2021 Academic Challenge

ENGINEERING GRAPHICS TEST – REGIONAL

– **This Test Consists of 40 Questions** –

Engineering Graphics Test Production Team
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Ted Branoff, Illinois State University – Reviewer
Douglas Brandt, Eastern Illinois University – Coordinator of Test Production

GENERAL DIRECTIONS

Please read the following instructions carefully. This is a timed test; any instructions from the test supervisor should be followed promptly.

The test supervisor will give instructions for filling in any necessary information on the answer sheet. Most Academic Challenge sites will ask you to indicate your answer to each question by marking an oval that corresponds to the correct answer for that question. One oval should be marked to answer each question. Multiple ovals will automatically be graded as an incorrect answer.

Be sure ovals are marked as , not , , , etc.

If you wish to change an answer, erase your first mark completely before marking your new choice.

You are advised to use your time effectively and to work as rapidly as you can without losing accuracy. Do not waste your time on questions that seem too difficult for you. Go on to the other questions, and then come back to the difficult ones later if time remains.

***** Time: 40 Minutes *****

DO NOT OPEN TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO!

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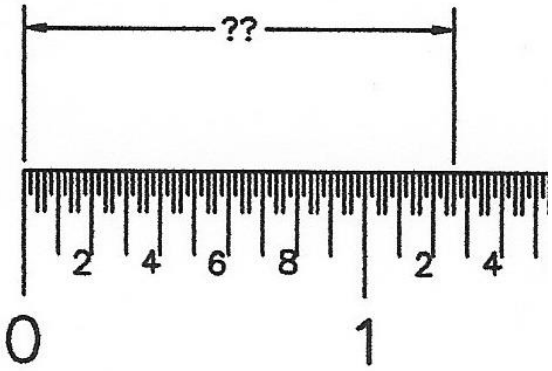
Academic Challenge
Engineering Graphics Test (Regional) - 2021

1. Which of the following ASME standard symbols would NOT be associated with a hole?

   A.
   B.
   C.
   D.
   E.

2. What distance is indicated on the measuring scale illustrated below?

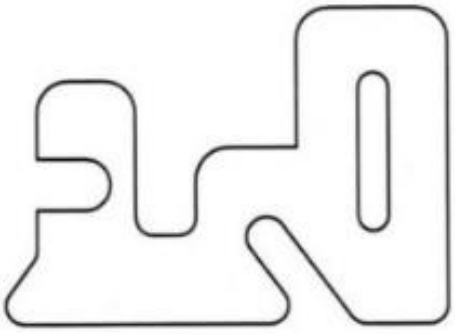


   A. 1.024”
   B. 1.028”
   C. 1.230”
   D. 1.260”
   E. 1.300”

3. Using the edge of a triangular metric scale, measure the coin and determine the diameter (in inches) for this 1879 Morgan silver dollar?

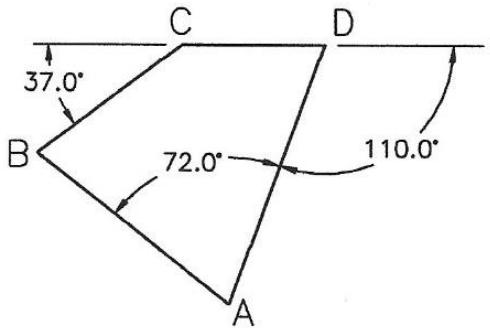
   A. 1.50”
   B. 1.90”
   C. 2.12”
   D. 3.00”
   E. 3.81”

4. If the perimeter shape of this gasket were to be dimensioned, how many acute angles could be specified?



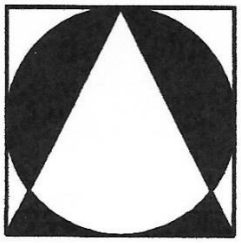
   A. 1
   B. 2
   C. 3
   D. 4
   E. 5

5. Given this geometric shape with line segment CD horizontal, determine interior angle C-B-A:



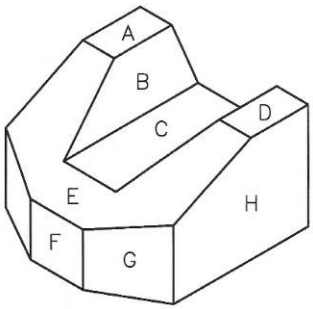
A. 95
B. 90
C. 85
D. 80
E. 75

6. Given the logo design below, which is a TRUE statement with respect to the geometric relationships of the circle, triangle, and square?



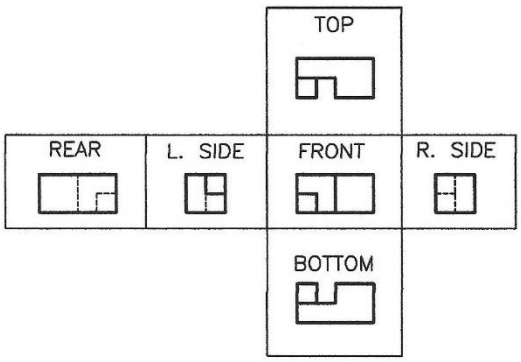
A. The circle is circumscribed inside the square
B. The square and circle are both concentric with the triangle
C. The circle is eccentric with the square
D. The square is circumscribed around the circle
E. The square and circle are both circumscribed around the triangle

7. In engineering graphics textbooks, flat planar surfaces are often identified as ***normal***, ***inclined***, or ***oblique***. Of the five pairs listed below, which pair of surfaces are NOT the same type?



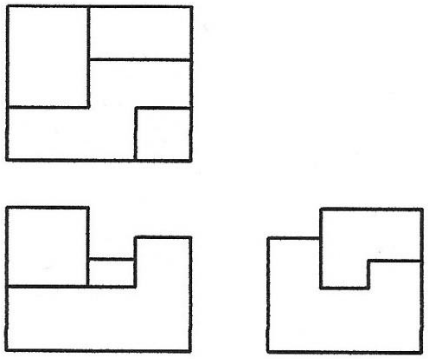
A. B-G
B. H-A
C. D-F
D. C-E
E. A-D

8. The illustration below features the six principle views of an object arranged in a standard orthographic glass box development. Which of the views is incorrectly represented?



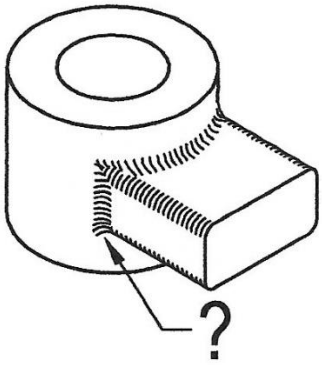
A. REAR
B. BOTTOM
C. RIGHT SIDE
D. TOP
E. LEFT SIDE

9. How many hidden lines segments, if any, would need to be added to the multiview drawing below to make it complete and correct?



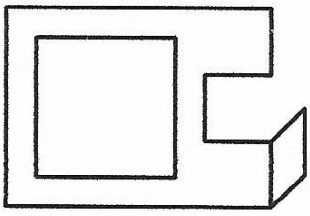
A. 0
B. 1
C. 2
D. 3
E. 4

10. A multiview drawing of this object would need to show how the rounded and filleted edges meet with a curved surface. What is the name of the feature that a drafter would use when creating a front view (looking from lower left) of this feature?



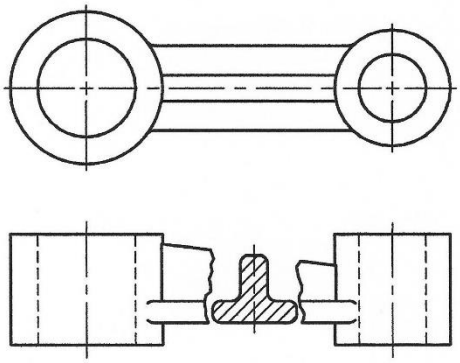
A. Runout
B. Tail
C. Ogee curve
D. Tangent quarter
E. Key

11. Finish the oblique drawing of this block. It has a square "through" hole, and only one depth dimension. How many line segments are needed to finish the drawing?



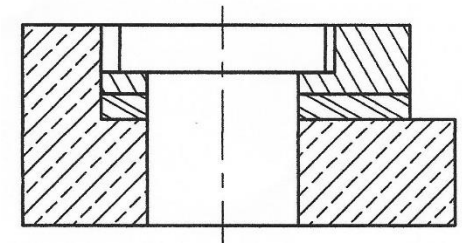
A. 10
B. 11
C. 12
D. 13
E. 14

12. Which type of section is represented by the views below?



A. Aligned section
B. Half section
C. Removed section
D. Broken-out section
E. Revolved section

13. Which of the following is a FALSE statement about the angled lines of this view?



A. The lines are drawn thinner than the visible lines of the object

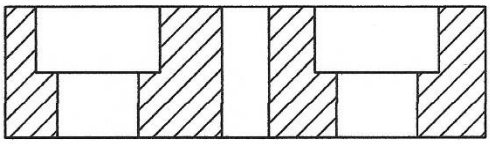
B. The lines are slanted in different directions because this is an assembly drawing

C. The lines that are the same type and angle are representing the same part

D. The alternating dashed lines in the larger areas represent brass or bronze material

E. The lines are officially called cutting plane lines

14. Study the section view illustrated below, and then select a type of section view that is NOT a possibility for that view:



A. Half section

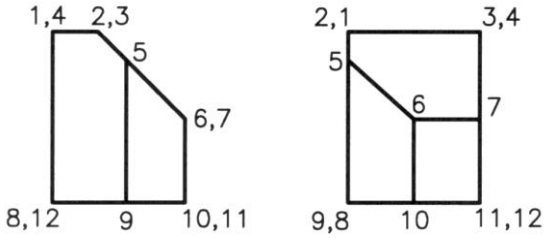
B. Aligned section

C. Removed section

D. Full section

E. Offset section

15. For the object illustrated below, choose a TRUE statement with respect to the true size and shape of inclined surface 2-3-7-6-5.



A. An auxiliary view to show the true size and shape would not be necessary if a top view were present

B. It could be found in a primary auxiliary projected from the right-side view

C. It could be found in a primary auxiliary projected from the front view

D. It could be found in a primary auxiliary projected from a top view where 5-6-10-9 is shown as a line

E. It could be found in a secondary auxiliary view projected from a primary auxiliary view that shows the true size and shape of 5-6-10-9

16. For a CAD program that has a relative "rectangular coordinate" input syntax of ***#delta X, delta Y***, the user can input #2,0 to draw a 2" horizontal line to the right, or #-2,0 to draw to the left. If the next input is #0,2 the line would continue up in a vertical direction. Which letter of the alphabet would be drawn by the following sequence?

#-5,0 #5,5 #-5,0

A. J

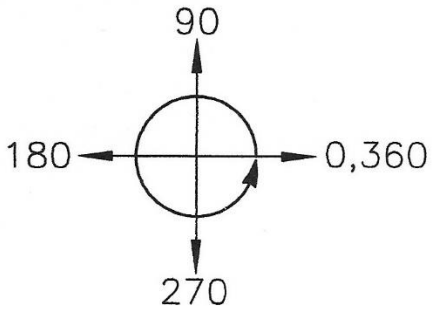
B. C

C. U

D. Z

E. N

17. *(Fill in the blanks)* In most CAD situations, the diagram below would be a handy reference for _____ _____ _____ .



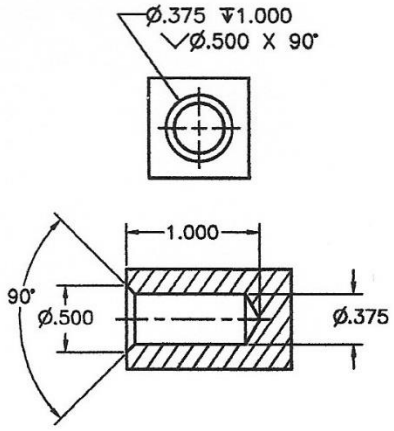
A. polar coordinate directions
B. 3D alignment points
C. Cartesian coordinate input
D. mirror plane reference
E. civil compass bearings

18. The chart below shows recommended standard pitches for metric threads. What metric thread note would be the "closest" conversion of a 1/2-20UNF-2 thread?

NOMINAL DIAMETER (mm)	THREAD PITCH (mm)		
	COARSE	FINE	EXTRA FINE
6	1		
8	1.25	1	1
10	1.5	1.25	1.25
12	1.75	1.5	
14	2	1.5	
16	2	1.5	
18	2.5	1.5	
20	2.5	1.5	
22	2.5	1.5	
24	3	2	
27	3	2	
30	3.5	2	

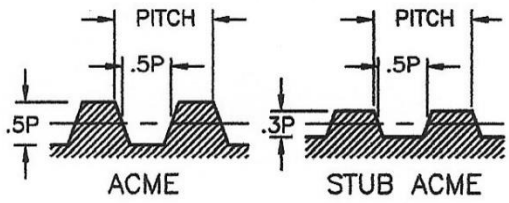
A. M12 X 1.75
B. M12 X 1.5
C. M20 X 2.5
D. M20 X 1.5
E. M24 X 3

19. The sectional view illustrates the dimensional values expressed in the local callout note. Which dimension on the sectional view, if any, is incorrect?



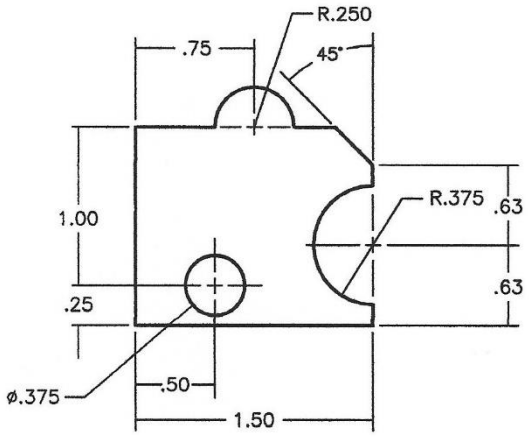
A. 90°
B. .500"
C. 1.000"
D. .375"
E. All the dimensions are correct

20. As shown below, a variation of the standard ACME thread is the STUB ACME thread. What is the ***thread depth*** for a thread that is specified as 4.5-8 STUB ACME?



A. .0375
B. .0625
C. .375
D. 1.35
E. 2.40

21. The geometric shape illustrated below has been dimensioned, but all the arrows are missing! How many arrows need to be added?



A. 16
B. 17
C. 18
D. 19
E. 20

22. What would be represented by the expression below on an engineering print?

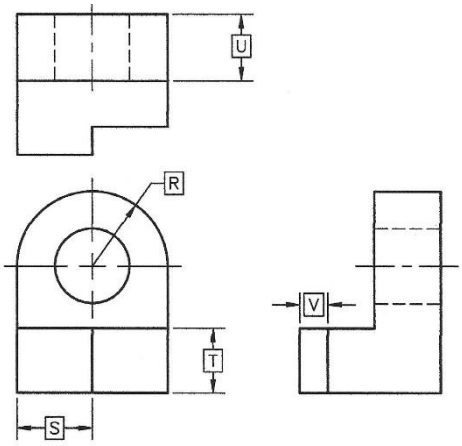
$$\pm 1°30'$$

A. A screw thread pitch
B. A weld face specification
C. A clearance fit allowance
D. A surface quality specification
E. An angular tolerance

23. What is a common characteristic of a ***local*** note, as compared to a ***general*** note?

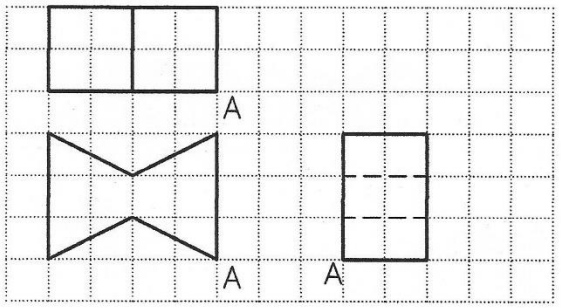
A. An identification balloon
B. A feature control frame
C. A radius symbol
D. Lower-case lettering
E. A leader line

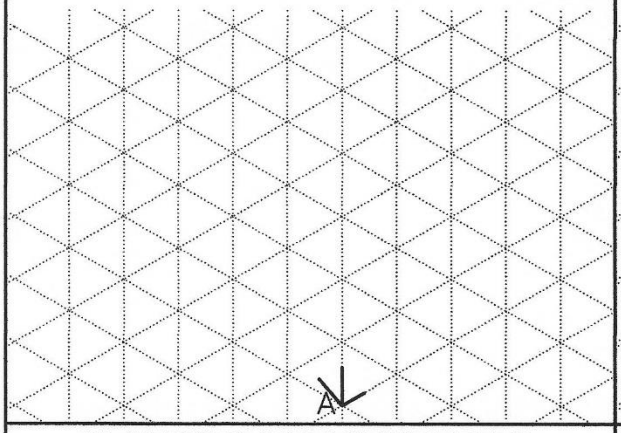
24. Based on the contour rule of dimensioning, which of the following dimensions is best located?



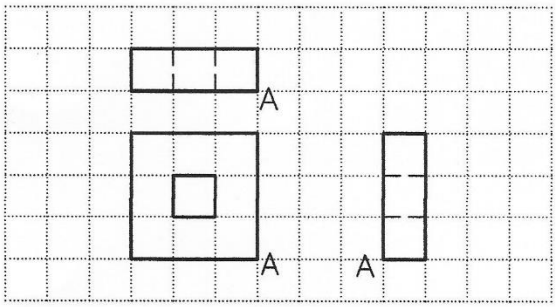
A. R
B. S
C. T
D. U
E. V

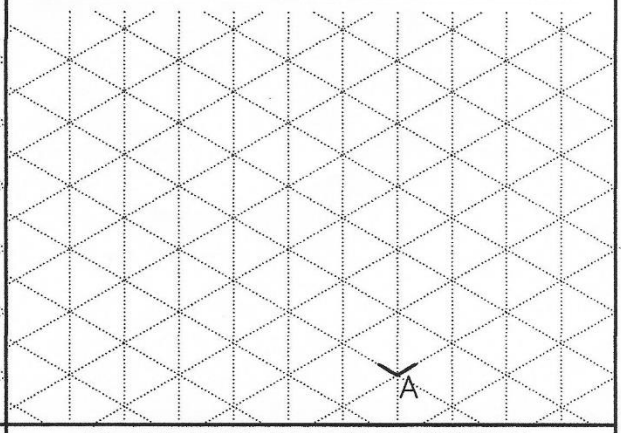
PROBLEMS 25 & 26: CREATE ISOMETRIC SKETCHES
SELECT AN ANSWER THAT REPRESENTS THE NUMBER OF SEGMENTS REQUIRED





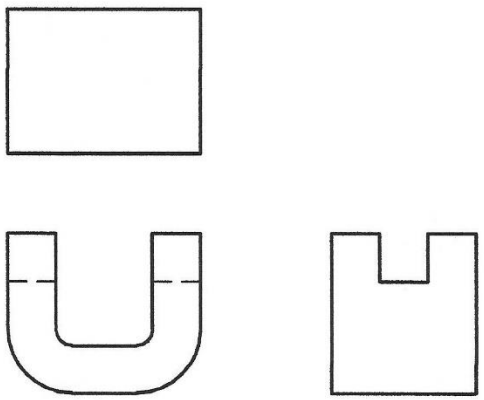
25. NUMBER OF LINE SEGMENTS:
A. 12 B. 13 C. 14 D. 15 E. 16



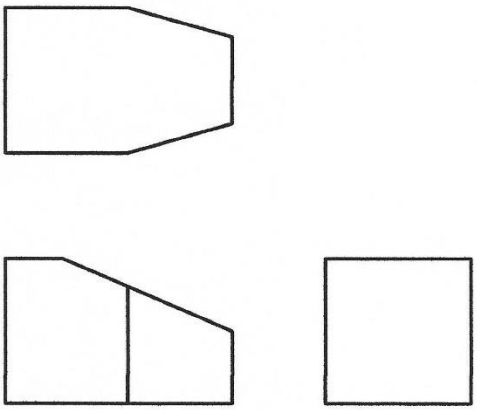


26. NUMBER OF LINE SEGMENTS:
A. 11 B. 12 C. 13 D. 14 E. 15

PROBLEMS 27 & 28: MISSING LINE PROBLEMS: SELECT AN ANSWER THAT CORRESPONDS WITH THE LEAST NUMBER OF MISSING LINE SEGMENTS (VISIBLE AND HIDDEN) IT WILL TAKE TO CREATE A CORRECT MULTIVIEW DRAWING



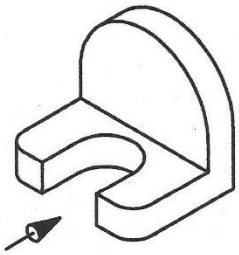
27. MINIMUM NUMBER OF LINES:
A. 4 B. 5 C. 6 D. 7 E. 8

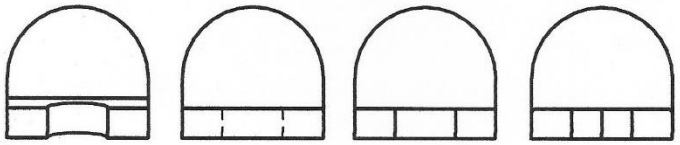


28. MINIMUM NUMBER OF LINES:
A. 4 B. 5 C. 6 D. 7 E. 8

FOR EACH PROBLEM ON THIS PAGE, SELECT A FRONT VIEW
NOTE: CENTER LINES OMITTED ON THIS TEST

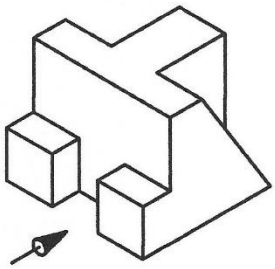
29.

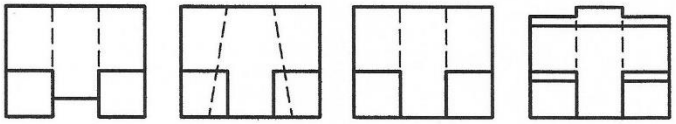




A. B. C. D. NONE OF THESE E.

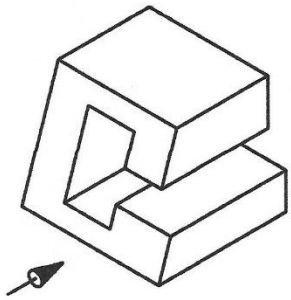
30.

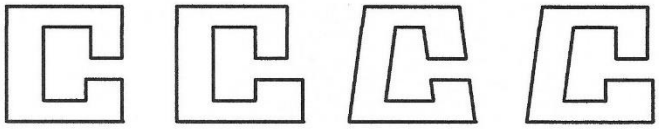




A. B. C. D. NONE OF THESE E.

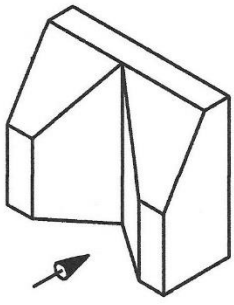
31.

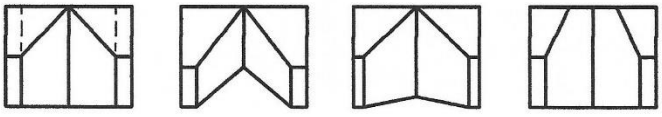




A. B. C. D. NONE OF THESE E.

32.

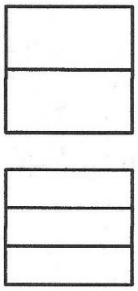




A. B. C. D. NONE OF THESE E.

FOR EACH PROBLEM ON THIS PAGE, SELECT A SIDE VIEW
NOTE: CENTER LINES OMITTED ON THIS TEST

33.



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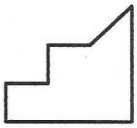
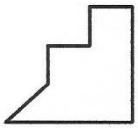
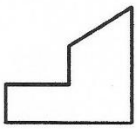


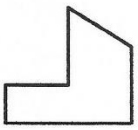
A.



B.



C.

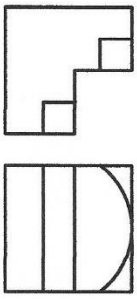


D.

NONE OF THESE

E.

34.



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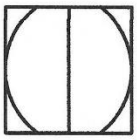
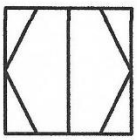


A.

B.



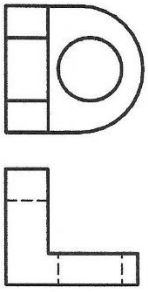
C.

D.

NONE OF THESE

E.

35.



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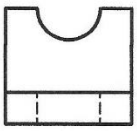

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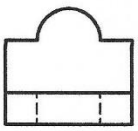

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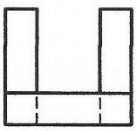

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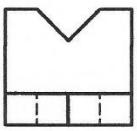
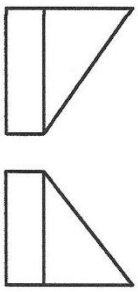


D.

NONE OF THESE

E.

36.



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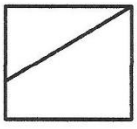
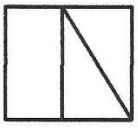


A.



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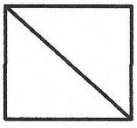
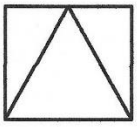


C.



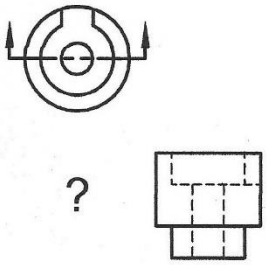
D.

NONE OF THESE

E.

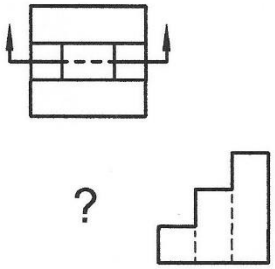
FOR EACH PROBLEM ON THIS PAGE, SELECT A FRONT SECTIONAL VIEW
NOTE: CENTER LINES OMITTED ON THIS TEST

37.



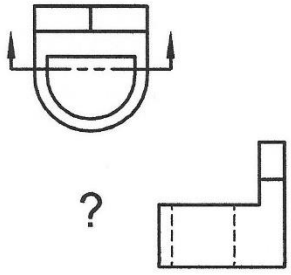
A. B. C. D. NONE OF THESE E.

38.



A. B. C. D. NONE OF THESE E.

39.



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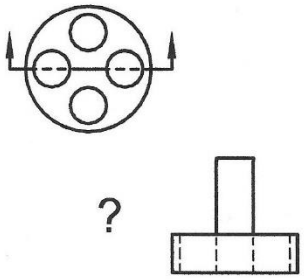
40.



A. B. C. D. NONE OF THESE E.