Student Name_____ Date_____

DIRECTIONS

The problems below represent many of the math skills you will need to enter the field of precision metalworking. This test will help your teachers understand what you need to know. Don't worry if you can't answer the questions because we are going to teach you the things that you don't know. Your test will be scored, not to assign a grade, but so that we can measure the progress that you will make in this program.

Take your time and carefully answer each question as best you can. If you don't know how to answer a question, just leave it blank and don't worry.

I. DECIMALS

(1) Put these decimals in order from the smallest to the largest. Mark them 1 for the smallest, 2 for the next biggest and so on.

.1601	.161	.156	.16
_____	____	____	___

(2) Round these decimals to the nearest *thousandth* (3 decimal places).

.9063 = _____ .3906 = _____

.8125 = _____ .1996 = _____

(3) Add these decimals.

3.125
+7.25

3.0625 + .9375 =

.015+.187 =

(4) Subtract these decimals.

$$\begin{array}{r} 3.875 \\ -\ 2.75 \\ \hline \end{array}$$

$6.505 - .438 =$

$6.005 - .18 =$

(5) Multiply these decimals.

$$\begin{array}{r} 2.75 \\ \times 20 \\ \hline \end{array}$$

$3.46 \times 1.11 =$

$.438 \times 19 =$

(6) Divide these decimals.

$8\overline{)32.4}$

$40 \div .25 =$

$7.5 \div .375 =$

II. FRACTIONS

(1) Change these Fractions to Decimals.

$\frac{5}{8} =$

$\frac{1}{16} =$

$\frac{7}{32} =$

(2) Add these fractions:

$\frac{3}{8} + \frac{1}{16} =$

$\frac{3}{4} + \frac{1}{6} =$

$5\frac{27}{32}$
$+ 2\frac{7}{8}$

3) Subtract these fractions:

$\frac{7}{8}$
$-\frac{11}{32}$

$\frac{3}{5} - \frac{1}{2} =$

6
$-1\frac{3}{4}$

(4) Multiply these fractions:

$\frac{1}{2} \times \frac{1}{4} =$

$\frac{5}{6} \times \frac{3}{5} =$

$6 \times \frac{3}{8} =$

(5) Divide these fractions:

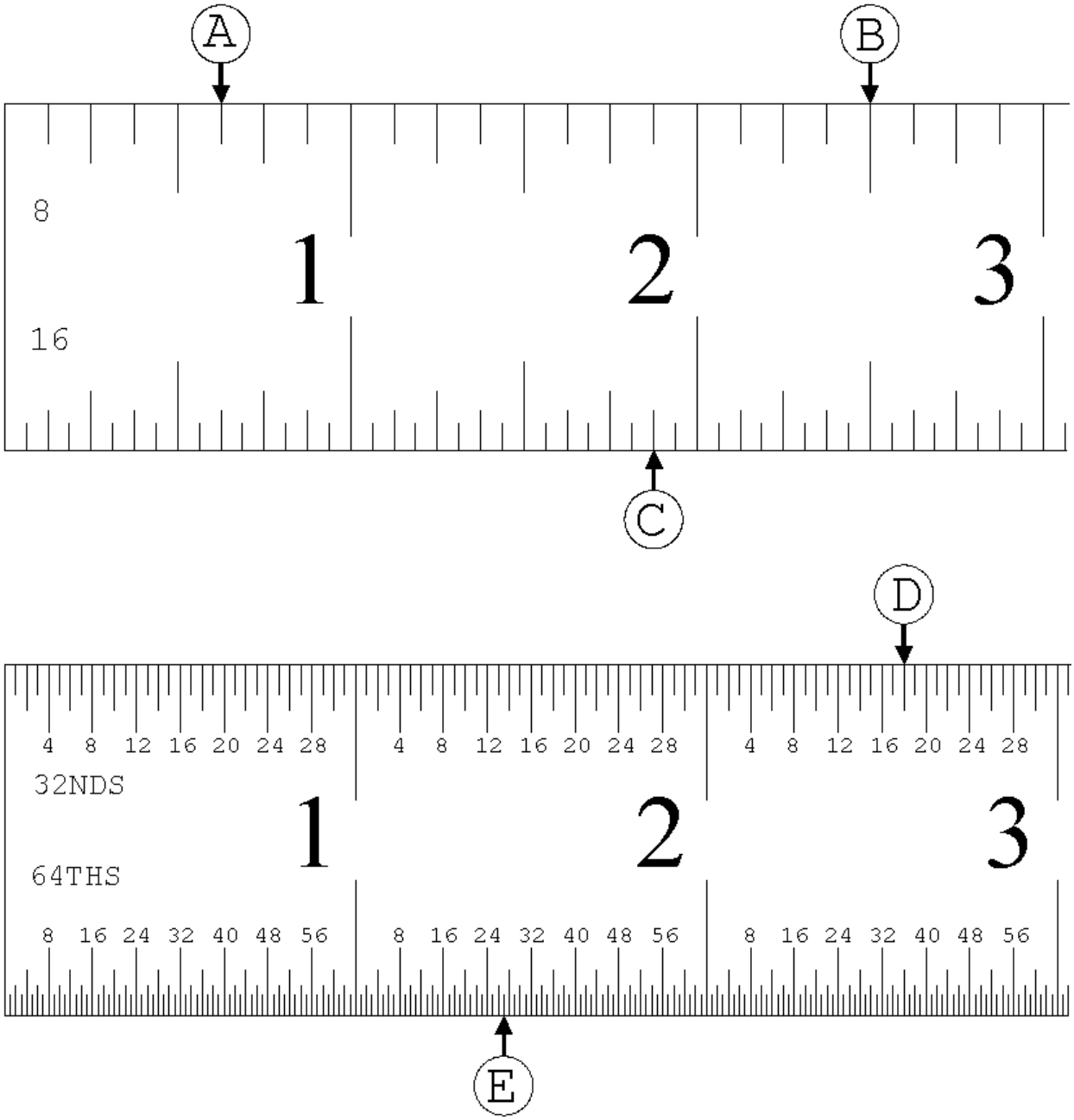
$35 \div \frac{5}{32} =$

$\frac{5}{8} \div \frac{5}{32} =$

$\frac{\frac{7}{8}}{\frac{1}{16}} =$

III. READING A SCALE

Write down the reading indicated by arrows A to E in the spaces below.



A_____ B_____ C_____ D_____

E_____

IV. SHOP MATH PROBLEMS

Solve the problems below and be sure to show your work so we know how you got your answer.

(13) If a machine can make 225 parts in one hour, how long will it take it to make 4,500 parts?

(14) A job order requires 48 pieces of rough stock, each 1 ¼ inches long. Roughly how much bar stock is required to prepare this order?

(15) If you cut a 12 foot bar of aluminum stock into lengths of 4 ½inches, roughly how many pieces will you get?

V. BLUEPRINT READING

Instructions: Use the print on the next page to answer the following questions.

(16) Look at the feature labeled "B". How is this feature labeled in the *front* view? _____

(17) Look at the feature labeled "C". How is it labeled in the *front* view? _____

(18) How is surface "G" labeled in the *top* view? _____

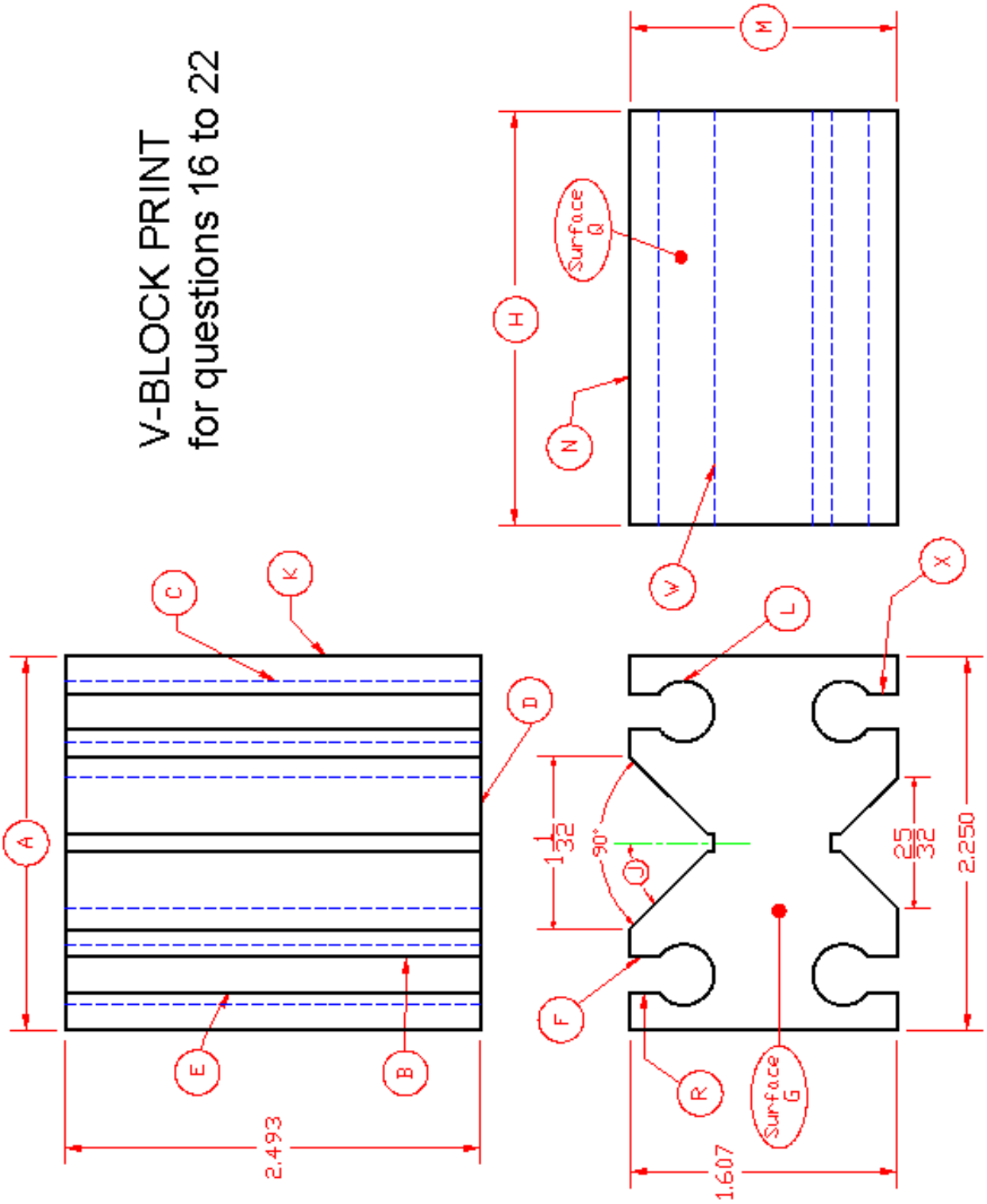
(19) What is the size of dimension "H"? _____

(20) What is the size of dimension "A"? _____

(21) How is surface "Q" labeled in the *top* view? _____

(22) What is dimension "J"? _____

V-BLOCK PRINT
for questions 16 to 22



Student Name_____ Date_____

DIRECTIONS

The problems below represent many of the math skills you will need to enter the field of precision metalworking. This test will help your teachers assess what skills you have learned in this program. This test is similar to some of the tests that employers give to job applicants.

Take your time and carefully answer each question as best you can. If you don't know how to answer a question, just leave it blank and don't worry.

I. DECIMALS

(1) Put these decimals in order from the smallest to the largest. Mark 1 for the smallest, 2 for the next biggest and so on.

.5699	.571	.5709	.57
_____	____	____	___

(2) Round these decimals to the nearest *thousandth* (3 decimal places).

.0354 = _____ .1875 = _____

.90551 = _____ .73448 = _____

(3) Add these decimals.

$$\begin{array}{r} 3.25 \\ +\ 7.125 \\ \hline \end{array}$$

3.0625 + .8175 =

.015 + .563 =

(4) Subtract these decimals.

$$\begin{array}{r} 3.875 \\ -\ .438 \\ \hline \end{array}$$

$6.505 - 2.75 =$

$6.005 - .8125 =$

(5) Multiply these decimals.

$$\begin{array}{r} 2.75 \\ \times\ 40 \\ \hline \end{array}$$

$3.64 \times 1.011 =$

$.439 \times 18 =$

(6) Divide these decimals.

$7\overline{)31.5}$

$20 \div .25 =$

$12.5 \div .625 =$

II. FRACTIONS

(1) Change these Fractions to Decimals.

$\frac{3}{8} =$ $\frac{7}{16} =$ $\frac{33}{64} =$

(2) Add these fractions:

$\frac{1}{8} + \frac{3}{16} =$ $\frac{3}{4} + \frac{1}{3} =$ $5\frac{29}{32} + 2\frac{5}{8}$

3) Subtract these fractions:

$\frac{5}{8} - \frac{11}{32}$ $\frac{4}{5} - \frac{1}{2}$ $7 - 1\frac{3}{8}$

(4) Multiply these fractions:

$\frac{3}{4} \times \frac{1}{2} =$ $\frac{5}{32} \times \frac{3}{16} =$ $4 \times \frac{5}{8} =$

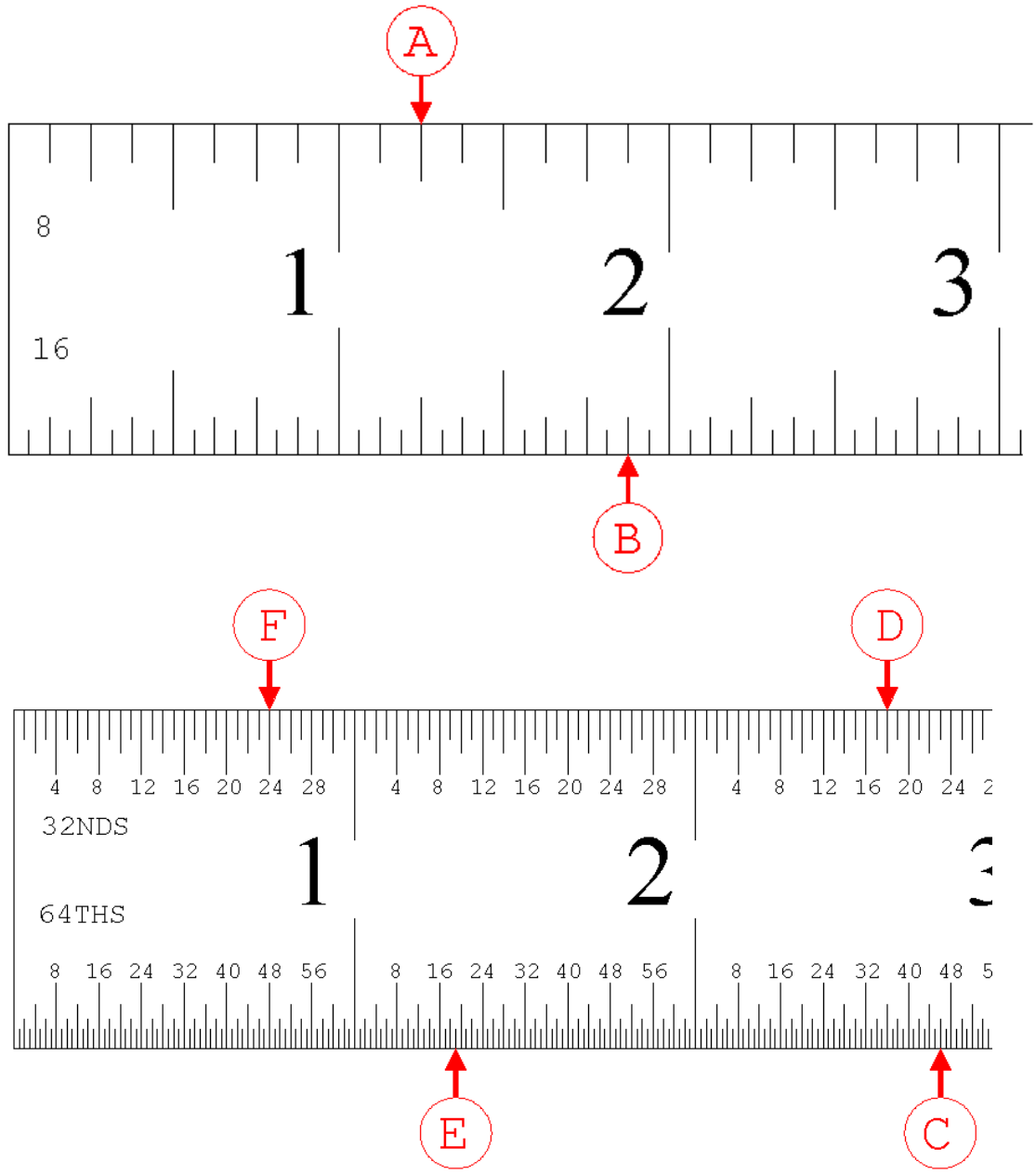
(5) Divide these fractions:

$35\overline{)\frac{5}{16}}$ $\frac{5}{8} \div \frac{5}{64} =$

$$\frac{\frac{5}{8}}{\frac{1}{16}} =$$

III. SCALE

Write down the reading indicated by arrows A to E in the spaces below.



A_____ B_____ C_____ D_____ E_____

IV. SHOP MATH PROBLEMS

Solve the problems below and be sure to **show your work** so we know how you got the answer.

(13) If a machine can make 540 parts in one hour, how long will it take it to make 8,100 parts?

(14) If you cut a 12-foot bar of aluminum stock into lengths of 2 ¼ inches, roughly how many pieces will you get?

(15) A job order requires you to use a horizontal band saw to cut 50 pieces of rough stock. The pieces have to be 5 ¾ inches long.

(a) Roughly how much bar stock is required to prepare this order? (Don't account for waste from the cutting). Give your answer as inches of bar stock.

(b) Recalculate you answer and this time account for the width of the saw blade. Allow 1/16" for each saw cut. Now **exactly** how much bar stock do you need?

(c) If you cut the pieces from bar stock that comes in 12 foot lengths, you will have to calculate how many of these bars are needed to cut all 50 pieces. In order to do this you have to calculate how many pieces you can get from each bar.
And when you use a horizontal band saw, you must allow for the material that has to be held in the clamp while you are sawing. Allow 8" at the end of each bar for the clamp.

How many pieces can you get from one 12-foot bar?

(d) How many 12 ft. bars do you need for this job?

(e) When you are done cutting the 50 pieces, will you have any bar stock leftover to be put back in the rack? (Note: pieces less than 12" are waste and go in the recycle bin.) And if so, how long would it be?

(16) Burrs on the edges of holes punched in metal parts are usually allowed to be no more than 5% of the material thickness.

(a) If you are punching holes in material that is .120" thick, what is the maximum allowable burr?

(b) What if the material is .032" thick?

(17) If you run 4,270 pieces on a press and 162 were rejects, what percent are bad?

(18) If you earn $10.75/hour and you get paid "time and a half" for every hour over 40 hours that you work in one week, how much would your gross pay be if you worked 51 hours?

V. BLUEPRINT READING

Instructions: Use the V-BLOCK print on page11 to answer the following questions.

(19) Look at the feature labeled "B". How is this feature labeled in the *front* view? _____

(20) Look at the feature labeled "C". How is it labeled in the *front* view? _____

(21) How is feature "D" labeled in the *front* view? _____

(22) What is the size of dimension "H"? _____

(23) What is the size of dimension "A"? _____

(24) How is feature "K" labeled in the *side* view? _____

(25) What is dimension "J"? _____

(26) What type of line is "C"? _____

(27) What type of line is "R"? _____

(28) What type of line is "S"? _____

(29) What type of line is "T"? _____

(30) How is feature "R" labeled in the *top* view? _____

(31) How is feature "U" labeled in the *side* view? _____

(32) What type of line is "V"? _____

(33) What type of line is "AA"?

Calculate the upper and lower limits of the following print dimensions:

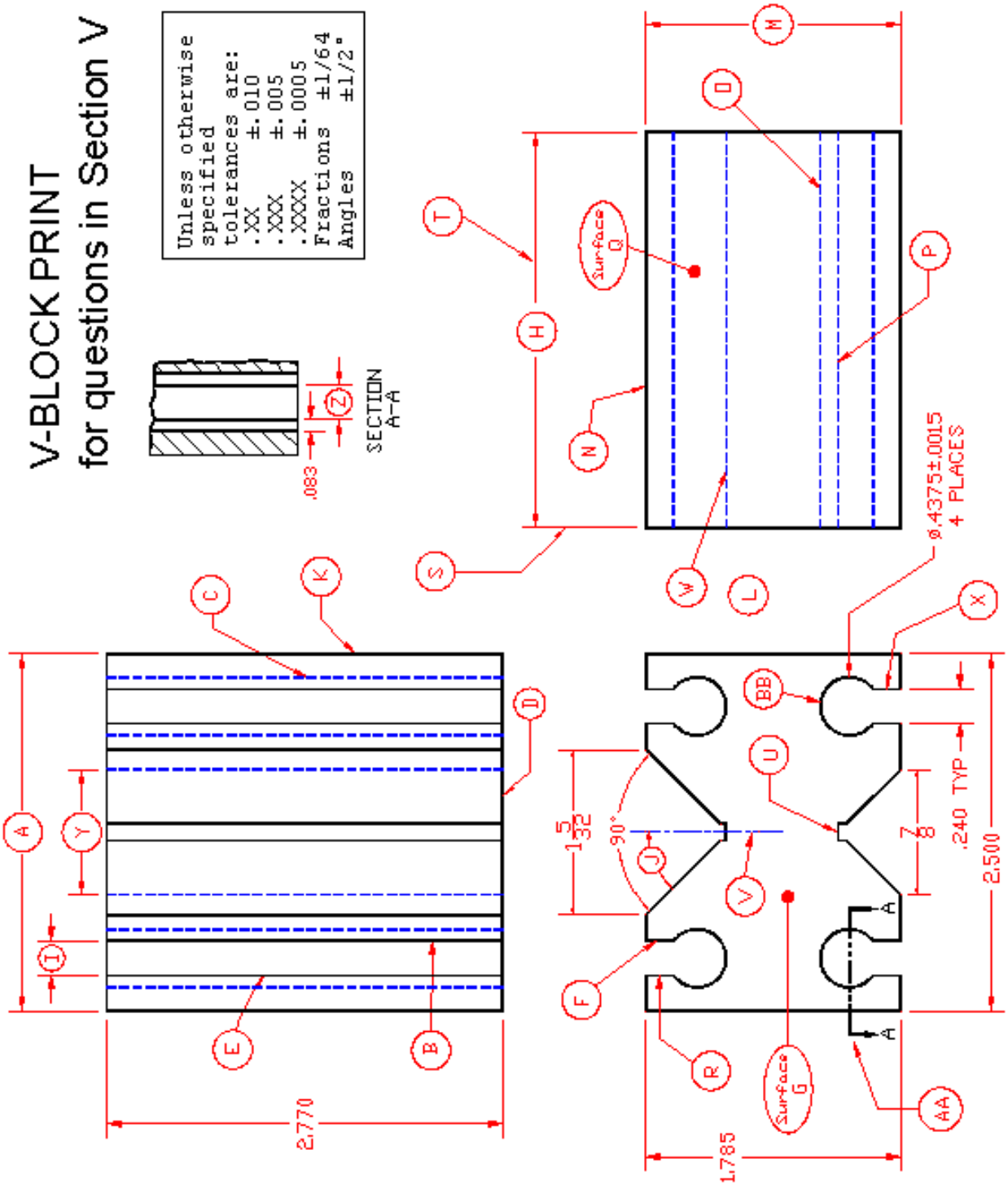
(34) 2.270 lower:_____ upper:_____

(35) 7/8 lower:_____ upper:_____

(36) .2400 lower:_____ upper:_____

(37) Ø.4375 lower:_____ upper:_____

(38) 90° lower:_____ upper:_____


V-BLOCK PRINT
for questions in Section V
Unless otherwise specified tolerances are:
.XX ±.010
.XXX ±.005
.XXXX ±.0005
Fractions ±1/64
Angles ±1/2°
SECTION A-A
.083
Surface Q
Surface G
Ø.4375±.0015
4 PLACES
.240 TYP
2.500
2.770
1.785
90°

Instructions: Use the BRACE PLATE drawing below to answer the following questions:

(39) What is the size of dimension "A"? _____

(40) If the holes are equally spaced, what is dimension "B"? _____