe place to hide.

   The best choice is b. "A kelp bed has a major effect on the ocean and sea creatures around it."

   This sentence signals the beginning of a new aspect of the discussion: the effects of kelp on the ocean and marine life.

2. Why are the other choices not accurate topic sentences?

   Suggested Response: The paraprofessional should identify the other sentences as supporting ideas, not main ideas. The group can discuss these sentences.

3. Since the essay "Giant Kelp" has been divided into two paragraphs, we might consider how the student would begin an outline of the report.

   **Giant Kelp**
   I. Description of Giant Kelp
   II. _____

   Which would be the correct outline topic for II?
   a. Length of Giant Kelp
   b. Fast Growth of Giant Kelp
   c. Effect of Giant Kelp on the Ocean and Sea Creatures
   d. Giant Kelp Provides Food

   The correct choice is c. The new paragraph discusses the effect of giant kelp on the ocean and sea creatures.

- The paraprofessional will be asked to identify relevant supporting ideas in sample paragraphs. The following letter is adapted from the *ParaPro Assessment Study Guide*:

Dear School Superintendent:
(1) I would like to convince you that high school should begin at 9:00AM rather than at 8:00AM. (2) I will tell you why. (3) At last, research has shown what we teenagers have known for a long time; we are tired, too tired to really concentrate in school. (4) Recently, research found that teenagers need more sleep than younger children. (5) In order for us teenagers not to be tired, we need about 9 hours and 15 minutes of sleep to feel truly rested. (6) This is different than elementary school students who need only 8 hours of sleep.

1.    What is the purpose of this letter?
      a.    to describe
      b.    to persuade
      c.    to compare
      d.    to instruct

      The correct response is b., to persuade the superintendent that school should start at 9AM.

2.    Which sentence could the student add to the letter as additional support for the main idea?
      a.    I go to bed too late to be awake during my first-period class.
      b.    Data from attendance records show that high school students tend to be late to school more often in the spring than in the fall.
      c.    High school students who don't have much homework are more likely to sign up for after-school activities.
      d.    Studies have found that in districts in which high school classes begin at 9:00AM, students pay more attention in class.

      The correct response is d. This sentence provides more support for her main point, that high school classes should begin at 9:00AM rather than 8:00AM.

3.    Explain why the other three choices are not suitable.
      Suggested Response: The paraprofessional will recognize that choices a., b., and d. are not relevant to the argument that school should begin an hour later.

### Reference Materials

The ParaPro Assessment will measure the paraprofessional's ability to recognize appropriate reference materials for a classroom assignment. The paraprofessional will not be asked to identify or define various types of reference materials. Rather, the paraprofessional should note the main idea and key words and then identify the resource that is the best match.

•    Reread the essay "Giant Kelp."

      Which would be the best source to find additional information to include in the essay?
      a.    a book about a famous marine biologist
      b.    an Internet review of a new book on pollution
      c.    an encyclopedia entry for giant kelp
      d.    a newspaper article about a grounded oil tanker

The correct answer is c. The term "giant kelp" indicates that this source deals specifically with our topic. The book about the famous marine biologist may possibly have information on the topic, but we cannot be sure. Only answer c. contains the key words for which we are looking.

*Proofreading and Editing*

The paraprofessional will be asked to identify corrections or revisions that will improve the student's essay. The examinee will not be required to know grammatical rules, nor to write corrections. These test items require that the paraprofessional . . .

- recognize correct revisions of sentences.
- recognize inappropriate tone and language for a given writing situation.
- recognize effective revisions, which result in concise, grammatically correct sentences.
- recognize when a transition might be appropriate.

The parts of a sentence, sentence fragments, and run-on sentences may be reviewed in Part 2, "Writing Skills."

When the paraprofessional is asked about tone and language, careful consideration should be given to the purpose of the essay and the intended audience.

- Review the essay "Giant Kelp." The student wants to add a final supporting idea to the essay.

    1. Which of the following sentences would be the best choice?
        a. It really sucks when humans mess up a valuable ecosystem.
        b. Humans need to protect all parts of the ocean's ecosystem, all the life forms are dependent on one another.
        c. Thus, the giant kelp beds are a valuable resource for sea life and ultimately for human life.
        d. Therefore, important to life on this planet.

        The best choice is c. The sentence is complete, relevant to the topic, and connected with a transition word (*thus*).

    2. Discuss the other choices. Why are they flawed?
        - Sentence a. is an abrupt shift in tone and language; it is much too casual for a serious report.

        - Sentence b. is grammatically incorrect; it contains a comma splice with two independent clauses incorrectly separated by a comma.

        - Sentence d. is a sentence fragment, an incomplete sentence. Although it begins with an effective transitional word (*therefore*), it is grammatically incorrect.

## Sample Test Questions
These sample test questions are adapted from the *ParaPro Assessment Study Guide*.

Questions 1 - 5 are based the following student essay:

> ### *How Many Friends Is Enough?*
> (1) Some people think it's a good idea to have one very close friend, but I think it's best to have lots of friends. (2) If you have a lot of friends, you get to know many different kinds of people. (3) This can help you throughout your life. (4) Some things are more fun to do with a group of friends. (5) Some things I can think of are going to a ball game or having a party. (6) I can understand why some people take the other point of view and want just one close friend. (7) If you have just one close friend, you have more time to understand how another person thinks. (8) Secrets that you share with just one friend have a better chance of staying secret.

1. The student has been instructed to divide his essay into two paragraphs, one for each of his main ideas. Which of the following sentences should be the opening sentence for the second paragraph?
   a. Sentence 3
   b. Sentence 4
   c. Sentence 6
   d. Sentence 7

2. The student wants to make the essay more persuasive by adding another supporting point. Which sentence supports the point that it is best to have a lot of friends?
   a. Having a lot of friends means you will learn more news about what's going on in your neighborhood.
   b. People who have a lot of friends spend too much time trying to get them all to like each other.
   c. People should spend less time hanging out with their friends and spend more time with their families.
   d. If you have a lot of friends and you move away, it will be very tiring to keep in touch with all of them.

3. The student has been instructed to combine sentences 4 and 5 into a single sentence that is clear, concise, and grammatically correct. Which of the following sentences would be the most effective revision?
   a. Some things are more fun to do with a group of friends, for example I think going to a ball game or a party is more fun with a group.
   b. Some things are more fun to do with a group of friends, such as going to a ball game or having a party.
   c. Some things are more fun to do with a group of friends go to a ball game or having a party.
   d. Some things are more fun to do with a group of friends you can go to a ball game together or have a party.

4. The same student wants to conduct research on the subject of friendship. What would be the best source of information?
    a. A magazine article about a group of students who help the poor
    b. A newspaper article about two teens who were involved in an accident
    c. A book about friendship and its effects on our lives
    d. An interview with one of the stars of the TV show *Friends*

5. The same student is learning how to use transition words. The new paragraph will begin with the sentence "I can understand why some people take the other point of view and want just one close friend." Which of the following phrases would be the best transition to begin this sentence. You may need to reread the essay above.
    a. *For example*
    b. *In conclusion*
    c. *In addition*
    d. *On the other hand*

A student is writing a paper on the kinds of books she enjoys. Here is part of her outline (adapted from the *ParaPro Assessment Study Guide*).

Kinds of Books I Love

I. Adventure Books
    A. Wizards and dragons
    B. Wild places
    C. Space travel

II. Mystery Books
    A. _____
    B. Unexplained events
    C. Mysterious disappearances

6. Which topic is best for the blank in section II, Mystery Books?
    a. Science and technology encyclopedias
    b. Stories about growing up
    c. Detective fiction
    d. Biographies

Questions 7 and 8 are based on the student examples adapted from the *ParaPro Assessment Study Guide*:

Students are learning how to write essays for different purposes, such as to compare, to instruct, to persuade, or to describe. They have been instructed to choose a primary purpose for their essay and then write an introductory sentence. Here are the sentences written by four students:

    (1) My skateboard is designed to roll like a racing car and fly like a jet plane.
    (2) Our school must offer more courses about real-life skills, such as how to find a job, and it must do so immediately.
    (3) Making a sock puppet is easy and requires just one old sock and a lot of imagination.
    (4) My favorite movie and my favorite television show have a lot of things in common.

7.  Which introductory sentence most strongly suggests that the primary purpose of the essay is to explore a comparison?
    a.  Sentence 1
    b.  Sentence 2
    c.  Sentence 3
    d.  Sentence 4

8.  Which introductory sentence most strongly suggests that the primary purpose of the essay is to persuade?
    a.  Sentence 1
    b.  Sentence 2
    c.  Sentence 3
    d.  Sentence 4

## Evaluation

1.  The correct answer is c., sentence 6, where the student begins to discuss a new idea: the benefits of having just one good friend.

2.  The correct response is a. Since the main point in the first paragraph is that it's best to have lots of friends, sentence a. provides more evidence: You can learn more about neighborhood news if you have lots of friends. Sentences b. and d. state reasons that it's not a good idea to have a lot of friends. Sentence c. deals with an entirely different topic.

3.  The correct answer is b. Sentence a. is a comma splice. Sentence c. is flawed because of an error in parallelism and a missing connecting phrase. Sentence d. is an example of a run-on sentence.

4.  The correct answer is c. The book is specifically about friendship, while the other sources are only vaguely related. There is no way to tell whether a., b., or d. will discuss the topic of friendship specifically.

5.  The correct response is d. *On the other hand* signals a contrast. The student is explaining contrasting points of view on the subject of how many friends one should have.

6.  The correct answer is c. *Detective fiction* properly belongs under the general heading of "Mystery Books." The other choices cannot be classified as mysteries.

7.  The correct answer is d., which refers to sentence 4. This sentence suggests that the essay will explain what a movie and a television show have in common, which means the essay will compare the ways the two things are alike.

8.  The correct answer is b. Sentence 2 takes a position and strongly suggests that the author try to persuade readers to adopt a particular viewpoint or understand a particular position about what the school must do.

## Supplemental Resources

For more information about paragraph structure, see the following resources:

- http://webster.commnet.edu/grammar
  Explore the pull-down menu for "Paragraph Level."
  The Index will allow the paraprofessional to find other relevant topics.

- http://owl.english.purdue.edu (Owl Online Writing Lab)
  Use the search function, entering the term, such as "paragraph." Choose "The Paragraph:
  Length Consistency," then "Also see the handout on paragraphs."

- *ParaPro Assessment Study Guide*, Chapter 6, available from the Educational Testing Service.

- Ruszkiewicz, Hairston, and Seward. *S F Writer* (2nd ed.). Longman. (ISBN 0-321-12560-6).
  See Chapter 24, "Shaping Effective Paragraphs."

The deliverer of this module can add local resources here.

**Note: All materials included in this part of Module 3 may be reproduced for instructional purposes.**

# Module 3 – Writing
*Part 4: Application in a Writing Sample (WorkKeys Assessment)*

## Overview
In Module 3, Part 4, the paraprofessionals will learn about the following:
- Grammatically correct sentences, using various parts of speech
- Grammar, punctuation, word usage, and spelling
- Writing paragraphs that are clear, smooth, and logical
- Writing paragraphs using complete sentences and using elements of correct grammar, mechanics, and spelling
- Characteristics of the writing skill levels (1-5) (WorkKeys)

## Objectives
Following completion of Module 3, Part 4, the paraprofessionals will have . . .
- reviewed Module 3, Part 2.
- identified the components of a clear, smooth, and logical paragraph.
- practiced writing paragraphs using complete sentences.
- practiced writing paragraphs using complete, correct sentences with correct grammar.
- practiced writing paragraphs with complete correct sentences and correct grammar, mechanics, and spelling.
- recognized the characteristics of the WorkKeys writing skill levels (1-5) and the writing-related scoring.

## Lessons and Activities

### Review of Grammatically Correct Sentences and Using Various Parts of Speech
Although we generally don't think about the elements of a sentence as we speak or write, a basic understanding of the parts of speech will help the paraprofessional improve writing skills, assist students in the classroom, edit written work, and prepare for exams.

- A complete sentence expresses a complete thought and contains an action word. The doer of the action can be either expressed or not expressed.
  John runs.
  *Runs* is the action word (verb); *John* is the doer of the action (noun) and is expressed.

- Example 2:
  Run.
  *Run* is the action word. "John" is the doer of the action and is not expressed.

### Grammar, Punctuation, Word Usage, and Spelling Review
Please refer to Part 2 of Module 3 for lessons and activities for grammar, punctuation, word usage, and spelling. Part 2 of the module will review all the necessary components of the principles of standard English.

### Skills for Writing Paragraphs That Are Clear, Smooth, and Logical

Paragraphs that are logical and smooth have beginning, middle, and ending sentences. Beginning sentences tell the main idea of the paragraph. Middle sentences relate details about the beginning sentence or main idea. The ending sentence concludes or brings closure to the paragraph. By including these three paragraph components, an idea is clearly developed in writing.

Sentence fragments are incomplete sentences. They do not contain a complete thought. They lack an action word, and the doer of the action is either expressed or not expressed.

- Example 1: Beginning Sentence
    - The Great Lakes are one of the major lake systems in the world.
    - The above sentence states a main idea, which can be developed.

- Example 2: Middle Sentence
    - Through the centuries many large cities have grown up along their perimeters. People recognize their value for inland navigation, water supply, and recreation.
    - The above sentences develop the main idea of the beginning sentence.

- Example 3: Ending Sentence
    - Because of the importance of the Great Lakes, people must work to keep them healthy and free of pollution.
    - The above sentence concludes the main idea expressed in the paragraph.

- Example 4: Sentence Fragments
    - And our catalog.
    - This is a sentence fragment. It does not express a complete thought.
    - Items can be found in our store and our catalog.
    - The above sentence contains a complete thought.

### Learning Activity 1

Using the following sentences, underline those sentences that would be considered a good example of a beginning sentence.

1. Schools are necessary institutions in our society.
2. Schools have been analyzed, and some need improvement.
3. After reading the submitted information, we can draw conclusions about how to improve our schools.

Both sentences 1 and 2 are examples of beginning sentences. They contain a main idea, which can be developed.

Sentence 3 is an example of an ending sentence.

### Learning Activity 2

In the following paragraph, circle the middle sentence, and underline the ending sentence.

(1) The problem of high school dropouts in the United States is serious. (2) Dropouts are less likely to find gainful employment. (3) They are less likely to be able to support their families. (4) Their families become reliant upon society to sustain them financially. (5) The cycle of poverty continues. (6) It is, therefore, very important for students to succeed in high school and graduate.

Sentences 2, 3, 4, and 5 are examples of middle sentences. They express details, which help to clarify the beginning sentence.

Sentence 6 is the ending sentence. This sentence sums up and concludes the paragraph ideas.

### Learning Activity 3

In the following samples, indicate which are Sentences (S) and which are Fragments (F).

1. Run as fast as you can _____
2. The sky is very blue _____
3. On sale next month _____
4. Stop _____
5. Using green paint _____

Numbers 3 and 5 are both sentence fragments. They do not contain complete thoughts. Sentences 1, 2, and 4 contain a complete thought.

### Using Complete, Correct Sentences and Elements of Correct Grammar, Mechanics, and Spelling

Basic punctuation and capitalization are essential to good writing. There are four types of sentences: (1) declarative, (2) interrogative, (3) imperative, and (4) exclamatory.

- A declarative sentence states a fact and ends with a period. (.)
- An interrogative sentence asks a question and ends with a question mark. (?)
- An imperative sentence states a command or direction and ends with a period. (.)
- An exclamatory sentence states an exclamation and ends in an exclamation point. (!)

The first word of every sentence should be capitalized. Proper nouns, which name particular persons, places, or things, should be capitalized.

Correct spelling allows the reader to accurately understand what is being communicated. Many words sound alike but are spelled differently and have different meanings.

### Learning Activity: Punctuation
Correctly punctuate the following sentences.

1. The weather is cool today
   A period would be used because this is a declarative sentence.

2. Stop
   A period is used because this is an imperative sentence.

3. Oh, I am so happy
   An exclamation point is used because this is an exclamatory sentence.

4. Are you going to do your homework now
   A question mark would be used because this is an interrogative sentence.


### Learning Activity: Capitalization
Capitalize the appropriate words in the following sentences.

Example 1:
    i live at 52 wentworth street.
    *I* should be capitalized because it is the first word of the sentence.
    *Wentworth* and *Street* should be capitalized because they are both proper nouns.

Example 2:
    mary jane brown is a good paraprofessional.
    *Mary Jane Brown* is a proper name and should be capitalized.

Example 3:
    The nursery sells houseplants and flowers.
    The is the only word that should be capitalized. It is the first word of the sentence. There are no proper names or nouns in this sentence.


### Learning Activity: Spelling
Circle the correct spelling in the following sentences.

Example 1:
    (Their, There) books are on the desk.
    *Their* is the correct spelling because it indicates possession of the books.

Example 2:
    (Their, There) are more books on the desk.
    *There* is the correct spelling because it indicates position of the books.

### Characteristics of the WorkKeys Assessment Writing Skill Levels (1-5)

The *Instructor Manual* of the WorkKeys Assessment states . . .

> WorkKeys Writing skills are the skills employees need in order to write clear and appropriate work-related messages. Writing skills also provide a good basis for other workplace writing tasks such as memos, letters, reports, proposals, and correspondence.
>
> The main requirement of work place writing is clarity. Employers want their employees' written communications to be direct, grammatically correct, and easy to read. Careless errors in a message may lead the reader to believe there are also errors in the facts, and the writer loses credibility and trustworthiness. Business-people usually have many demands competing for their attention and only a short time to read a message and to decide upon a response. They can read and effectively act upon a message that is short, direct, courteous, and grammatically correct.

### Description of Level Skills

According to the WorkKeys Assessment, Targets for Instructional Writing, the descriptions of Skill Levels are as follows:

*Level 1*
The paraprofessional's writing at this level, records parts of a spoken message using phrases, sentence fragments, or a list of words. Writing at this level contains many errors in spelling and frequently ignores punctuation and capitalization altogether. The tone of Level 1 writing may be overly casual or rude. Level 1 messages contain clues to their meanings, but can be very difficult to decipher.

*Level 2*
The paraprofessional's writing at this level may include a few complete sentences, but consists of fragments, few sentences, and comma splices. They make many errors in spelling and punctuation. They often invent verb forms. They may use no upper case letters whatsoever, or they may mix upper- and lowercase letters at random. Their sentences are disorganized. There are tense shifts, voice shifts, disagreement in number, and unclear pronoun references, which all create confusion. Their messages may contain slang and casual language, which is unacceptable in many workplaces.

Level 2 writing, however, conveys workplace messages adequately. That is, despite errors in grammar, punctuation, spelling, and organization, the general meaning of the message is apparent.

*Level 3*
Writing at this level requires a minimum interpretation. This writing contains some incomplete sentences, usually in the form of comma splices or sentences that are fused together without punctuation or capitalization to separate them. Most sentences are complete. Writers misplace commas, misuse other punctuation marks, use erratic capitalization, and misspelled words.

In this writing, there is often a voice shift. Also, there may be other logical errors, such as tense shift, noun/verb disagreements, pronoun/antecedent disagreement, and misplaced modifiers.

The sentences could be choppy and lack appropriate transitions. Though casual in tone, they are free of slang and rude remarks. The writing is acceptable for the workplace.

Errors in grammar, punctuation, and spelling and the shortcoming in style and tone do not ultimately interfere in the reader's comprehension.

*Level 4*
Writing at this level conveys messages clearly and without ambiguity. Writers use complete sentences with good structure. The writing contains few, if any, errors in grammar, punctuation, capitalization, or spelling. If these errors exist, they do not interfere with the reader's comprehension.

Sentences may be choppy but follow each other in logical order with appropriate transitions. There may be logical errors or inconsistencies, but these do not interfere with the clarity of the writing. Writers avoid slang and sometimes attempt a businesslike tone and style. This attempt may result in errors. This writing is appropriate, courteous, and free of personal bias.

*Level 5*
This level of writing is graceful and precise. It contains no errors in grammar, punctuation, capitalization, or spelling. Paraprofessionals at this level use well-placed modifiers, clear pronoun references, and parallel constructions. They use verb tenses accurately and are consistent in voice, tone, and style. They write "strong" sentences: active sentences with positive, familiar words. Their sentences flow logically and smoothly, using transitions to orient the reader in space, time, and sequence. Sentences vary both in structure and length.

Writers avoid slang, vague, pompous, inaccessible words and choose words which are concrete, simple, and direct. This writing is highly appropriate for the workplace; it is both courteous and free of bias. Level 5 writing respects the reader by presenting new information with clarity and precision in a polished and professional manner.

## Audiotaped Message Activity
You will either play a pre-recorded audiotaped message or read the following passage aloud. The paraprofessional is to listen to the message and write a summary. The scoring will be determined by the characteristics of the skill level.

*Audiotaped Message*
You work at a school and are to write a summary of playground supervision.

(Principal) This year we will put into practice a new set of playground procedures. This means that all paraprofessionals who have playground supervision as a job responsibility need to know and understand these practices. Thank you for your participation.

(Assistant Principal) Children in the lower grades will walk out to the playground in an orderly and single file line. They will exit through the double doors on the south end of the building. The children must remain in a single file line until they are on the playground. Once on the playground, you then will disperse them for play.

(Principal) These younger children must play only on the south end of the lot. Construction crews enter and exit through the north end lot. We must constantly be aware of the safety issues.

(Assistant Principal) The recess period will be for 20 minutes. You will ring a warning bell two minutes before recess ends. At this time, the children will line up along the wall of the south entrance. They must remain in their lines and be quiet and orderly. You then are to lead them to their classroom. Thank you for your help in our new school procedure.

*Level 1 Examinee Response*
the school goT a new reces-follow it.Kids go to the soth and Coming in same. Snigle File lines.

Indications That This Is a Level 1 Response – The above writing sample consists of sentence fragments, and contains numerous errors in spelling, punctuation, and grammar.

*Level 2 Examinee Response*
will have new lines at Reseses that allKIDS and us workers must obay!!! The trucks go by the south lot----we stay way far from Their. Bell rings—2 monutes-b4.

Indications That This Is a Level 2 Response – The above writing consists of poorly structured sentences throughout the paragraph. The first sentence lacks a subject, beginning with the verb *will*. The reader must guess what this paragraph is about. The paragraph contains numerous misspellings, sentence fragments, and errors in mechanics and punctuation.

*Level 3 Examinee Response*
The school will have a new recess procedures. It is our job to line up the student's on the South Side of the school. The principle will ring a bell at the two-minute mark. Then we get started to organize, the students to come in. All students must remain quiet when they are in the lines.

Indications That This Is a Level 3 Response – The above writing consists of complete sentences, though poorly structured. The phrase "Then we get started to organize, the students to come in," could be rewritten more clearly. Additionally, there are punctuation, spelling, and word usage errors. The paraprofessional does convey the message, and the tone is polite.

*Level 4 Examinee Response*
The school has a new recess procedure. We, as paraprofessionals who supervise the playground, need to know the new rules. The students will exit through the south doors in a quiet and orderly line. On the playground, they may get out of line and play. For safety, they should stay there. A bell will ring two minutes before they are to line up to come in the building. They should enter the school as they exited, quiet and orderly.

Indications That This Is a Level 4 Response – The writing sample consists of complete sentences and good sentence structure. The summary does not have any grammar, spelling or punctuation errors. The sentences are written in a logical order. The second sentence contains good comma usage. The fifth sentence is vague because of the use of the word *there*. The writing is courteous, avoids slang or trendy language, and is free of bias. Overall, the message is clearly expressed in writing.

*Level 5 Examinee Response*

This school year, there will be new playground procedures. All paraprofessionals, who supervise, must know these procedures. Before exiting for recess, the younger students must be organized in a single file, orderly line. Then, they are to exit the building through the south side double doors. The paraprofessional can disperse the students once they are on the playground. For safety reasons, the students must avoid the north end of the playground because of the construction crews. A new warning bell will ring two minutes before the recess period ends. At this time, the students are to be organized in a single file line against the south side wall. In a quiet and orderly manner, the students may then proceed to their classrooms.

Indications That This Is a Level 5 Response – The above writing sample consists of complete sentences, which flow in a logical and clear manner. The entire message is conveyed with no grammar, spelling, punctuation, or mechanical errors. There are well placed modifiers, subject-verb agreement, transitions, and familiar words. The sentences vary in structure and length.

This writing is highly appropriate for the workplace and contains information that is presented in a precise, polished, and professional manner.

## Supplemental Resources

For more information about the topics covered in Part 4, see the following resources:
*   http://webster.commnet.edu/grammar
*   http://owl.english.purdue.edu
*   *ParaPro Assessment Study Guide* (Available for $25)

**Note: All materials included in this part of Module 3 may be reproduced for instructional purposes.**

# Math
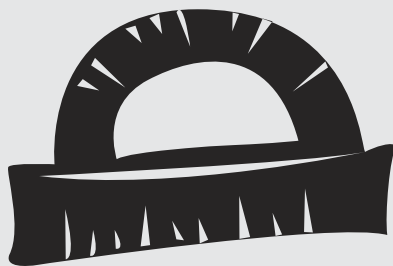
# Important Information on the Use of the Math Module

! The math module is larger than the other modules because it includes more examples, sample questions, and explanations of math concepts than the other content modules. Whereas the reading and writing modules present a basic refresher/review course approach, the math module represents a basic instructional approach to the introduction of math concepts in addition to review and practice.

! The math module was written in this manner because a large number of people experience math anxiety both during and following regular schooling. It may be helpful to explain certain math concepts in more depth in order for course participants to attain the appropriate level of test-readiness intended by this curriculum.

> It is recommended that instructors review students' pre-test results before selecting the lessons, activities, sample questions, and quizzes to use with students. Also, it is important to review the module carefully prior to preparation for instruction in order to determine which sections should be copied and used with students. Select only those parts that seem to be essential for the particular group receiving instruction.

! It is suggested that some parts be given to students as supplemental resources or homework to allow them ample time to absorb some of the concepts. Another suggestion from the field test instructors is that the basic math skills sections (Parts 1, 2, and 3) be presented in one session; then complete a different module or allow a weekend break before presenting the more advanced math sections (Parts 4, 5, 6, and 7). This approach seemed to lessen anxiety for field test participants.

! The math module has also been coded to identify basic review parts (R), parts relevant to WorkKeys (W), or parts relevant to ParaPro (P). Instructors may also consider their students' intended testing choices before selecting supplemental resources, homework, or class activities to use with a group.

# Module 4 – Mathematics
*Part 1: Overview of Entire Module*

## Overview
In Module 4, Part 1, the paraprofessionals will learn about the following:
- Part 1: Overview of the Entire Module
- Part 2: Basic Number Sense
- Part 3: Unit Analysis
- Part 4: Basic Algebra Review and Number Sequences
- Part 5: Geometry and Data Analysis
- Part 6: Word Problems
- Part 7: Classroom Applications
- Part 8: Calculator Basics
- Part 9: Sample Test Questions in Mathematics

## Objectives
Following completion of Module 4, the paraprofessionals will be able to . . .
- perform basic mathematics skills and apply these to the classroom setting.
- understand the differences between the ParaPro and WorkKeys Assessments.
- feel more comfortable with the types of questions asked on each of the assessments through completion of practice questions.
- perform calculations using a simple calculator for the WorkKeys Assessment.

## Lessons and Activities
The lessons and activities of Module 4 mirror the topics listed above in the overview. Each part will begin with a short overview of the module with objectives and a review of previous parts, if necessary.

Lessons with activities follow; these should be completed according to the instructor's directions. Some activities are open-ended questions. Some are more like sample test questions for the ParaPro and WorkKeys Assessments. Activities are also included in several handouts, which can be reproduced easily.

> **The mathematics module is one of the longer modules in the series. Depending on the skills of the paraprofessionals, the instructor may have a time constraint. Each section will be keyed with one or more capital letters to aid the instructor in deciding which parts should be covered and how much emphasis should be placed on each part. The key is as follows:**

| Symbol | Emphasis | Description of Section | Suggestions for Instructor |
|---|---|---|---|
| **(R)** | **Review** | These sections are very basic and are appropriate for both the WorkKeys and the ParaPro Assessments. | These sections and handouts are important to both assessments and need to be covered; however, the instructor can try to limit the time spent on these sections. Some topics can be omitted if the instructor feels that the paraprofessionals have a solid grasp of the material. |
| **(P)** | **ParaPro** | These sections emphasize the ParaPro Assessment. | Although these sections emphasize the ParaPro, the thinking skills are appropriate to both assessments. The instructor should consider the percent of paraprofessionals taking the ParaPro Assessment in deciding how much time to devote to this. |
| **(W)** | **WorkKeys** | These sections emphasize the WorkKeys Assessment. | Although these sections emphasize the WorkKeys Assessment, the thinking skills are still appropriate for the ParaPro Assessment. The instructor should consider the number of paraprofessionals who have already decided to take the WorkKeys Assessment and make a decision concerning how much time to devote to these sections. |

## Sample Test Questions

Multiple-choice questions modeling the questions in the two assessments are given in Part 9. Answers are also listed.

## Evaluation

A short test/quiz will be given periodically in the module to evaluate retention of the lessons. The instructor can supply more questions if needed.

## Supplemental Resources

Supplemental resources will be listed in the module. Some contain definitions and additional information. Others are listings of online activities and interactive quizzes that could be used as needed to evaluate knowledge.

# Module 4 – Mathematics
*Part 2: Basic Number Sense*

## Overview
In Module 4, Part 2, the paraprofessionals will learn about the following:
- Basic sets of numbers and definitions of special numbers
- Comparing and ordering numbers
- Basic operations, exponents, and order of operations for whole numbers
- Order of operations
- Forms of numbers
- Percents

## Objectives
Following the completion of Module 4, Part 2, the paraprofessionals will be able to . . .
- Understand the basic concepts of number sets and perform computations.
- Feel more comfortable with the multiple-choice test questions though practice.

## Lessons and Activities

### Basic Sets of Numbers and Definitions of Special Numbers (R) (P)
Natural or counting numbers consist of the following: {1, 2, 3, 4, . . .} The ellipses indicate that the pattern would continue the same way.

- *Examples:* 11 is a natural or counting number.
  3 $\frac{2}{5}$ is not a counting number.

Whole numbers consist of the following: {0, 1, 2, 3, 4, . . .} We have simply added 0 to the set of natural numbers.

- *Examples:* 11 and 0 are whole numbers.
  3 $\frac{2}{5}$ is not a whole number.

Integers consist of the whole numbers and their opposites: { . . . -3, -2, -1, 0, 1, 2, 3, . . .}

- *Examples:* -4, 0, and 112 are integers.
  $\frac{6}{5}$ and 6 $\frac{8}{9}$ are not integers.

*Activity*
For each number, decide whether or not it is a counting number, whole number, or integer. (Hint: There may be more than one answer.)

1. -5
2. 28

*Solutions*
1. Answer: -5 is an integer only.
2. Answer: 28 is a counting number, a whole number, and an integer.

Fractions are numbers used to represent part of a whole:
* *Examples*

   $\frac{4}{5}$ is an example of a fraction. If a whole unit were divided into 5 parts, the fraction $\frac{4}{5}$ would represent 4 of the 5 parts. To put this another way, if a student had 5 problems in social studies for homework and had completed 4 questions, this student would have finished $\frac{4}{5}$ of the homework.

   In the fraction $\frac{4}{5}$, 4 is called the numerator, and 5 is called the denominator.

   Diagrams help to see this relationship. The shaded parts below represent $\frac{4}{5}$ of a whole.
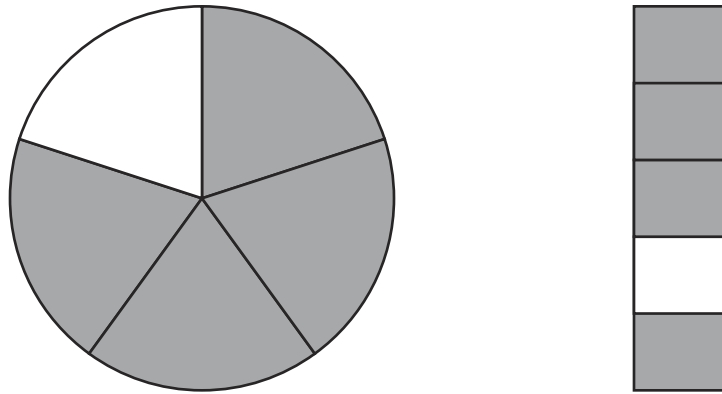


   Decimal numbers are numbers that can be written as fractions with denominators of 10; 100; 1,000; and so on.

* *Examples*

   $4\frac{6}{10}$ is read as "4 and 6 tenths" and is written in decimal form as 4.6.
   0.63 is read as "63 one hundredths" and is written in fraction form as $\frac{63}{100}$.
   2.005 is read as "2 and 5 one thousandths" and is written in fraction form as $2\frac{5}{1,000}$.

*Activity*
Fill in the table below either by writing the decimal number in words or in symbols.

| Symbols | Words |
|---|---|
| 0.8 | |
| 0.45 | |
| 3.11 | |
| | One and 6 tenths |
| | 4 one hundredths |

*Solutions*

| Symbols | Words |
|---------|-------|
| 0.8 | 8 tenths |
| 0.45 | 45 one hundredths |
| 3.11 | 3 and 11 one hundredths |
| 1.6 | One and 6 tenths |
| 0.04 | 4 one hundredths |

The even numbers are the following: { . . . -4, -2, 0, 2, 4, . . . }. These numbers are multiples of 2. We could also say that these numbers can be divided by 2 without a remainder.

The odd numbers are the following: {. . . -3, -1, 1, 3 . . . }. These numbers are not multiples of 2. Two will not divide these numbers.

A factor is a number that divides an integer without a remainder.
*   *Example*
    The factors of 20 are 1, 4, 5, 10, and 20. 3 is *not* a factor of 20.
    A multiple of an integer is the product of an integer and another integer.

*   *Example*
    The multiples of 6 are 0,+6, -6, +12, -12, and so on. Six would be a factor of +6, -6, +12, -12, etc.

*Activity*
1.    Write three factors of 12:

2.    Write three multiples of 12:

*Solutions*
1.    Any three of 1, 2, 3, 4, 6, or 12 is correct.

2.    Any that follow this pattern 12, 24, 36, 48 . . .

A prime number is an integer larger than one with only two factors: one and the number itself.
*   *Example*
    17 is a prime number. Only 1 and 17 are factors of 17. 14 is *not* a prime number. 14 has factors of 1, 2, 7, and 14. This number is called a composite number.

*Activity*

Below is a list of numbers in the table. Decide whether each is prime or composite. In each case, find the factors.

| Number | Prime/Composite | Factors |
|--------|-----------------|---------|
| 8 | | |
| 14 | | |
| 26 | | |
| 31 | | |
| 11 | | |

*Solutions*

| Number | Prime/Composite | Factors |
|--------|-----------------|---------|
| 8 | Composite | 1, 2, 4, 8 |
| 14 | Composite | 1, 2, 7, 14 |
| 26 | Composite | 1, 2, 13, 26 |
| 31 | Prime | 1, 31 |
| 11 | Prime | 1, 11 |

### Comparing and Ordering Numbers (P)

Comparing and ordering numbers is a basic idea for many computations in mathematics and for estimating reasonableness of answers to computations.

Place value is one way to order numbers. Place value gives the value of each digit, based on its position as the number is written.

- *Example*
  When we read 2,345.6789, we say "2 thousand 3 hundred forty five and 6 thousand 7 hundred eighty nine ten thousandths." The word *and* indicates where the decimal point goes.

| Thousands | Hundreds | Tens | Units | *and* | Tenths | Hundredths | Thousandths | Ten Thousandths |
|-----------|----------|------|-------|-------|--------|------------|-------------|-----------------|
| 2 | 3 | 4 | 5 | . | 6 | 7 | 8 | 9 |

Using place value, we can write the 2,345.6789 in expanded form as follows:
2,000 + 300 + 40 + 5 + 0.6 + 0.07 + 0.008 + 0.0009

*Activity*
Give the digit in the hundredths place for the number 358.401.

*Solution*
We would line up the number 358.401 as follows:

| Thousands | Hundreds | Tens | Units | *and* | Tenths | Hundredths | Thousandths | Ten Thousandths |
|---|---|---|---|---|---|---|---|---|
|  | 3 | 5 | 8 | . | 4 | 0 | 1 |  |

Answer: 0 is in the hundredths place.

*Activity*
Fill in the chart, writing the number or expanded form.

| Number | Expanded Form |
|---|---|
| 76.3 |  |
| 4.06 |  |
|  | 200 + 50 + 1 + 0.3 |
|  | 400 + 0.7 + 0.002 |

*Solutions*

| Number | Expanded Form |
|---|---|
| 76.3 | 70 + 6 + 0.3 |
| 4.06 | 4 + 0.06 |
| 251.3 | 200 + 50 + 1 + 0.3 |
| 400.702 | 400 + 0.7 + 0.002 |

To order numbers using place value, compare the place value of each digit.
*   *Example*
    Of the two numbers, 43.8 and 48.3, 43.8 is smaller than 48.3. Both numbers have 4 in the tens place, but the first number has 3 units and the second has 8 units. We can write 43.8<48.3.

*Activity*

Take the numbers in the first column, and place them in order from smallest to largest in the second column.

| Numbers | Ordered Numbers |
|---|---|
| 6, 80, 22 | |
| -8, 7, -2 | |
| 100, 10, 1000 | |
| 5.098, 5, 890 | |
| 756, 657 | |

*Solution*

| Numbers | Ordered Numbers |
|---|---|
| 6, 80, 22 | 6, 22, 80 |
| -8, 7, -2 | -8, -2, 7 |
| 100; 10; 1,000 | 10, 100, 1000 |
| 5.098; 5,890 | 5.098; 5,890 |
| 756, 657 | 657, 756 |

Another method used to order numbers is by their placement on the number line.
* *Example*
  3 is smaller (less than) 8 since it appears to the left of 8 on the number line.



$$-4 \qquad 0 \qquad 3 \qquad 8$$
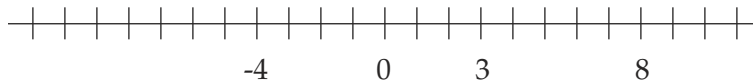
It is also true that 8>3. Using the number line above, since -4 is to the left of 3, -4<3 or we can say that 3>-4.

*Activity*

Place the following numbers on the number line in order from smallest to largest.

1. 6, -3, 5



2. 8, 6, -6



*Solutions*

1. 6, -3, 5



$$-3 \qquad\qquad 5 \quad 6$$

2. 8, 6, -6



$$-6 \qquad\qquad 6 \quad 8$$
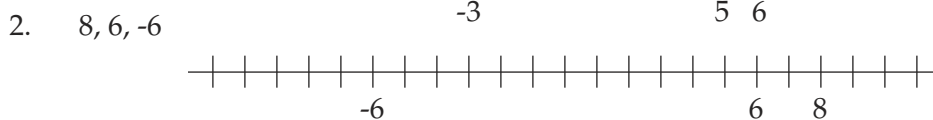
The symbol "<" is defined more specifically than "less than." Writing the statement 3<8 means the following: 3 plus some positive number will equal 8.

- *Examples*
  10<14 means 10 plus some positive number equals 14. (The positive number is 4.)
  10<14 also means that 14 minus 10 is a positive number.

*Activity*
Each statement below is incorrect. Rewrite the statement to make it a true statement. There can be more than one answer.

| Incorrect Statement | Corrected Statement |
|---|---|
| 5<11 means 5 minus 11 is a positive number. | |
| 54>45 means 45 plus some negative number equals 54. | |
| 17<23 means 23 plus some positive number equals 17. | |

*Solution*

| Incorrect Statement | Corrected Statement |
|---|---|
| 5<11 means 5 minus 11 is a positive number. | 5 plus some positive number is 11. |
| 54>45 means 45 plus some negative number equals 54. | 45 plus some positive number equals 54. |
| 17<23 means 23 plus some positive number equals 17. | 17 plus some positive number equals 23. |

### Basic Operations, Exponents, and Order of Operations for Whole Numbers [(R) (P) until exponents]
Addition is the most basic operation combining several numbers. Knowing the "100 facts" is a start in learning the method.

The following is the standard algorithm (a step-by step-procedure to find an answer) for addition.
1. Line the numbers in columns according to place values.
2. Add from right to left, carrying as needed.

- *Example*

$$54+3+166=\begin{cases} \overset{1}{\phantom{0}} \\ 54 \\ 3 \\ +166 \\ \hline 223 \end{cases}$$

Subtraction or "taking away" is performed as follows:
1. Line the numbers in columns according to place values.
2. Subtract from right to left, regrouping as needed.

- *Examples*

$$17-4=\left\{\begin{array}{l}17\\\underline{-4}\\13\end{array}\right.\quad\text{or}\qquad 35-18=\left\{\begin{array}{l}\overset{2\,1}{\cancel{3}5}\\\underline{-18}\\17\end{array}\right.$$

Multiplication is sometimes looked at as "repeated addition." Instead of adding 6 + 6 + 6, we can write 3 x 6, meaning " 3 times 6" or "6 added together 3 times." Knowing the "100 multiplication facts" is a start to reviewing this method.

Multiplication is performed as follows:

- *Example*
Multiply 23 x 65.
Place the numbers so that the unit's digits are lined up.

$$\begin{array}{r}23\\\times 65\end{array}$$

Multiply 23 x 5, carrying as shown.

$$\begin{array}{r}{\scriptstyle 1}\\23\\\times 65\\\hline 115\end{array}$$

Multiply 23 x 6, carrying and adjusting for 6 in the tens place.

$$\begin{array}{r}{\scriptstyle 1}\\23\\\times 65\\\hline 115\\138\end{array}$$

Finish the problem by adding 115 and 1,380, the partial products.

$$\begin{array}{r}{\scriptstyle 1}\\23\\\times 65\\\hline 115\\\underline{138\phantom{0}}\\1495\end{array}$$

Division can be looked at as repeated subtraction.

- *Example*
  Suppose 9 books are passed out to 4 children. Four is subtracted from 9 to give each child a book. Four is subtracted again to give each a second book, and there is 1 book left over.

  9 - 4 = 5   Four was subtracted 2 times. Since 4 can no longer be subtracted from 1, 1 is the
  5 - 4 = 1   remainder. This is written as 9 ÷ 4 = 2 with a remainder of 1.

The long division algorithm looks like the following.
- *Example*
  26 ÷ 6

$$
\begin{array}{r}
4 \\
6\overline{)\ 26} \\
-24 \\
\hline
2
\end{array}
$$

  6 can be subtracted from 26, 4 times. Then, 24 is subtracted from 26, leaving a remainder of 2.

Refer to the "Basic Operations"Handout for a related activity. (R)


### Exponents (P) (W)
Exponents are used for repeated multiplication.

- *Example*
  $4 \times 4 \times 4 = 64$ can be written as $4^3 = 64$.

*Activity*
Fill in the chart. The first problem has been done.

| Multiplication Form | Exponential Form | Simplified Form |
|---|---|---|
| 5 x 5 x 5 | $5^3$ | 125 |
| 3 x 3 x 3 x 3 | | |
| | $2^4$ | |
| | | 36 |

*Solutions*

| Multiplication Form | Exponential Form | Simplified Form |
|---|---|---|
| 5 x 5 x 5 | $5^3$ | 125 |
| 3 x 3 x 3 x 3 | $3^4$ | 81 |
| 2 x 2 x 2 x 2 | $2^4$ | 16 |
| 6 x 6 | $6^2$ | 36 |

### Distributing (P) (W)

Distribution is part of the basis for many algorithms.

- *Example*

     2
     24
     ×6
     144

     This algorithm is the same as writing 6 x (24). This is the same as 6 (20+4), and this is the same as 6 x 20 + 6 x 4. The point here is 6 (20+4) = 6 x 20 + 6 x 4.

- *Example*

     4 (7 + 3) = 4 x 7 + 4 x 3 = 28 + 12 = 40
     8 (7 - 4) = 8 x 7 - 8 x 4 = 56 - 32 = 24

### Activity

Fill in the columns. The first one is completed.

| Problem | Distributive Property | Answer |
|---|---|---|
| 3 (5 + 7) | 3 x 5 + 3 x 7 | 36 |
| 5 (10 - 2) | | |
| | 4 x 9 + 4 x 1 | |
| | 8 x 2 + 8 x 4 | |

### Solutions

| Problem | Distributive Property | Answer |
|---|---|---|
| 3 (5 + 7) | 3 x 5 + 3 x 7 | 36 |
| 5 (10 - 2) | 5 x 10 - 5 x 2 | 40 |
| 4 (9 + 1) | 4 x 9 + 4 x 1 | 40 |
| 8 (2 + 4) | 8 x 2 + 8 x 4 | 48 |

### Sample Problem

Dionne wrote the following: 3 (5 - 2) = 3 x 5 + 2

What should have Dionne written?
a.   3 (5 - 2) = 3 x 5 + 2 x 3
b.   3 (5 - 2) = 35 - 32
c.   3 (5 - 2) = 3 x 5 - 3 x 2
d.   Dionne wrote this correctly.
Answer: c.

## *Order of Operations (P) (W)*

When several operations are used in one expression, follow this specific order to perform the operations:
1.  Simplify inside parentheses.
2.  Simplify exponents.
3.  Perform multiplications and divisions as the problem is read.
4.  Lastly, perform additions and subtractions as the problem is read.

- *Example*

  $15 - 3^2 =$      First, simplify the exponents.

  $15 - 9=$      Second, perform the subtraction.

  6

- *Example*

  $3 (7 + 3) =$      First, simplify inside the parentheses.

  $3 (10) =$      Second, perform the multiplication.

  30

*Activity*

Simplify the following, using the correct order of operations.
1.  $5 (9 - 2) + 3$

2.  $3 + 2 (7 - 4)^3$

3.  $70 \div 10 + 4 \times 3$

*Solutions*

Simplify the following, using the correct order of operations.
1.  $5 (9 - 2) + 3 = 5 (7) + 3 = 35 + 3 = 38$

2.  $3 + 2 (7 - 4)^3 = 3 + 2 (3)^3 = 3 + 2 (27) = 3 + 54 = 57$

3.  $70 \div 10 + 4 \times 3 = 7 + 12 = 19$

*Sample Problem*

What is the first step in simplifying the problem given?
$8 + 2 (3 \times 5)$

a.  Multiply 2 times 3.
b.  Add 8 plus 2.
c.  Multiply 8 times 2.
d.  Multiply 3 times 5.
Answer: d.

Monica solved the following problem and found an answer of 15. What should the answer have been?
(3 + 2) x (4 - 1)

a.    8
b.    18
c.    7
d.    Monica was correct. The answer is 15.
Answer: d.

# Basic Operations (R)

Name _____

Perform the following computations as indicated. (A calculator is not permitted during the ParaPro Assessment. A calculator is permitted during the WorkKeys Assessment.)

1. 
$$456$$
$$+74$$

2. 
$$895$$
$$-45$$

3. 
$$5,673$$
$$+2,405$$

4. 
$$547$$
$$-318$$

5. $5\overline{)48}$

6. $642 \times 10$

7. 
$$40$$
$$\times 12$$

8. $21\overline{)488}$

9. 
$$254$$
$$\times 22$$

10. 
$$54$$
$$17$$
$$+81$$

11. $8\overline{)541}$

12. $12 + 504 + 8$

# Answer Key

Name _____

Perform the following computations as indicated. (A calculator is not permitted in the ParaPro Assessment. A calculator is permitted in the WorkKeys Assessment.)

1.
$$456$$
$$+74$$
$$530$$

2.
$$895$$
$$-45$$
$$850$$

3.
$$5,673$$
$$+2,405$$
$$8,078$$

4.
$$547$$
$$-318$$
$$229$$

5.
$$9, \text{r. } 3$$
$$5\overline{)48}$$

6. $642 \times 10$
$= 6,420$

7.
$$40$$
$$\times 12$$
$$480$$

8.
$$23, \text{r. } 5$$
$$21\overline{)488}$$

9.
$$254$$
$$\times 22$$
$$5,588$$

10.
$$54$$
$$17$$
$$+81$$
$$152$$

11.
$$67, \text{r. } 5$$
$$8\overline{)541}$$

12. $12 + 504 + 8$
$= 524$

### Forms of Numbers (R)

Equivalent fractions are fractions that name or mean the same amount.

- *Example*

  Since $\frac{4}{6}$ and $\frac{2}{3}$ represent the same part to whole,            $\frac{4}{6}$

  the fractions are equivalent and $\frac{4}{6} = \frac{2}{3}$.            $\frac{2}{3}$

Equivalent fractions can be created by multiplying or dividing the numerator and denominator by the same number.

- *Example*

$$\frac{6}{14} = \frac{6 \div 2}{14 \div 2} = \frac{3}{7} \text{ and } \frac{6}{14} = \frac{6 \times 2}{14 \times 2} = \frac{12}{28}$$

The three fractions $\frac{6}{14}$, $\frac{3}{7}$, and $\frac{12}{28}$ are equivalent.

### Activity

Write three equivalent fractions for each of the following:

1.   $\frac{4}{6}$

2.   $\frac{5}{2}$

3.   $\frac{14}{6}$

### Solutions

Write three equivalent fractions for each of the following:

1.   $\frac{2}{3}$, $\frac{8}{12}$, $\frac{10}{15}$ are some of the choices.

2.   $\frac{10}{4}$, $\frac{15}{6}$, $\frac{20}{8}$ are some of the choices.

3.   $\frac{7}{3}$, $\frac{21}{9}$, $\frac{28}{12}$ are some of the choices.

The same fraction can have several forms.

A mixed fraction is a combination of an integer and a fraction.

- *Example*

  5 $\frac{1}{3}$ is called a mixed fraction. To change 5 $\frac{1}{3}$ to $\frac{16}{3}$, multiply the whole number by the denominator, and add this to the numerator, placing this answer in the numerator of the fraction.

  That is, $5\frac{1}{3} = \frac{5 \times 3 + 1}{3} = \frac{16}{3}$ is called an improper fraction.

  To change the improper fraction, $\frac{16}{3}$ to the mixed fraction, 5 $\frac{1}{3}$, divide the denominator into the numerator, and put the remainder over the denominator.

*Operations with Fractions*

Adding fractions: To add fractions with the same denominator, add the numerators, and place over the common denominator.

• *Example*

$$\frac{3}{7}+\frac{5}{7}=$$

$$\frac{8}{7}=$$    Remember to put the final answer in mixed form if needed.

$$1\frac{1}{7}$$

• *Example*

$$6\frac{1}{3}+5\frac{2}{3}=$$    Add the whole numbers.

$$11\frac{3}{3}=$$    Then, add the fractions.

$$11+1=$$    Simplify.

$$12$$

*Adding Fractions with Different Denominators*

To add fractions with different denominators, rewrite fractions as equivalent fractions with the same denominator, and follow the previous example.

• *Example*

$$7\frac{2}{5}+3\frac{4}{3}=$$

$$7\frac{2\times3}{5\times3}+3\frac{4\times5}{3\times5}=$$    The fractions are rewritten with a common denominator.

$$7\frac{6}{15}+3\frac{20}{15}=$$    The whole number parts and fraction parts are added separately.

$$10\frac{26}{15}=$$    The fraction is simplified.

$$10+1\frac{11}{15}=$$

$$11\frac{11}{15}$$

Subtraction of fractions proceeds the same way as addition, unless regrouping is needed.
- *Example*

$$5\frac{1}{3} - 2\frac{2}{3} =$$

$$\left(4 + 1 + \frac{1}{3}\right) - 2\frac{2}{3} =$$

$$4 + \left(\frac{3}{3} + \frac{1}{3}\right) - 2\frac{2}{3} =$$

$$4\frac{4}{3} - 2\frac{2}{3} =$$

$$2\frac{2}{3}$$

Multiplying fractions is performed by changing fractions to their improper form, and then multiplying both numerators together and both denominators together.
- *Example*

$$4\frac{1}{5} \times 1\frac{2}{3} =$$

Fractions are changed to improper form.

Cancelling is done where appropriate.

$$\overset{7}{\cancel{\underset{5}{21}}} \times \overset{1}{\cancel{\underset{3}{5}}} =$$
$$\quad 1 \quad\quad 1$$

Numerators and denominators are multiplied together.

$$7$$

Division of fractions is carried out the same way, except the second fraction is inverted.
- *Example*

$$4\frac{1}{2} \div \frac{3}{4} =$$

$$\frac{9}{2} \div \frac{3}{4} =$$

Notice that the second fraction is inverted.

$$\overset{3}{\cancel{\underset{2}{9}}} \times \overset{2}{\cancel{\underset{3}{4}}} =$$
$$\quad 1 \quad\quad 1$$

$$6$$

See the "Operations with Fractions" Handout included in this part for a related activity. (R)

### *Percents*

- *Example*

  15% is read as "15 percent" or "15 parts per hundred." The fraction form is $^{15}/_{100}$, which can then be reduced to $^{3}/_{20}$. To write a fraction as a percent, reverse this process. First, rewrite the fraction with a denominator of 100; then replace the denominator by the percent sign.

- *Example*

  $$= \frac{12}{20} \quad \frac{12\times5}{20\times5} = \frac{60}{100} = 60\%$$

*Activity*

Fill in the table below with the missing forms.

| Percent | Fraction | Decimal |
|---------|----------|---------|
| 17 | | |
| 25 | | |
| | $^{3}/_{4}$ | |
| | | 0.44 |
| | | 1 |

*Solutions*

| Percent | Fraction | Decimal |
|---------|----------|---------|
| 17 | $^{17}/_{100}$ | 0.17 |
| 25 | $^{25}/_{100} = ^{1}/_{4}$ | 0.25 |
| 75 | $^{75}/_{100} = ^{3}/_{4}$ | 0.75 |
| 44 | $^{44}/_{100} = ^{11}/_{25}$ | 0.44 |
| 100 | $^{100}/_{100} = 1$ | 1 |

Many word problems require finding a percent of a given number.

- *Example*

  Find 70% of 50. Since 70% is equivalent to 0.7 or $^{7}/_{10}$, we can solve the problem with fractions or with decimal multiplication.

  0.7 x 50 = 35 or $^{7}/_{10}$ x 50 = 35

# Operations with Fractions (R)

Name _____

Perform the following operations as indicated.

1. $\frac{2}{7} + \frac{6}{7}$

2. $\frac{6}{10} + \frac{4}{5}$

3. $\frac{5}{8} - \frac{3}{8}$

4. $\frac{7}{10} - \frac{4}{6}$

5. $\frac{1}{3} \times \frac{5}{9}$

6. $4\frac{1}{2} + \frac{3}{4}$

7. $\frac{5}{6} \div \frac{5}{2}$

8. $\frac{9}{5} \div \frac{3}{10}$

9. $4\frac{1}{2} \times \frac{2}{5}$

10. $2\frac{1}{3} \div 2\frac{1}{6}$

# Answer Key

Name _____

Perform the following operations as indicated.

1. $\frac{2}{7} + \frac{6}{7} = 1\frac{1}{7}$

2. $\frac{6}{10} + \frac{4}{5} = 1\frac{2}{5}$

3. $\frac{5}{8} - \frac{3}{8} = \frac{1}{4}$

4. $\frac{7}{10} - \frac{4}{6} = \frac{1}{30}$

5. $\frac{1}{3} \times \frac{5}{9} = \frac{5}{27}$

6. $4\frac{1}{2} + \frac{3}{4} = 5\frac{1}{4}$

7. $\frac{5}{6} \div \frac{5}{2} = \frac{1}{3}$

8. $\frac{9}{5} \div \frac{3}{10} = 6$

9. $4\frac{1}{2} \times \frac{2}{5} = 1\frac{4}{5}$

10. $2\frac{1}{3} \div 2\frac{1}{6} = 1\frac{1}{13}$

### Estimation (P) (W)

Estimation helps to determine reasonableness of answers. Rounding numbers to the nearest whole, ten, or hundreds place value is a first step in learning this skill.

If the digit is 5 or above, add one to the digit in the next higher place value. If the value is 4 or below, do not change the digit in the next higher place value.

In both cases, replace any remaining digits to the right with 0.

- *Example*
  4,263.75 rounded to units is 4,264. Since 7 is greater than 5, we add 1 to the 3.

  4,263.75 rounded to thousands is 4,000. Since 2 is less than 5, keep the 4 and replace other digits with 0.

*Activity*
Round each number to the place indicated at the top of the column.

| Number | Rounded to Units | Rounded to Tens | Rounded to Tenths |
|--------|------------------|-----------------|-------------------|
| 45.37  |                  |                 |                   |
| 791.3  |                  |                 |                   |
| 7      |                  |                 |                   |
| 46.04  |                  |                 |                   |

*Solutions*

| Number | Rounded to Units | Rounded to Tens | Rounded to Tenths |
|--------|------------------|-----------------|-------------------|
| 45.37  | 45               | 50              | 45.4              |
| 791.3  | 791              | 790             | 791.3             |
| 7      | 7                | 10              | 7.0               |
| 46.04  | 46               | 50              | 46.0              |

Estimating answers to computations is accomplished by rounding each number in the problem, then computing with the rounded numbers. Sometimes, there are several choices for a reasonable estimate.

- *Examples*
  The answer to 52 x 19 can be found by multiplying 50 x 20. The estimated answer is 1,000.

  The answer to 472 + 18 can by found by adding 500 + 20. The estimated answer is 520. Adding 470 + 20 would also produce a reasonable estimate.

*Activity*
Cross off the estimates that are not reasonable for the given problem.

| | | | | | |
|---|---|---|---|---|---|
| 1. | 22 x 4 | Estimates: | 8 | 800 | 80 |
| 2. | 421 ÷ 8 | Estimates: | 40 | 50 | 5 |
| 3. | 7,802 - 409 | Estimates: | 7,400 | 760 | 8,400 |

*Solutions*

| | | | | | |
|---|---|---|---|---|---|
| 1. | 22 x 4 | Estimates: | ~~8~~ | ~~800~~ | 80 |
| 2. | 421 ÷ 8 | Estimates: | 40 | 50 | ~~5~~ |
| 3. | 7,802 - 409 | Estimates: | 7,400 | ~~760~~ | ~~8,400~~ |

- *Example*
  Anika is going on a class trip to Washington, DC, which is 367 miles from her school. The bus driver told the students that the bus had traveled 85 miles. Which one of the following is a reasonable estimate for the remaining distance?
  a.   300
  b.   500
  c.   4,000
  d.   4
  Answer: a.

## Evaluation
Evaluation for Part 2 is included as "Quiz #2."

# Quiz #2

Name _____

### *Instructions*
Complete the following problems. Show your work neatly on a separate sheet of paper.

### *Remember*
A calculator cannot be used on the ParaPro Assessment but can be used on the WorkKeys Assessment.

1. Circle the prime numbers in the list: 5, 9, 11, 13, 21

2. Simplify using the order of operations: 16 - 2 (4 + 1)

3. List three multiples of 4.

4. List all whole number factors of 16, including 1.

5. Add: $\frac{5}{6} + 1\frac{1}{2}$

6. Multiply: $\frac{2}{9} \times 3\frac{1}{2}$

7. Cross out the number that is *not* equal to the other two: 70%, 0.7, $\frac{7}{100}$.

8. Estimate the answer to the questions 12, 056 ÷ 213.

9. Subtract the following: 66.302 - 9.11.

10. Place the following in order from lowest to highest using place value: 4.9, 4.09, and 0.49.

11. Name the digit in the tenths position in the number 12.643.

12. Write two fractions that are equivalent to $\frac{8}{10}$.

13. Simplify, using order of operations: 4 (9 - 4) - 2 x 3².

14. Divide 182 by 4.

15. Which is the answer to the following problem: 5.03 - 0.4?
    a. 5.43
    b. 5.01
    c. 4.43
    d. 4.63

# Answer Key

Name _____

1.   5, 11, 13

2.   6

3.   4, 8, 12, 16, . . . Remember, only three multiples are needed.

4.   1, 2, 4, 8, 16

5.   $2\frac{1}{3}$

6.   $\frac{7}{9}$

7.   $\frac{\cancel{7}}{\cancel{100}}$

8.   12,000 ÷ 200 = 60 (Other estimates are possible.)

9.   57.192

10.  0.49<4.09<4.9

11.  6

12.  $\frac{4}{5} = \frac{16}{20} = \frac{32}{40}$

13.  2

14.  45, r. 2

15.  d.

## Supplemental Resources

For more information and games on approximation, see the following resource:
*   http://www.vendian.org/envelope/

For online activities, see the Virtual Manipulative Library at the following address:
*   http://matti.usu.edu/nlvm/nav/vlibrary.html

For information about definitions and basic math activities, see the following resource:
*   http://www.math.com/index.aspx

For information about definitions of basic math terms, see the following resource:
*   http://www.hbschool.com/glossary/math2/index4.html

To access a game, using equivalent fractions, see the following resource:
*   http://www.funbrain.com/fract/index.html

For information about definitions and skills for four basic operations for K-8, see the following resource:
*   http://www.aaamath.com/mul.html

For information about order of operations, rules, and activities, see the following resource:
*   http://amby.com/educate/ord-op/

## A Look Ahead

Now that basic mathematics skills have been covered, the manual now looks at topics such as unit analysis, organizing data, classroom applications, and calculator operations. Number sense is needed on both assessments. The ParaPro Assessment is more likely to emphasize number sense directly, and the WorkKeys Assessment is more likely to assume that paraprofessionals have these skills. WorkKeys will make use of a calculator and applications.

# Module 4 – Mathematics
*Part 3: Unit Analysis*

## Overview
In Module 4, Part 3, the paraprofessionals will learn about the following:
- Introduction to Units of Measurement (R)
- Linear Measurement (R)
- Measurements of Weight (R)
- Measurements of Volume (R)
- Measurements of Time (R)
- Converting Between Different Systems (R) (W)
- A Look Ahead

## Objectives
Following completion of Module 4, Part 3, the paraprofessionals will be able to . . .
- Convert linear measurements.
- Convert units of weight.
- Convert units of volume.
- Convert units of time.
- Convert units in different systems.

## Review
The first part of this module covered basic number sense. You reviewed different types of numbers and how to work with numbers, including order of operations. We deal with numbers on a daily basis, frequently in terms of measurements. Measurements generally contain two parts: (1) a numerical value and (2) a unit of measurement. Since you have already looked at how to manipulate numbers, we turn our attention now to working with different units of measurement.

## Lessons and Activities

### Introduction to Units of Measurement (R)
Many real-life objects are not exactly a perfect geometric shape. For example, the Earth is not quite a sphere. It is more of a squashed sphere—a little wider through the equator than through the poles. We can, however, get very good results by comparing such objects with others that are easier with which to work.

Another thing to remember is that applied problems (or word problems) will usually involve units of measurement. Be careful when dealing with units! Remember the concepts that you have already learned involving like terms. These same concepts apply when dealing with units. We can only add units that are the same. If we want to add a number measured in feet to a number measured in inches, one of the measures must be converted to the same units as the other. In addition, you must perform the same operations on units as on the numerical values. For example, if we want the area of a square that is 5 inches on each side, we write . . .
$A = s^2 = (5 \text{ inches})^2 = 5^2 \text{ inches}^2 = 25 \text{ in.}^2$

# Math

Length (one dimension) is always in single units like feet or inches; area (two dimensions) is always represented in square units; and volume (three dimensions) is always in cubic units. Units can be written out in words or abbreviated. For instance, square inches = $in^2$.

If it helps, you can treat operations on units just like you would with variables (these will be reviewed in Part 4). The same rules and procedures apply.

| Variables | Units |
|---|---|
| 2x + 3y<br>not like terms – can't add | 2 ft + 3 in<br>not the same units – can't add |
| 4w + 7w<br>like terms – add to get 11w | 4 yards + 7 yards<br>same units – add to get 11 yards |
| $3x + 5x^2$<br>not like terms – can't add | $3 ft + 5 ft^2$<br>not the same units – can't add |
| $(4x)^2$<br>distribute to get $4^2 x^2 = 16x^2$ | $(4 cm)^2$<br>distribute to get $4^2 cm^2 = 16 cm^2$ |

Some people like to leave off units when working a problem so that it is less cumbersome. This is fine as long as you know that the units line up correctly. Even so, your final answer should always include units if there are any.

### Linear Measurement (R)
In this section, we look at measurements of length. Particularly, we are interested in unit conversion.

Length can be measured in different types of units. The most commonly used units are English units and metric units.

*English Units of Length*
12 inches (in) = 1 foot (ft)
3 feet = 1 yard (yd)
5,280 feet = 1 mile (mi)

To convert from one type of unit of length to another, we can use unit ratios. A unit ratio is a ratio that equals 1. Since 12 in. = 1 ft., we have the unit ratios:

$$\frac{12 \text{ in}}{1 \text{ ft}} = \frac{1 \text{ ft}}{12 \text{ in}} = 1$$

*Unit Ratios for English Units of Length*

$$\frac{12 \text{ in}}{1 \text{ ft}} = \frac{1 \text{ ft}}{12 \text{ in}} = 1$$

$$\frac{3 \text{ ft}}{1 \text{ yd}} = \frac{1 \text{ yd}}{3 \text{ ft}} = 1$$

$$\frac{5280 \text{ ft}}{1 \text{ mi}} = \frac{1 \text{ mi}}{5280 \text{ ft}} = 1$$

Since the product of any quantity and 1 is always the same quantity, we can multiply any quantity by a unit ratio without changing that quantity. If we use the correct ratios, we can convert units.

- *Example*
    1. Convert 5 feet into inches.
    2. Convert 36 inches into feet.

- *Solutions*
    1.
    $$5 \text{ ft} = \frac{5 \text{ ft}}{1} \cdot \frac{12 \text{ in}}{1 \text{ ft}} = \frac{5 \ \cancel{\text{ft}}}{1} \cdot \frac{12 \text{ in}}{1 \ \cancel{\text{ft}}} = 60 \text{ in}$$

    2.
    $$36 \text{ in} = \frac{36 \text{ in}}{1} \cdot \frac{1 \text{ ft}}{12 \text{ in}} = \frac{36 \ \cancel{\text{in}}}{1} \cdot \frac{1 \text{ ft}}{12 \ \cancel{\text{in}}} = \frac{36 \text{ ft}}{12} = 3 \text{ ft}$$

Notice that in the first part of the example we use the ratio $^{12 \text{ in}}\!/_{1 \text{ ft}}$, but in the second part we use $^{1 \text{ ft}}\!/_{12 \text{ in}}$.

*Choosing Units of Measurement*
The units to which you are converting should be on top of the unit ratio, and the original units should be on the bottom of the unit ratio. Occasionally, more than one conversion fact (unit ratio) may be needed in order to convert units.

- *Example*
    1. Convert 1.5 miles into feet.
    2. Convert 6.25 yards into inches.

- *Solutions*
    1. Since we want to convert to feet, we should put feet in the top of the unit ratio. We are converting from miles, so we should put miles in the bottom of the unit ratio.

    $$1.5 \text{ mi} = \frac{1.5 \text{ mi}}{1} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} = \frac{1.5 \ \cancel{\text{mi}}}{1} \cdot \frac{5280 \text{ ft}}{1 \ \cancel{\text{mi}}} = 7920 \text{ ft}$$

    2. Here we need two conversions. First, we convert yards to feet, and then we convert feet to inches. This will require two unit ratios. When going from yards to feet, we put feet in the top and yards in the bottom. To go from feet to inches, we put inches in the top and feet in the bottom.

    $$6.25 \text{ yd} = \frac{6.25 \text{ yd}}{1} \cdot \frac{3 \text{ ft}}{1 \text{ yd}} \cdot \frac{12 \text{ in}}{1 \text{ ft}} = \frac{6.25 \ \cancel{\text{yd}}}{1} \cdot \frac{3 \ \cancel{\text{ft}}}{1 \ \cancel{\text{yd}}} \cdot \frac{12 \text{ in}}{1 \ \cancel{\text{ft}}}$$
    $$= (6.25)(3)(12) \text{ in} = 225 \text{ in}$$

Sometimes, lengths are expressed by combining more than one unit. For example, we might say that a person is 6 feet, 3 inches tall.

- *Examples*
  1.  6 ft., 3 in. = _____ in.
  2.  17,000 ft. = _____ mi., _____ ft.

- *Solutions*
  1.  6 ft, 3 in = 6 ft + 3 in = $\frac{6\,ft}{1} \bullet \frac{12\,in}{1\,ft}$ + 3 in = 72 in + 3 in = 75 in

  2.  Because there are 5,280 feet in 1 mile, we divide 17,000 by 5,280. We get 3 with a remainder of 1,160. Thus 17,000 ft. = 3 mi.; 1,160 ft.

Note: We divided above because $17,000\ ft = \dfrac{17,000\ ft}{1} \cdot \dfrac{1\ mi}{5280\ ft} = \dfrac{17,000}{5280}\ mi$

Sometimes we need to add or subtract mixed units. This can involve carrying or borrowing units.

- *Example*
  1.  Add: 3 ft, 8 in + 6 ft, 9 in
  2.  Subtract: 8 ft, 2 in - 6 ft, 9 in

- *Solution*
  1.  We begin by combining like units.

        3 ft 8 in
      + 6 ft 9 in
        9 ft 17 in

      But 17 inches is greater than a foot. So, we convert: 17 in = 1 ft, 5 in. Thus,
      3 ft, 8 in + 6 ft, 9 in = 9 ft, 17 in = 9 ft + 1 ft, 5 in = 10 ft, 5 in.

  2.  We begin by subtracting like units, beginning with the smallest units. We cannot take 9 inches from 2 inches, so we must borrow:

        8 ft, 2 in = 7 ft, 14 in
      -  6 ft, 9 in = -6 ft, 9 in
                      1 ft, 5 in

      Thus, 8 ft, 2 in - 6 ft, 9 in = 1 ft, 5 in.

We have looked at numerous examples of the English units of length. Metric units can be converted in a similar manner.

*Metric Units of Length*
1000 meters (m) = 1 kilometer (km)
100 centimeters (cm) = 1 meter
1000 millimeters (mm) = 1 meter
10 millimeters = 1 centimeter

Because they involve factors of 10, converting metric units is much easier than converting English units.

- *Examples*
  1. Convert 2.5 meters into centimeters.
  2. Convert 7,540 meters into kilometers.

- *Solutions*
  1.
  $$2.5 \text{ m} = \frac{2.5 \text{ m}}{1} \cdot \frac{100 \text{ cm}}{1 \text{ m}} = \frac{2.5 \text{ m}}{1} \cdot \frac{100 \text{ cm}}{1 \text{ m}} = 250 \text{ cm}$$

  2.
  $$7540 \text{ m} = \frac{7540 \text{ m}}{1} \cdot \frac{1 \text{ km}}{1000 \text{ m}} = \frac{7540 \text{ m}}{1} \cdot \frac{1 \text{ km}}{1000 \text{ m}} = \frac{7540}{1000} \text{ km} = 7.54 \text{ km}$$

### Measurements of Weight (R)

In this section, we look at measurements of weight. Once again, we are interested in unit conversion. The process for converting units in this section is the same as that in the last section. As was the case with measurements of length, weight can be measured in different types of units. The most commonly used units are English units and metric units.

*English Units of Capacity*
2000 pounds (lb) = 1 ton
16 ounces = 1 pound (lb)

As was the case with measurements of length, to convert from one type of unit of weight to another, we can use unit ratios.

*Unit Ratios for English Units of Weight*

$$\frac{16 \text{ oz}}{1 \text{ lb}} = \frac{1 \text{ lb}}{16 \text{ oz}} = 1$$

$$\frac{2000 \text{ lb}}{1 \text{ ton}} = \frac{1 \text{ ton}}{2000 \text{ lb}} = 1$$

Since the product of any quantity and 1 is always the same quantity, we can multiply any quantity by a unit ratio without changing that quantity. If we use the correct ratios, we can convert units.

- *Example*
  1. Convert 5.25 tons into pounds.
  2. Convert 172 ounces into pounds.

- *Solutions*
  1. $5.25 \text{ tons} = \dfrac{5.25 \text{ tons}}{1} \cdot \dfrac{2000 \text{ lb}}{1 \text{ tons}} = \dfrac{5.25 \ \cancel{\text{tons}}}{1} \cdot \dfrac{2000 \text{ lb}}{1 \ \cancel{\text{tons}}} = 10{,}500 \text{ lb}$

  2. $172 \text{ oz} = \dfrac{172 \text{ oz}}{1} \cdot \dfrac{1 \text{ lb}}{16 \text{ oz}} = \dfrac{172 \ \cancel{\text{oz}}}{1} \cdot \dfrac{1 \text{ lb}}{16 \ \cancel{\text{oz}}} = \dfrac{172 \text{ lb}}{16} = 10.75 \text{ oz}$

### Choosing the Unit of Measurement

Remember that the units to which you are converting should be on top of the unit ratio and the original units should be on the bottom of the unit ratio.

Occasionally, more than one conversion fact (unit ratio) may be needed in order to convert units.

- *Example*
  Convert 2 tons into ounces.

- *Solution*

$$2 \text{ ton} = \frac{2 \text{ ton}}{1} \cdot \frac{2000 \text{ lb}}{1 \text{ ton}} \cdot \frac{16 \text{ oz}}{1 \text{ lb}} = \frac{2 \ \cancel{\text{ton}}}{1} \cdot \frac{2000 \ \cancel{\text{lb}}}{1 \ \cancel{\text{ton}}} \cdot \frac{16 \text{ oz}}{1 \ \cancel{\text{lb}}} = (2)(2000)(16) \ \text{oz} = 64{,}000 \text{ oz}$$

Sometimes, weights are expressed using more than one unit. For example, we might say that a newborn baby weighs 8 pounds, 10 ounces.

- *Examples*
  1. 8 lb, 10 oz = _____ oz
  2. 11,542 lb = _____ tons, _____ lb

- *Solutions*
  1. $8 \text{lb}, 10 \text{ oz} = 8 \text{ lb} + 10 \text{ oz} = \frac{8 \text{ lb}}{1} \bullet \frac{16 \text{ oz}}{1 \text{ lb}} + 10 \text{ oz} = 128 \text{ oz} + 10 \text{ oz} = 138 \text{ oz}$

  2. Because there are 2,000 pounds in a ton, we divide 11,542 by 2000. We get 5 with a remainder of 1542. Thus, 11,542 lb = 5 tons, 1542 lb.

  Note: We divided above because $11{,}542 \text{ lb} = \dfrac{11{,}542 \text{ lb}}{1} \cdot \dfrac{1 \text{ ton}}{2000 \text{ lb}} = \dfrac{11{,}542}{2000} \text{ lb}$

Sometimes, we need to add or subtract mixed units. This can involve carrying or borrowing units.

- *Examples*
  1. Add: 5 lb, 8 oz + 10 lb, 9 oz
  2. Subtract: 5 tons, 325 lb - 2 tons, 1218 lb

- *Solutions*
    1.  We begin by combining like units.

        ```
          5 lb    8 oz
        +10 lb   9 oz
         15 lb   17 oz
        ```

        But 17 ounces is greater than a pound. So, we convert 17 oz = 1 lb, 1 oz. Thus,
        5 lb, 8 oz + 10 lb, 9 oz = 15 lb, 17 oz = 15 lb + 1 lb 1 oz = 16 lb, 1 oz

    2.  We begin by subtracting like units, beginning with the smallest units, but we cannot take 1,218 pounds from 325 pounds, so we must borrow:

        ```
          5 ton   325 lb    =    4 ton   2,325 lb
        - 2 ton   1,218 lb = -   2 ton   1,218 lb
                            =    2 ton   1,107 lb
        ```

        Thus, 5 ton, 325 lb - 2 ton, 1,218 lb = 2 ton, 1107 lb.

We have looked at numerous examples with the English units of weight. Metric units can be converted in a similar manner.

*Metric Units of Weight*
1000 grams (g) = 1 kilogram (kg)
1000 milligrams (mg) = 1 gram

Because they involve factors of 10, converting metric units is much easier than converting English units.

- *Example*
    1.  Convert 3.7 grams into milligrams.
    2.  Convert 5,230 grams into kilograms.

- *Solution*
    1.
        $$3.7 \text{ g} = \frac{3.7 \text{ g}}{1} \cdot \frac{1000 \text{ mg}}{1 \text{ g}} = \frac{3.7 \text{ g}}{1} \cdot \frac{1000 \text{ mg}}{1 \text{ g}} = 3700 \text{ mg}$$

    2.
        $$5230 \text{ g} = \frac{5230 \text{ g}}{1} \cdot \frac{1 \text{ kg}}{1000 \text{ g}} = \frac{5230 \text{ g}}{1} \cdot \frac{1 \text{ kg}}{1000 \text{ g}} = \frac{5230}{1000} \text{ kg} = 5.23 \text{ kg}$$

### Measurements of Volume (R)
In this section, we continue along the same lines as the previous sections but focus on measurements of volume instead.

*English Units of Volume*
1 gallon (gal) = 4 quarts (qt)
1 quart (qt) = 2 pints (pt)
1 pint (pt) = 2 cups (c)
1 cup (c) = 8 fluid ounces (fl oz)

We again use unit ratios to convert from one unit to another.

*Unit Ratios for English Units of Volume*

$$\frac{1 \text{ gal}}{4 \text{ qt}} = \frac{4 \text{ qt}}{1 \text{ gal}} = 1 \qquad \frac{1 \text{ qt}}{2 \text{ pt}} = \frac{2 \text{ pt}}{1 \text{ qt}} = 1$$

$$\frac{1 \text{ pt}}{2 \text{ c}} = \frac{2 \text{ c}}{1 \text{ pt}} = 1 \qquad \frac{1 \text{ c}}{8 \text{ fl oz}} = \frac{8 \text{ fl oz}}{1 \text{ c}} = 1$$

Since the product of any quantity and 1 is always the same quantity, we can multiply any quantity by a unit ratio without changing that quantity. If we use the correct ratios, we can convert units.

- *Examples*
    1. Convert 44 c to pints.
    2. Convert 5 gal to quarts.

- *Solutions*
    1.
    $$\frac{44 \cancel{c}}{1} \cdot \frac{1 \text{ pt}}{2 \cancel{c}} = \frac{44}{2} \text{ pt} = 22 \text{ pt}$$

    2.
    $$\frac{5 \cancel{\text{gal}}}{1} \cdot \frac{4 \text{ qt}}{1 \cancel{\text{gal}}} = 5 \cdot 4 \text{ qt} = 20 \text{ qt}$$

Occasionally, more than one unit ratio may be needed in order to convert units.

- *Examples*
    1. Convert 56 c to quarts.
    2. Convert 2 gal to cups.

- *Solutions*
    1.
    $$\frac{56 \cancel{c}}{1} \cdot \frac{1 \cancel{\text{pt}}}{2 \cancel{c}} \cdot \frac{1 \text{ qt}}{2 \cancel{\text{pt}}} = \frac{56}{2 \cdot 2} \text{ qt} = \frac{56}{4} \text{ qt} = 14 \text{ qt}$$

    2.
    $$\frac{2 \cancel{\text{gal}}}{1} \cdot \frac{4 \cancel{\text{qt}}}{1 \cancel{\text{gal}}} \cdot \frac{2 \cancel{\text{pt}}}{1 \cancel{\text{qt}}} \cdot \frac{2 \text{ c}}{1 \cancel{\text{pt}}} = 2 \cdot 4 \cdot 2 \cdot 2 \text{ c} = 32 \text{ c}$$

Sometimes, volumes are expressed using more than one unit. For example, we might say that a jar can hold 2 cups, 4 fluid ounces.

- *Examples*
  1. 3 c, 4 fl oz = _____ fl oz

  2. 5 qt, 1 pt = _____ pt

- *Solutions*
  1. $3 \text{ c } 4 \text{ fl oz} = 3 \text{ c} + 4 \text{ fl oz} = \dfrac{3 \cancel{c}}{1} \cdot \dfrac{8 \text{ fl oz}}{1 \cancel{c}} + 4 \text{ fl oz} = 24 \text{ fl oz} + 4 \text{ fl oz} = 28 \text{ fl oz}$

  2. $5 \text{ qt } 1 \text{ pt} = 5 \text{ qt} + 1 \text{ pt} = \dfrac{5 \cancel{qt}}{1} \cdot \dfrac{2 \text{ pt}}{1 \cancel{qt}} + 1 \text{ pt} = 10 \text{ pt} + 1 \text{ pt} = 11 \text{ pt}$

Sometimes, we need to add or subtract mixed units. This can involve carrying or borrowing units.

- *Examples*
  1. Add: 1 gal, 2 qt + 2 gal, 3 qt
  2. Subtract: 3 c, 5 oz - 1 c, 6 oz

- *Solutions*
  1. We begin by combining like units:

     ```
       1 gal,  2 qt
     +2 gal,  3 qt
       3 gal,  5 qt
     ```

     Since there are 4 quarts in a gallon, we convert 5 quarts to 1 gal 1 qt. Thus, 1 gal, 2 qt + 2 gal, 3 qt = 3 gal, 5 qt = 4 gal, 1 qt

  2. We begin by combining like units, but we can't subtract 6 oz from 5 oz, so we need to borrow:

     ```
       3 c,  5 oz  =    2 c,  13 oz
     +1 c,  6 oz  = -  1 c,   6 oz
                  =    1 c,   7 oz
     ```

     So, 3 c, 5 oz - 1 c, 6 oz = 1 c, 7 oz.

Now we look at some metric units of volume.

*Metric Units of Volume*
1 milliliter (mL) = 1 cm³
1 liter (L) = 1,000 milliliters
1 kiloliter (kL) = 1,000 liters

Because they involve factors of 10, converting metric units is much easier than converting English units.

- *Examples*
  1. Convert 4,300 L to kiloliters.
  2. Convert 3,500 mL to liters.

- *Solutions*
  1.
  $$\frac{4300 \ \cancel{L}}{1} \cdot \frac{1 \ kL}{1000 \ \cancel{L}} = \frac{4300}{1000} \ kL = 4.3 \ kL$$

  2.
  $$\frac{3500 \ \cancel{mL}}{1} \cdot \frac{1 \ L}{1000 \ \cancel{mL}} = \frac{3500}{1000} \ L = 3.5 \ L$$

### Measurements of Time (R)

We finish off our review of basic units of measurement by considering units of time.

*Basic Units of Time*
1 year (yr) = 365 days
1 week (wk) = 7 days
1 day (d) = 24 hours (hrs)
1 hour = 60 minutes (min)
1 minute = 60 seconds (s)

*Unit Ratios for Units of Time*

$$\frac{1 \ yr}{365 \ d} = \frac{365 \ d}{1 \ yr} = 1 \qquad\qquad \frac{1 \ wk}{7 \ d} = \frac{7 \ d}{1 \ wk} = 1$$

$$\frac{1 \ d}{24 \ hr} = \frac{24 \ hr}{1 \ d} = 1 \qquad\qquad \frac{1 \ hr}{60 \ min} = \frac{60 \ min}{1 \ hr} = 1$$

$$\frac{1 \ min}{60 \ sec} = \frac{60 \ sec}{1 \ min} = 1$$

Since the product of any quantity and 1 is always the same quantity, we can multiply any quantity by a unit ratio without changing that quantity. If we use the correct ratios, we can convert units.

- *Examples*
  1. Convert 3 wk to days.
  2. Convert 420 s to minutes.

- *Solutions*
  1.
  $$\frac{3 \ \cancel{wk}}{1} \cdot \frac{7 \ d}{1 \ \cancel{wk}} = 3 \cdot 7 \ d = 21 \ d$$

  2.
  $$\frac{420 \ \cancel{s}}{1} \cdot \frac{1 \ min}{60 \ \cancel{s}} = \frac{420}{60} \ min = 7 \ min$$

Occasionally, more than one unit ratio may be needed in order to convert units.

- *Examples*
  1. Convert 3 days to minutes.
  2. Convert 180,000 s to hours.

- *Solutions*
  1.
  $$\frac{3 \ \cancel{d}}{1} \cdot \frac{24 \ \cancel{hr}}{1 \ \cancel{d}} \cdot \frac{60 \ min}{1 \ \cancel{hr}} = 3 \cdot 24 \cdot 60 \ min = 4320 \ min$$

  2.
  $$\frac{180,000 \ \cancel{s}}{1} \cdot \frac{1 \ \cancel{min}}{60 \ \cancel{s}} \cdot \frac{1 \ hr}{60 \ \cancel{min}} = \frac{180,000}{60 \cdot 60} \ hr = \frac{180,000}{3600} \ hr = 50 \ hr$$

Sometimes, time is expressed using more than one unit. For example, we might say that a show lasted 2 hours, 10 minutes.

- *Examples*
  1. 2 hr, 20 min = _____ min
  2. 4 d, 6 hr = _____ hr

- *Solutions*
  1. $2 \ hr \ 20 \ min = 2 \ hr + 20 \ min = \dfrac{2 \ \cancel{hr}}{1} \cdot \dfrac{60 \ min}{1 \ \cancel{hr}} + 20 \ min = 120 \ min + 20 \ min = 140 \ min$

  2. $4 \ d \ 6 \ hr = 4 \ d + 6 \ hr = \dfrac{4 \ \cancel{d}}{1} \cdot \dfrac{24 \ hr}{1 \ \cancel{d}} + 6 \ hr = 96 \ hr + 6 \ hr = 102 \ hr$

Sometimes we need to add or subtract mixed units. This can involve carrying or borrowing units.

- *Examples*
  1. Add: 3 hr, 30 min + 2 hr, 40 min
  2. Subtract: 4 hr, 20 min - 2 hr, 40 min

- *Solutions*
  1. We begin by combining like units:

     ```
       3 hr,   30 min
     +2 hr,   40 min
       5 hr,   70 min
     ```

     Since 70 minutes is more than 1 hour, we get 70 min = 1 hr, 10 min. Thus, 3 hr, 30 min = 2 hr, 40 min = 5 hr, 70 min = 6 hr, 10 min.

  2. Begin by collecting like units. Since we can't subtract 40 minutes from 30 minutes, we need to borrow.

     ```
       4 hr,   20 min  =  3 hr,   80 min
     +2 hr,   40 min  =  2 hr,   40 min
       5 hr,   70 min  =  1 hr,   40 min
     ```

     So, 4 hr, 20 min - 2 hr, 40 min = 1 hr, 40 min.

### Converting Between Different Systems (R) (W)

We have referenced English units throughout this part of the module. In fact, the United States is one of very few countries that do not use the metric system (SI units). Even Great Britain has switched to the metric system, so the "English" system is really more of the "American" system. Almost all scientific measurements are done using the metric system, so it is important to know how to convert between the two systems. The idea is the same as converting within the same system: you need to use unit ratios. The following table gives a summary of some conversions.

| English | Metric |
|---------|--------|
| 1 in | 2.54 cm (exact) |
| 1 lb | 0.454 kg |
| 1 qt | 0.946 L |

- *Examples*
  1. Convert 2 ft to centimeters.
  2. Convert 2 gal to liters.

- *Solutions*
  1.
  $$\frac{2 \text{ ft}}{1} \cdot \frac{12 \text{ in}}{1 \text{ ft}} \cdot \frac{2.54 \text{ cm}}{1 \text{ in}} = 2 \cdot 12 \cdot 2.54 \text{ cm} = 60.96 \text{ cm}$$

  2.
  $$\frac{2 \text{ gal}}{1} \cdot \frac{4 \text{ qt}}{1 \text{ gal}} \cdot \frac{0.946 \text{ L}}{1 \text{ qt}} = 2 \cdot 4 \cdot (0.946) \text{ L} = 7.568 \text{ L}$$

**Note:** This discussion of units of measurement is not complete. There are many units that have not been included. We have focused on the basic units that you will encounter. Remember that the WorkKeys Assessment will include a formula sheet that has some basic unit conversions.

## A Look Ahead

So far, we have been looking at the basics of numbers, number relationships, and units. The majority of the rest of the module focuses on problem solving and formulas. Each part contains techniques and skills that will be helpful in the parts that follow. Remember that math knowledge builds on previous skills. The stronger your foundation, the more sure-footed you will be!

## Sample Test Questions

These questions are examples of what might appear on the ParaPro Assessment. The WorkKeys math portion is all word problems, but you will need the skills covered in this section to help you solve those problems.

1.  How many pounds of ground beef must be purchased by Food Service to make 120, 5-oz burgers?
    a.  16 lb
    b.  21 lb
    c.  38 lb
    d.  60 lb

2.  To get electrical power to a pool's water pump, 59 feet of wire is needed. About how many meters is this?
    a.  10 m
    b.  18 m
    c.  34 m
    d.  59 m

3.  Convert 12 pt to quarts.
    a.  3 qt
    b.  6 qt
    c.  24 qt
    d.  96 qt

4.  Convert 25 yards to feet.
    a.  75 ft
    b.  225 ft
    c.  300 ft
    d.  900 ft

5.  Convert 4,500 lb to tons.
    a.  1 $\frac{4}{5}$ tons
    b.  2 $\frac{1}{4}$ tons
    c.  3 tons
    d.  4 $\frac{1}{2}$ tons

## Solutions

1.
$$120 \cdot 5 \text{ oz} = 600 \text{ oz}$$

$$\frac{600 \text{ oz}}{1} \cdot \frac{1 \text{ lb}}{16 \text{ oz}} = \frac{600}{16} \text{ lb} = 37.5 \text{ lb}$$

Answer c. is correct.

2.
$$\frac{59 \text{ ft}}{1} \cdot \frac{12 \text{ in}}{1 \text{ ft}} \cdot \frac{2.54 \text{ cm}}{1 \text{ in}} \cdot \frac{1 \text{ m}}{100 \text{ cm}} = \frac{59 \cdot 12 \cdot 2.54}{100} \text{ m}$$

$$= \frac{1798.32}{100} \text{ m} \approx 17.98 \text{ m}$$

Answer b. is correct.

3.
$$\frac{12 \text{ pt}}{1} \cdot \frac{1 \text{ qt}}{2 \text{ pt}} = \frac{12}{2} \text{ qt} = 6 \text{ qt}$$

Answer b. is correct.

4.
$$\frac{25 \text{ yd}}{1} \cdot \frac{3 \text{ ft}}{1 \text{ yd}} = 25 \cdot 3 \text{ ft} = 75 \text{ ft}$$

Answer a. is correct.

5.
$$\frac{4500 \text{ lb}}{1} \cdot \frac{1 \text{ ton}}{2000 \text{ lb}} = \frac{4500}{2000} \text{ ton} = \frac{9}{4} \text{ ton} = 2\frac{1}{4} \text{ ton}$$

Answer b. is correct.

## Evaluation

Students can be evaluated by using Quiz #3. Students could work together to practice classroom instruction.

## Supplemental Resources

For activities related to converting units, see the following resources:

- Conversion Tool (Convert-me.com) – http://www.convert-me.com/en/

- Converting units of length (@school) – http://www.atschool.co.uk/activity/activity4.asp?Act5Back=%2FSubject%2FSubject%2Easp%3FOpenLinks%3D8705%23block8705

- Reading scales (@school) – http://www.atschool.co.uk/activity/activity4.asp?Act5Back=%2FSubject%2FSubject%2Easp%3FOpenLinks%3D8705%23block8705

- Math matching - measures (Harcourt) – http://www.harcourtschool.com/activity/con_math/g05c14.html

- Measure resource page (Measure 4 Measure) – http://www.wolinskyweb.net/measure.htm

# Quiz #3

(Round answers to three decimal places if necessary.)

1.    Convert 6,300 mL to liters.


2.    Convert 5.8 m to centimeters.


3.    Convert 93,000 centimeters to kilometers.


4.    Convert 3 d, 4 hr to seconds.


5.    Convert 378 s to minutes.


6.    Convert 75 in to feet.


7.    Convert 2 mi to meters.


8.    Convert 13 L to gallons.


9.    Convert 56 c to gallons.


10.   Convert 36 oz to pounds.


11.   The first atomic weapon test was on July 16, 1945. The first atomic bomb was dropped on
      August 6, 1945. About how many minutes elapsed between the two events?


12.   As of 1990, the N-Reactor at the Hanford Nuclear Reservation in Washington state had
      produced about 60,500 kg of plutonium. About how many pounds is that?

# Answer Key

1. 6.3 L

2. 580 cm

3. 0.93 km

4. 273,600 s

5. 6.3 min

6. 6.25 ft

7. 3218.688 m

8. 3.434 gal

9. 3.5 gal

10. 2.25 lb

11. About 30,240 min

12. About 133,260 lb

# Module 4 – Mathematics
*Part 4: Basic Algebra Review and Number Sequences*

## Overview
In Module 4, Part 4, the paraprofessionals will learn about the following:
- What is algebra? (R)
- Variables and constants (W) (P)
- Solving linear equations (W) (P)
- Checking solutions (W) (P)
- Simple number patterns and graphical trends (P)

## Objectives
Following completion of Module 4, Part 4, the paraprofessionals will be able to . . .
- distinguish between variables and constants.
- solve linear equations involving one or more steps.
- check solutions to linear equations.
- identify number and graphical patterns and determine the next term.

## Review
In Part 2 of this module, you focused your attention on reviewing numbers and operations with numbers. Knowing how to work with numbers is fundamental to working with algebraic expressions. Regardless of which assessment you take, WorkKeys or ParaPro, you will encounter some basic algebra. In this section, we will examine operations involving letters and numbers (the basics of algebra). We will also look at how to recognize number patterns and extend those patterns.

## Lessons and Activities

### What Is Algebra? (R)
Algebra is the branch of mathematics that uses symbols to stand for unknown quantities and solves for these unknowns by means of basic arithmetic operations. In Part 2 of this module, you dealt with numbers only, and you always knew what the values were. Algebra allows us to deal with unknown values by expressing them with letters or symbols.

If you were asked to evaluate 4 + 5 - 8 + 2, you might start by writing: 4 + 5 - 8 + 2 = ?

Since you don't know the answer right away, we consider it an unknown value. Instead of using a question mark, in algebra, we would use a letter such as x (4 + 5 - 8 + 2 = x).

The goal is still the same—we want to know the value of x. This is the same as asking for the value of 4 + 5 - 8 + 2.

That is one of the goals of algebra—to use symbols to abbreviate statements. This is particularly true in word problems, which you will see in a later part.

### \Variables and Constants (W) (P)

A variable is a quantity that changes value or is not known (e.g., x, y, or z).

A constant is a value that never changes (e.g., $-2, \sqrt{3}, \frac{1}{3}$, or 5).

When working with algebra, it is important to distinguish between variables and constants. Usually this is pretty easy since constants are generally numbers, and variables are typically represented by letters. There are cases, however, in which letters are used to represent constants. The only one you need to worry about right now is pi, $\pi$. This is a Greek letter, but it is used to represent a special constant: $\pi = 3.141592654 \ldots$ . You will see this later in the geometry part of this module.

Let's look at the difference:
The expression $x + 3$ is considered a variable expression because it contains the variable x. We don't know exactly what value this expression is equal to since we don't know the value of x. Each different value for x gives us a different value for the expression.

| x | x + 3 |
|---|-------|
| 1 | 1 + 3 = 4 |
| 2 | 2 + 3 = 5 |
| 3 | 3 + 3 = 6 |

The expression $5 + 9$ is considered a numeric expression because it only contains numbers (which are constants). We know exactly what this value is, and it never changes ($5 + 9 = 14$).

### Solving Linear Equations (W) (P)

Understanding the difference between variables and constants is important to solving linear equations. A linear equation in one variable is any equation that can be written in the form $ax + b = 0$ where a and b are constants (a = 0) and x is the variable of interest. For both the WorkKeys and ParaPro Assessments, you will usually be limited to solving linear equations in one variable.

To solve a linear equation, we need to *isolate the variable* of interest using basic math operations. This means we want to keep the variable on one side of the equation and put all the constants on the other side.

To isolate a variable, we really only need to remember two things:
1.    What you do to one side, you need to do to the other.
2.    To move something to the other side, perform the opposite operation.

| Operation | Opposite |
|-----------|----------|
| addition | subtraction |
| subtraction | addition |
| multiplication | division |
| division | multiplication |

So, let's look at a few examples of how to solve a linear equation.

- *Example*
  Solve each of the following equations:
  1.  x + 2 = 7

  2.  x - 12 = 5

  3.  6x = 138

  4.  $x/4 = 6$

  5.  $4/7 x = 3/28$

- *Solution*
  1.  $$x + 2 = 7$$
      $$x + 2 - 2 = 7 - 2 \quad \text{subtract 2 from both sides}$$
      $$x = 5$$

  2.  $$x - 12 = 5$$
      $$x - 12 + 12 = 5 + 12 \quad \text{add 12 to both sides}$$
      $$x = 17$$

  3.  $$6x = 138$$
      $$\frac{6x}{6} = \frac{138}{6} \quad \text{divide both sides by 6}$$
      $$\frac{\cancel{6}^1 x}{\cancel{6}_1} = \frac{\cancel{138}^{23}}{\cancel{6}_1} \quad \text{cancel like factors}$$
      $$x = 23$$

  4.  $$\frac{x}{4} = 6$$
      $$4 \cdot \frac{x}{4} = 4 \cdot 6 \quad \text{multiply both sides by 4}$$
      $$x = 24$$

  5.  $$\frac{4}{7}x = \frac{3}{28}$$
      $$\frac{7}{4} \cdot \frac{4}{7}x = \frac{7}{4} \cdot \frac{3}{28} \quad \text{multiply by reciprocal of } x \text{ coefficient}$$
      $$\frac{\cancel{7}^1}{\cancel{4}_1} \cdot \frac{\cancel{4}^1}{\cancel{7}_1}x = \frac{\cancel{7}^1}{4} \cdot \frac{3}{\cancel{28}_4} \quad \text{cancel like factors}$$
      $$x = \frac{3}{16}$$

These examples were one-step problems. That is, the equation could be solved by performing one basic operation. But what if the equation is more involved? There is no need to fear! Just do one thing at a time! Rushing through the work is a common source of mistakes. Take your time!

**Hint:** Remember to distribute when you have expressions grouped in parentheses!

When you multiply a number (or variable) by an expression in parentheses, you need to distribute that multiplication to each term in the parentheses. Some examples follow:

$$3(x+2) = 3 \cdot x + 3 \cdot 2 = 3x + 6 \qquad -2(x-3) = (-2)(x) - (-2)(3) = -2x + 6$$

$$-(2+x) = -1(2) + (-1)x = -2 - x$$

When more than one step is required, it is often best to use the following approach:
1. Isolate the variable term first (the term with the variable in it).
2. Perform the one-step operation to isolate the variable.

*Fractions*
A lot of people panic at the sight of fractions, but do not let them intimidate you. You can get rid of the fractions by multiplying both sides of the equation by the least common denominator. Remember, as long as you do the same thing to both sides, you maintain the equality.

- *Examples*
  Solve each of the following equations:
  1. $3x + 2 = 8$

  2. $\frac{x}{2} + 3 = 7$

  3. $13 - (3 - x) = 5$

  4. $3(x - 4) + 2(x + 6) = 5$

  5. $\frac{1}{2}(x + 6) - \frac{1}{3}(9 - 2x) = 8$

- *Solutions*
  1. $3x + 2 = 8$
     $3x + 2 - 2 = 8 - 2$   subtract 2 from both sides
     $3x = 6$   simplify
     $\frac{3x}{3} = \frac{6}{3}$   divide both sides by 3
     $x = 2$

2. $\dfrac{x}{2} + 3 = 7$

$\dfrac{x}{2} + 3 - 3 = 7 - 3$    subtract 3 from both sides

$\dfrac{x}{2} = 4$    simplify

$2 \cdot \dfrac{x}{2} = 2 \cdot 4$    multiply both sides by 2

$x = 8$

3. $13 - (3 - x) = 5$

$13 - 3 + x = 5$    distribute

$10 + x = 5$    simplify

$10 + x - 10 = 5 - 10$    subtract 10 from both sides

$x = -5$

4. $3(x - 4) + 2(x + 6) = 5$

$3x - 12 + 2x + 12 = 5$    distribute

$5x = 5$    simplify

$\dfrac{5x}{5} = \dfrac{5}{5}$    divide both sides by 5

$\dfrac{\cancel{5}^{1}x}{\cancel{5}_{1}} = \dfrac{\cancel{5}^{1}}{\cancel{5}_{1}}$    cancel like factors

$x = 1$

5. $\dfrac{1}{2}(x + 6) - \dfrac{1}{3}(9 - 2x) = 8$

$6 \cdot \left[ \dfrac{1}{2}(x + 6) - \dfrac{1}{3}(9 - 2x) \right] = 6 \cdot 8$    multiply both sides by 6 (the LCD), and distribute

$3(x + 6) - 2(9 - 2x) = 48$    distribute

$3x + 18 - 18 + 4x = 48$    simplify

$7x = 48$

$\dfrac{7x}{7} = \dfrac{48}{7}$    divide both sides by 7

$x = \dfrac{48}{7}$

Okay, not too bad so far. Some got a little messy, but we took things one step at a time. Can it get any worse? The answer is yes, a little. But just take things slowly, and there should be little difficulty.

*What if the Variable Is on the Right Side?*
This is not a problem because the equal sign lets us switch the sides if we want. That is, 2 = x + 4 is the same as x + 4 = 2. If you prefer to have the variable on one particular side, go ahead and switch the sides.

*What if the Variable Is on Both Sides?*

Again, this is not a problem. It just means a few more steps. Remember to do one thing at a time. The following approach might be helpful:
1. Move all the variable terms to one side (remember it doesn't matter which side you pick).
2. Move all the constants to the other side.
3. Isolate the variable.

- *Examples*
  Solve each of the following equations:
  1. 3x + 4 = 2 - x

  2. 3x - 5 = 2x + 6

  3. 5 - 8x = -4x

  4. 3 (x - 5) + 6 = 4 (1 - x )

  5. ½x + ¾ = ⅔x - 1

- *Solutions*
  1.
  $$3x + 4 = 2 - x$$
  $$3x + 4 + x = 2 - x + x \quad \text{add } x \text{ to eliminate the variable from the right side}$$
  $$3x + 4 + x - 4 = 2 - x + x - 4 \quad \text{subtract 4 to eliminate the constant from the left side}$$
  $$4x = -2 \quad \text{simplify}$$
  $$\frac{4x}{4} = \frac{-2}{4} \quad \text{divide both sides by 4 to isolate the variable}$$
  $$x = -\frac{1}{2} = -0.5$$

  2.
  $$3x - 5 = 2x + 6$$
  $$3x - 5 + 5 = 2x + 6 + 5 \quad \text{add 5 to both sides}$$
  $$3x = 2x + 11 \quad \text{simplify the right side}$$
  $$3x - 2x = 2x - 2x + 11 \quad \text{subtract } 2x \text{ from both sides}$$
  $$x = 11$$

  3.
  $$5 - 8x = -4x$$
  $$5 - 8x + 8x = -4x + 8x \quad \text{add } 8x \text{ to both sides}$$
  $$5 = 4x \quad \text{simplify the right side}$$
  $$\frac{5}{4} = \frac{4x}{4} \quad \text{divide both sides by 4 to isolate } x$$
  $$\frac{5}{4} = 1.25 = x$$

4.  $3(x-5)+6=4(1-x)$   distribute first
    $3x-15+6=4-4x$
    $3x-9=4-4x$   simplify each side
    $3x-9+4x=4-4x+4x$   add $4x$ to both sides to eliminate the variable from the right
    $3x-9+4x+9=4-4x+4x+9$   add 9 to both sides to eliminate the constant from the left
    $7x=13$   simplify
    $\dfrac{7x}{7}=\dfrac{13}{7}$   divide both sides by 7 to isolate the variable
    $x=\dfrac{13}{7}\approx1.857$

5.  $\dfrac{1}{2}x+\dfrac{3}{4}=\dfrac{2}{3}x-1$

    $12\cdot\left(\dfrac{1}{2}x+\dfrac{3}{4}\right)=12\cdot\left(\dfrac{2}{3}x-1\right)$   multiply both sides by 12 (the LCD) to eliminate fractions

    $6x+9=8x-12$   simplify
    $6x+9-8x=8x-12-8x$   subtract $8x$ from both sides to eliminate the variable on the right
    $6x+9-8x-9=8x-12-8x-9$   subtract 9 from both sides to eliminate the constant from the left
    $-2x=-21$   simplify
    $\dfrac{-2x}{-2}=\dfrac{-21}{-2}$   divide both sides by $-2$ to isolate the variable
    $x=\dfrac{21}{2}=10.5$

### Checking Solutions (W) (P)

Now that we have looked at how to solve linear equations, we want to look at how we can check to see if our answer is correct.

A solution to a linear equation is a value that, when substituted in for the variable, makes the equation true. To check a solution, we simply put the value in for the variable in the original equation and see if a true statement results.

Suppose we consider the equation 2x + 4 = 10. If we want to see whether x = 5 is a solution, we plug in 5 for x in the equation and simplify both sides.

2 (5) + 4 = 10
10 + 4 = 10
14 = 10 FALSE

This results in a false statement, so we know that is not a solution to the equation. Suppose we want to check to see whether x = 3 is a solution to the same equation. We plug in 3 for x and simplify both sides.

2 (3) + 4 = 10
6 + 4 = 10
10 = 10 TRUE

This results in a true statement. Thus, x = 3 is a solution to the equation.

**Hint:** You can use this idea to help you answer questions on the ParaPro Assessment that ask you to solve an equation. If you forget how to solve the equation, just plug in the different values that are listed until you find one that gives a true statement. This will take some time, but you know the answer is one of the choices listed—you just need to find out which one it is.

### Simple Number Patterns and Graphical Trends (P)

**Note:** Number patterns are more likely to appear on the math portion of the ParaPro Assessment than on the math portion of the WorkKeys Assessment; however, pattern recognition (particularly graphical trends) could show up on both exams, even in other sections.

Linear equations give rise to a special type of number pattern called an arithmetic sequence. If we consider the expression $3x + 2$, notice what happens in the following table:

| x | 3x + 2 |
|---|--------|
| 0 | 3 (0) + 2 = 2 |
| 1 | 3 (1) + 2 = 5 |
| 2 | 3 (2) + 2 = 8 |
| 3 | 3 (3) + 2 = 11 |
| 4 | 3 (4) + 2 = 14 |

Each time we increase the value of x by 1 unit, the value of the expression goes up 3 units. If we just look at the values for the expression, try to see this pattern:

2, 5, 8, 11, 14, . . .

So, without doing any additional calculations by hand, we know that the next value in the sequence will be 17 because $14 + 3 = 17$.

Next, we look at some basic sequences.

### Arithmetic Sequences

This type of sequence is characterized by a common difference. Each successive term in the sequence is obtained by adding the same amount to the current term. This amount is called the common difference and is denoted by the letter d. To determine the common difference, subtract one term from the term that follows. To be an arithmetic sequence, remember that the difference between any two consecutive terms must be the same.

- *Examples*
  Identify the next term in each of the following arithmetic sequences:
  1.  1, 4, 7, 10, 13, 16, . . .

  2.  10, 8, 6, 4, 2, 0, . . .

  3.  $\frac{3}{2}$, 2, $\frac{5}{2}$, 3, $\frac{7}{2}$, 4, . . .

- *Solutions*
    1. 1, 4, 7, 10, 13, 16, . . .
       Consider the differences between successive terms:
       4 - 1 = 3
       7 - 4 = 3
       10 - 7 = 3
       13 - 10 = 3
       16 - 13 = 3
       Notice that every difference works out to be 3. This sequence is arithmetic with a common difference of 3. To get the next term in the sequence, we just add the common difference to the last term.
       16 + 3 = 19
       The next term in the sequence is 19.

    2. 10, 8, 6, 4, 2, 0, . . .
       Consider the differences between successive terms:
       8 - 10 = -2
       6 - 8 = -2
       4 - 6 = -2
       2 - 4 = -2
       0 - 2 = -2
       Notice that every difference works out to be -2. This sequence is arithmetic with a common difference of -2. To get the next term in the sequence, we just add the common difference to the last term.
       0 + (-2) = 0 - 2 = -2
       The next term in the sequence is -2.

    3. $\frac{3}{2}$, 2, $\frac{5}{2}$, 3, $\frac{7}{2}$, 4, . . .
       Consider the differences between successive terms:
       $2 - \frac{3}{2} = \frac{4}{2} - \frac{3}{2} = \frac{1}{2}$
       $\frac{5}{2} - 2 = \frac{5}{2} - \frac{4}{2} = \frac{1}{2}$
       $3 - \frac{5}{2} = \frac{6}{2} - \frac{5}{2} = \frac{1}{2}$
       $\frac{7}{2} - 3 = \frac{7}{2} - \frac{6}{2} = \frac{1}{2}$
       $4 - \frac{7}{2} = \frac{8}{2} - \frac{7}{2} = \frac{1}{2}$
       Notice that every difference works out to be $\frac{1}{2}$. This sequence is arithmetic with a common difference of $\frac{1}{2}$. To get the next term in the sequence, we just add the common difference to the last term.
       $4 + \frac{1}{2} = \frac{8}{2} + \frac{1}{2} = \frac{9}{2}$
       The next term in the sequence is $\frac{9}{2}$.

Note that the difference can be positive, negative, a fraction, etc. The only thing that matters is that the difference between any two consecutive terms is always the same.

### Geometric Sequence
This type of sequence is characterized by a common ratio. Each successive term in the sequence is obtained by multiplying the same amount to the current term. This amount is called the common ratio and is denoted by the letter r. To determine the common ratio, we divide one term by the term that comes before it to get a ratio. To be a geometric sequence, this ratio must be the same for any two consecutive terms in the sequence.

- *Examples*
  Identify the next term in each of the following geometric sequences:
  1. 2, 6, 18, 54, 162, . . .

  2. 16, 8, 4, 2, 1, ½, ¼, . . .

  3. 3, -6, 12, -24, 48, -96, . . .

- *Solutions*
  1. $^6/_2 = 3$
     $^{18}/_6 = 3$
     $^{54}/_{18} = 3$
     $^{162}/_{54} = 3$
     Notice that each of these ratios is equal to 3. This sequence is geometric with a common ration of 3. The next term in the sequence can be found by multiplying the last term by the common ratio, 3.
     162 • 3 = 486
     The next term in the sequence is 486.

  2. Start by considering the ratio of consecutive terms.
     $^8/_{16} = ½$
     $^4/_8 = ½$
     $^2/_4 = ½$
     $^1/_2 = ½$
     $^{1/2}/_1 = ½$
     $^{1/4}/_{1/2} = ½$
     Notice that each of these ratios is equal to ½. This sequence is geometric with a common ratio of ½. The next term in the sequence can be found by multiplying the last term by the common ratio, ½.
     ¼ • ½ = ⅛
     The next term in the sequence is ⅛.

  3. Start by considering the ratio of consecutive terms.
     $^{-6}/_3 = -2$
     $^{12}/_{-6} = -2$
     $^{-24}/_{12} = -2$
     $^{48}/_{-24} = -2$
     $^{-96}/_{48} = -2$
     Notice that each of these ratios is equal to -2. This sequence is geometric with a common ratio of -2. The next term in the sequence can be found by multiplying the last term by the common ratio, -2.
     -96 (-2) = 192
     The next term in the sequence is 192.

Again, notice that the common ratio can be positive, negative, a fraction, etc. The important thing is that the ratio between any two consecutive terms is always the same.

*General Sequences*

There are numerous number patterns that exist, but the general idea is still the same. Can you identify the pattern that exists among the numbers and then extend that pattern?

**Hint:** When working with sequences or number patterns, it often helps to look at each term and identify two types of quantities: (1) those that change and (2) those that stay the same. Once you take care of the part that stays the same, you can focus on the pattern that exists among the quantity that changes.

- *Examples*
  Identify the next term in each of the following sequences:
  1.  $\{\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \ldots\}$

  2.  $\{0, 2, 0, 2, 0, 2, \ldots\}$

  3.  $\{-\frac{1}{4}, \frac{2}{9}, -\frac{3}{16}, \frac{4}{25}, \ldots\}$

- *Solutions*
  1.  Notice that in this sequence, every term is a fraction, and all numerators are equal to 1. So, it seems reasonable that the next term would have the form $\frac{1}{\square}$ .

      Now the denominators are changing from term to term, but how do they change? If we look at the pattern 2, 4, 8, 16, it appears that each number is twice the number before it. Since 16 x 2 = 32, the next term in the sequence should be $\frac{1}{32}$. (This is actually a geometric sequence with a common ratio of $\frac{1}{2}$).

  2.  Here we notice that the terms seem to alternate between 1 and 2. Since the last written term is 2, the next term should be 0. (This is neither arithmetic nor geometric).

  3.  This pattern is a bit involved because there are lots of things changing. One thing that does not change is that each number is a fraction. Notice that each term changes sign. Since the last written term is positive, we suspect that the next term will take on the form $-\frac{\square}{\square}$ .

      Both the numerator and denominator change from term to term, but how? The numerator seems to be increasing by 1 each time, so we think the next term should have a 5 in the numerator. The denominator is a little more complicated, but again look for relationships among the numbers. Each denominator is the square of the number that is one larger than the numerator. Since we think our numerator is 5, the denominator should be $(5 + 1)^2 = 6^2 = 36$. So the next term should be $-\frac{5}{36}$. (The denominators 4, 9, 16, 25, 36, . . . actually form a sequence of squares).

*Graphical Trends*

Besides seeing patterns in a list of numbers, you may be presented with a graph that illustrates a trend. Consider the following graph:

**Thickness vs. Number of Pages**
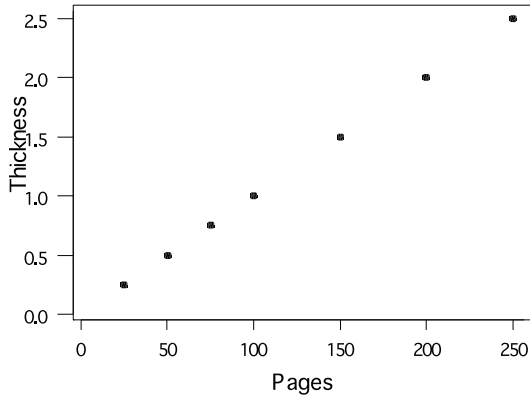


This graph shows the thickness, in centimeters, of pages in statistics textbooks. A clear trend is present—the more pages you have, the thicker it is; however, can we say anything about how thick 350 pages will be? From the graph, it appears that for every 50 pages, the thickness increases by 0.5 centimeters. Since 350 pages is 100 more than 250 pages, we would guess that the thickness would increase by 1 centimeter (0.5 for every 50 pages). This assumes that the trend continues.

The next example illustrates a negative trend.

**Bi-annual Enrollment**
**Welsh Elementary**
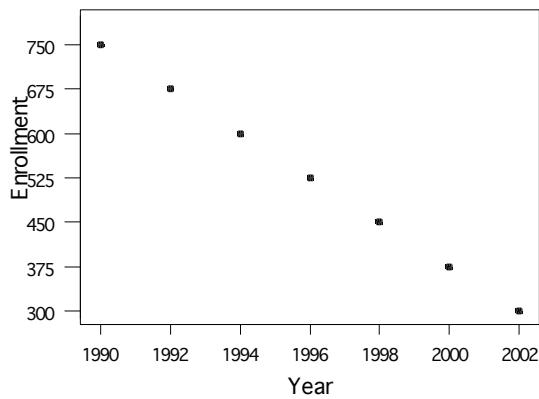
You might be asked to predict the enrollment at Welsh Elementary in the year 2004 if the trend continues. Since the enrollment is decreasing by 75 every 2 years, we would predict that the enrollment would be down to 225 in the year 2004. You may also need to interpret the trend that is present in a graph. Consider the following graph:

**Exam Grades vs. Quiz Grades**
**Math 235-01**
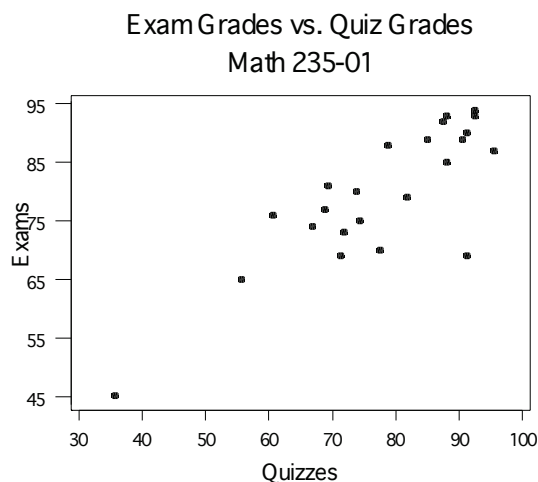


This graph plots final quiz scores against final exam scores. Though the data are spread out more than in the first example, there is still a trend. The data seem to indicate that those who did better on their quizzes also did better on their exams.

## A Look Ahead

In the next part of this module, you will be combining the skills you learned in the first three parts to solve real-world applications. I know; this means word problems! Don't let that bother you! Solving word problems will not be much different than what you have already done. The only thing you have to do is write equations yourself from the information provided.

## Sample Test Questions

These questions are examples of what might appear on the ParaPro Assessment. The WorkKeys math portion consists entirely of word problems, but you will need the skills covered in this section to help you solve those problems.

1.   Solve the following equation for x:

$5.8 + x = 17.9$

   a.   $x = 11.6$
   b.   $x = 12.1$
   c.   $x = 23$
   d.   $x = 23.5$

2. Solve the following equation for x:

   $4 (x + 3) = 3 (x - 4)$

   a. x = -24
   b. x = -7
   c. x = 0 $x = 0$
   d. x = 7

3. Which number comes next in the following sequence?

   16, 24, 32, 40, _____

   a. 41
   b. 44
   c. 46
   d. 48

4. Which number comes next in the following sequence?

   1, 3, 9, 27, 81, _____

   a. 82
   b. 162
   c. 243
   d. 324

5. Solve the following equation for x:

   $\frac{2}{3} x + 2 = 6$

   a. $x = \frac{8}{3}$
   b. x = 6
   c. $x = \frac{16}{3}$
   d. x = 12

## Solutions

1. 5.8 + x = 17.9
   Subtract 5.8 from both sides.
   5.8 + x - 5.8 = 17.9 - 5.8
   x = 12.1
   The answer is b., x = 12.1.

2. $4 (x + 3) = 3 (x - 4)$
   Distribute first.
   4x + 12 = 3x -12
   Subtract 3x from both sides.
   4x + 12 - 3x = 3x - 12 - 3x
   x + 12 = -12
   Subtract 12 from both sides.
   x + 12 - 12 = -12 - 12
   x = -24
   The solution is a., x = -24.

3.    What number comes next in the following sequence? 16, 24, 32, 40, _____

Notice that 24 - 16 = 8, 32 - 24 = 8, and 40 - 32 = 8. This is an arithmetic sequence with a common difference of 8. To get the next term, we add 8 to the last term in the list (40 + 8 = 48). The answer is d., 48.

4.    What number comes next in the following sequence? 1, 3, 9, 27, 81, _____

Notice that 3 - 1 = 2 and 9 - 3 = 6. The differences are not the same, so this is not an arithmetic sequence; however, $\frac{3}{1} = 3$, $\frac{9}{3} = 3$, and $\frac{81}{27} = 3$. The ratio of consecutive terms is always 3. This is a geometric sequence with a common ratio of 3. To get the next term, we multiply the last term in the list by 3.
The answer is c., 243.

5.    $\frac{2}{3} x + 2 = 6$
Subtract 2 from both sides.
$\frac{2}{3} x + 2 - 2 = 6 - 2$
$\frac{2}{3} x = 4$
Multiply both sides by $\frac{3}{2}$.
$\frac{3}{2} \cdot \frac{2}{3} x = \frac{3}{2} \cdot 4$
$x = \frac{12}{2} = 6$
The solution is b., x = 6.

## Evaluation
Paraprofessionals can be evaluated by using "Quiz #4." Paraprofessionals could work together to practice classroom instruction.

## Supplemental Resources
For more information about the topics covered in Part 3, see the following resources:
*    Simplifying Activities (Jim Reed) – http://dev1.epsb.edmonton.ab.ca/math14_Jim/ math9/strand2/2209.htm

*    Simplifying Expressions Activity (OpenTeach) – http://www.openteach.com/ mathematics/applets/brackets.html

*    Linear Equation Activities (Jim Reed) – http://dev1.epsb.edmonton.ab.ca/math14_Jim/ math9/strand2/2202.htm

*    Solving Linear Equations Activity (OpenTeach) – http://www.openteach.com/ mathematics/applets/linearEq.html

*    Solving Equations Activity (Targeon) – http://www.targeon.org.uk/jrw/equate2.htm

# Quiz #4

1.  Solve: -8x + x = -63

2.  Solve: 9y + 3 (y - 6) = 78

3.  Solve: x + 7 = 15

4.  Solve: 0.5x - 0.2 (10 + x) = 0.2 (20)

5.  What term comes next? 2, 4, 7, 11, 16, 22, _____

6.  What term comes next? 2, 0, 2, 0, 2, 0, 2, _____

7.  What term comes next? 3, 6, 12, 24, 48, _____

# Answer Key

1.  x = 9

2.  y = 8

3.  x = 8

4.  x = 20

5.  29 (Go up by 2, 3, 4, 5, 6, 7.)

6.  0

7.  96 (Multiply by 2.)

# Module 4 – Mathematics
*Part 5: Geometry and Data Analysis*

## Overview
In Module 4, Part 5, the paraprofessionals will learn about the following:
- Basic geometric shapes (W) (P)
- Perimeter and area (W) (P)
- Volume and surface area (W) (P)
- Angle formulas (W) (P)
- Pythagorean theorem (W) (P)
- Rectangular coordinates (R) (P)
- Basic graphs (W) (P)
- Measures of central tendency (W) (P)

## Objectives
Following completion of Module 4, Part 5, the paraprofessionals will be able to . . .
- identify basic geometric shapes.
- perform computations related to perimeter and area.
- perform computations related to volume and surface area.
- perform computations related to angle measurement.
- perform computations using the pythagorean theorem.
- plot points in the x/y-coordinate plane.
- identify basic graphs and interpret them.
- compute the mean, median, and mode for a set of data.

## Review
So far, we have looked at basic operations, units of measurement, and manipulating equations. The skills learned in those parts of the module will be helpful as we move into a more visual part. This part deals mainly with geometric figures and graphs, so drawing pictures will be useful in many cases.

## Lessons and Activities

### Basic Geometric Shapes (W) (P)
Here we look at the shapes of some basic two-dimensional and three-dimensional figures. Formulas relating to these figures are presented in the next two sections.

*Two-Dimensional Figures*
*Triangle*
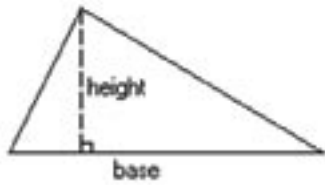


Triangles have three sides and three angles. The base, b, of a triangle can be any one of its sides. The height, h, of a triangle is the perpendicular line drawn from the base to the vertex across from the base.

*Equilateral Triangle*
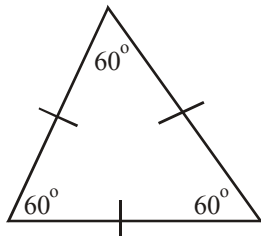


All three sides are the same length, and all three angles have the same measure.

*Isosceles Triangle*
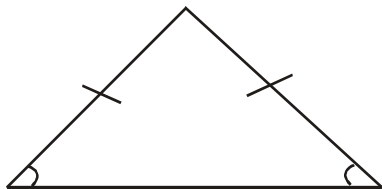


Two of the three sides have the same length. Angles opposite these sides have the same measure.

*Right Triangle*
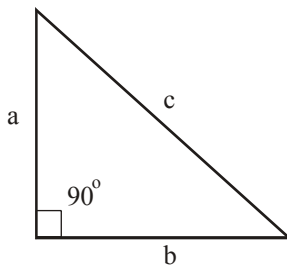


A right triangle has a 90° angle.

*Rectangle*
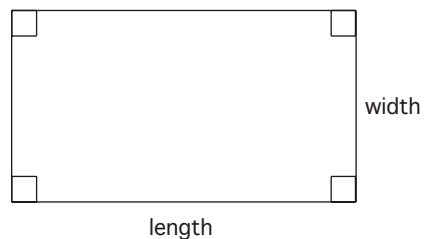


A quadrilateral with four right angles. There are two long sides (opposite each other) and two short sides.

*Square*
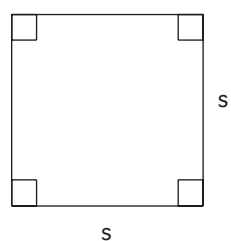


A rectangle having all sides of equal length.

*Circle*
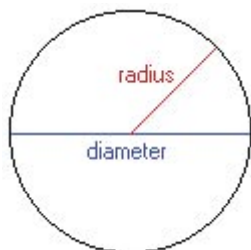


A circle is the set of all points equidistant from a fixed point. The fixed point is called the center, and the distance from the center to the edge of the circle is called the radius, r. The diameter, d, of a circle is twice the radius.

*Other Polygons*
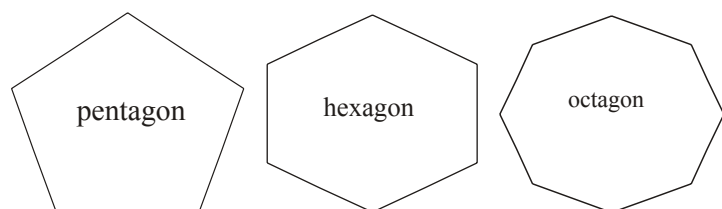
*Three-Dimensional Figures*
*Rectangular Solid*

height

length

width

*Cube*

s

s

s
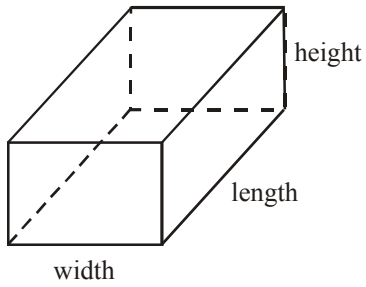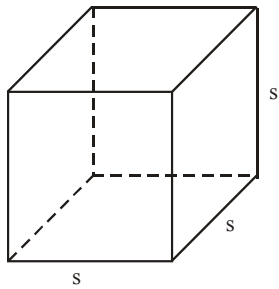
A cube is a rectangular solid that has all six sides the same size. All edges have the same length.

*Cylinder*
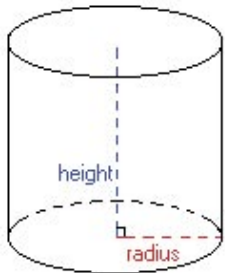
height

radius

Sometimes the height is also called the length.

*Sphere*
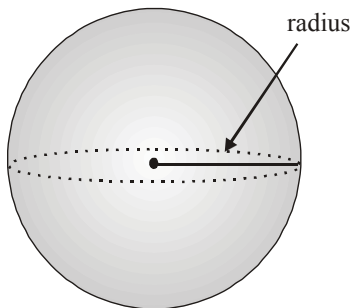
radius

A sphere is a ball with a radius, r.

*Cone*
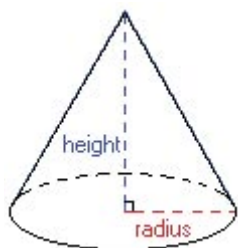


### Perimeter and Area (W) (P)

Perimeter, P, (circumference, C ) is the distance around a two-dimensional figure. Area, A, is the amount of surface covered by a two-dimensional figure.

The perimeter of a polygon is the distance around that polygon. Thus, we measure perimeter in units of length such as inches, feet, yards, miles, millimeters, centimeters, meters, and kilometers. To find the perimeter of a polygon, we must know the lengths of all the sides. The perimeter will equal the sum of the lengths of all the sides of the polygon. In the case of a circle, there are no sides, but we still can get the perimeter. The perimeter of a circle is called the circumference and is equal to the constant π times the diameter of the circle.

Since surface is two-dimensional, units for the measurement of surface must also be two-dimensional. That is, we use square units to measure surface (area). We generally use formulas to find the number of square units that will be required to cover the surface in question.

Some common two-dimensional shapes are given below, along with formulas for their perimeter and area.

| Shape | Perimeter | Area |
|-------|-----------|------|
| Triangle | $P = a + b + c$ | $A = \frac{1}{2}bh$ |
| Rectangle | $P = 2l + 2w$ | $A = lw$ |
| Square | $P = 4s$ | $A = s^2$ |
| Circle | $P = C = 2\pi r = 2\pi d$ | $A = \pi r^2$ |

For the formulas above, r = radius, h = height, b = base, C = circumference, l = length, w = width, d = diameter, and s = length of common side.

**Note:** You will be given a formula sheet on the WorkKeys Assessment that contains all the formulas you will need for the exam. You will not get a formula sheet for the ParaPro Assessment, but the shapes involved will tend to be the basic shapes.

- *Examples*
    1. Find the area and perimeter of a rectangle that has a width of 4 feet and a length of 7 feet.

    2. What is the circumference and area of a circle that has a radius of 5 ¼ inches?

3.    Find the area of the triangle shown below.
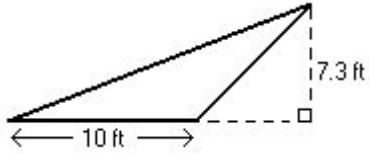


4.    Find the perimeter and area of the square shown below.



18 in
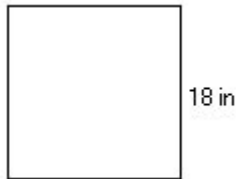
- Solutions
  1.    Since we don't have a picture, it might be a good idea to draw one.



4 feet

7 feet

$A = lw$            $P = 2l + 2w$
  $= (7)(4)$          $= 2(7) + 2(4)$
  $= 28 \text{ ft}^2$        $= 14 + 8$
                    $= 22 \text{ ft}$

The area of the rectangle is 28 ft², and the perimeter is 22 ft.

2.    Since we don't have a picture, it might be a good idea to draw one.



$5\frac{1}{4}$
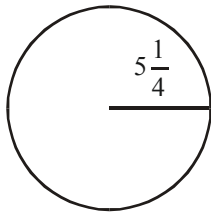
$A = \pi r^2 = \pi (5\ \tfrac{1}{4})^2 = 86.6 \text{ in}^2$
$P = 2\pi r = 2\pi (5\ \tfrac{1}{4}) = 33.0 \text{ in}$

3.   The height is 7.3 feet, and the base is 10 feet. Using the formula for the area of a triangle, we get . . .

$A = \frac{1}{2} bh = \frac{1}{2} (10) (7.3) = 36.5 \text{ ft}^2$

4.   To find the perimeter of a square, we only need to know the length of one of its sides. In this case, the length is 18 inches, so we get . . .

$P = 4s = 4 (18) = 72 \text{ in.}$
$A = s^2 = (18)^2 = 324 \text{ in}^2$

For shapes that are more complex, you can often divide them up into smaller sections that have basic shapes. This is helpful when finding the area. For perimeter, remember that you only need to add up the lengths of the outside edges.

·    *Example*
     Find the perimeter and area of the figure below. All of the angles in the figure are right angles.
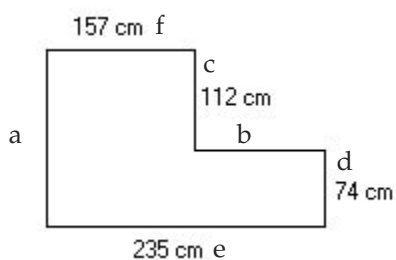


·    *Solution*
     First, notice this figure has six sides, but only four lengths are given. We must determine the other two. In the figure below, we must determine the lengths of side a and side b. The length of side a is the sum of the lengths of sides c and d: $112 + 74 = 186$ cm. The length of side b is the difference of sides e and f:
     $235 - 157 = 78$ cm.
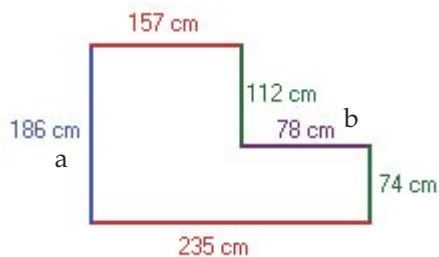


Thus, $P = 157 + 112 + 78 + 74 + 235 + 186 = 842$ cm

Notice that this figure is made up of two rectangles. We can find the area of each rectangle and add the two areas together to get the total area.

157 cm

A   112 cm

B   74 cm

235 cm
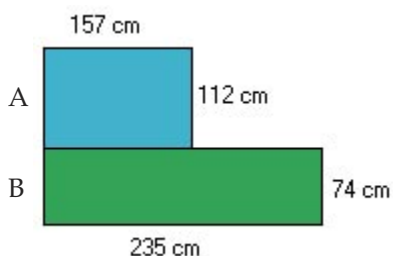
Area of rectangle A = 157 • 112 = 17,584 cm²
Area of rectangle B = 235 • 74 = 17,390 cm²
Total Area = 17,584 + 17,390 = 34,974 cm²

### *Volume and Surface Area (W) (P)*

Volume, V, is the amount of space enclosed by a three-dimensional figure. Surface Area, S, is the total area of all exposed surfaces of a three-dimensional figure.

Again, focus on concepts. To find the total surface area, you can break up the surface into smaller regions with which you are already familiar. For example, the surface area of a rectangular solid is just the sum of the areas of some two-dimensional rectangles. If you draw a diagram, try to see where the formulas come from. This makes remembering them much easier.

Looking at the surface area of a right circular cylinder, do you see anything familiar? Look back at the two-dimensional formulas for circles. Can you see why these are involved in the surface area formula for a cylinder?

Some common three-dimensional shapes are given below, along with formulas for their surface area and volume.

| Shape | Surface Area | Volume |
|-------|--------------|--------|
| Rectangular Solid | S = 2lw + 2wh + 2lh | V=lwh |
| Cube | S = 6s² | V = s³ |
| Right Circular Cylinder | S = 2πr² + 2πrh | V=πr²h |
| Sphere | S = 4πr² | V = ⁴⁄₃ πr³ |
| Cone | $S = \pi r\sqrt{r^2 + h^2} + \pi r^2$ | V = πr²h⁄₃ |

For the formulas above, r = radius, h = height, l = length, w = width, and s = length of common side.

**Note:** You will be given a formula sheet on the WorkKeys Assessment that contains all the formulas you will need. You will not get a formula sheet for the ParaPro Assessment, but the shapes involved will tend to be the basic shapes.

- *Example*
  1. A box in Joe's closet has a width of 3 feet, a length of 5 feet, and a height of 1 foot. Find the volume and surface area of the box.

2. A cube of ice is to be carved into a table decoration for a wedding party. The cube measures 2.5 feet on each side. How many cubic feet of ice does it contain?

3. Find the volume of a ball with diameter 26 cm.

4. Find the volume of the circular cylinder shown below.
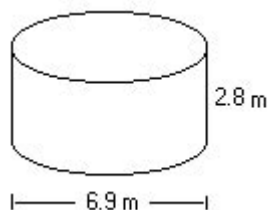


5. Find the volume of the cone shown below.
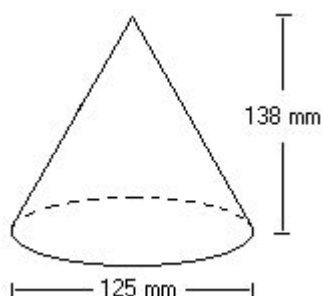


- *Solutions*
    1. $V = L \bullet W \bullet H = (5)\,(3)\,(1) = 15ft^3$
       $S = 2L \bullet W + 2W \bullet H + 2L \bullet H$
       $= 2\,(5)\,(3) + 2\,(3)\,(1) + 2\,(5)\,(1)$
       $= 30 + 6 + 10 = 46ft^2$
       The box has a volume of 15 cubic feet and a surface area of 46 square feet.

    2. $V = s^3 = (2.5)^3 = 15.625\ ft^3$
       The block contains 15.625 cubic feet of ice.

    3. Since the diameter is 26 cm, then the radius is 26 ÷ 2 = 13 cm. Thus,
       $V = \tfrac{4}{3}\,\pi\,(13)^3 = 9202.77\ cm^3$.

    4. Since the diameter of the cylinder is 6.9 m, the radius is 6.9 ÷ 2 = 3.45 m. Thus,
       $C = \pi\,(3.45)^2\,2.8 = 104.70\ m^3$.

    5. Since the diameter of the cone is 125 mm, the radius is 125 ÷ 2 = 62.5 mm. Thus,
       $V = \tfrac{1}{3}\,\pi\,(62.5)^2\,138 = 564,504.93\ mm^3$.

### Angle Formulas (W) (P)
An angle is a geometric figure formed by two rays extending from a common point. An angle is measured in degrees, denoted by the symbol °, or radians. While discussions of angles can be extensive in geometry and trigonometry courses, we will limit our discussion to some special situations.

One full revolution equals 360°. One-half of a full revolution equals 180°. An angle that measures 180° is called a straight angle. For example, ∠EFG below is a straight angle.
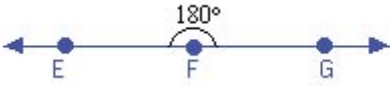


One-fourth of a full revolution is 90°. An angle that measures 90° is called a right angle. For example, ∠LMN below is a right angle.
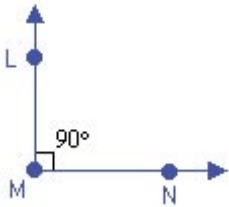


An acute angle is an angle that measures between 0° and 90°. An obtuse angle is an angle that measures between 90° and 180°. In the figures below, ∠QRS is an acute angle, and ∠TUV is an obtuse angle.
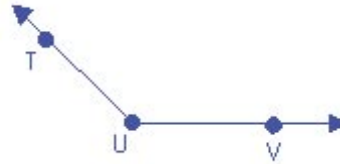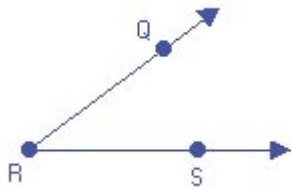


Notice in the figure below that angles ∠ABD and ∠DBC together form the straight angle ∠ABC. Two angles are called supplementary angles if the sum of their measurements is 180°. Thus, we say that angles ∠ABD and ∠DBC are supplements.
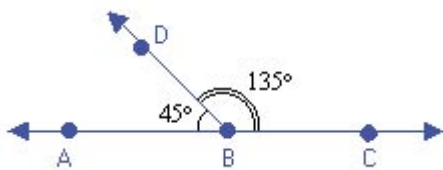


Similarly in the figure below, angles ∠EFH and ∠HFG together form the right angle ∠EFG. Two angles are called complementary angles if the sum of their measurements is 90°. Thus, we say that angles ∠EFH and ∠HFG are complements.
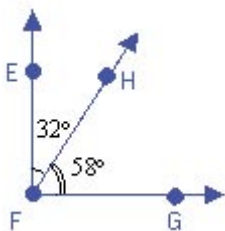
*Some Basic Properties*
- Two angles are complementary if their measurements add to 90˚.
- Two angles are supplementary if their measurements add to 180˚.
- A straight line has 180˚.
- A triangle has three angles that add up to 180˚.
- A square or rectangle has 4 right angles (each 90˚), so it has a total of 360˚.

- *Examples*
    1. If two angles of a triangle measure 28˚ and 82˚, what is the measurement of the third angle?
    2. Find the complement and supplement of an angle that measures 73˚.
    3. Find the complement and supplement of an angle that measures 42˚.
    4. The measurement of the second angle of a triangle is 5˚ less than the measure of the first angle. The third angle is 3 times as large as the second angle. Find the measurement of each angle.

- *Solutions*
    1. Since every triangle has three angles that add up to 180˚, the remaining angle's measurement is 180˚ - (28˚ + 82˚) = 180˚ - 110˚ = 70˚.

    2. Complementary angles add to 90˚ so the complement is 90˚ - 73˚ = 17˚.
       Supplementary angles add to 180˚ so the supplement is 180˚ - 73˚ = 107˚.

    3. Complementary angles add to 90˚ so the complement is 90˚ - 42˚ = 48˚.
       Supplementary angles add to 180˚ so the supplement is 180˚ - 42˚ = 138˚.

    4. We should begin by noting that we are working with a triangle, and we know that every triangle has three angles that total 180˚. We don't know any of the angle's measurements, but we want to limit ourselves to only 1 variable (not 3). Notice that the problem relates the first and third angles to the second angle. We can use this information to write the first and third angles in terms of the second angle.

       If we call the second angle x, then we know that the first angle must be 5 + x (5 more than the second because the second was 5 less than the first). The third angle must be 3x (three times as large as the second).

       Since we know that 180 = A + B + C, we can substitute to get 180 = (5 + x) + x + (3x). This equation can now be solved for x.
       $180 = (5 + x) + x + (3x)$
       $180 = 5 + x + x + 3x$
       $180 = 5 + 5x$
       $175 = 5x$
       $35 = x$

       We now know the measurement of the second angle. We can use this to find the measurements of the other two.
       $5 + x = 5 + 35 = 40$
       $3x + 3 (35) = 105$

       The angles measure 40˚, 35˚, and 105˚.

**Pythagorean Theorem (W) (P)**

Generally, application problems dealing with triangles will be limited to right triangles. A right triangle is a triangle that has a right angle. A right angle is an angle that measures 90°. The side opposite the right angle is called the hypotenuse, c, and the other two sides are called the legs of the right triangle.

Right triangles have some characteristics that make them easier to work with than other triangles. One such characteristic is that the Pythagorean theorem can be used to solve equations.

*Pythagorean Theorem*
$a^2 + b^2 = c^2$
The sum of the squares of the legs of a right triangle is equal to the square of the hypotenuse.

This theorem is used a lot in applications. You may need to use it to find the length of a side or the length of the hypotenuse. Remember to draw pictures, if possible, when working applied problems. The situation may involve a right triangle, and the Pythagorean theorem may be helpful.
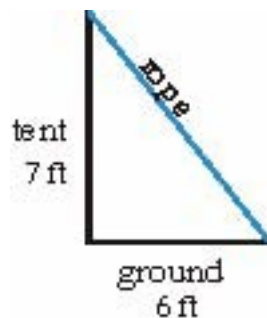
- *Examples*
    1. Find the hypotenuse of a right triangle whose legs measure 7 and 24 feet.
    2. Shawn anchors his tent with a rope. The rope is attached to the tent at a height of 7 feet and is staked into the ground a distance of 6 feet from the tent. How long is the rope?

- *Solutions*
    1. $a^2 + b^2 = c^2$

       $c = \sqrt{a^2 + b^2}$

       $= \sqrt{7^2 + 24^2}$

       $= \sqrt{625}$

       $= 25$

       The hypotenuse is 25 feet long.

    2. For this problem, we can draw a picture.

       

       This rope makes up the hypotenuse of a right triangle. We can find its length using the Pythagorean theorem.

       $c = \sqrt{a^2 + b^2} = \sqrt{7^2 + 6^2} = \sqrt{49 + 36} = \sqrt{85} \approx 9.22$

       The rope is roughly 9.22 feet long.

### Rectangular Coordinates (R) (P)

The rectangular coordinate plane is constructed by drawing two number lines: one vertical and one horizontal. These two lines, referred to as the axes, are perpendicular to each other and divide a plane (rectangular region) into four parts called quadrants. Each axis is divided into equal spaces by tic marks.
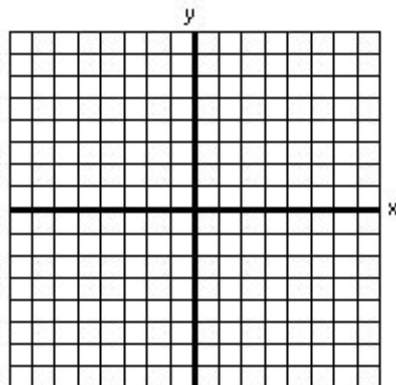


*Terms to Know*
- The *x-axis* is the horizontal number line representing values of x.
- The *y-axis* is the vertical number line representing values of y.
- The *origin, O,* is the point of intersection of the x-axis and y-axis.
- A *quadrant* is one-fourth of the x/y-plane, separated by the x-axis and the y-axis. The quadrant determines the sign of the values of x and y.
- The *coordinates* of a point are the ordered pair (x,y) that indicates the values of x and y.

We plot ordered pairs by placing a dot at the appropriate intersection of the x and y values.
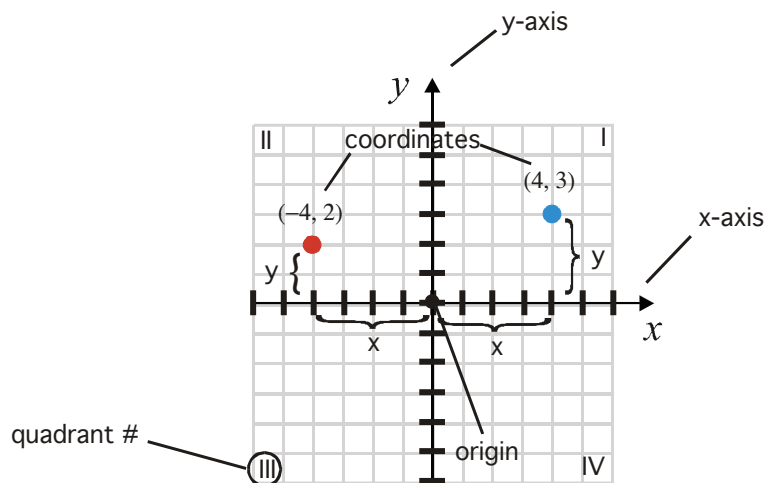


● (right 4, up 3)
(4, 3)

● (left 4, up 2)
(−4, 2)

*Plotting Points*

A point is given as a pair of coordinates and written as (x,y) . The first value (x-coordinate) is the value of the independent variable and indicates the amount and direction to move horizontally. The second value (y-coordinate) is the value of the dependent variable and indicates the amount and direction to move vertically. The following table is useful when trying to determine within which quadrant a point lies.

|  | x-values | y-values |
|---|---|---|
| Quadrant I | + | + |
| Quadrant II | - | + |
| Quadrant III | - | - |
| Quadrant IV | + | - |

**Note:** On the x-axis, the value of y is 0. Similarly, on the y-axis, the value of x is 0.

• *Example*
  Plot the following ordered pairs on a graph: {(-3, 5), (4, 0), (6.5, -4), (-½, -6)}.
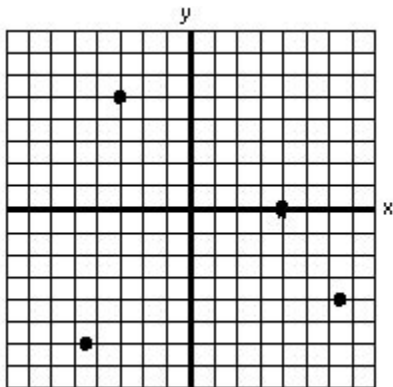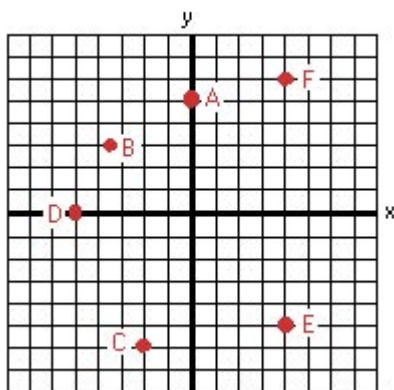
• *Solution*



• *Example*
  State the coordinates of the points graphed in the grid below.
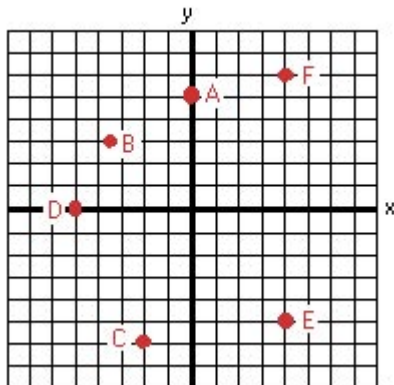
- *Solution*



A (0, 5); B (-3.5, 3); C (-2, -6); D (-5, 0); E (4, -5); F (4, 6)

**Basic Graphs (W) (P)**
*Bar Graphs*
Bar graphs are generally used at the nominal level of measurement. The bars are of uniform width and are uniformly spaced. The lengths of the bars represent the quantities we wish to compare.

- *Example*
Following is a horizontal bar graph that shows the costs of presidential inaugurations (in millions of dollars).



Source: USATODAY.com
http://www.usatoday.com/snapshot/news/2001-01-15/inaugurationprice.htm

How much was spent on Ronald Reagan's inauguration?

- *Solution*
Looking at the bar graph, we see $16.3 next to the bar for Reagan; however, it should be obvious that more than $16 was spent on his inauguration. We need to look back at the description of the graph and see that the values are in millions of dollars. Thus, $16.3 million was spent on Ronald Reagan's inauguration.
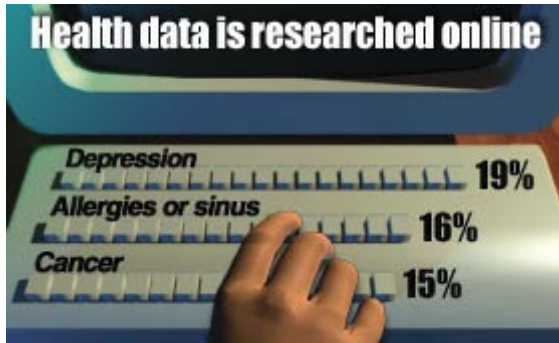
*Pictographs*
Pictographs are similar to bar graphs, but pictures are used instead of solid bars. The pictures being use to make the bars should all be the same size. The number of pictures rather than the size should be changed to represent the changing quantity.

- *Example*
  Following is a pictograph that shows the health information researched online in 1999.



  Source: Harris Interactive, 1999
  http://www.usatoday.com/snapshot/news/nsnap172.htm

  How much does each key on the keyboard represent?

- *Solution*
  Looking at the data for Depression, we see the total is 19%. Since there are 19 keys in that row, each key must represent 1%.

*Pie Graphs*
Pie graphs are useful for showing the division of the total quantity into its component parts. Because angles are often hard to judge, they can be difficult to use in comparing different parts. Instead, the emphasis is on comparing the part to the whole.

- *Example*
  Following is a pie chart that shows Americans' opinions about the state of movies.



  Source: Gallup Poll of 800 adults March 16-18, 2001
  http://www.usatoday/com/snapshot/news/2001-06-14-moviemania.htm

  What opinion was given the most?

- *Solution*

  Looking at the graph, we see that the opinion "Getting Better" was stated the most with 45% of respondents. The next highest was "Getting Worse" with 43% of respondents.

*Line Graphs*

Line graphs simply show the behavior of data over time.

- *Example*

  Following is a time plot that shows the losses to cellular phone companies due to fraud (in millions of dollars).
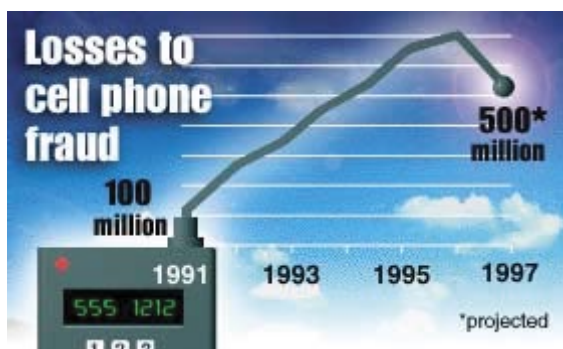


  Source: USATODAY.com
  http://www.usatoday.com/snapshot/news/nsnap050.htm

  During which year did losses to cell phone fraud reach a maximum?

- *Solution*

  To find the maximum, we are looking for a peak in the graph. The losses seemed to increase until around 1996 when they started to decrease.

### Measures of Central Tendency (W) (P)

*Mean*

The term *mean* has become almost synonymous with the word *average* because it is the most commonly used average. The mean of a set of data is in fact the arithmetic average of the data. It is the sum of the data values divided by the number of data values; that is, . . .

$$\text{mean} = \frac{\text{the sum of all the data values}}{\text{number of data values}}$$

- *Example*

  Find the mean number of fish caught and released per hour for the fisherman whose data is listed below:

  1    3    2    2    4    2    2    3    5    4

• *Solution*

The mean is the sum of the data values divided by the number of data values:

$$\frac{1+3+2+2+4+2+2+3+5+4}{10} = \frac{28}{10} = 2.8 \text{ fish per hour.}$$

**Note:** The mean is influenced by every data entry. This is not true for the mode and median.

*Median*

The median is the middle value. It is the midpoint of observations when they are arranged in order from smallest to largest. To find the median, use the following rules:

1. List the data in order from smallest to largest.

2. If the data consists of an odd number of observations, the median, M, is the center observation in the list. We can find the location of the median by counting forward $\frac{n+1}{2}$ observations from the beginning of the list.

3. If the data consists of an even number of observations, the median, M, will not necessarily consist of an actual data value. It must be constructed. Find the two middle data values; these will be in positions $\frac{n}{2}$ and $\frac{n}{2} + 1$. The median is <u>sum of the middle two values</u>.
2

**Note:** The formulas $\frac{n+1}{2}$, $\frac{n}{2}$, $\frac{n}{2} + 1$ do *not* give the value of the median. They are used to find the *position* of the median.

• *Example*

Nine students took an aptitude test in technical electronics. There were 1,000 possible points. The scores were as follows:

351     988     348     450     290     965     360     346     318

Find the median score of the nine students.

• *Solution*

First put the data values in order from smallest to largest:
290     318     346     348     351     360     450     965     988

Since we have an odd number of data, namely 9, the median will be in position

$\frac{9+1}{2} = \frac{10}{2} = 5.$

| Data Value: | 290 | 318 | 346 | 348 | 351 | 360 | 450 | 965 | 988 |
|---|---|---|---|---|---|---|---|---|---|
| Position: | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th |

Since the data value 351 is in the 5th position, the median score is 351 points.

- *Example*
  A fly fisherman fishing in Rock Falls River kept track of the number of fish he caught and released per hour. The data are given below:

  1    3    2    2    4    2    2    3    5    4

  Find the median number of fish caught and released per hour.

- *Solution*
  First put the data in order from smallest to largest:

  1    2    2    2    2    3    3    4    4    5

  Since we have an even number of data, namely 10, the median will be the "average" of the values in positions $\frac{10}{2} = 5$ and $\frac{10}{2} + 1 = 6$.

  | Data Value: | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 5 |
  |---|---|---|---|---|---|---|---|---|---|---|
  | Position: | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th |

  Since 2 and 3 are the data values in the 5th and 6th positions, respectively, the median is $\frac{2+3}{2} = \frac{5}{2} = 2.5$ fish per hour.

### Mode

The mode is the value (or property) that occurs most frequently in the data. The mode is easy to compute, but it is unstable. It can be very far from the center of the distribution. The main advantage of the mode is that it can be used for variables that use a nominal scale.

- *Example*
  A fly fisherman fishing in Rock Falls River kept track of the number of fish he caught and released per hour. The data are given below:

  1    3    2    2    4    2    2    3    5    4

  Find the mode number of fish caught and released per hour.

- *Solution*
  The most frequently occurring data value is 2, which appears four times in the list. Thus, the mode is 2 fish per hour.

  **Note:** The median is more stable than the mode, but it does not indicate the range of values above or below it.

## A Look Ahead

**Hint**: You do *not* need to memorize all of the geometric formulas. Remember that the WorkKeys Assessment comes with a formula sheet and the ParaPro Assessment tends to focus on the basic shapes. After reviewing this material, you will likely remember most of what you need.

After reviewing some sample test questions, you will move on to the next part of the module, which deals with word problems. While many people have difficulty with word problems, they will be an important part of the assessment you take. The WorkKeys Assessment consists entirely of word problems. The ParaPro Assessment has basic skills questions, but also a significant number of word problems (applications).

## Sample Test Questions

These questions are examples of what might appear on the ParaPro Assessment. The WorkKeys math portion is all word problems, but you will need the skills covered in this section to help you solve those problems.

1.  What is the volume of a rectangular box that has a width of 2 feet, a length of 3 feet, and a height of 2.5 feet?
    a.   15 square feet
    b.   31 cubic feet
    c.   7.5 cubic feet
    d.   15 cubic feet

2.  Find the perimeter of a triangle with sides that measure 42 inches, 32 inches, and 23 inches in length.
    a.   51 inches
    b.   97 inches
    c.   97 square inches
    d.   194 inches

3.  Two angles of a triangle measure 37° and 85°. What is the measure of the third angle?
    a.   48° 48°
    b.   58°
    c.   122°
    d.   238°

4.  If a circular swimming pool has a diameter of 16 feet, how much water does it take to fill it to a depth of 3.5 feet?
    a.   87.92 cubic feet
    b.   703.36 feet
    c.   175.84 cubic feet
    d.   703.36 cubic feet

5.  Find the mean of the following set of numbers: 18, 18, 15, 22, 25, 46
    a.   18
    b.   20
    c.   24
    d.   30

6.  Find the mode of the following set of numbers: 18, 18, 15, 22, 25, 46
    a.   18
    b.   20
    c.   24
    d.   30

7. What is the complement of an angle that measures 43°?
   a. -43° −43°
   b. 47°
   c. 57°
   d. 137°

8. The following chart shows the number of fourth-grade students at a suburban elementary school. During which year span was the percent increase in fourth-grade enrollment the largest?
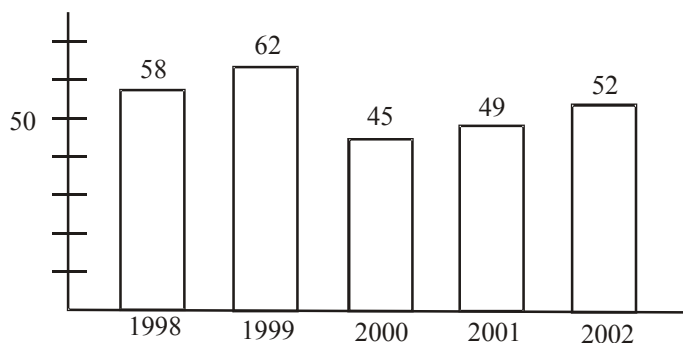


   a. 1998-1999
   b. 1999-2000
   c. 2000-2001
   d. 2001-2002

## Solutions

1. The volume of a box is V = L • W • H, so we get V = 3 (2) (2.5) = 15 ft.³
   The box has a volume of 15 cubic feet. Answer d. is correct. Watch the units. Answer a. is not correct because volume is measured in cubic units, not square units.

2. To get the perimeter, we simply add up the lengths of all the sides (P = 42 + 32 + 23 = 97 in).
   The perimeter of the triangle is 97 inches. Answer b. is correct. Watch the units. Answer c. is not correct because perimeter has single units, not square units.

3. Every triangle has 180°. To find the third angle, subtract the measurements of the other two from 180 (180 - 37 - 85 = 58). $180 - 37 - 85 = 58$
   The third angle measures 58°. Answer b. is correct.

4. A circular swimming pool is in the shape of a cylinder. Since the diameter is 16 feet, the radius is 8 feet. The volume of the cylinder is $V = \pi r^2 h = \pi (8)^2 (3.5) \approx 703.36$ cubic feet. It would take roughly 703.36 cubic feet of water to fill the pool. Answer d. is correct. Watch the units. Answer b. is not correct because volume has cubic units, not single units.

5. To find the mean, add up all the numbers, and divide by the total number.

   $\dfrac{18 + 18 + 15 + 22 + 25 + 46}{6} = \dfrac{144}{6} = 24$ . The mean is 24. Answer c. is correct.

6.  The mode is the most frequent value. The mode here is 18 since it occurs twice and all of the other numbers occur once. Answer a. is correct.

7.  To find the complement of an angle, subtract it from 90 (90 - 43 = 47).
    The complement of 43° is 47°. Answer b. is correct.

8.  Find the percent increase for each year.

    1998 - 1999: $\frac{62 - 58}{58} \approx 0.069$

    1999 - 2000: $\frac{45 - 62}{62} \approx -0.274$

    2000 - 2001: $\frac{49 - 45}{45} \approx 0.089$

    2001 - 2002: $\frac{52 - 49}{49} \approx 0.061$

    The largest percent increase is 0.089 for the years 2000-2001. Answer c. is correct.

## Evaluation
Paraprofessionals can be evaluated by using "Quiz #5." Paraprofessionals could work together to practice classroom instruction.

## Supplemental Resources
For more information about geometric shapes and data analysis, see the following resources:

*   Data Handling Activity (Targeon) – http://www.targeon.org.uk/jrw/dat/quests.htm
*   Area and Volume Activity (Targeon) – http://www.targeon.org.uk/jrw/areas.htm
*   Shape and Space Activity (Targeon) – http://www.targeon.org.uk/jrw/sha/quests.htm
*   Surface Area and Volume Activity (Jim Reed) – http://dev1.epsb.edmonton.ab.ca/math14_Jim/math9/strand3/3107.htm
*   Area and Perimeter Activity – http://dev1.epsb.edmonton.ab.ca/math14_Jim/math9/strand3/3108.htm

# Quiz #5

1. Find the area and perimeter of a rectangle with a length of 12 inches and a width of 8 inches.

2. Find the volume and surface area of a cylinder that has a height of 4 feet and a diameter of 3 feet.

3. Two angles of a triangle measure 63˚ and 100˚; what is the measure of the remaining angle?

4. What is the hypotenuse of a right triangle with sides that measure 6 in and 14 in?

5. Find the mean, median, and mode for the following data: 10, 13, 9, 16, 13, 14, 2.

# Answer Key

1.  Area: 96 in²         Perimeter: 40 in

2.  Volume: 28.274 ft³     Surface area: 51.836 ft²

3.  The third angle measures 17°.

4.  The hypotenuse measures roughly 15.232 in.

5.  Mean: 11
    Median: 13
    Mode: 13

# Module 4 – Mathematics
*Part 6: Word Problems*

## Overview
In Module 4, Part 6, the paraprofessionals will learn about the following:
- Mathematics as a language (W) (P)
- Defining variables (W) (P)
- Translating word expressions and equations (W) (P)
- An approach to solving word problems (W) (P)

## Objectives
Following completion of Module 4, Part 6, the paraprofessionals will be able to . . .
- define variables from a word statement.
- translate word expressions into equations.
- solve word problems involving linear equations and geometric formulas.

## Review
So far, this module has presented basic skills and formulas that will be needed for you to successfully complete either the WorkKeys or ParaPro Assessment. Some skills questions will appear on the ParaPro Assessment. Both assessments will incorporate word problems. In fact, the WorkKeys math portion consists entirely of word problems. The skills and formulas you have been reviewing will be important when you actually solve the word problem; however, you will not be able to solve the problem if you can't set it up correctly. This next part focuses on how to read word problems and translate them into mathematical statements that can be solved.

## Lessons and Activities

### *Mathematics as a Language (W) (P)*
Word problems are often a source of frustration for students. Typically, it is not because students cannot do mathematics, but rather because they do not understand that mathematics is really a language of its own. To many individuals, it is a foreign language in the sense that it is often confusing and hard to understand, but like other languages, the language of mathematics can be learned with practice.

Consider the following sentence written in Spanish, and translate it into English:

"Juan cayó en el río frío."

With a little background in Spanish, many students can at least pick out "John _____ in the cold river." They are able to get most of the sentence, and from that try to fill in the rest.

"John fell into the cold river."

Now consider the following sentence written in English and translate it into Spanish:

"Steve bought a hammer at the store."

Even students with a little background in Spanish often give up and don't even try to translate this statement. The more experience students have with Spanish, the more likely they are to try the translation.

"Steve comprado un martillo en el almacén."

The same is true for mathematics. Most students will at least attempt to solve a problem like 3x + 4 = 5x - 7; however, if the same problem were written in words (e.g., "Three times a number, increased by 4, is the same as five times the number, decreased by 7."), many students would not even bother to finish reading the problem.

Just as with any foreign language, it takes practice and knowledge of the building blocks to successfully master the language of mathematics. Treating mathematics as the language it is will help reduce some of the frustrations that often hinder students from doing well in math. Know that the basics will come with practice.

When you were a child, you did not learn to speak full sentences overnight. You started by learning words that were commonly used. Then, with practice, you put the words together to form complex sentences. Math is the same way. You will learn bits and pieces that eventually go together to help you solve complex mathematical problems.

### Defining Variables (W) (P)
One key factor in translating from English to math is to first define any necessary variables. This should be done immediately because the variable definition can have a big impact on the resulting expression or equation. We typically use variables to represent unknown quantities. So, as you read a word problem, be on the lookout for quantities that you do not know and need to find. It is very important to know what question you are answering. Take time to read, and re-read, the problem. Identify what you are looking for, and think about how you could go about solving for that quantity.

For simpler problems, there is usually just one quantity that is unknown. This is generally the quantity that you are trying to find. You can define your variable so that knowing its value will answer the question posed in the problem. When defining a variable, it is common practice to use a letter that is related to the quantity of interest. For example, you might use $t$ for time, or $d$ for distance. This is certainly not a requirement, but it often helps us remember what the variable represents.

- *Examples*
  For each problem, define a variable to represent the unknown quantity.

  1. Last year, the school board had approved a calendar that contained 181 school days. If 77 school days have already passed this year, how many school days remain?

  2. Shawn needs to buy new pencils for his math class. He has $4 to spend, and the pencils he wants to purchase each cost $0.65. How many pencils can he buy?

- *Solutions*
  1. After reading the problem, you should realize that the question asked is "How many days remain?" Thus, we should define a variable to represent this quantity.

     Let d = number of days remaining.

     Knowing the value of d will answer the question. We will look at setting up an equation to solve next.

  2. After reading this problem, you should realize that the question asked is "How many pencils can Shawn purchase?" Thus, we should define a variable to represent this quantity.

     Let p = number of pencils Shawn can purchase.

     Knowing the value of p will answer the question. We will look at setting up an equation to solve next.

### Translating Word Expressions and Equations (W) (P)

To continue solving word problems, we need to understand how to translate the word statements into math statements. This will require us to recognize key words in a problem statement, as well as carefully watch punctuation and word order. Translating words into algebraic expressions requires us to be familiar with the translations of certain words. For example, consider some of these translations:

| Addition | Subtraction | Multiplication | Division | Equality |
|----------|-------------|----------------|----------|----------|
| sum | difference | product | quotient | is |
| plus | minus | times | divided by | same as |
| increased by | decreased by | multiplied by | divided into | equal to |
| more than | less than | twice, triple, . . . | per | equivalent |
| | | of | | |

While the table above is by no means exhaustive, it illustrates the complexity of translating in mathematics. There are usually many ways to say the same thing, and it is necessary to be comfortable with seeing several different translations.

- *Example*

  You have 3 dollars in change in your pocket; however, there is a hole in the same pocket through which your money is falling out. Before you lose all your money, you notice the hole and take out the money that remains. Write an expression that represents how much money is left in your pocket.

  Method 1:
  Define x as the amount that fell out.
  Expression: The amount left can be expressed by 3 - x.

  Method 2:
  Define x as the amount left.
  Expression: The amount left can be expressed by x.

Note in the previous example that the definition of the variable changes the expression. While this case is fairly simplistic, this idea is prevalent in even more complicated problems.

To write an algebraic expression, we need to do two things:
1.  Define the variable or variables.
2.  Translate the words into numbers and symbols in terms of the variable(s).

- *Examples*

  Translate each of the following word statements into a math statement.
  1.  Four less than the product of a number and 7.
  2.  Three times a number plus four is the same as the number itself decreased by three.
  3.  The sum of three consecutive integers is 21.
  4.  The cost, C, of manufacturing wooden trains is equal to $250 plus $1.75 for each train built.
  5.  One angle in a triangle measures 10° more than the sum of the measure of the other two angles.

- *Solutions*

  1.  For this problem, there is no question that needs to be answered, so how do we define a variable? Remember that a variable will represent a quantity whose value we don't know. So, ask yourself "What quantity do I not know that relates to this problem?" The obvious answer should be that you do not know the "number" in the word statement. So, represent this unknown number with a variable.

      Let n denote the number.

      "Four less than" means we will be subtracting 4 from something. From what? That follows next: "the product of a number and 7." *Product* means to multiply, and we said the number could be represented by n. So, putting it all together gives us 7n - 4.

2.  Here again, we let n be the unknown number. This statement can be translated pretty much in the order in which it is written:

    Three times a number ⇨ 3 • n
    plus four ⇨ + 4
    is the same as ⇨ =
    the number itself ⇨ n
    decreased by three ⇨ - 3
    Putting all this together gives 3n + 4 = n - 3.

3.  We know that consecutive integers differ by 1 unit; however, we do not know the value of the smallest integer. We also don't know the values of the other two integers, but these both depend on what the smallest integer is. So, we use a variable to represent the smallest integer, and then write expressions for the other two in terms of that variable.

    Smallest integer ⇨ x
    Next consecutive integer ⇨ x + 1
    Next consecutive integer ⇨ (x + 1) + 1 = x + 2
    Now that we have expressions for the three unknowns, we can translate the statement:
    "The sum of" means we will be adding some things together. What? Three consecutive integers. Right now, we have x + (x + 1) + (x + 2) as the sum of three consecutive integers.
    "Is" means equal to, but equal to what? 21.
    Putting it all together, we have x + (x + 1) + (x + 2) = 21.

4.  We are told to represent the total cost by C, but there is still one thing left to define. Since the total cost depends on the number of trains that are built, we need a variable to represent this. Let x = number of wooden trains built.

    The cost C, of manufacturing wooden trains ⇨C
    is equal to ⇨ =
    $250 ⇨ 250
    plus ⇨ +
    $1.75 for each train built ⇨ 1.75x
    The equation is C = 250 + 1.75x

5.  Here we are dealing with the three angles of a triangle, so we need a variable for each one. Let . . .

    A = measure of the first angle
    B = measure of the second angle
    and C = measure of the third angle
    Now we can translate the statement:
    One angle in a triangle⇨ A
    measures ⇨ =
    10° more than ⇨ 10 +
    the sum of the measures of the other two angles ⇨ (B + C)
    The equation is A = 10 + (B + C).

*   *Example*

    A charter bus company charges adults $45 and senior citizens $35 for a day tour. The company figures that its average expense for each person taking the trip is $14.50. Write an algebraic expression for the amount of money made on the tour. Evaluate the expression to determine the amount of money the company will make if 23 adults and 9 senior citizens take the trip.

*   *Solution*

    Let's start by defining some variables. From the problem, it should be clear that the money the company makes would depend on the number of people. Since we have two types of people, we need two variables:

    > x = number of adults
    > y = number of seniors

    Next we will try writing the expression in words. The money made by the company can be expressed as follows:

    > revenue - costs

    Now we need to express revenue and costs algebraically. Revenue is the money brought in by the company. (Revenue = money from adults + money from seniors).

    Since each adult pays $45 and each senior pays $35, we can write . . .

    > Revenue = 45x + 35y

    Costs are the expenses of the company. The company spends $14.50 per person, so . . .

    > Costs = 14.5 (number of adults + number of seniors) or, Costs = 14.5 (x + y)

    Thus, the money the company makes is given by . . .

    > Revenue - Cost
    > 45x + 35y - 14.5 (x + y)

    which can be simplified . . .

    > 45x + 35 y - 14.5x - 14.5 y
    > 45 x - 14.5x + 35 y - 14.5y
    > (45 - 14.5)x + (35 - 14.5)y
    > 30.5x + 20.5y

    If 23 adults and 9 seniors take the tour, . . .

    > 30.5 (23) + 20.5 (9) = 701.5 + 184.5 = 886

    The company will make $886 on the tour.

### An Approach to Solving Word Problems (W) (P)

More elaborate word problems will require you to utilize various formulas. Such formulas often help the translation process by allowing us to go from words to a mix of words and math, and then finally to all math. Many formulas contain several variables. In such cases, the problem statement will typically tell you certain values. It is helpful to write down related formulas and

then go through the formula listing the values of the different variables. If a value is unknown, use a question mark to indicate that you still need to find the value.

It is not practical to try to memorize how to do different types of problems. While we can keep general ideas in mind, the best method for dealing with word problems is to have a strategy. It is possible for students to use different strategies and be just as successful. The important thing is to have a plan with which you feel comfortable.

One strategy you could use is as follows:
1.  Read and understand the situation. A drawing is often helpful.
2.  Define a variable for the unknown quantity. Define other quantities in terms of the variable, if possible. Remember that we have only looked at solving equations in one variable so far.
3.  Write an equation with the information given. It sometimes helps to start by writing a word equation. Then, you can translate the equation in smaller steps.
4.  Solve the equation.
5.  Check the solution. Also remember that just because you find a solution does not mean it is a feasible solution. Check your answers in your equation, but also check to see whether it makes sense for the problem.
6.  Write an answer for the question asked, using complete sentences.

You will need to remember some formulas and concepts that you have learned previously. Make sure you review the basic formulas presented throughout this review.

Each different type of unit is associated with a different type of term. You can't add x and $x^2$, length and area, nor feet and square feet. If you watch your units carefully, they can often help you identify like terms. When working with units, it is important to make sure that everything matches up. It is usually a good idea to write the units as you work the problem, just to make sure things are okay. Often, we leave the units out of our work when doing computations, but this can be dangerous. If you have mixed up units, the answer will likely be wrong. In addition, you may forget to express your final answer in terms of units. Be careful!

Look at the following examples to see how this strategy can be used. Do not focus so much on the type of problem, but rather on the approach. This keeps the strategy general enough to work in many more situations.

*   *Example*
    It costs seven cents per minute to make a phone call. If Marty was on the phone for twenty-seven minutes, how much did the call cost?

*   *Solution*
    Although this problem could be done quickly in your head, let's take a look at how we could approach this as a word problem.

    First, identify the question. We want to know how much the call will cost. We could define a variable to represent this:
        c = cost of the call

Now ask yourself what you need to know to find the cost. Try a word equation:

cost of the call = (price per minute) • (number of minutes)

Looking back at the problem, we are given the price per minute and the number of minutes. We want to find the cost of the call. Plug in the elements you know, and solve for the one you don't.

cost of the call = (price per minute) • (number of minutes)

$c = (0.07)(27)$

$c = 1.89$

Now that we have solved the problem, we need to state our conclusion in words.

Marty's call will cost $1.89.

• *Example*
Abby sets up a lemonade stand in her front yard. She spent $5 on supplies to set up the stand and advertise, and it costs her $0.15 for each cup she sells for water, sugar, etc. How many cups must she sell at $0.50 to make a profit of at least $10?

• *Solution*
Start with the question, "How many cups must she sell at $0.50 to make a profit of at least $10?" The desired quantity is the number of cups, so let $c$ = number of cups sold. The rest of the sentence gives us the condition that must be met: Abby wants to make a profit of at least $10 by selling cups of lemonade for $0.50 each.

Now, to simplify the problem, just consider that she makes a profit of exactly $10. This will give you the minimum number of cups she needs to sell. Start with a word equation that describes what you want:

profit = 10

But how will she get a profit? Profit is the difference between revenue (the money she brings in) and cost (the money she spends). Use this to adjust your word equation:

revenue - cost = 10

Now you should ask yourself two things: (1) how does she get money? and (2) what does she spend money on?

Abby makes money by selling cups; $0.50 for each cup to be exact. She has two types of costs: variable and fixed. Fixed costs are the costs she has regardless of the number of cups of lemonade she sells (such as for advertising). Variable costs are the costs she has for each cup. To summarize . . .

Revenue: 0.50c ($0.50 for each cup sold)
Fixed Cost: 5c ($0.15 for each cup sold)
Variable Cost: 0.15c ($0.15 for each cup sold)

Now the word equation can be expanded a little further:

revenue - (fixed cost + variable cost) = 10

Since you have expressions for each part, plug in what you know:

0.5c - (5 + 0.15c) = 10

Now you have a mathematical equation that you can solve.

$0.5c - (5 + 0.15c) = 10$

$0.5c - 5 - 0.15c = 10$

$0.35c - 5 = 10$

$0.35c = 15$

$c = {}^{15}\!/_{0.35} \approx 42.86$

Since she can't sell a fractional number of cups, this number needs to be rounded to 43. Now you can answer the question in a sentence:

Abby must sell at least 43 cups of lemonade to make a profit of at least $10.

**Note:** This may seem like a long way to go to answer the question; however, the point is to show a technique for solving word problems. The same approach that can be used on simple problems can also be applied to more complex problems. Having a strategy helps to take the fear out of solving word problems.
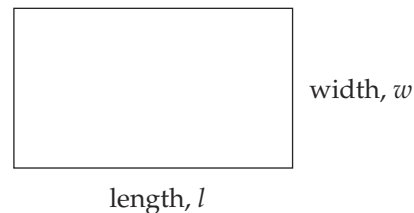
- *Example*
The length of a rectangular room is one and one-half times its width. If the perimeter of the room is 84 feet, what are the dimensions of the room?

- *Solution*
You know the dimensions of a rectangle are the length and width, so define these as variables:

$l$ = length

$w$ = width

width, $w$

Now it might be a good idea to draw a picture:

length, $l$

The problem states that the length is 1.5 times the width. This means that we have $l = 1.5w$. The problem also states that the perimeter is 84 feet. Since we have a formula for the perimeter of a rectangle that involves the length and width (the variables of interest), this might be a good place to start.

$P = 2l + 2w$

Plug in what you know, and solve for what you don't know:

$P = 2l + 2w$

$84 = 2(1.5w) + 2w$

$84 = 3w + 2w$

$84 = 5w$

${}^{84}\!/_5 = w$

$16.8 = w$

So, the width of the room is 16.8 feet, but what about the length? Remember that the length was 1.5 times the width. So, . . .

$l = 1.5w$

$= 1.5(16.8)$

$= 25.2$

The length of the room is 25.2 feet. The dimensions are 16.8 feet by 25.2 feet.

Check:    25.2 + 25.2 + 16.8 + 16.8
           50.4 + 33.6
           84

**Hint:** Make sure you check your answer for feasibility!

•    *Example*
A car dealer plans to advertise that all cars will be sold at a 25% discount off the sticker price. If the dealer wants to receive $6,900 for a particular car, what should the sticker price be?

•    *Solution*
Remember that sale price = original price – (discount) • (original price)

Here we know the sale price is $6,900 and the discount is 0.25 (i.e., 25%). We don't know the original price, so we can call that x. Plugging in our information yields the following equation:
       6,900 = x - .25x
       which can be solved as:
       6,900 = x - .25x
       6,900 = .75x
       $^{6,900}/_{.75}$ = x
       $9,200 = x

The dealer should set the sticker price at $9,200.

•    *Example*
Angie is 5 years older than three times the age of her son, Shawn. The sum of their ages is 45. Find their ages.

•    *Solution*
If we let Shawn's age be x, then we know Angie's age must be 5 + 3x. We also know the sum of their ages is 45, so we can write the equation:
       Angie's age + Shawn's age = 45
       (5 + 3x) + x = 45
       5 + 4x = 45
       4x = 40
       x = 10

Shawn is 10 years old, and Angie is 35 years old.

•    *Example*
In 1998, there were 212 long distance area codes in the United States. This was an increase of 147% over the number when the area code plan originated in 1947. How many area codes were there in 1947?

- *Solution*

    Let x = number of area codes in 1947.

    Since the number of area codes in 1998 was 147% more than x, the expression would be 2.47x. This needs to be equal to 212, so we get the equation . . .

    2.47x = 212

    x = $^{212}/_{2.47}$

    x ≈ 85.83

    Now remember that x is the number of area codes so it is not possible to have a fractional number. This would seem to indicate that the percent increase has been rounded. There were actually 86 area codes in 1947.

    Note that we used 2.47 because there was an increase of 147%. The original amount was 100% (or 1), and the increase was 147% (or 1.47). In 1998, we have a total of 247% of the original amount, or 2.47x.

- *Example*

    After Christmas, a toy store marked down Barbie dolls on clearance for $5.99. If the dolls originally cost $8.50, how much was the markdown?

- *Solution*

    Let x = amount of the markdown.

    Since the sale price plus the markdown needs to equal the original price, we can write the equation as follows:

    5.99 + x = 8.50

    5.99 + x - 5.99 = 8.5 - 5.99

    x = 2.51

    The dolls were marked down $2.51.

- *Example*

    Payton can get to school in 15 minutes if she rides her bike. It takes her 45 minutes if she walks. Her speed when walking is 10 miles per hour slower than her speed when riding. How far does she travel to school?

- *Solution*

    Even though the problem asks for us to find distance, we want to define a variable involving speed. This is because the two speeds are related. Once we know the speed, we can find distance since we know the times of travel.

    Let x = speed riding in miles per hour

    Next, we need to realize that the distance to school is the same whether she rides or walks. That is, . . .

    distance riding = distance walking

Using the distance traveled formula, we can write . . .
(rate riding) (time riding) = (rate walking) (time walking)

Next, we use the given times and the fact that her walking speed is 10 miles per hour less than her riding speed. Note that each time must be converted to hours since speed is based on hours. The resulting equation is . . .

$\{x \, {}^{miles}\!/\!_{hr}\}$ (.25 hr) = $\{x - 10 \, {}^{miles}\!/\!_{hr}\}$ (.75 hrs)
.25x miles = .75x miles - 7.5 miles
-.5x = -7.5
x = 15
d = r • t = 15 (.25) = 3.75 miles

Payton can ride her bike at a rate of 15 miles per hour. If it takes her 15 minutes (.25 hours) to get to school, then the school is 3.75 miles away.

- *Check*
  If the school is 3.75 miles away and she can walk at a rate of 5 miles per hour (10 less than riding), we should be able to verify the given time to walk.
  d = r • t
  ${}^{d}\!/\!_{r}$ = t
  ${}^{3.75 \, miles}\!/\!_{5 \, miles/hr}$ = 0.75 hours (or 45 minutes)

  This checks out.

- *Example*
  A chemist must mix 8 liters of a 40% solution of potassium chloride with some 70% solution to get a mixture that is a 50% solution. How much of the 70% solution should be used?

- *Solution*
  Let x = amount of 70% solution.

  When dealing with mixtures, we know that the amount of the substance we start with, plus what we add, must equal how much we have at the end. Knowing this, we want to write an equation that deals with the amount of potassium chloride.
  amount of potassium chloride originally + amount of potassium chloride added = amount of potassium chloride at the end

  To get the amounts, we need to multiply the number of liters by the solution percent (written as a decimal).
  (original liters of solution) (original %) + (liters added) (% added) = (final liters) (final %)
  (8) (.40) + (x) (.7) = (8 + x) (.5)
  3.2 + .7x = 4 + .5x
  .2x = .8
  x = 4

  The chemist must add 4 liters of the 70% solution to obtain the desired result.

- *Example*

  Consider three consecutive integers. The sum of the first two consecutive integers is 5 less than three times the third. Find the integers.

- *Solution*

  There is no picture that we can draw here; however, we should recall that consecutive means one after another, and integers differ in value by 1 unit. Next, we define a variable. Since the second and third numbers really depend on the first, we will define a variable as follows:

  x = the first integer

  Now, three consecutive integers can be written (in terms of the first) as follows:

  x, x + 1, and x + 2

  Now, we translate the statement given in the problem:

  "The sum of the first two consecutive integers" translates into (x) + (x + 1).
  "Is" translates into =.
  "5 less than three times the third" translates into 3 (x + 2) - 5.

  Thus, the whole statement can be translated into the equation:

  (x) + (x + 1) = 3 (x + 2) - 5

  which can be solved as . . .

  x + x + 1 = 3 (x + 2) - 5
  2x + 1 = 3x + 6 - 5
  2x + 1 = 3x + 1
  0 = x

  Now we know the first consecutive integer, and from it, we can find the other two.

  x + 1 = 0 + 1 = 1
  x + 2 = 0 + 2 = 2

  The three consecutive integers are: 0, 1, and 2.

- *Example*

  A building inspector for the city of Pine Peaks is checking on an apartment building that is under construction. She finds that a window ledge, exactly 22 feet from the level ground, can be reached with a ladder that is 24 feet long. The bottom of the ladder is 6 feet away from the base of the wall, and the top of the ladder just reaches the window ledge. Is the wall perfectly vertical?

- *Solution*

The first thing to do with this problem is to visualize what is going on. Imagine a ladder leaning against a wall. The ladder, wall, and ground form the three sides of a triangle. Hmmm. So this problem is really about triangles, but how so? The question asks whether the wall is vertical. If it is, this means that it must be perpendicular to the ground (which is level, or horizontal). This means that the wall and ground meet at right angles. Oh! We have a right triangle! So, try to draw a picture of the situation:
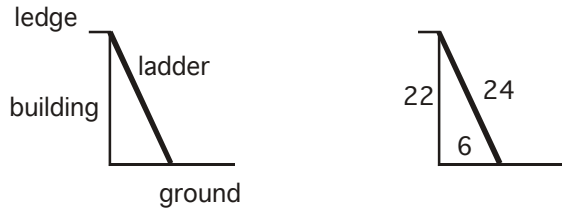


Hey, isn't there a theorem that works for every right triangle? Yes, the Pythagorean Theorem: $a^2 + b^2 = c^2$. So, if we had a right triangle, this theorem should hold. That is, $6^2 + 22^2 = 24^2$ (where did the numbers come from?).

$$6^2 + 22^2 = 24^2$$
$$36 + 484 = 576$$
$$520 = 576$$

Well, that doesn't work. This means that the wall is not vertical.

The following tips are useful when solving word problems:
1. Read the entire problem.
2. Draw a picture if possible.
3. Identify and label any known quantities.
4. Identify and label any unknown quantities.
5. Write any relevant formulas that relate the unknown quantities to each other or to the known quantities (here is where translation comes in).
   - Start with general formulas (if possible).
   - First write equations using a mix of words and math if that helps.
6. Solve the resulting equation(s) for the desired quantity.

**Hint:** Remember that math is a language. Translate the word statement in little bits if you need to, slowly working your way to a complete equation.

## A Look Ahead

The next part of the module looks at more word problems but strictly in the context of a school setting. In particular, it focuses on the types of questions that may appear on the ParaPro Assessment.

## Sample Test Questions

These questions are examples of what might appear on the ParaPro Assessment. The WorkKeys math portion is all word problems, but you will also encounter word problems on the ParaPro Assessment.

1. Ray is buying a computer package on sale for $460. He pays $110 up front and finances the balance for the remainder of the year with no interest. If there are 7 months left in the year, how much should he pay each month to pay off the computer in equal payments and avoid interest?
   a. $50
   b. $65
   c. $66
   d. $82

2. Lisa goes to the grand opening of Shoe Barn and buys a pair of running shoes that are 35% off the original price. If the shoes cost her $39, what was the original price?
   a. $25.35
   b. $29
   c. $52.65
   d. $60

3. Jacob went to Florida for spring break and bought each of his two brothers a t-shirt at a souvenir store. The t-shirts cost $10.95 each, and Jacob paid $1.65 in sales tax. Jacob made no other purchases and left the store with only $4.45. How much did he have when he entered the store?
   a. $23
   b. $25
   c. $28
   d. $30

4. The length of a recreation room is 2 feet longer than twice its width. If the perimeter of the room is 184 feet, what are the room's dimensions?
   a. Width = 18 feet; Length = 74 feet
   b. Width = 22 feet; Length = 70 feet
   c. Width = 30 feet; Length = 62 feet
   d. Width = 45 feet; Length = 47 feet

5. While building a craft, Payton needs to cut a 2-foot piece of yarn into three pieces whose lengths are consecutive integers. How long, in inches, is the shortest piece?
   a. 5 inches
   b. 7 inches
   c. 9 inches
   d. 11 inches

## Solutions

1. Let x = the amount Ray pays each month.
   monthly payments + down payment = total cost
   $7x + 110 = 460$
   $7x = 460 - 110$
   $7x = 350$
   $x = 50$
   Ray would need to pay $50 each month. Answer a. is correct.

2. Let x = the original price.
   sale price = original price - discount
   sale price = original price - (% off ) (original price)
   39 = x - (.35) (x)
   39 = x - .35x
   39 = .65x
   $^{39}/_{.65}$ = x
   60 = x
   The shoes originally cost $60. Answer d. is correct.

3. Let x = initial amount of $ that Jacob had.
   money leaving = money entering - money spent
   4.45 = x - (10.95 • 2 + 1.65)
   4.45 = x - (21.90 + 1.65)
   4.45 = x - 23.55
   28 = x
   Jacob entered the store with $28. Answer c. is correct.

4. Let l = length and w = width

   

   *l* = 2 + 2*w*

   P = 2l + 2w
   184 = 2 (2 + 2w) + 2w
   184 = 4 + 4w + 2w
   180 = 6w
   30 = w
   Since w = 30, we have l = 2 + 2w = 2 = 2 (30) = 2 + 60 = 62. The dimensions of the room are 30 feet by 62 feet. Answer c. is correct.

5.    Let x = the length of the shortest piece.

total length = length of short piece + length of middle piece + length of long piece

Since the lengths are consecutive integers, the middle piece is 1 unit longer than the shortest piece, and the long piece is 2 units longer than the shortest.

The question asks for the length of the short piece in inches, but the total length is given in feet. We should make sure to convert to the same units for consistency.

2 ft = 24 in
$24 = x + (x + 1) + (x + 2)$
$24 = x + x + 1 + x + 2$
$24 = 3x + 3$
$21 = 3x$
$7 = x$

The short piece is 7 inches long (the other two are 8 and 9 inches, and notice that $7 + 8 + 9 = 24$). Answer b. is correct.


## Evaluation
Paraprofessionals can be evaluated by using "Quiz #6." Paraprofessionals could work together to practice classroom instruction.


## Supplemental Resources
For more information about solving word problems, see the following resources:
*    Word problem solvers at Algebra.com – http://www.algebra.com/algebra/homework/word/

*    Word problems for kids (St. Francis Xavier University, Canada) – http://www.stfx.ca/special/mathproblems/welcome.html

*    Writing algebraic equations (MathGoodies) – http://www.mathgoodies.com/lessons/vol7/equations.html

1.  Shawn gave Eric half of his baseball cards. Eric gave Bryan half of the cards he received from Shawn. Bryan kept 18 of those cards and gave the remaining 20 to Chris. How many baseball cards did Shawn give Eric?

2.  By installing a new electronic thermostat that reduces the temperature setting at night, a family expects to cut its annual heating bill by 5%. If the thermostat costs $100 and the cost will be covered in fuel savings after two years, what was the family's annual heating bill when using the old thermostat?

3.  A falling tree damaged the side of a brick building, and the entire wall needs to be replaced. The wall is 28 feet long and 9 feet tall. If the area of a side of a brick used to reconstruct the wall is $\frac{1}{6}$ square feet, how many bricks will be needed to rebuild the wall?

4.  Lawson Roofing charges customers $35 per sheet of plywood when replacing damaged wood. If each sheet costs the company $12, how much profit does the company make if they use 36 sheets of plywood on a job?

# Answer Key

1. Shawn gave Eric 76 baseball cards.

2. The family's annual heating bill with the old thermostat was $1,000.

3. It will take 1,512 bricks to rebuild the wall.

4. Lawson Roofing would make a profit of $828.

# Module 4 – Mathematics
*Part 7: Classroom Applications*

## Overview
In Module 4, Part 7, the paraprofessionals will learn about the following:
- Applications in a classroom setting (P)
- Applications in support of classroom instruction (P)

## Objectives
Following completion of Module 4, Part 7, the paraprofessionals will be able to . . .
- understand the types of classroom application questions that appear on the ParaPro Assessment.
- apply previous skills to solve application problems related to the classroom setting.
- apply previous skills to solve application problems in support of classroom instruction.

## Review
In the previous parts of this module, we have focused on the skills and techniques that are necessary to do well on both the WorkKeys and ParaPro Assessments. In terms of assessing classroom instruction ability, the two differ. Part of the WorkKeys Assessment involves an observation of actual classroom instruction. The ParaPro Assessment builds in questions that are intended to assess this ability. Both exams build in application questions that are merely school related. They are no different than other word problems except in setting.

## Lessons and Activities

### Applications in a Classroom Setting (P)
Both exams will contain word problems. Earlier we noted that the WorkKeys math portion consists entirely of word, or application, problems. These will typically deal with a school setting, though they do not have to. The ParaPro Assessment will contain some application problems that deal with school scenarios, but there are also questions directly related to instruction.

**Hint:** Whether the application problem deals with a school situation or not, the same approach should be used. Review Part 6 on solving word problems if necessary.

The following examples will illustrate this type of problem and serve as a review of the techniques for solving word problems.

- *Examples*
    1. The school library has one hundred fifty three books in the new book section that can be checked out. On Friday, only forty-two new books remained. How many of the books from the new book section had been checked out?

    2. Eric and two of his friends were asked to put the science books away at the end of the year. There are 32 science books, and they put an equal number of books onto each of 4 shelves in the bookcase. What was the total number of books on each shelf?

3.  The concert band is trying to raise money to replace the two curtains for the stage in the auditorium. Each curtain is rectangular with a width of 30 feet and a height of 15 feet. The cost of material for the curtains is $1.25 per square foot. How much money do they need to raise?

4.  Holt Middle School only has 7th and 8th grade students. There are 980 students at the school, and there are 50 more 7th graders than 8th graders. How many 8th graders attend Holt Middle School?

- *Solutions*
  1.  The question asks you to find the number of new books checked out. Since you don't know what this is right now, let x be this number.
      Now consider a word equation (remember to talk the problem out in your head).
      # of new books left = # of new books total - # of new books rented

      Looking at the word equation, put in what you know. Remember that variables are okay to put in too. The important thing is to express the word statement as a math statement.
      # of new books left = # of new books total - # of new books rented
      42 = 153 - x

      So, you only need to solve the equation 42 = 153 - x to answer the question.
      42 = 153 - x
      42 - 153 = 153 - x - 153
      -111 = -x
      111 = x

      There are 111 new books checked out.

  2.  Start with the question. You are asked to find how many books are on each shelf. Since you don't know this right now, let x be this number.
      You know that they put the same number of books on each shelf. So, you can think of the following:
      total # of books = (# of shelves) (# of books per shelf)

      Looking at the word equation, put in what you know.
      total # of books = (# of shelves) (# of books per shelf)
      32 = (4) (x)

      So you really need to solve the equation 32 = 4x.
      32 = 4x
      $\frac{32}{4} = \frac{4x}{4}$
      8 = x

      Each shelf has 8 science books.
      Notice that the number of people putting the books away is not important.

3. Start with the question. You need to find out how much money the band needs to raise. This is the same as the cost of the curtains, which you don't know yet. Let c be the cost of the curtains, and consider the following equation:

cost of curtains = (price per sq. ft.) (# of sq. ft.)

Look at the word equation, and put in what you know:

cost of curtains = (price per sq. ft.) (# of sq. ft.)
c = (1.25) (# of sq. ft.)

Notice that you do not know the number of square feet directly (the area of the curtains). You need to use additional information to find this. The curtains are rectangular so each has an area of $A = l \bullet w = 30 \bullet 15 = 450$ sq. ft. There are two curtains, so the total area is $450 \bullet 2 = 900$ sq. ft.

Now put this into the word equation.

cost of curtains = (price per sq. ft.) (# of sq. ft.)
c = (1.25) (# of sq. ft.)
c = (1.25) (900)
c = 1,125

The band needs to raise $1,125 to buy new curtains.

4. Start with the question. You are asked to find the number of 8th graders. Since you don't know this right now, let x be this number. Now consider the following word equation:

total number of students = # of 7th graders + # of 8th graders

Looking at the equation, you know the total number of students, and you have an expression for the number of 8th graders (x), but what about the 7th graders? The problem says "there are 50 more 7th graders than 8th graders" so you can express this as 50 + x. Now go to the word equation, and put in what you know.

total number of students = # of 7th graders + # of 8th graders
980 = (50 + x ) + x

So, you need to solve the equation 980 = (50 + x) + x.
980 = (50 + x) + x
980 = 50 + x + x
980 = 50 + 2x
930 = 2x
465 = x

There are 465 8th graders at Holt Middle School.

**Note:** Not every word problem will require you to define a variable and set up an equation directly. Sometimes, you can just "see" what needs to be done and do the computation in your head.

## Math 

### Applications in Support of Classroom Instruction (P)

These types of problems are unique to the ParaPro Assessment and deal directly with classroom instruction. In terms of instruction, it is not enough to know *how* to solve a problem, you must be able to see where students are making mistakes so you can offer corrective suggestions. These problems will present you with a situation in which a student has made a mistake in a math problem. Your task is to identify his or her mistake and/or indicate what should be done instead.

**Hint:** Take your time on these problems. It really helps to work the actual problem out first. Then, you can compare your work to the student's work. This can often point out the trouble spot more quickly.

The following examples will illustrate this type of problem.

- *Examples*
  1. Chad is asked to solve $2x + 3 = 5$ but doesn't understand why his answer is wrong. He shows you the following work:

     $2x + 3 = 5$
     $2x = 5 + 3$
     $2x = 8$
     $x = 4$

     What, if anything, is wrong with his work?

  2. Stephanie is asked to plot the ordered pair (-2, 4). She plots the following:
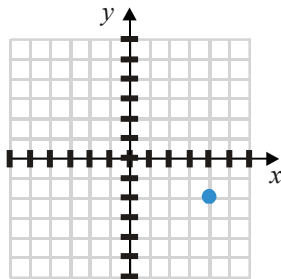
     

     What, if anything, is wrong with her plot?

  3. Sherry is having trouble evaluating $2 \cdot 5 + 8 \cdot 2 + 2$. She shows you the following work:

     $2 \cdot 5 + 8 \cdot 2 + 2$
     $10 + 8 \cdot 2 + 2$
     $18 \cdot 2 + 2$
     $36 + 2$
     $38$

     What, if anything, is wrong with her work?

4. David is asked to find the area of a rectangle that has a width of 6 centimeters and a length of 15 centimeters. He shows you the following:

A = 2L + 2W
A = 2 (15) + 2 (6)
A = 30 + 12 = 42 cm²
x = 4

What, if anything, is wrong with his work?

- *Solutions*
  1. This problem requires you to know how to solve a linear equation. First, solve the equation; then determine where Chad went wrong.

     2x + 3 = 5
     2x + 3 - 3 = 5 - 3
     2x = 2
     $^{2x}/_2 = ^2/_2$
     x = 1

     In Chad's work, he added three to the right side when he should have subtracted.


  2. This problem requires you to know how to plot a point. First plot the point (-2, 4), and then see if you can determine Stephanie's mistake.

     To plot the point, start at the origin; move two units left (since the x-coordinate is -2); and then move four units up (since the y-coordinate is 4).
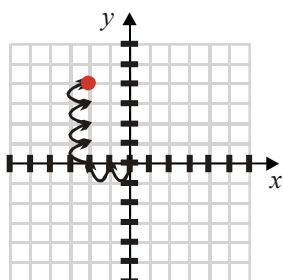
     

     It appears that Stephanie switched the coordinates. She went to the right 4 units and down 2 units. The point she plotted has coordinates (4, -2).

3.   This problem requires you to know the order of operations. Start by simplifying the expression, and see whether you can determine Sherry's mistake.

2 • 5 + 8 • 2 + 2      Do multiplication and division first from left to right.
10 + 16 + 2            Do addition and subtraction next from left to right.
26 + 2
28

In the third line of Sherry's work, she did not follow the order of operations. She added before she finished multiplying.

4.   This problem requires you to know how to find the area of a rectangle. The formula is $A = L \bullet W$. The expression that David is using, $2L + 2W$, is the perimeter of the rectangle and does not have square units.

## A Look Ahead

You are just about finished reviewing the material necessary to succeed on either the WorkKeys or ParaPro Assessment. The remainder of this part involves sample test questions and a short review quiz. Part 8 of the module presents a short tutorial on using a calculator. Only the basic operations will be presented since you will not be required to do any advanced computations.

## Sample Test Questions

These questions are examples of what might appear on the ParaPro Assessment. The WorkKeys math portion consists entirely of word problems, but you will need the skills covered in this section to help you solve those problems.

### *Applications Related to Classroom Setting*

1.   In Marsha's fifth-grade class, homework counts as 30% of a student's grade, and exams count as 70% of the grade. If a student in her class has a 90% for his homework grade and an 80% for his exam grade, what is his course grade? Round to the nearest whole percent.
     a.   85%
     b.   83%
     c.   68%
     d.   50%

2.   The average amount of money spent in a cafeteria is $4.25, and the average cost of the food made for the customer is $1.20. The cost to operate the cafeteria per week is roughly $1,500 per week plus the cost of the ingredients used. Estimate the number of customers needed per week (on average) for the cafeteria to break even.
     a.   350
     b.   1,200
     c.   275
     d.   500

3. During a 5-day used-book charity drive, Matt's sixth-grade class collected the following:

| Day | Hardbound | Paperback |
| --- | --- | --- |
| Monday | 2 | 8 |
| Tuesday | 3 | 7 |
| Wednesday | 5 | 14 |
| Thursday | 0 | 7 |
| Friday | 1 | 6 |
| Total | 11 | 42 |

How many total books did his class collect *after* Wednesday?
a. 11
b. 14
c. 19
d. 67

4. To get ready for the upcoming class party, Pam needs to determine how much money each child needs to bring in to cover the cost of the pizza (only the students will be eating pizza). Each pizza costs $7 and has 8 slices. She has 30 students in her class and wants to have enough pizza so that each student can have 2 slices. How much should each student bring in (to 2 decimal places)?
a. $0.88
b. $1.75
c. $1.87
d. $2.37

5. The school day at Fox Lake Elementary begins at 8:25 AM and lasts for 7 hours. What time is it when half of the school day is complete?
a. 11:45 AM
b. 11:55 AM
c. 12:15 PM
d. 12:25 PM

## Solutions

1. The question asks for the student's grade. Let's call this value x. Now try writing a word equation.

    final grade = .3 (hw grade) + .7 (exam grade)

    Plug in what you know:
    x = .3 (.9) + .7 (.8)

    Solve the equation:
    x = .27 + .56 = .83

    The student's grade would be 83%. (Answer b.)

2.  Start by letting x be the average number of customers needed per week.
    Since the average person spends $4.25 and the cost of individual meals (to the cafeteria) is $1.20, the cafeteria makes $4.25 - $1.20 = $3.05 per person that can be applied to costs other than food. Since this is about $3 per person, and the costs are $1,500, we can estimate the number of customers needed by solving the following equation:

    x = $^{1500}/_3$ = 500

    The cafeteria should serve about 500 customers per week to break even.
    (Answer d.)

3.  "After Wednesday" means on Thursday or Friday. We simply need to add up the individual amounts for hardbound and paperback on those days.

    0 + 7 + 1 + 6 = 14

    Matt's class collected a total of 14 books after Wednesday. (Answer b.)

4.  Consider the following word equation:

    cost per student = $^{\text{total cost of pizza}}/_{\text{number of students}}$

    We know the number of students, but we don't know the total cost of the pizza. Each pizza costs $7 so we could say, . . .

    total cost of pizza = 7 (number of pizzas)

    Now we know a little more, but we don't know how many pizzas we need. Each pizza has 8 slices so we could say,

    total cost of pizza = $^{\text{total slices}}/_8$

    Another problem . . . we don't know how many slices we need. We do know that each of the 30 students should get 2 slices. Since 30 • 2 = 60, we need a total of 60 slices. We can use this to find the number of pizzas required:

    number of pizzas = $^{60}/_8$ = 7.5
    Since we can't order just half a pizza, we need to get 8 pizzas.

    We have the number of pizzas, so we can get the total cost:

    total cost of pizza = 7 (8) = $56
    The total cost will be $56.

    With the total cost, we can find the cost per student:

    cost per student = $^{56}/_{30}$ ≈ 1.87
    Each student needs to bring in $1.87 to cover the cost of the pizza. (Answer c.)

5.  Since the school day is 7 hours long, half the day is 3.5 hours. The day starts at 8:25. Three hours later will be 11:25. Half an hour is 30 minutes, so an additional 30 minutes makes the time 11:55. Half the day is complete at 11:55 AM. (Answer b.)

### *Applications Related to Classroom Instruction*

1. Patrick is having trouble with simplification and shows you the following:

   2 (x + 9) + 5x - 3
   2x + 9 + 5x - 3
   7x + 6

   What, if anything, is wrong with his work?
   a. Patrick did not collect like terms correctly.
   b. Patrick did not distribute correctly.
   c. Patrick did not finish combining terms.
   d. Nothing is wrong. The problem is worked correctly.

2. Ashley is supposed to illustrate the commutative property of addition using the expression 4 + (9 + 3). She incorrectly writes (4 + 3) + 9.

   Which of the following statements would Ashley need to use?
   a. (9 + 3) + 4
   b. (4 + 9) + 3
   c. 4 + 9 + 3
   d. 4 + 12

3. Sydney was asked to evaluate $(3^2)$ $(3^5)$ and write the answer in exponential form. She wrote the following incorrect statement: $(3^2)$ $(3^5) = 3^{10}$

   Which of the following statements should Sydney have written instead?
   a. $(3^2)$ $(3^5) = 9^{10}$
   b. $(3^2)$ $(3^5) = 9^7$
   c. $(3^2)$ $(3^5) = 6^{10}$
   d. $(3^2)$ $(3^5) = 3^7$

4. Peter was given the number 823.74961 and was asked to identify the number in the hundredths place. He *incorrectly* reasons that 7 is in the oneths place and 4 is in the tenths place, so 9 must be in the hundredths place. What is the correct number?
   a. 8 is the correct number since it represents 800.
   b. 4 is the correct number since there is no oneths place.
   c. 5 is the correct number since the thousandths place is larger than 4.
   d. There is nothing wrong with his reasoning. 9 is the correct number.

5. Jeff is trying to find the area of an equilateral triangle whose sides are all 10 centimeters long. He is having trouble and shows you the following work:

   A = ½ bh = ½ (10 cm) (10 cm) = 50 cm²

   What, if anything, is wrong with Jeff's work?
   a. He should be using the formula A = l • w to find the area.
   b. The height of an equilateral triangle is not one of its sides.
   c. The area should not have square units.
   d. Nothing is wrong with his work. The answer is correct.

## Solutions

1.  Start by simplifying the expression:

    2 (x + 9) + 5x - 3
    2x + 18 + 5x - 3
    7x + 15

    In the second line of work, Patrick did not correctly distribute the 2. (Answer b.)

2.  The commutative property says that the order of addition is not important. This is illustrated by saying that 4 + (9 + 3) = (9 + 3) + 4. Ashley has also changed the grouping of the addition (which relates to the associative property), but she was not asked to do so. The correct answer is a.
    Note: the commutative property could also have been illustrated by saying
    4 + (9 + 3) = 4 + (3 + 9), but this was not one of the answers.

3.  Start by simplifying the expression using rules of exponents.

    $(3^2) (3^5) = 3^{2 + 5} = 3^7$

    Sydney incorrectly multiplied the exponents when she should have added them. The correct answer is d.

4.  The first place after the decimal place is the tenths place.
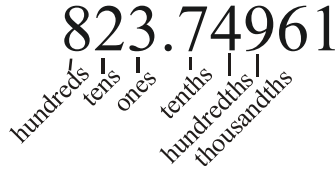
    

    There is no oneths place, so answer b. is correct.

5.  Jeff is using the correct formula for finding the area of a triangle; however, he is not using the correct values. For an equilateral triangle, we would have . . .
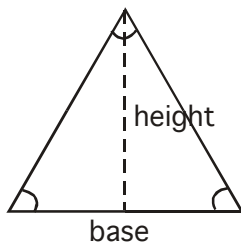
    

    The base of an equilateral triangle is the length of one of the sides, but the height is not. The height is only one of the sides if we have a right triangle. The correct answer is b.

## Evaluation

Paraprofessionals can be evaluated by using "Quiz #7." Paraprofessionals could work together to practice classroom instruction.

## Supplemental Resources

* Solving Word Problems with Arithmetic Expressions (Amby's Math Resources) – http://amby.com/educate/math/1-2_expr.html

* Interactive problem solving game (Absurd Math) – http://www.learningwave.com/abmath/

# Quiz #7

1. The drama students at Wilson Middle School would like to have room for one hundred eighty people to see their annual performance. If there is enough room for each row to contain 12 chairs, how many rows will they need to set up?

2. Sandstone Elementary wants to pave the circular sidewalk that surrounds the flagpole area. If asphalt pavement costs $0.70 per square foot, find the cost to pave the circular road (indicated by dots) in the figure shown.



60 ft

40 ft
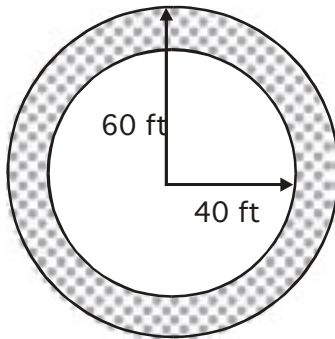
3. Sam is asked to evaluate $4^3$ and doesn't understand why the answer is not 12. What is he doing wrong?

4. Cindy is asked to solve $9x - (7x - 1) = 2$ and can't get the correct answer. She shows you the following work:

$9x - (7x - 1) = 2$
$9x - 7x - 1 = 2$
$2x - 1 = 2$
$2x = 3$
$x = \frac{3}{2}$

What, if anything, did Cindy do wrong?

# Answer Key

1.  $^{180}/_{12} = 15$
    There should be 15 rows.

2.  Find the area of the shaded part by finding the area of the large circle and subtracting the area of the small circle $[\pi \, (60)^2 - \pi \, (40)^2 = 6{,}283.19 \text{ ft}^{2)}]$. Multiply this area by the cost per square foot: $6{,}283.19 \, (0.7) = \$4{,}398.23$.

3.  Sam is mistaking the exponent for multiplication. $4^3 = 4 \bullet 4 \bullet 4 = 64$ not $4^3 = 4 \bullet 3 = 12$

4.  Cindy did not distribute the negative correctly. Her first step should be $9x - 7x + 1 = 2$.

# Module 4 – Mathematics
*Part 8: Calculator Basics*

## Overview
In Module 4, Part 8, paraprofessionals will learn about the following:
- Review of basic calculator techniques
- Solving problems using a calculator

## Objectives
Following the completion of Module 4, Part 8, the paraprofessionals will be able to . . .
- perform basic calculations using a simple calculator.
- solve word problems with the use of a calculator.

## Review
In the previous parts of the module for mathematics, the focus has been on mathematical knowledge. The WorkKeys Assessment allows the use of a formula sheet and a calculator. This next section will review basic calculator techniques and relate them to word problems in the workplace.

## Lessons and Activities

### *Review of Basic Calculator Techniques (W)*
Calculators vary in the layout of the keys. These instructions attempt to work with simpler calculators. The paraprofessionals should take a look at their calculators and locate the following keys.

| | |
|---|---|
| **On**, **Off** | These keys are next to each other, or can be the same key. |
| **Clear** | This key will clear the display. It will *not* clear the memory or settings. |
| **+**, **−**, **×**, **÷** | These keys will perform the operations indicated. They will be located in a line or near each other. |
| **(−)** | This key enters a negative sign. This is *not* an operation sign. Some calculators will not have this key. |
| **(**, **)** | These keys open and close grouping symbols. |
| **Enter** | This key will complete all operations. Some calculators use **=** for this purpose. |
| **AC** | This key will reset the calculator, and clear the calculator completely. |
| **.** | This key inserts a decimal point. |

Before each problem set, the calculator should be cleared and reset. ( $\boxed{\text{AC}}$ is the usual key. Check each calculator to be sure.)

The table below shows how to enter and complete some basic arithmetic problems.

| Problem | Entry | Display |
|---------|-------|---------|
| 67 + 852 | 67 $\boxed{+}$ 852 $\boxed{=}$ | 919 |
| 53 - 14 | 53 $\boxed{-}$ 14 $\boxed{=}$ | 39 |
| 20 - (-8) | 20 $\boxed{-}$ $\boxed{(-)}$ 8 $\boxed{=}$ | 28 |
| 38 x 4.62 | 38 $\boxed{\times}$ 4 $\boxed{.}$ 62 $\boxed{=}$ | 175.56 |

Most calculators use the Equation Operating System to evaluate expressions. This is essentially the order of operations reviewed in the previous part called Number Sense:

1. Simplify inside parentheses.
2. Simplify exponents.
3. Perform multiplications and divisions as the problem is read.
4. Perform additions and subtractions as the problem is read.

| | Solution Without Calculator | Solution Using Calculator |
|---|---|---|
| Example: 5 + 3 x 3 | 5 + 3 x 3<br>= 5 + 9<br>= 14 | 5 $\boxed{+}$ 3 $\boxed{\times}$ 3 $\boxed{=}$ 14 |
| Example: (5 + 3) x 3 | (5 + 3) x 3<br>=(8) x 3<br>= 24 | $\boxed{(}$ 5 $\boxed{+}$ 3 $\boxed{)}$ $\boxed{\times}$ 3 $\boxed{=}$ 24 or<br><br>$\boxed{(}$ 5 $\boxed{+}$ 3 $\boxed{)}$ 3 $\boxed{=}$ 24<br><br>Since the correct order of operations is followed, the $\boxed{\times}$ is not needed. |

Calculator usage requires that the user pay attention to grouping symbols and order of operation.

- *Examples*
  Find the answer to the following using a calculator.
  1. 980 + 42.3 - 3.88

  2. 3,500 - 28 x 56

  3. 57 - 2 (6 + 7)

  4. 0.36 (700-154)

- *Solutions*
    1. 980 [+] 42.3 [−] 3 [.] 88 [=] 1,018.42

    2. 3,500 [−] 28 [×] 56 [=] 1,932

    3. 57 [−] 2 [×] [(] 6 [+] 7 [)] [=] 31 or 57 [−] 2 [(] 6 [+] 7 [)] [=] 31

    4. [.] 36 [×] [(] 700 [−] 154 [)] [=] 196.56 or [.] 36 [(] 700 [−] 154 [)] [=] 196.56

### Solving Problems Using a Calculator (W)

The problems on the WorkKeys Assessment allow the use of a calculator. The learner taking the WorkKeys Assessment needs problem solving skills, calculator skills and basic mathematics skills.

- *Examples*
    1. A paraprofessional must figure the percentage score on a test. If Mark has 53 out of possible 62 points, what is his percentage?

    2. Trina earned a 85% on her last test. The test had a total of 75 points. About how many did she get correct?

    3. The classroom had a box of 200 pencils for the year. Each of the 36 students was to receive 2 pencils. How many pencils should be left over?

- *Solutions*

| | |
|---|---|
| 1. The question asks for a percent for an answer. Getting 53 out of possible 62 is the fraction $^{53}/_{62}$. Secondly, the fraction needs to be multiplied by 100 to give the answer in percent form. $^{53}/_{62}$ x 100 is the correct percentage. | 53 [÷] 62 [×] 100 [=] 85.4838 . . . , which is 85.8% rounded to tenths. |
| 2. The problem asks for the approximate number correct. Using the ideas from the last problem, $^{x}/_{75}$ x 100 = 85. $\require{cancel}\cancel{75}\,\dfrac{x}{\cancel{75}}\times 100 = 75\times 85$ $^{100x}/_{100} = {}^{75\ x\ 85}/_{100}$ x $= {}^{75\ x\ 85}/_{100}$ | 75 [×] 85 [÷] 100 [=] 63.75, which is approximately 64 problems. (The teacher may well have rounded off the original 85%). |
| 3. The question asks for the number of pencils left over. Starting with 200, and then subtracting 36 twice, we need the following: 200 - 2 x 36. | 200 [−] 2 [×] 36 [=] 128 There should be 128 pencils left over. |

## Math

### A Look Ahead

The Mathematics manual so far has reviewed the concepts and skills needed to take either assessment. In the next unit, you will get a chance to check on your progress in mathematics by taking a sample test of 30 questions, all in mathematics. This sample test should be taken individually.

### Sample Test Questions

These are questions that are of the type that may appear on the WorkKeys or ParaPro Assessment. Remember that a calculator is allowed on the WorkKeys Assessment. The formula sheet is also available for use.

1. As a paraprofessional, you are responsible for 2 classes each day that are 45 minutes long, and 3 classes that are 60 minutes long. How much time of the day is spent in class?
   a. 4 ½ hr
   b. 4 hr, 15 min
   c. 8 hr, 45 min          8 hr 45 min
   d. 1 hr, 15 min

2. A rectangle has a width of 25 feet and an area of 400 feet. How long is the rectangle?
   a. 375 ft
   b. 10,000 sq ft
   c. 425 ft
   d. 16 ft

### Solutions

1. $2 \boxed{\times} 45 \boxed{+} 3 \boxed{\times} 60 \boxed{=} 270$

   $270 \boxed{\div} 60 \boxed{=} 4.5$

   The answer is a. 4 ½ hr.

2. For a rectangle, area = length x width. Then length = area ÷ width.
   Length = $400 \boxed{\div} 25 \boxed{=} = 16$. The answer is d. 16 ft.

### Evaluation

Solve the following problems using a calculator.
1. The paraprofessional collected $5.75 from each of 27 students for a field trip. After he collected all the money, he counted it and found he had $158.25. Did he count the money correctly?

2. Micheline got 34 out of 45 correct on her history test. What was her percentage?

## Solutions

| 1. Collecting $5.75 from each of 27 students, gives a total of $5.75 x 27. This answer must be compared to $158.25 using subtraction. | 5 $\boxed{.}$ 75 $\boxed{\times}$ 27 $\boxed{=}$ 155.25 <br> Since 158 $\boxed{.}$ 25 $\boxed{-}$ 155 $\boxed{.}$ 25 $\boxed{=}$ 3, <br> the paraprofessionals had better recount the money! |
| --- | --- |
| 2. The fraction 34⁄45 represents the part to whole. This must be multiplied by 100 for the final answer. | 34 $\boxed{\div}$ 45 $\boxed{\times}$ 100 $\boxed{=}$ 75.5555 . . . <br> Rounded to tenths, the percent is 75.6%. |

## Supplemental Resources

These links take the learner to the websites of two of the more popular brands of calculators. Specific instructions can be found here for many of the calculators on the market.

- Manuals for selected Casio calculators – http://www.casio.co.jp/edu_e/support/top_body.html
- TI (Texas Instruments) home site – http://education.ti.com/educationportal/index.jsp

# Module 4 – Mathematics
*Part 9: Sample Test Questions (P) (W)*

1. $612 \div 17 =$
   a. 0.028
   b. 30
   c. $\frac{1}{36}$
   d. 36

2. A test question stated the following: "Add the sum of 5 and 3, and then multiply by the sum of 6 and 8." The student wrote the following: $5 + 3(6 + 8)$. What should have the student written?
   a. $5 + 3 \times 6 + 8$
   b. $(5 + 3) \times (6 + 8)$
   c. $(5 + 3 \times 6) + 8$
   d. $(5 + 3 \times 6 + 8)$

3. Homework

   | Subject | Time (in minutes) |
   |---|---|
   | Reading | 20 |
   | Mathematics | 30 |
   | English | 35 |
   | Social Studies | 25 |

   How much time is NOT spent in Reading?
   a. 20 min
   b. $1\frac{1}{2}$ hr
   c. 55 min
   d. 1 hr, 40 min

4. A student added the following fractions and wrote $\frac{3}{7} + \frac{2}{7} = \frac{5}{14}$. What should the student have written?
   a. $\frac{3}{7} + \frac{2}{7} = \frac{5}{7}$
   b. $\frac{3}{7} + \frac{2}{7} = \frac{1}{14}$
   c. $\frac{3}{7} + \frac{2}{7} = \frac{1}{7}$
   d. The student is correct.

5. Which fraction is not equivalent to $\frac{4}{6}$?
   a. $\frac{2}{3}$
   b. $\frac{8}{12}$
   c. $\frac{6}{8}$
   d. $\frac{16}{24}$

6.

**Percent of Students Taking Music by Grade**
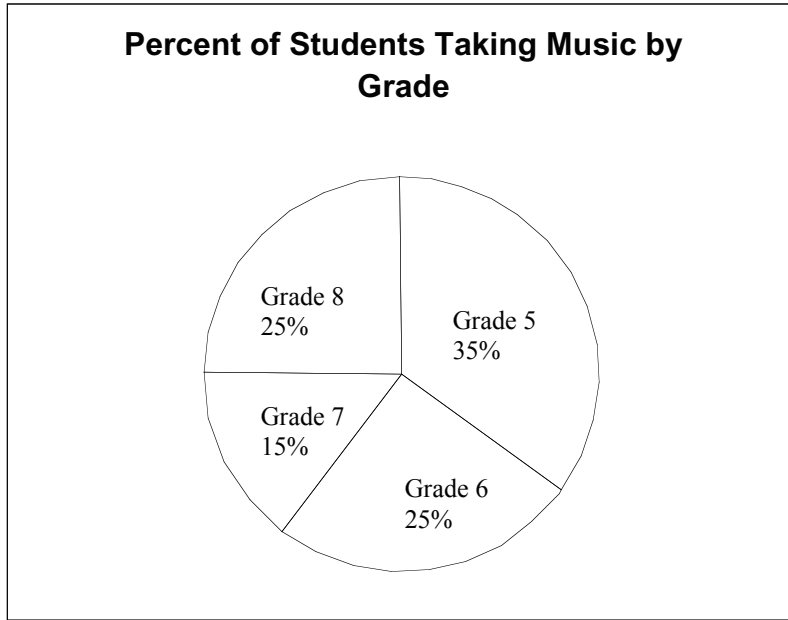


A total of 600 students are taking music. How many of the students were in grade 8?
a.   90
b.   150
c.   210
d.   200

7.   Find the perimeter of the triangle below.
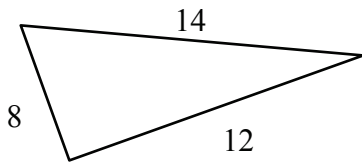


a.   24
b.   56
c.   34
d.   96

8.    Find the area of the circle below.



Diameter = 6
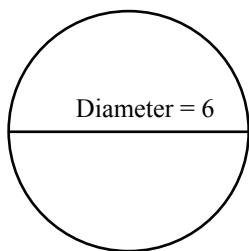
   a.    9π sq. units
   b.    3π sq. units
   c.    6π sq. units
   d.    12π sq. units

9.    The problem stated was "8 subtracted from some number equals 14." Ian wrote down the following: 8 - x = 14. Was he correct?
   a.    No. The correct answer is x - 8 = 14.
   b.    No. The correct answer is 14 - 8 = x.
   c.    No. The correct answer is 14 - x = 8.
   d.    Yes. Ian is correct.

10.   The solution to 5x - 2 = 13 is . . .
   a.    x = 1.
   b.    x = 2 $\frac{1}{5}$.
   c.    x = 3.
   d.    x = 5.

11.   In the sequence 2, 5, n, 23, 47, . . . the value of n is missing. Find n.
   a.    8
   b.    14
   c.    13
   d.    11

12.   Find the number that comes next in the sequence 3, -6, 12, -24 . . .
   a.    27
   b.    -36
   c.    48
   d.    -60

13.   Margaret worked on 5 math problems and completed them in 20 minutes. How long would it take her to solve 12 problems?
   a.    10 minutes
   b.    40 minutes
   c.    48 minutes
   d.    60 minutes

14. School supply company A offers packages of 100 cups for $2.50. A second company B offers packages of 500 cups for $10. Which company gives the better price, and by how much?
    a. A gives the better price of ½ cent less.
    b. B gives the better price of ½ cent less.
    c. Both companies give the same prices.
    d. B gives the better price of ½ dollar less.

15.

**Funding for Books in Millions**
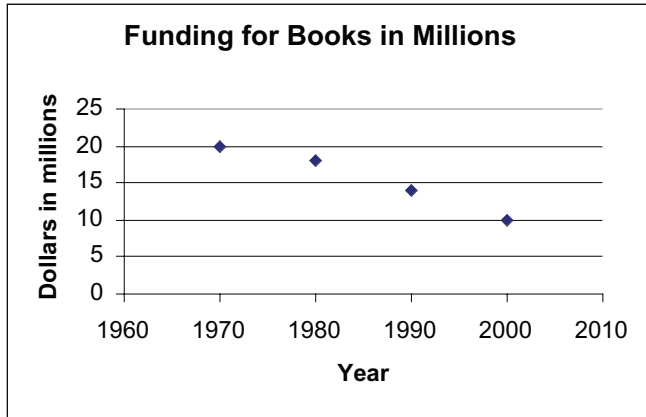


For the year 2005, funding for books is likely to be approximately
    a. $0 million
    b. $5 million
    c. $10 million
    d. $15 million

16. Find the mode for the following numbers: 2, 5, 5, 7, and 11
    a. 5
    b. 6
    c. 7
    d. 11

17. Find the area of the triangle below.
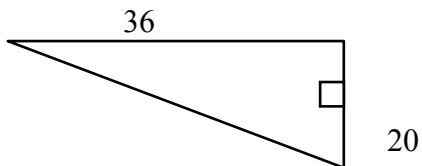


    a. 720
    b. 360
    c. 58
    d. We need more information to find the answer.

18.
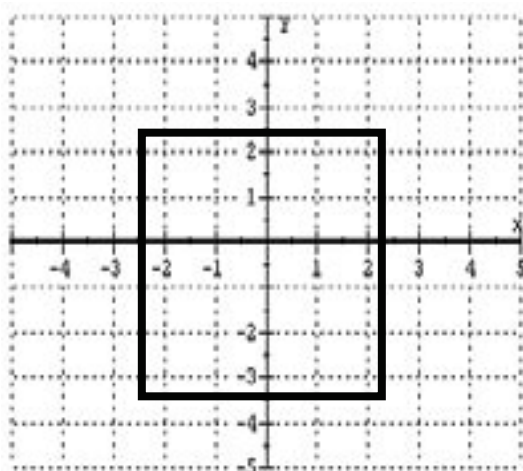


Which of the following points is NOT inside the box?
a.   (0, 3.5)
b.   (1.3, 2)
c.   (-2, -2)
d.   (2,2)

19.   Which of the following would be a correct value for n in the statement: 4.2 < n?
a.   0.42
b.   3
c.   2.4
d.   4.7

20.   A classroom measures 20 feet across by 30 feet and is 12 feet high. What is the volume of this classroom?
a.   62 cu ft
b.   612 cu ft
c.   720 cu ft
d.   7,200 cu ft

21.   A student bought a textbook for $45.75, a calculator for $19.95, and a t-shirt for $14. Clothing only is taxed at a rate of 8%. How much is the total cost for the three items?
a.   $79.70
b.   $63.76
c.   $86.08
d.   $80.82

22.   Order the following numbers from lowest to highest: 57%, 5.72, and 0.75.
a.   0.75, 57%, 5.72
b.   57%, 0.75, 5.72
c.   0.75, 5.72, 57%
d.   5.72, 57%, 0.75

23. Which number is *not* a multiple of 6?
    a.  9
    b.  12
    c.  18
    d.  24

24. The correct answer to $2^3 + 3^2$ is . . .
    a.  $5^5$
    b.  $6^5$
    c.  15
    d.  17

25. Add the following: $4.67 + 55.4 + 0.7$  $4.67 + 55.4 + 0.7$
    a.  60.77
    b.  102.8
    c.  10.28
    d.  60.14

26. Find 20% of 45.
    a.  9
    b.  90
    c.  900
    d.  9,000

27. Find the difference between $17\,\frac{1}{3}$ and $10\,\frac{1}{2}$.
    a.  $7\,\frac{1}{6}$
    b.  7
    c.  $6\,\frac{5}{6}$
    d.  $27\,\frac{5}{6}$

28. Find the digit in the hundreds position for the number 2,468.935.
    a.  4
    b.  6
    c.  9
    d.  3

29. Amos wrote the following: $4x - 2(x + 1) = 4x - 2x + 2$
    What should he write to correct his mistake?
    a.  $4x - 2(x + 1) = 4x - 2x - 2$
    b.  $4x - 2(x + 1) = 4x - 2x - 1$
    c.  $4x - 2(x + 1) = 4x - 2 - x - 2$
    d.  $4x - 2(x + 1) = 4x - 2 + x + 1$

30. Find the measurement of the missing angle in the triangle.



    a.    57°
    b.    47°
    c.    43°
    d.    227°
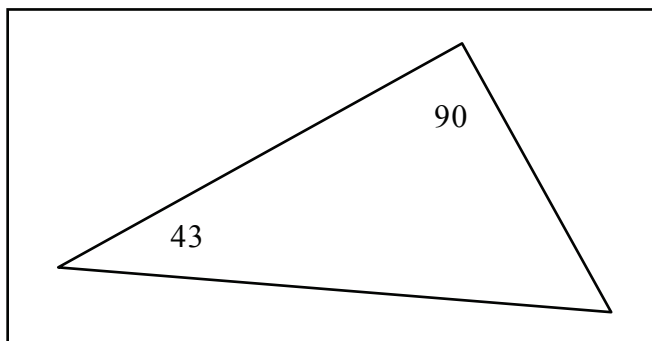
1.   d.
2.   b.
3.   b.
4.   a.
5.   c.
6.   b.
7.   c.
8.   a.
9.   a.
10.  c.
11.  d.
12.  c.
13.  c.
14.  b.
15.  b.
16.  a.
17.  b.
18.  a.
19.  d.
20.  d.
21.  d.
22.  b.
23.  a.
24.  d.
25.  a.
26.  a.
27.  c.
28.  a.
29.  a.
30.  b.

# Test-Taking Strategies ✓

# Module 5 – Test-Taking Strategies
*Part 1: Overview of the Entire Module*

## Overview
In Module 5, Part 1, the paraprofessionals will learn about the following:
- Part 1: Overview of the Entire Module
- Part 2: Test-Taking Strategies Specifically Geared Toward the Paraprofessional Assessments
- Part 3: Posttest Based on the WorkKeys and ParaPro Assessments
- Part 4: ParaPro or WorkKeys: How to Choose Which Test to Take

## Objectives
Following completion of Module 5, the paraprofessionals will . . .
- review the test-taking strategies necessary to take standardized tests.
- have practiced strategies to avoid test anxiety.
- know their own strengths and weaknesses in reading, writing, math, and test-taking skills and which areas need continued study.
- have a list of resources to acquire material for continued study.
- have the information needed to decide which paraprofessional assessment to take.
- have a list of resources to acquire material regarding test dates, formats, and locations.

## Lessons and Activities
The lessons and activities of Module 5 coincide with the overview listed above. Each of the four parts will begin with an instructor outline that has an overview of the module part, objectives, lessons and activities, and an evaluation.

## Sample Test Questions
In Module 5, all paraprofessionals will take a Posttest comprised of reading, writing, and math questions modeled after WorkKeys and ParaPro questions.

## Evaluation
A Posttest of sample questions similar to questions on the WorkKeys and ParaPro Assessments including reading, writing, and math will be given, scored, and evaluated for strengths and weaknesses. Paraprofessionals will also use a decision analyzer to determine which test to take.

## Supplemental Resources
For more information on the ParaPro Assessment, see the following resources:
- www.ets.org/parapro
- *ParaPro Assessment Study Guide* (available for $25)

For more information on the WorkKeys Assessment, see the following resources:
- www.act.org/workkeys
- Key Train individual training program for WorkKeys (available at www.keytrain.com for $50 plus $5 shipping and handling)

The deliverer of this module can add local resources here.

# Module 5 – Test-Taking Strategies
*Part 2: Test-Taking Strategies Specifically Geared*
*Toward the Paraprofessional Assessments*

## Overview
In Module 5, Part 2, the paraprofessionals will learn about the following:
- General strategies for taking standardized, multiple-choice tests
- Specific strategies for the ParaPro Assessment
- Specific strategies for the WorkKeys Assessment
- Specific strategies for computer and Internet-based versions of the tests
- Physical and emotional readiness for the tests

## Objectives
Following completion of Module 5, Part 2, the paraprofessionals will have . . .
- reviewed the test-taking strategies necessary to take standardized tests.
- developed specific test-taking strategies for the ParaPro and WorkKeys Assessments.
- developed strategies to avoid test anxiety.

## Lessons and Activities

### Test-Taking Strategies
Using the "Taking Standardized Tests" Handout, lead a group discussion of each of the strategies listed. Refer paraprofessionals back to the Pretest or questions from Modules 2, 3, or 4 whenever applicable. Ask paraprofessionals to share questions for which they successfully implemented a strategy or instances in which they would have gotten the answer correct if they had known the strategy before answering the question.

### Specific Strategies for the ParaPro Assessment
Using the "Strategies for the ParaPro Assessment" Handout, lead a group discussion to address these specific strategies.

### Specific Strategies for the WorkKeys Assessment
The "Strategies for the WorkKeys Assessment" Handout included in this course was taken from information provided by WorkKeys; however, it doesn't contain any information that isn't included elsewhere, and you may choose not to use it.

### Physical and Emotional Readiness for the Test
Using the handout, "Physical and Emotional Readiness for the Test," lead a group discussion of each of the strategies listed. Ask those paraprofessionals who scored in the high range on the "Test Anxiety Survey" in Module 1 if they believe that these strategies will help them during the Posttest. Ask paraprofessionals who scored low for test anxiety to share the strategies they use to stay calm and focused during a test.

## Sample Test Questions

In Module 5, Part 2, there are no new sample test questions introduced, but paraprofessionals will be referring to the Pretest and sample questions used in Modules 2, 3, and 4.

## Evaluation

No specific evaluation instrument will be used in Module 5, Part 2. Evaluation of the effectiveness of this module will take place when paraprofessionals analyze their errors in Part 3.

## Supplemental Resources

For more information on test-taking strategies, see the following resources:

For more information on test anxiety, see the following resources:

For more information on the ParaPro Assessment, see the following resources:
- www.ets.org/parapro
- *ParaPro Assessment Study Guide* (available for $25)
- ParaPro Tutorial for Internet-Based Version at <http://ibt.ets.org/parapro/candidate/tutorial_welcome.jsp>

For more information on the WorkKeys Assessment, see the following resources:
- www.act.org/workkeys
- Key Train individual training program for WorkKeys (available at www.keytrain.com for $50 plus $5 shipping and handling)

The deliverer of this module can add local resources here.

## Module 5, Part 2 Handouts
- "Taking Standardized Tests"
- "Strategies for the ParaPro Assessment"
- "Strategies for the WorkKeys Assessment"
- "Physical and Emotional Readiness for the Test"
- "Taking the Internet-Based Version of the ParaPro Assessment"

# Taking Standardized Tests
*General Strategies to Keep in Mind*

Standardized tests are . . .
- Developed by professional test designers.
- Usually multiple-choice questions.
- Objective. (There is one best answer. The grader's opinions are not a factor.)
- A measure of one's critical reading and thinking skills.

## Steps for Taking Standardized Tests
1.  Look the test over carefully:
    - Read and *understand* the directions.
    - Determine whether there is a penalty for guessing.
    - Neither the WorkKeys nor the ParaPro have a penalty, so answer every question even if you have to guess.
    - Discern the organization of the test booklet and the answer sheet.
    - The layout of answer sheets is often confusing.

2.  Answer the questions you know quickly and carefully:
    - Answer each question in your mind before reading the possible answers. This will help eliminate the possibility of being confused by the choices.
    - Be sure to read all the possible answers, especially when you think the first answer is correct.
    - Underline any *negatives* or the word *except*.

3.  Use the process of elimination:
    If you don't know what the answer is, try to figure out what the answer is not.

    *Example*
    The capital of Belgium is . . .
    - a.  New York.
    - b.  Texas.
    - c.  London.
    - d.  Brussels.

    *Explanation*
    - You may not know the capital of Belgium, but you can eliminate choices.
    - New York is in the United States.
    - Texas is a state, not a capital.
    - London is in England.

    Therefore, by process of elimination answer d. must be correct.

4.   Go back to questions you didn't know:
     •   As you work through the test, develop a marking system for questions that you
         would like to spend time figuring out.
     •   If you have eliminated some choices, be sure you have marked them.
     •   When going back to these questions, be especially careful that the question you are
         answering is marked in the correct space on the answer sheet.

5.   On the math portion, watch your time carefully:
     •   Don't spend so much time on difficult problems that you cannot finish the test.
     •   When you are stumped, move on to the next question.
     •   Mark the question so that you can come back if you have time.

6.   Watch for double negatives and other grammar clues.
     •   Two negative terms make the idea positive (e.g., Not unloved = loved, Never
         invisible = visible).
     •   If a question ends in the word *an*, you know the answer must start with a vowel.
     •   If the noun or verb in the question is singular, then the noun or verb in the answer
         you choose must agree with it and also be singular.

7.   Use guessing strategies only when you must.
     These are some guessing strategies:
     •   The longest answer is often correct.
     •   The most complete and inclusive answer is often correct.
     •   An answer in the middle, especially one with the most words, if often correct.
     •   If two answers have the opposite meaning, one of them is often correct.
     •   If two answers have the same meaning, these are often *not* correct.
     •   Answers with words like *usually, average, could, mainly, sometimes, some, frequently,*
         *probably,* and *generally* are often correct. These words tend to indicate that the answer
         choice is a carefully qualified statement.
     •   Answers that contain words like *always, none, never, all,* and *everyone* are often
         *not* correct. These words represent broad, sweeping generalizations that create
         improbable answers.

     Narrow your choices, and make an intelligent guess.

# Strategies for the ParaPro Assessment

The *ParaPro Assessment Study Guide* offers some tips and test-taking strategies specific to this assessment including the following:

1. There are no trick questions on the test.
   a. The professional test developers have spent much time to eliminate tricky, confusing questions. You should assume that the question is asking what it says it is asking.
   b. If it seems confusing, mark it to return to later.
   c. If you have plenty of time, reread the question again slowly.

2. There is plenty of time to complete the test.
   a. You will have 150 (2 and ½ hours) minutes to answer 90 questions.
   b. This is plenty of time, and you shouldn't feel rushed.

3. There is no set order that you are forced to use in answering the questions.
   a. Some paraprofessionals prefer to take the portion they feel most challenging first; while others prefer to get the one testing their strengths done first.
   b. You make your own path through the test.

4. There are no answer patterns.
   a. Professional test developers review a test carefully for patterns in the answers and remove them.
   b. The myths that say multiple-choice tests follow patterns, or there will never be more than two questions with the same lettered answer following each other are not true. Choose the best answer!

5. You are allowed to write in the test booklet if you are taking the paper-pencil version. The test booklet will be destroyed when you are finished. Take advantage of this.
   a. Cross out answers with your pencil as you eliminate them.
   b. Estimate your math answer right next to the answer choices.
   c. Mark questions to facilitate returning to them later.
   d. Underline negative words like *not*, *never*, *don't* to help you find double negatives.

6. You will have questions that use the words LEAST, EXCEPT and NOT.
   a. When these words are used, the question asks you to select the choice that doesn't fit or that contains information that isn't true.
   b. These words are CAPITALIZED in the ParaPro Assessment.

7. Keep track of the time.
   a. Bring a watch in case there is no clock in the testing room.
   b. If you are bogged down in one section, you might decide to move on and come back to that section later.

8. On the day of the test, be prepared.
   a. Take photo identification with you.
   b. Take a supply of number 2 pencils. The study guide recommends three.
   c. Be prepared to stand in line to check in or to wait while other test takers are being checked in. Keep that test anxiety in check while you are waiting in line.
   d. Don't be concerned if the test doesn't start exactly on time. You *will* have 90 minutes to take the test.

# Strategies for the WorkKeys Assessment

In the student guide, *Preparing for the WorkKeys Assessment*, the following test-taking tips are given:

- There is no need to study or cram for the WorkKeys Assessments.

- Bring a sharp #2 pencil with you.

- Bring a calculator to use during the Applied Mathematics section.

- Listen to and read the directions for each test carefully.

- Read each question carefully.

- Be sure you understand what each question is asking.

- Budget your time so you will be able to complete the test in the allotted time.

- Answer the easy questions first.

- Use logic in more difficult questions.

- Answer every question because there is no penalty for guessing.

- Review your work.

- Be precise in marking your answer sheet; stay within the circles.

- Erase completely all unintended marks.

- Scratch work is to be done in the test booklet.

- Take advantage of any break times to walk around a bit, relax, clear your head, and come back motivated to do your best on the next assessment.

# Physical and Emotional Readiness for the Test

These strategies will help you feel better about the testing process and help you avoid test anxiety.

## What Causes Test Anxiety?
Test anxiety is caused by both physical and emotional factors.

## Physical Causes of Test Anxiety
When you get into a stressful situation (like a test), your body reacts as if it were in real physical danger. Have you ever heard of people who do amazing acts of strength like lift a car off a child? They are uncharacteristically strong because they are experiencing a great big rush of adrenaline coursing through their veins. When you are in a test situation, sometimes your body sends too much adrenaline into you in reaction to that perceived threat. Your body is acting as if there were a saber-toothed tiger in the room. You are geared up to fight or run (the "fight/flight" reaction). Instead, you have to sit there and take a test. Knowing that the physical feelings of fidgetiness, racing heart, and sweaty palms are temporary may help them disappear more quickly.

## Emotional Causes of Test Anxiety
*   Pressure
    It is hard to remember sometimes that one test is *not* going to make or break your life. It may feel like it is, but it isn't. This test is *not* a reflection of your self worth. Expectations can make it hard to go into a test situation with calmness.

*   Past Experience
    If you have had negative test experiences in the past, it is harder to believe that you can have positive ones in the future. Try to think about past experiences that were more positive and focus your energy on recreating the successful experiences you have had in the past.

*   Fear of Failure
    Everyone wants to do a good job and feels a little afraid of failing. Most people want to please their family with successful grades. This makes us afraid that we may fail. Just try to put that fear into perspective. Realize that almost everyone in the room is a little nervous too. Nervousness is natural. Many people have negative memories of failing tests from the past that still haunt them. Let that slight fear propel you into studying rather than allowing it to freeze up your memory.

*   Feeling a Loss of Control
    If you feel like you cannot control your life or that outside forces control what happens, you are more likely to feel test anxiety. Developing an internal locus of control gives you both a sense of responsibility and also a sense of control over outcomes. In preparing for the paraprofessional test, you have control over many factors, including how well you prepare and how positive you feel about taking the test.

## Take Care of Your Physical Needs.

### *Before the Test*
- Regular exercise
- Good nutrition
- Healthy lifestyle
- Maintaining a schedule of study that will help you prepare for the test.

### *Right Before the Test*
- Get plenty of sleep the night before the test. Cramming at the last minute is an ineffective approach to taking a test.
- Have a good meal before taking the test. You will need a good protein breakfast to keep you alert. Avoid heavy carbohydrates or excessive sugar consumption.
- Get up a half hour earlier on test day to avoid last minute crises.
- Be at the test site on time.
- Take a trial run before test day if you are unsure where you are going. Know how long it takes to get there, where you will park, what room the test is given in, where you get a snack or drink, where the closest restroom is, etc.

### *During the Test*
- Take breaks without leaving your chair.
- Sit up straight; push your lower back against the chair; tense and relax your back.
- Stretch your neck by straightening your back and allowing your chin to drop as close to your chest as you can. Don't look at the ceiling or make a circle with your neck as this cuts off the blood supply to the brain—not a good idea when your brain needs oxygen to do its best work.

## Take Care of Your Emotional Needs.

### *Before the Test*
Develop some strategies that diffuse your body's panic response.
- When your mind is racing with negative thoughts, yell "Stop!" to remove these thoughts. Practice at home (preferably when you are alone!!); then fade it to a spoken word, a whisper, and then just thinking the word, *Stop*.
- Learn some breathing techniques that quiet your rapid heartbeat and rapid breathing. One example: breathe in for four seconds; hold your breath for four seconds; exhale for four seconds. Repeat for one whole minute. The exhale is the hard part. Practice makes perfect!
- Learn some techniques that diffuse the tension in your body. One example is called the chair grab. Sit up straight, feet together and flat on the floor. Drop your arms and find something solid on the chair to grab. Watch out for used chewing gum! Pull up with your arms while pushing down with your feet. Scrunch up your face and neck muscles. Hold for five seconds; then release slowly. Feel the relaxation and release of tension in all your muscles. Again, practice makes perfect.

### *At the Testing Site Right Before the Test*
- Develop a good attitude toward the test. To do well, you *must* think positively. Visualize success.
- Don't panic. Feel confident. If you have prepared, this will be easier to do.
- Sit in a quiet spot before the test. Avoid getting into conversations regarding the test.

***During the Test***
- Use self talk; try to stay content-related rather than evaluating progress.
- Use the breathing techniques and tension diffusers you have learned.
- Try to ignore the test anxiety; don't let it overwhelm you.
- Don't panic if others are in the room and you sense that they are finishing early.

You can tame that saber-toothed tiger by studying the reading, writing, and math skills tested and developing test-taking strategies that help control test anxiety. Before beginning the test, repeat to yourself, "This test is not a saber-toothed tiger."

# Taking the Internet-Based Version of the ParaPro Assessment

*Found on the Internet at <http://ibt.ets.org/parapro/candidate/tutorial_welcome.jsp>*

The ParaPro Assessment display appears as shown below. Questions appear in the area surrounded by the black border, while navigation and controls appear within the border itself.

ETS ParaPro Assessment for Candidates



## About the ParaPro Assessment

This tutorial will cover all the steps you need to know to complete the ParaPro Assessment.

The ParaPro Assessment for prospective and practicing paraprofessionals measures skills and knowledge in reading, mathematics, and writing, as well as the ability to apply those skills and knowledge to assist in classroom instruction.

The test consists of 90 multiple-choice questions across three subject areas of reading, mathematics and writing. Approximately two-thirds of the questions in each subject area focus on basic skills and knowledge and the remaining one-third of the questions focus on the application of those skills and knowledge in a classroom setting.

This index lists what the tutorial will cover:

- The ParaPro Screen
- Answering Questions and Changing Answers
- Moving Between Screens
- Marking Questions for Review
- The Review Screen
- Getting Help
- Ending the Test
- Clock
- Question Types
- Standalone Reading Questions
- Answering Standalone Reading Questions
- Math Questions
- Answering Math Questions
- Sets of Questions Related to a Single Passage
- Answering Sets of Questions Related to a Single Passage
- Writing Questions
- Answering Writing Questions
- Printing an Unofficial Score
- Ending the Tutorial

Next

To answer a question, click the circle or "radio button" next to the most likely answer.

The controls at the bottom of each screen are divided into three groups. The left group provides help and ends the test. The central buttons let you track your progress. The group at right controls movement between screens.

## Helpful Hints for Using the Controls

1. Use the **Back** and **Next** buttons to move from one question to another.

2. Click **Mark** to mark a question for later review. The word *Marked* will appear at the top of the screen. Click the **Mark** button again to unmark the question.

3. Click **Review** when you want to check your progress through the test. This opens a list that shows every question and whether you have seen, marked, or answered the questions. The Review List displays every test question and its section. Links allow you to go to any question directly from the Review List.

4. If you need instructions about any part of the test, you can click the **Help** button. This will open help files and instructions for using the ParaPro Assessment.

5. Exit the test by clicking the **Exit** button at the lower left portion of the screen. This will end the assessment and calculate your score.

   • Don't worry about accidentally ending the test by hitting the **Exit** button by mistake.

   • After clicking the **Exit** button, you will be asked two more times if you really want to end the test.

6. The time display at upper right tells how much time is left for the test.

   • You can show or hide the clock as desired, by clicking **Time**.

   • The ParaPro Assessment is 2 hours, 30 minutes long, so the clock counts down from 2:30:00.

   • The time cannot be paused once it has started.

   • When only ten minutes remain for the test, the clock will appear and stay on screen until the end of the test.

   • Clicking the **Time** button will have no response during the last ten minutes of the test.

7.  The question types and the skills tested on the Internet-based version of the ParaPro Assessment are similar to the paper/pencil questions.

If you plan on taking the Internet-based version of the ParaPro Assessment, spend a few minutes going through the online tutorial. It should only take 30 minutes (or even less), and you will be more comfortable with the testing process.

Visit ParaPro Assessment's tutorial website at <http://ibt.ets.org/parapro/candidate/tutorial_welcome.jsp>.

If you take the ParaPro Assessment online, you will know your scores immediately.

After the test has been completed, you will be able to print your unofficial score report using your web browser's **Print** button. You will receive seven scores: six sub-scores and an overall scaled score, as illustrated below. When you are finished printing your unofficial score report, click "Close this window" to exit the assessment.

| Candidate Name: | Sample, Paraprofessional |
| --- | --- |
| School District: | Sample School District, IL |
| Test Completed: | 2002-11-04 10:54:21.0 |

| **Content Categories** | **Your Score** |
| --- | --- |
| Reading Skills and Knowledge | 15 out of 15 |
| Application of Reading Skills and Knowledge to Classroom Instruction | 10 out of 10 |
| Mathematics Skills and Knowledge | 16 out of 16 |
| Application of Mathematics Skills and Knowledge to Classroom Instruction | 9 out of 9 |
| Writing Skills and Knowledge | 15 out of 15 |
| Application of Writing Skills and Knowledge to Classroom Instruction | 10 out of 10 |
| Scaled Score | 480 |

# Module 5 – Test-Taking Strategies
*Part 3: Posttest Based on the WorkKeys and ParaPro Assessments*

## Overview
In Module 5, Part 3, the paraprofessionals will cover the following:
*   Posttest and scoring
*   Posttest error analysis
*   Skill level analysis
*   Resources for continued study

## Objectives
Following completion of Module 5, Part 3, the paraprofessionals will . . .
*   know their own strengths and weaknesses in reading, writing, math, and test-taking skills and which areas need continued study.
*   have a list of resources to acquire material for continued study.

## Lessons and Activities

### Posttest and Scoring
Included in this section are the Posttest and Scoring Guide. This practice test should be carefully timed for 50 minutes. After 50 minutes, all paraprofessionals should stop the test and the test, should be scored.

As in the Pretest, there are a variety of ways to accomplish scoring the test, depending on the size of the class. These include having each person score their own, trading answer sheets with another paraprofessional, or having the instructor score each one quickly. It is important to complete the scoring as quickly and accurately as possible.

Protect the integrity of the Posttest (and Pretest) included in this course by collecting (and, at the end of the course, destroying) the used copies of test questions and answer sheets.

| Reading Test Answers | Math Test Answers | Writing Test Answers |
|---|---|---|
| 1.  c. | 1.  a. | 1.  c. |
| 2.  c. | 2.  d. | 2.  b. |
| 3.  d. | 3.  a. | 3.  c. |
| 4.  b. | 4.  c. | 4.  c. |
| 5.  d. | 5.  c. | 5.  d. |
| 6.  c. | 6.  d. | 6.  a. |
| 7.  a. | 7.  b. | 7.  d. |
| 8.  c. | 8.  b. | 8.  c. |
| 9.  d. | 9.  c. | 9.  d. |
| 10. b. | 10. c. | 10. Use rubric. |

### Posttest Error Analysis
Using the "Error Analysis" Handout, have each paraprofessional analyze his or her test to determine whether errors are caused by insufficient skill or information, test anxiety, lack of test wisdom, or test-taking skills.

### Skill Level Analysis

Those paraprofessionals whose primary cause of error was insufficient skill or information should be encouraged to spend more time in continued study after completing this preparation course before attempting the WorkKeys or ParaPro assessment.

### Resources for Continued Study

Lists of resources for continued study are included in the supplemental resources at the end of each instructor outline. Each entity providing instruction should add resources specific to the paraprofessional assessment test preparation that they will be providing to the list before reproducing it for each class.

## Sample Test Questions

In Module 5, Part 3, all paraprofessionals take a Posttest comprised of reading, writing, and math questions modeled after WorkKeys and ParaPro Assessment questions.

## Evaluation

A Posttest of sample questions similar to questions on the WorkKeys and ParaPro Assessments including reading, writing, and math will be given, scored, and evaluated for strengths and weaknesses in skills and test-taking strategies.

With the help of the instructor, paraprofessionals will self-evaluate and determine whether further study is needed before attempting the paraprofessional assessment.

## Supplemental Resources

For more information on the ParaPro Assessment, see the following resources:
* www.ets.org/parapro
* *ParaPro Assessment Study Guide* (available for $25)

For more information on the WorkKeys Assessment, see the following resources:
* www.act.org/workkeys
* Key Train individual training program for WorkKeys (available at www.keytrain.com for $50 plus $5 shipping and handling)

## Module 5, Part 3 Handouts

* "Math Posttest"
* "Writing Posttest"
* "Error Analysis"

# Reading Posttest Questions

Questions 1 and 2 are based on the following graph.

***Endangered and Threatened Species in the United States***
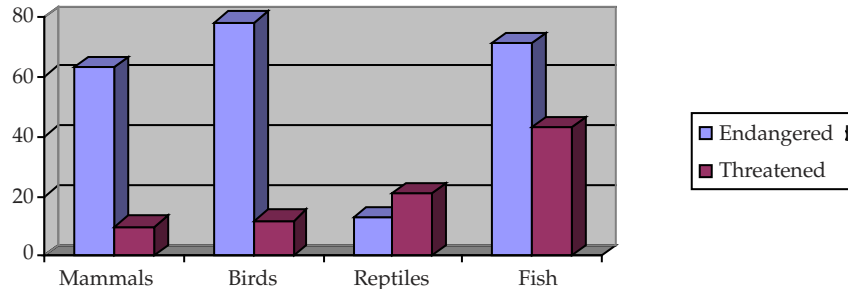


(The numbers on the left represent the number of species.)

1.  The graph can be used to answer which of the following questions?
    a.   When did mammal species and fish species become endangered?
    b.   In what region of the United States are bird species more endangered than reptile species?
    c.   How many reptile species are considered endangered?
    d.   What factors have endangered fish and reptile species?

2.  Which of the four species listed are more threatened than endangered?
    a.   Mammals
    b.   Birds
    c.   Reptiles
    d.   Fish

Questions 3 and 4 are based on the following passage.

Giant kelp is the largest seaweed in the ocean. Under good conditions, it can grow to a length of 200 feet. Giant kelp also grows faster than any other plant in the ocean world. When these king-sized seaweeds grow close together, they form huge kelp beds.

A kelp bed has a major effect on the ocean and the sea creatures around it. It provides food and shelter for countless sea creatures. It also offers them shade from bright light, or a safe place to hide. A kelp bed softens the action of ocean waves, making the water calmer close to shore.

3.  Which statement best describes the organization of the second paragraph?
    a.   A problem is described and a possible solution to it is proposed.
    b.   An argument is presented and then proved to be wrong.
    c.   An event is discussed and then contrasted with other events.
    d.   A general statement is made and then supported with evidence.

4.  This passage mentions all of the following characteristics of giant kelp EXCEPT its . . .
    a.  size compared to that of other ocean plants.
    b.  potential as a food source for humans.
    c.  benefits to sea creatures.
    d.  effect on the action of the waves.

Question 5 is based on the following passage.

Accompanied by a small grey spider crawling the dashboard, I drove into the street, around the corner, through the intersection, over the bridge, onto the highway. I was heading towards those little towns that get on the map—if they get on at all—only because some mapmaker has some blank space to fill: Remote, Oregon; Simplicity, Virginia; New Freedom, Pennsylvania; New Hope, Tennessee; Why, Arizona; Whynot, Mississippi; Igo, California (just down the road from Ono), here I come.

5.  The author is primarily concerned with . . .
    a.  pointing out that traveling can be very educational.
    b.  explaining the significance of a childhood experience.
    c.  describing the methods used to name small towns.
    d.  discussing the beginnings and destinations of a trip.

Questions 6 and 7 are based on the following table of contents from the *Literary History of the United States.*

### *Literary History of the United States Table of Contents*

6.   Chapter 1 is organized by . . .
     a.   theme.
     b.   time period.
     c.   region.
     d.   author.

7.   To find information about American fiction written around 1765, a reader should start
     looking on page . . .
     a.   43.
     b.   49.
     c.   86.
     d.   117.

Questions 8-10 are based on the following lesson plan created by a teacher.

   **Lesson Plan for Working with Compound Words**
   *Objective:* Students will use their knowledge of individual words that make up
   unknown compound words to determine the meanings of the unknown words.

   *Description:* The teacher explains the concept of compound words (two separate
   words joined to form a new word) to the students. The paraprofessional passes out a
   handout made by the teacher that has four compound words on it: *sunbeam*, *sandbox*,
   *scarecrow*, and *thumbprint*. Students draw a line between the two words that make up
   each compound word and then write what they think each compound word means.
   Finally, students invent their own, "new" compound words by combining two words.
   The teacher and the paraprofessional help individual students with this task. The
   paraprofessional collects the papers and places them in alphabetical order by the
   students' last names.

8.   The lesson plan indicates that the paraprofessional should do each of the following
     EXCEPT . . .
     a.   distribute the handout.
     b.   collect the handout.
     c.   explain the concept of compound words.
     d.   help students invent compound words.

9.   There are four students in the class whose last name starts with *A*. How should their
     names be alphabetized?
     a.   Alvarez, Anderson, Ames, Ahmed
     b.   Alvarez, Ames, Ahmed, Anderson
     c.   Ahmed, Ames, Alvarez, Anderson
     d.   Ahmed, Alvarez, Ames, Anderson

10.  Four students have written down words that they believe are "new" compound words.
     Which word indicates the strongest understanding of compound words?
     a.   Teacherist
     b.   Mousefood
     c.   Pencilly
     d.   Unbook

# Math Posttest

Choose the best answer for each.

1.  What value below is NOT equivalent to 175% ?
    a.   17.5
    b.   $\frac{7}{4}$
    c.   $\frac{175}{100}$
    d.   1.75

    Concepts covered: fractions, decimals, percents, equivalence, error finding

2.  If , 14>9 then which of the following statements is true?
    a.   14 divided by 9 equals 5.
    b.   14 minus 9 is a negative number.
    c.   14 plus a positive number equals 9.
    d.   9 plus a positive number equals 14.

    Concepts covered: mathematical symbols, operations, order

3.  What digit is in the hundredths place of the number 5,604.798?
    a.   9
    b.   8
    c.   0
    d.   6

    Concepts covered: place value

4.  The answer to 23 ¼ x 17 ¼ is approximately . . .
    a.   4.
    b.   40.
    c.   400.
    d.   4,000.

    Concept covered: estimation, fractions

5.  Find the area of the circle, using the formula *Area = $\pi r^2$*.

    

    *r = 6 units*
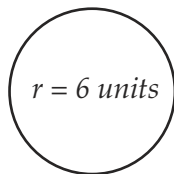
    a.   6π sq. units
    b.   12π sq. units
    c.   36π sq. units
    d.   6π² sq. units

    Concept covered: area, basic shapes

6.    The answer to 10 ½ ÷ 5 ½ is . . .
      a.    2.
      b.    ½.
      c.    1½.
      d.    1 ¹⁰⁄₁₁.

      Concepts covered: division, fractions

7.    Cheryl is solving an equation but does not know what to do next. She has gotten to
      -4$x$=36 and asks you for help. What should Cheryl do next?
      a.    Multiply both sides by -4.
      b.    Divide both sides by -4.
      c.    Add -4 to both sides.
      d.    Subtract -4 from both sides.

      Concepts covered: classroom application, one-step linear equations

8.    A homework assignment is worth 20 points. Late papers are assessed a penalty of 2 points
      for each day the assignment is late. Payton turns in her assignment 2 days late and only
      gets 80% of the questions correct. If she also correctly answered a 3-point bonus problem,
      what is her grade on the assignment?
      a.    20
      b.    15
      c.    12
      d.    9

      Concepts covered: word problem, classroom application, percentages, multiple-step linear
      equations

9.    Megan translated the word statement "Five times a number, increased by 2, is equal to the
      number, less 7" by writing:

      5(x+2) = x - 7

      Which of the following should Megan use to correctly translate the problem?
      a.    5(x+2) = 7 - x
      b.    5x + 2 = 7 - x
      c.    5x + 2 = x - 7
      d.    5(x) + 2 = 7 - x

      Concepts covered: classroom application, translating word statements

10.   District policy states that for school field trips, there must be at least one adult for every 10
      children going on the trip. 112 sixth-graders from Worth Middle School are planning to go
      on a field trip with their four teachers. How many additional adults (room parents) will be
      needed if the trip is to go on as planned?
      a.    12
      b.    11
      c.    8
      d.    7

      Concepts covered: word problems, classroom application, estimation, one-step equations

# Writing Posttest

Directions for Questions 1 and 2
Certain parts of the following sentences are underlined and labeled as a., b., c., or d. One of these underlined parts is an error in grammar or word use. Identify the error, and circle the correct answer on the answer sheet.

1.    Venice, <u>which</u> is built <u>primarily</u> on a cluster of islands, often <u>flood</u> <u>during</u> high tides.
            a.                    b.                                  c.     d.

2.    If the teacher <u>won't</u> <u>except</u> his work, he <u>may</u> need <u>to write</u> another essay.
                 a.       b.                c.          d.

Directions for Question 3
Only one of the following sentences has correct punctuation. After identifying the one with the correct punctuation, circle the correct answer on the answer sheet.

3.    Which of the following sentences has correct punctuation?
    a.    Companies often reduce the weight of a product, for example: a "half-gallon" tub of ice cream may weigh 12% less than it used to.
    b.    Companies often reduce the weight of a product, for example, a "half-gallon" tub of ice cream may weigh 12% less than it used to.
    c.    Companies often reduce the weight of a product; for example, a "half-gallon" tub of ice cream may weigh 12% less than it used to.
    d.    Companies often reduce the weight of a product for example, a "half-gallon" tub of ice cream may weigh 12% less than it used to.

Questions 4-6 are based on the following paragraph written by a student. When you have decided on the best response, circle the correct answer on the answer sheet.

*New Year's Eve*
By Leon

(1) We always spend New Year's Eve with my cousins, aunts, uncles, and grandparents. (2) We bring board games and lots of other toys. (3) We also rent or buy movies to watch. (4) We usually eat as soon as we get there. (5) Sometimes we order pizza or we order Chinese food. (6) After we eat, then we usually watch movies before the countdown. (7) We turn off the TV about five minutes before the countdown. (8) At midnight we shout Happy New Year! (9) Afterwards, we usually stay up for another hour and then we go to sleep. (10) This year we did something different because we all went to a bowling party. (11) We ate there and got some glow sticks, party hats, noisemakers, and poppers that shot out streamers. (12) At 5:30 we shouted Happy New Year, and made noise with the noisemakers. (13) Then we went back to their house. (14) Unfortunately, my sister fell asleep at seven and didn't wake up until the morning and missed the countdown.

4.  The teacher has suggested that this essay would be better if separated into two paragraphs. Where should Leon begin the new paragraph?
    a.   Start the new paragraph with sentence 8.
    b.   Start the new paragraph with sentence 9.
    c.   Start the new paragraph with sentence 10.
    d.   Start the new paragraph with sentence 13.

5.  Leon wants to combine sentences 6 and 7. His new sentence should be concise and grammatically correct. Which of the following sentences would be a correct revision?
    a.   After we eat, then we usually watch movies before the countdown, we turn off the TV about five minutes before the countdown.
    b.   After we eat, we usually watch movies before the countdown; until five minutes before the countdown.
    c.   After eating, we usually watch movies before the countdown; turn off the TV before the countdown.
    d.   After eating, we usually watch movies but turn off the TV about five minutes before the countdown.

6.  Leon wants to write an opening sentence that introduces his main point. Which sentence would best introduce his main point?
    a.   My family likes to spend New Year's Eve together and share the fun.
    b.   New Year's Eve is celebrated around the world.
    c.   New Year's Eve is a time to think of the new year ahead.
    d.   Lots of people have parties on New Year's Eve.

7.  Which of the following words is not spelled correctly?
    a.   *committed*
    b.   *occurrence*
    c.   *preferred*
    d.   *ommitted*

8.  The poem Herman wrote was not a <u>sonnet</u>, although it was lyrical in expression.
    In the sentence above, the underlined word is being used as . . .
    a.   an adverb.
    b.   a pronoun.
    c.   an object.
    d.   an adjective.

9.  The baseball team played <u>well</u> for five innings.
    In the sentence above, the underlined word is being used as . . .
    a.   a noun.
    b.   a verb.
    c.   an adjective.
    d.   an adverb.

10. Paraprofessional Writing Sample
    You are a paraprofessional in a third grade classroom. The teacher asks you to assist Sam with his math facts. Write a brief paragraph to show how you will help Sam.

| **Reading Test** | **Math Test** | **Writing Test** |
| --- | --- | --- |
| 1.  a. b. c. d. | 1.  a. b. c. d. | 1.  a. b. c. d. |
| 2.  a. b. c. d. | 2.  a. b. c. d. | 2.  a. b. c. d. |
| 3.  a. b. c. d. | 3.  a. b. c. d. | 3.  a. b. c. d. |
| 4.  a. b. c. d. | 4.  a. b. c. d. | 4.  a. b. c. d. |
| 5.  a. b. c. d. | 5.  a. b. c. d. | 5.  a. b. c. d. |
| 6.  a. b. c. d. | 6.  a. b. c. d. | 6.  a. b. c. d. |
| 7.  a. b. c. d. | 7.  a. b. c. d. | 7.  a. b. c. d. |
| 8.  a. b. c. d. | 8.  a. b. c. d. | 8.  a. b. c. d. |
| 9.  a. b. c. d. | 9.  a. b. c. d. | 9.  a. b. c. d. |
| 10.  a. b. c. d. | 10.  a. b. c. d. | 10.  Use back of paper. |

# Error Analysis

| List the numbers of the questions you missed in this column. | Preparation | | | | Test-Taking Skills | | | | | | | | | Test Anxiety | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | I didn't know the skill or information. | I studied this but don't remember it. | I knew a little bit about this but did not study fully. | I knew the information but did not know how to apply it. | I misread the directions. | I misread the questions. | I made poor use of the time provided. | I marked an obviously wrong answer by being careless. | I didn't use grammar cues to help me choose the correct answer. | I chose a right answer but not the "best" answer. | I didn't see and underline a double negative. | I didn't underline words that limit like *none* or *never*. | I had it right then changed my answer. | I drew a blank. | I panicked. | I was too tired to concentrate. | I didn't concentrate on test content. |
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| Totals | | | | | | | | | | | | | | | | | |

Add the number in each column to determine the most prevalent reasons for your errors.

# Module 5 – Test-Taking Strategies
*Part 4: ParaPro or WorkKeys: How to Choose Which Test to Take*

## Overview
In Module 5, Part 4, the paraprofessionals will learn about the following:
- Characteristics of each test revisited
- Advantages of each assessment
- Decision analyzer
- Resources for information regarding test dates, formats, and locations

## Objectives
Following completion of Module 5, Part 4, the paraprofessional will . . .
- have the information needed to decide which paraprofessional assessment to take, WorkKeys or ParaPro.
- have a list of resources to acquire information regarding test dates, formats, and locations.

## Lessons and Activities

### Review of the Characteristics of the Paraprofessional Assessments
This information is located in Part 4 of Module 1. A quick review of the characteristics addressed on the two handouts, "Characteristics of the WorkKeys Assessment" and "Characteristics of the ParaPro Assessment" will enable the paraprofessional to make an informed decision About the Assessmentss.

### WorkKeys or ParaPro Assessment?
Using the handout, "WorkKeys or ParaPro Assessment," lead a group discussion about the advantages of each test and those characteristics that are Nonfactors when deciding which test to take.

### Decision Analyzer
Using the handout, "Decision Analyzer," ask each paraprofessional to self-evaluate and come to a decision regarding which test to take. The more checks that an assessment gets, the higher likelihood that it is the best assessment to take.

### Resources for Material Regarding Test Dates, Formats, and Locations
A general list of contact information for both assessments is included in the handout "Making Arrangements to Take the Paraprofessional Assessment," but each entity providing this course should have more specific information regarding test dates, location, and formats for each class section.

## Sample Test Questions
There are no sample test questions in this part of Module 5.

## Evaluation

With the help of the instructor and the Decision Analyzer, the paraprofessionals will self-evaluate and determine whether to take the WorkKeys Assessment or the ParaPro Assessment.

## Supplemental Resources

For more information on the ParaPro Assessment, see the following resources:
- www.ets.org/parapro
- *ParaPro Assessment Study Guide* (available for $25)

For more information on the WorkKeys Assessment, see the following resources:
- www.act.org/WorkKeys
- Key Train individual training program for WorkKeys (available at www.keytrain.com for $50 plus $5 shipping and handling)

## Module 5, Part 4 Handouts

- "WorkKeys or ParaPro Assessment"
- "Decision Analyzer"
- "Making Arrangements to Take the Paraprofessional Assessment"

# WorkKeys or ParaPro Assessment

## Advantages of the WorkKeys Assessment

- Reading, writing, and math levels not quite as rigorous as ParaPro

- Use of calculator and worksheet of formulas allowed

- Questions more straightforward

- Paraprofessional skills demonstrated through checklist and observation of supervisor where employed

## Advantages of the ParaPro Assessment

- Paraprofessional classroom skills tested in each section of this assessment rather than supervisor-administered evaluation

- None of the sections of the test administered by audiotape

## Nonfactors

- Cost
  - ParaPro is $40.00
  - WorkKeys is $39.95

- Availability
  - Both assessments will be readily available by a variety of entities in the state of Illinois.

- Recognition
  - Illinois has adopted cutoff scores for both assessments and will recognize either one as fulfilling NCLB requirements.

# Decision Analyzer

## Which assessment is the best match for my skills and experience?

### *Choose the WorkKeys Assessment if . . .*
- You have quality paraprofessional experience with good performance evaluations.

- You lack confidence in your testing skills especially critical reading and application-type questions.

- You need to use the calculator and formula worksheet to do your best on the math test.

### *Choose the ParaPro Assessment if . . .*
- You did well on the application questions in the pre- and Posttest.

- You have confidence in your test-taking skills especially those that require critical reading.

- You are unsure how you will be rated on the paraprofessional Instructional Support Inventory.

- You have a visual learning style and are unsure of taking an audiotape test.

## Making Arrangements to Take the Paraprofessional Assessment

Many paraprofessionals will take the WorkKeys or ParaPro Assessment in a setting sponsored by their school district, Regional Office of Superintendent, or local community college.

If you make your own arrangements to take the test, the contact information is below:

### ParaPro Assessment

Teaching and Learning Division
ETS Distribution Center
225 Phillips Boulevard
P. O. Box 77435
Ewing, NJ 08628-7435

| | |
|---|---|
| Telephone | (609) 771-7395 |
| Disability Services | (609) 771-7780 |
| TTY | (609) 771-7714 |
| Fax | (609) 530-0581, (609) 771-7906 |
| Online | www.ets.org/parapro |

A registration packet is available through ETS.

### WorkKeys Assessment

ACT Education Services
P. O. Box 168
Iowa City, IA 52243-0168

| | |
|---|---|
| Telephone | (800) WORKKEY (967-5539) |
| E-Mail | workkeys@act.org |
| Online | www.act.org/workkeys |

### ACT centers and some community colleges in Illinois will offer the WorkKeys Assessment, including the following:

John A. Logan College, Carterville, (618) 985-2828, ext. 534

Richard J. Daley College, Chicago, (773) 838-0300

McHenry County College, Crystal Lake, (815) 479-7741

Danville Area Community College, Danville, (217) 443-8777

Illinois Central College, East Peoria, (309) 999-4580

Rend Lake College, Ina, (618) 437-5321, ext. 359

Illinois Eastern Community Colleges, Olney, (618) 395-4653, ext. 5805

Workforce Network, Peoria, (309) 495-8937

South Suburban College, South Holland, (708) 596-2000, ext. 2601

Waubonsee Community College, Sugar Grove, (630) 466-7900, ext. 2596

ACT Center at Business and Career Institute at SSC, South Holland, (708) 596-2000, ext. 2601

ACT Center at College of Lake County, Grayslake, (847) 223-6601

ACT Center at John A. Logan College, Carterville, (618) 985-2828

ACT Center at John Wood Community College, Quincy, (217) 224-6564

ACT Center at Lincoln Land Community College, Springfield, (800) 727-4161

ACT Center at Richard J. Daley College, Chicago, (773) 838-0300

ACT Center at Rock Valley College, Rockford, (815) 654-4250

In addition, some one-stop career centers and local schools have been trained to offer the test. Ask your local school district for locations.