Statewide Healthcare Curriculum:

Contextualized Math Module

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FOUNDATIONS FOR DESIGN

- ✓ Instruction emphasizes learning by doing through projects and simulations; therefore, the instructor is a facilitator or learning coach.
- ✓ Each module emphasizes communication, teamwork, and critical thinking.
- ✓ Content is contextualized for healthcare professions and their programs of study.
- ✓ Learning outcomes often require learners to meet and interact with academic and healthcare professionals, engage in collaborative and individual projects involving authentic materials and resources, visit healthcare and academic facilities, and complete documents and writing tasks for career paths with the guidance of learning facilitators.
- ✓ Specific units within modules may serve as precursors for additional units within the module. Many lessons and units may be repeated and expanded from one module to another.
- ✓ Self-advocacy and continual self-assessment and self-monitoring are inherent to each module while students must be introduced to, required to meet with, and encouraged to consult with program coordinator as well as academic and employment professionals.
- ✓ Site visits to healthcare and learning facilities, guest speakers, and conferences with employment and academic professionals are integral to the relevance and value of the program for students.

ASSUMPTIONS:

- ✓ Each agency or instructor who may use these modules may adapt instructional strategies, content level of difficulty, learning activities and projects to meet the needs of the program's own target population and adult learners of lower and higher academic levels.
- ✓ Referenced resources, relevant internet links, learning activities (created, suggested, attached, or referenced) will be used, modified, or omitted based on student need and restraints of class time and resources.

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- ✓ This curriculum will work in established internal partnerships within the academic community as well as external partnerships/relationships in the employment community.
- ✓ Units and lessons will be adapted to fit within varying contact hours of a program.

Module Description: The Contextualized Math Module offers the adult learner the opportunity to learn the basic mathematics skills necessary for use in the healthcare workplace and/or for additional post-secondary education. The module presents mathematics in the practical context of the healthcare industry. The course covers whole numbers, decimals, fractions, percents, ratios, proportions, probability, mean and median, basic algebra and geometry, metrics, and math applications for the healthcare field.

i-Pathways Alignment with the Statewide Healthcare Curriculum: The lessons identified in this document have connections with both i-Pathways and the intended learning objectives identified in the Statewide Healthcare Curriculum. The i-Pathways lessons can be used to build background knowledge, reinforce content, or provide learners with additional practice in a specific skill development.

Module Objectives:
Students will:
- Understand the value and importance of mathematics in the healthcare field
- Demonstrate competency in solving whole number problems
- Demonstrate competency in solving decimal and fraction problems
- Demonstrate competency in solving percent problems
- Demonstrate competency in solving proportion, ratio, and probability problems
- Demonstrate competency in finding the mean and median
- Demonstrate competency in solving basic algebra and geometry problems
- Demonstrate the ability to use the metric system for measurement
- Demonstrate competency in reading medical labels
- Demonstrate the ability to calculate medication dosage

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- Understand dosage by body weight

Learning Outcomes
Students will:
- Describe the value of mathematics in healthcare
- Determine the place value of a number by its location
- Use calculator functions correctly
- Interpret simple graphs and charts
- Solve whole number fraction, and decimal problems accurately
- Convert fractions into decimals and decimals into fractions
- Solve percent problems accurately
- Solve proportion, ratio, and probability problems accurately
- Find the mean and median in a set of numbers
- Solve basic algebra and geometry problems accurately
- Use Metric measurements for weight, dosage, food intake, liquid, height/length
- Read drug labels, medicine cups, syringes, and IV bags
- Calculate individual medication dosage
- Convert pounds and ounces into kilograms

Methods of Instruction

- Teacher demonstration and modeling
- Guided and independent skills practice
- Workbooks
- Online activities

Methods for Evaluating Student Performance

- Student demonstration
- Teacher skills checklist
- Student self-tests
- Unit assessments

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Module Overview

A. Introduction to Basic Math for Allied Healthcare
B. Unit I: Whole Numbers
C. Unit II: Decimals
D. Unit III: Fractions and Mixed Numbers
E. Unit IV: Percents
F. Unit V: Proportions, Ratios, Probability, Mean and Median
G. Unit VI: Algebra and Geometry I
H. Unit VII: Algebra and Geometry II
I. Unit VIII: Metrics
J. Unit IX: Reading Medical Labels
K. Unit X: Apothecary
L. Unit XI: Dosage Calculations
M. Unit XII: Parenteral Dosage
N. Unit XIII: Intravenous Fluid Administration
O. Unit XIV: Basic Dosage by Body Weight

Module Outline

Introduction to Basic Math for Allied Healthcare
1. Value and importance of math accuracy in the healthcare field
   a. Current events and recent studies
   b. Consequences of mathematical errors
2. Multiplication to 10
   a. Multiplication minute test
3. Place value
4. Calculator basics
5. Reading graphs and charts

Unit I: Whole Numbers
1. Whole number problems
   a. Addition, subtraction, multiplication, division

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       b. Greater than/Less than
       c. Combining operations
       d. Combining operations with parentheses
2. Number and Word problems

Unit II: Decimals
1. Decimal problems
       a. Addition, subtraction, multiplication, division
2. Combining operations: Order of Operations (PEMDAS)
3. Estimating and Rounding

Unit III: Fractions
1. Fraction problems
       a. Addition, subtraction, multiplication, division
       b. Lowest Common Denominator (LCD)
       c. Lowest terms
       d. Mixed numbers
       e. Proper and Improper fractions
       f. Combine operations
2. Convert fractions into decimals and decimals into fractions
3. Fraction word problems
4. Fraction keys on the calculator

Unit IV: Percents
1. The Percent Triangle
       a. Find the rate
       b. Find the part
       c. Find the base
2. Percent Change Formula
       a. Find the percent of increase
       b. Find the percent of decrease
3. Add and subtract a percent of a number
4. Simple interest

Unit V: Proportions, Ratios, Probability, Mean and Median
1. Proportions and Ratios
       a. Find the missing number
2. Probability
       a. Find the probability of an event
3. Mean and Median
       a. Find the mean
       b. Find the median

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Unit VI: Algebra and Geometry I
1. Integers
    a. Addition, subtraction, multiplication, division
2. Exponents
3. Roots/Radicals
4. Algebra
    a. Simplify expressions
    b. Solve equations
5. FOIL Method
    a. First, Outer, Inner, Last
6. Substitution

Unit VII: Algebra and Geometry II
1. Vocabulary
2. Basic Formulas
3. Lines and Angles
4. Slope of a line
5. Pythagorean Theorem
6. Coordinate Plane

Unit VIII: Metrics
1. Metric measurements for:
    a. Weight
    b. Dosage
    c. Food intake
    d. Height/Length
    e. Liquid
2. Metric Units
    a. Prefix
    b. Meaning
    c. Symbol
3. Conversion
    a. Change unit measures within metric system
4. Practical applications

Unit IX: Reading Medical Labels
1. Drug Label Literacy
    a. Generic name
    b. Trade name
    c. Manufacturer
    d. National Drug Code (NDC)

     e. Lot/Control number
     f. Drug form
     g. Dosage strength
     h. Total amount in vial
     i. Prescription warning
     j. Expiration date
2. Medicine cups
3. Syringes
4. IV Bags
5. Practical applications

Unit X: Apothecary
1. Apothecary measurement and conversions
     a. Common measure
     b. Conversion factor
     c. Common use
2. Rounding dosage calculations
     a. Metric system used to measure liquids, weights and medicine
3. Practical application

Unit XI: Dosage Calculations
1. Determine the individual dose a client will receive
     a. Desired dose
     b. Dosage strength
     c. Medications' unit of measure
2. Drug labels provide dosage strength and unit
3. Medication order formula
4. Practical applications

Unit XII: Parenteral Dosage
1. Parenteral Medications
     a. Intradermal
     b. Intramuscular
     c. Intravenous
     d. Subcutaneous
2. Most common syringes
     a. 1 milliliter/cubic centimeter
     b. Insulin
     c. 3 cubic centimeter
     d. Parts of syringe
3. Practical applications

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Unit XIII: Intravenous Fluid Administration
1. Common abbreviations in IV administration
2. Flow Rate Formula
    a. Flow rate = Volume/time
3. Infusion Rate Formula
    a. Amt. of fluid (mL)/Total time of infusion in min. X Administration set drop factor = Drops per min.

Unit XIV: Basic Dosage by Body Weight
1. Drug orders often calculated based on weight
2. Convert pounds to kilograms