



## 2013 Academic Challenge

### ENGINEERING GRAPHICS TEST - REGIONAL

This Test Consists of 50 Questions

**Engineering Graphics Test Production Team**

Ryan Brown, Illinois State University – Author/Team Leader

Jacob Borgerson, Independent Consultant – Reviewer

Mary Weaver, WYSE – 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. Only one oval should be marked to answer each question. Multiple ovals will automatically be graded as incorrect answers.

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!**

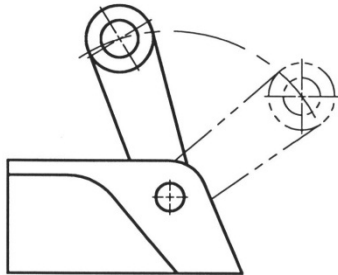
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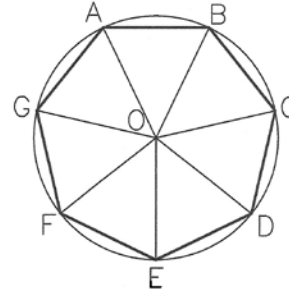
WYSE – Academic Challenge  
Engineering Graphics Test (Regional) - 2013

1. In the illustration below, what type of line is used to represent the **path of motion**?



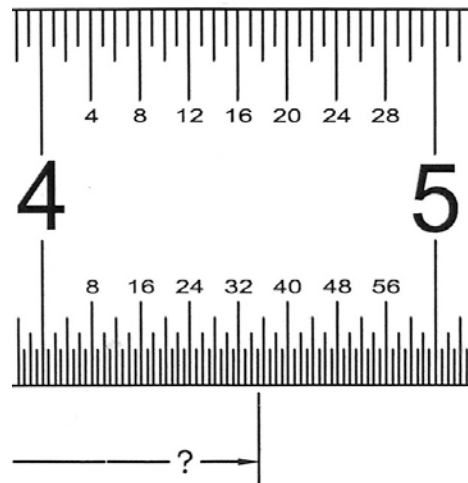
- A. Center  
B. Phantom  
C. Dotted  
D. Dashed  
E. Motion
2. As listed in the ASME standards, which one of the following line types is **NOT** an official line type designation?
- A. Hidden  
B. Center  
C. Visible  
D. Dashed  
E. Section
3. There are two types of pictorial drawings wherein circular features parallel with a frontal plane remain true circles. Which of the pairs below names the two types?
- A. Isometric and oblique  
B. Diametric and isometric  
C. One-point perspective and trimetric  
D. Two-point perspective and isometric  
E. Oblique and one-point perspective

4. Identify the number of degrees for angle B-O-E?



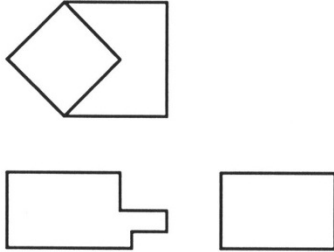
- A.  $45^\circ$   
B.  $51.4^\circ$   
C.  $128.6^\circ$   
D.  $154.3^\circ$   
E.  $180^\circ$

5. Identify the measurement (from 0) indicated on this enlarged view of a machinist scale:



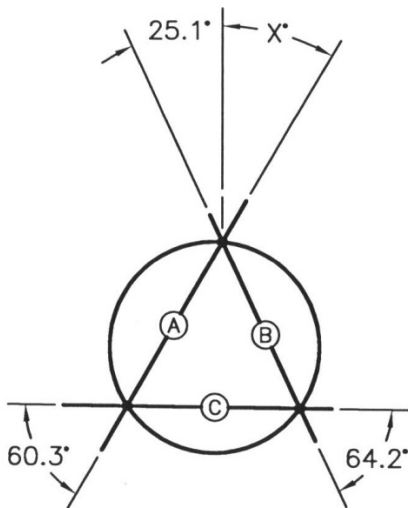
- A. 4.35"  
B. 4-35/64"  
C. 4.35 cm  
D. 4-35/50"  
E. 435 mm

6. Each view is missing one or more lines. To correct the views with the least amount of line segments will require \_\_\_\_ more visible segments and \_\_\_\_ hidden segments.



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

7. The circle shown in the illustration below goes through three points formed at the intersection of lines A, B, and C. Based on the given angles, what is angle X?



- A. 15.4°
- B. 25.1°
- C. 30.4°
- D. 40.4°
- E. 55.5°

8. If A-size paper is 8-1/2" x 11", what size is E-size paper?

- A. 11" x 14"
- B. 11" x 17"
- C. 18" x 24"
- D. 34" x 44"
- E. 85" x 110"

9. Given a 4" radius circle, and located 2" over and 2" up from the circle's center point is the center point of a 1" radius circle. Which of the following is a TRUE statement about these two circles?

- A. The circles do not intersect
- B. The circles are concentric
- C. The circles intersect at 2 points
- D. The circles are tangent
- E. The small circle center is on the large circle circumference

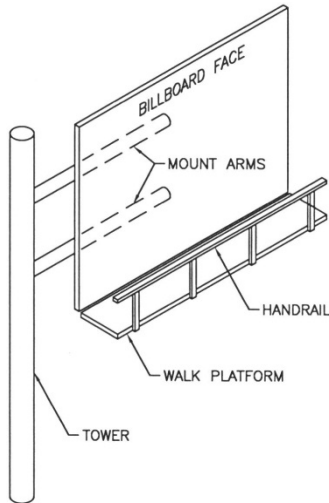
10. A tube to hold nickels needs an inside diameter 0.5 to 1.0 mm larger than the nickel's diameter. You only have this machinist scale with which to measure. The tube material is 1mm thick. Which of the following would be the **outside diameter** of the tube?



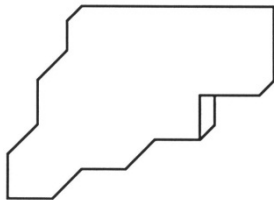
- A. 25 mm
- B. 26 mm
- C. 27 mm
- D. 28 mm
- E. 29 mm

11. The illustration below shows a basic billboard structure. Identify the FALSE statement about the orientation of the billboard's main surface to the structure and surroundings.

The **billboard face** is:



- A. perpendicular to the ground
  - B. perpendicular to the mount arms
  - C. parallel to the tower
  - D. perpendicular to the walk platform
  - E. parallel to the handrail
12. Given the incomplete silhouette of an abstract object drawn with an oblique pictorial method, how many line segments need to be added to complete the view?

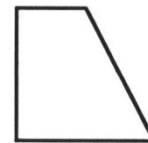
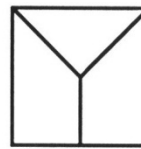


- A. 9
- B. 10
- C. 11
- D. 12
- E. 13

13. In most 3D CAD solid modeling programs, Boolean operations are common for combining solids to produce various results. How many Boolean operations are there?

- A. 2
- B. 3
- C. 4
- D. 5
- E. unlimited

14. In engineering graphics, it is common to number the vertices of an object in order to help solve a problem. How many unique vertices does this object have?

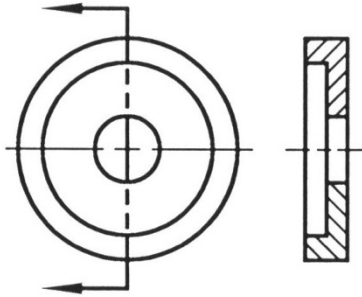


- A. 5
- B. 6
- C. 7
- D. 8
- E. 9

15. What is a common CAD term or command for removing a portion of 2D geometry, but not the whole?

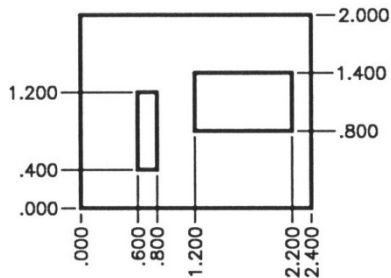
- A. TRIM
- B. PINCH
- C. SNIP
- D. CLIP
- E. REMOVE

16. What is incorrectly represented in the illustration below?



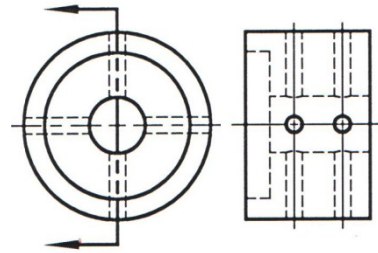
- A. Section lines too close
- B. Cutting plane line should not be thick
- C. Section lines run in different directions
- D. Cutting plane arrows point the wrong way
- E. Center lines are missing

17. The illustration below features **coordinate dimensioning**. In reading this view, identify the FALSE statement:



- A. The top edge and right edge are the datum edges
- B. The right hole is 1.0" x .6"
- C. The overall size of the part is 2.4" x 2.0"
- D. The left hole is .2" x .8"
- E. The surface between holes is .4" wide

18. When the side view of this drawing is converted into a full section view, how many bounded areas will need section lines (hatching)?

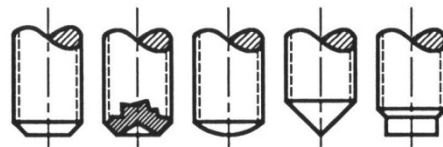


- A. 2
- B. 3
- C. 4
- D. 5
- E. 6

19. Which of the following threads has the smallest major diameter?

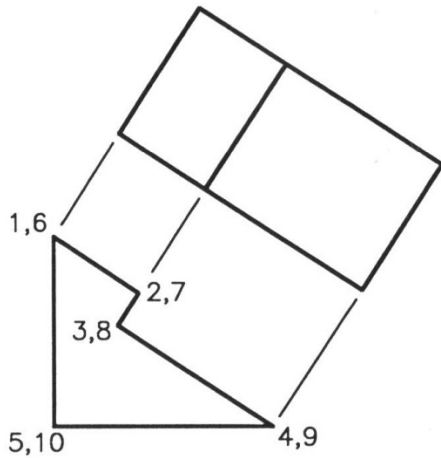
- A. #10-32UNF-2A
- B. 5/8-11UNC-1B
- C. M12 x 1.75
- D. 1-5 ACME
- E. 3/4-10UNC-3A LH TRIPLE

20. What aspect of threads and fasteners is being illustrated below?



- A. Wood screw points
- B. Machine bolt tips
- C. Cotter pin tips
- D. Set screw points
- E. Woodruff key points

21. Edge 3-8 appears as a **point** in the front view. How many edges appear as points in the auxiliary view?



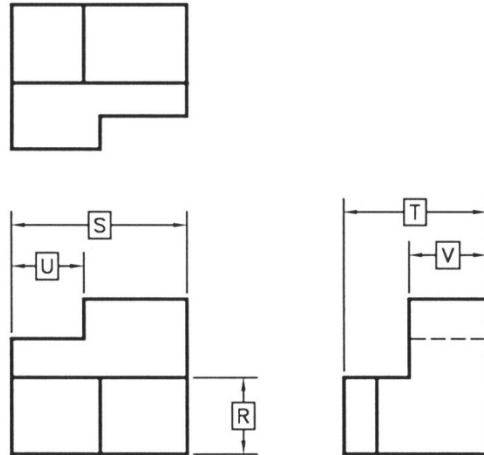
- A. 0
- B. 1
- C. 2
- D. 3
- E. 4

22. Identify this metalworking machine often used for a variety of processes, including reducing the thickness of a block, or cutting a groove or channel:



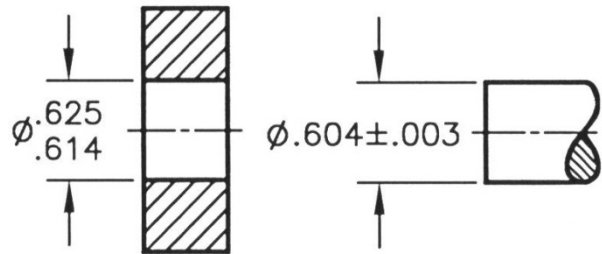
- A. Drill press
- B. Milling machine
- C. Lathe
- D. Welder
- E. Coordinate measuring machine

23. In dimensioning, the “contour rule” means place the dimension in the view where you best see the shape or profile of the feature. In the illustration below, which dimension breaks the contour rule?



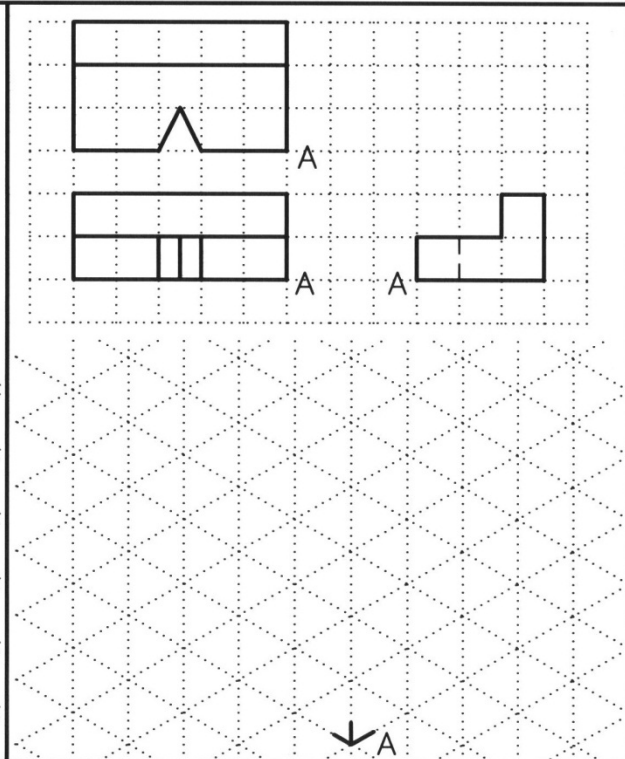
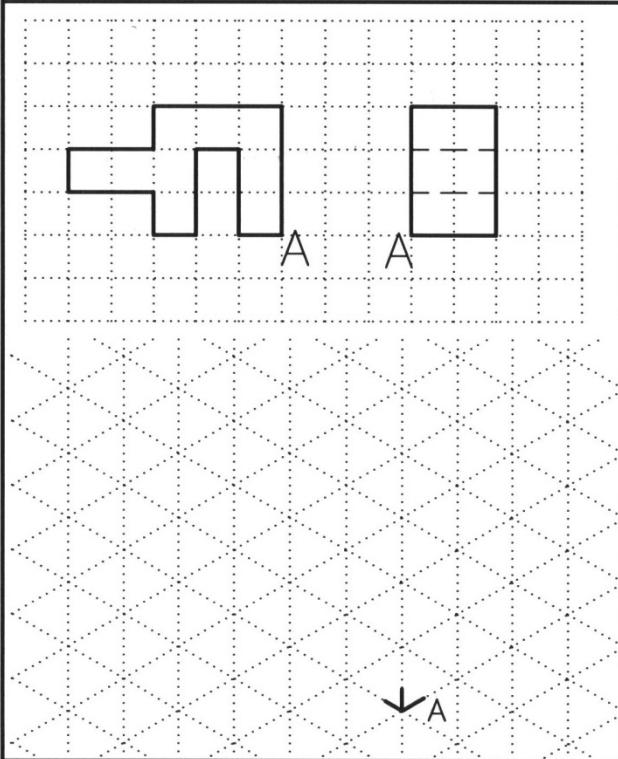
- A. R
- B. S
- C. T
- D. U
- E. V

24. What is the **allowance** of the mating relationship illustrated below?



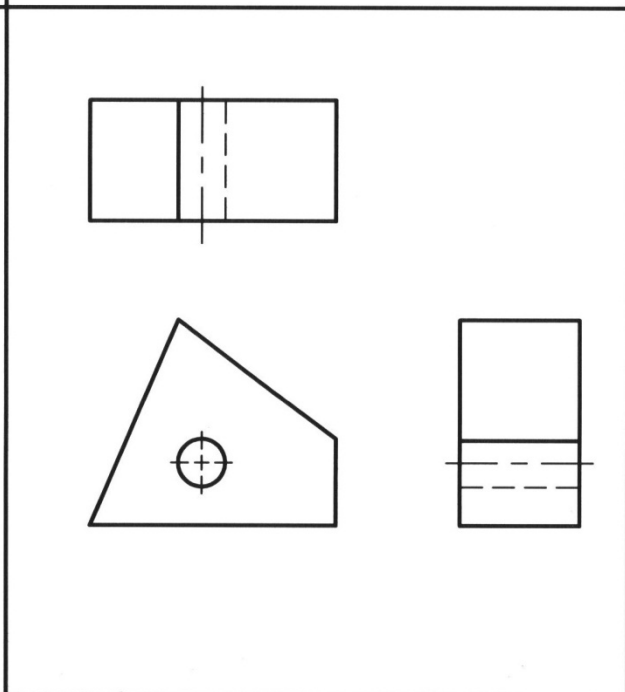
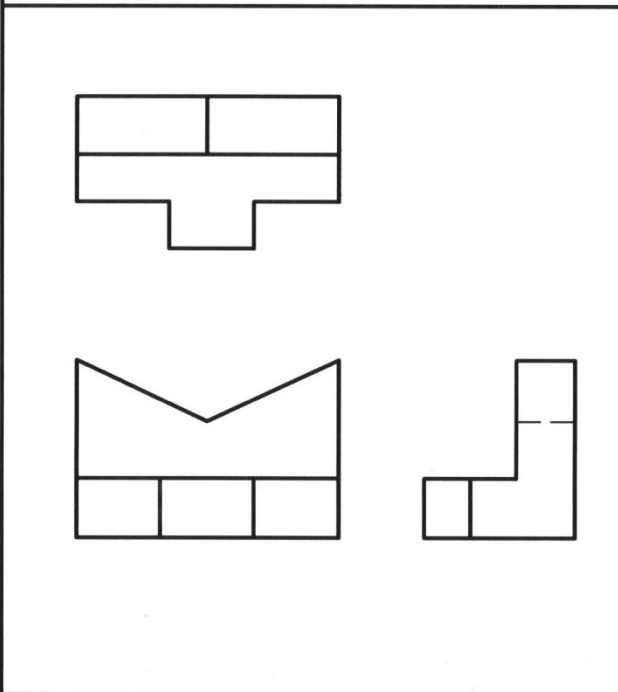
- A. .024"
- B. .021"
- C. .018"
- D. .010"
- E. .007"

PROBLEMS 25 & 26: CREATE ISOMETRIC SKETCHES.  
 PROBLEMS 27 & 28, DIMENSION COMPLETELY, BUT NO SUPERFLUOUS.



25. NUMBER OF LINE SEGMENTS:  
 A. 20 B. 21 C. 22 D. 23 E. 24

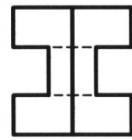
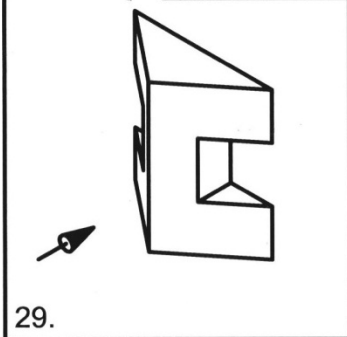
26. NUMBER OF LINE SEGMENTS:  
 A. 20 B. 21 C. 22 D. 23 E. 24



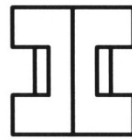
27. MINIMUM NUMBER OF DIMENSIONS:  
 A. 8 B. 10 C. 12 D. 14 E. 16

28. MINIMUM NUMBER OF DIMENSIONS:  
 A. 6 B. 7 C. 8 D. 9 E. 10

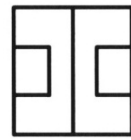
FOR EACH PROBLEM ON THIS PAGE, SELECT A FRONT VIEW  
 NOTE: CENTER LINES OMITTED ON THIS TEST



A.



B.



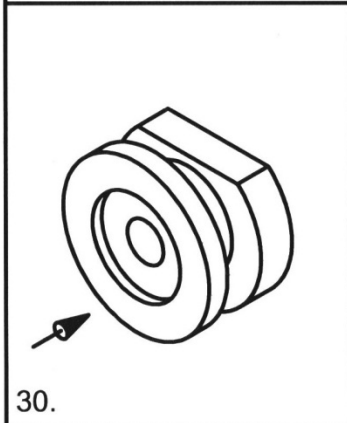
C.



D.

NONE  
OF  
THESE

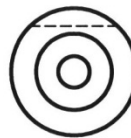
E.



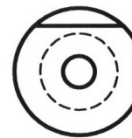
A.



B.



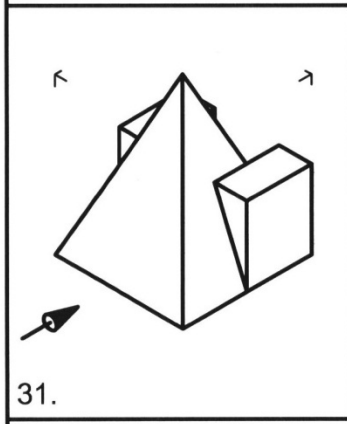
C.



D.

NONE  
OF  
THESE

E.



A.



B.



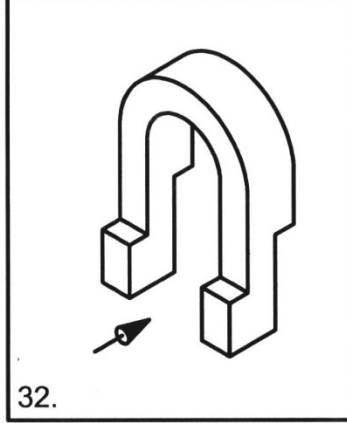
C.



D.

NONE  
OF  
THESE

E.



A.



B.



C.

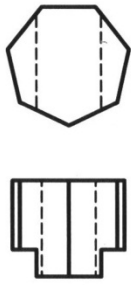
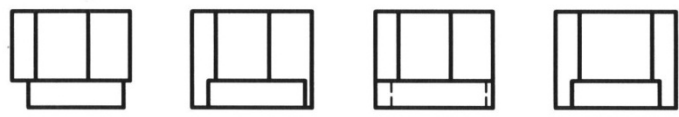
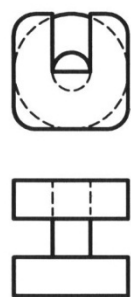
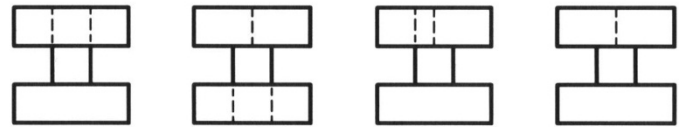
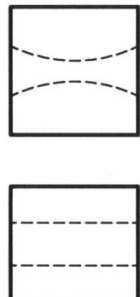

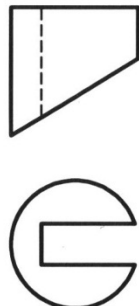



D.

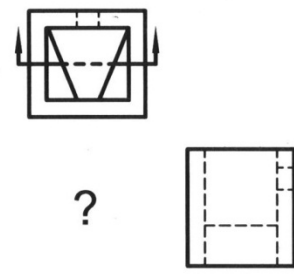
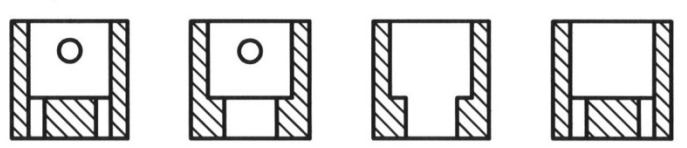
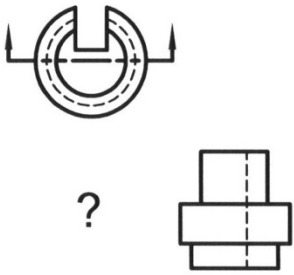
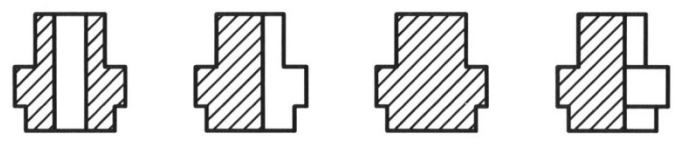
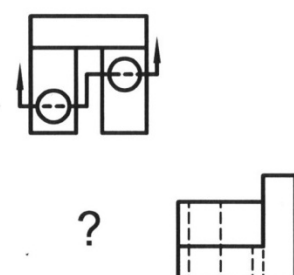
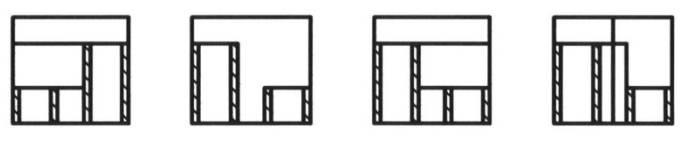
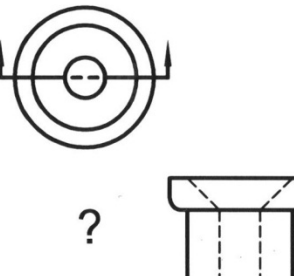
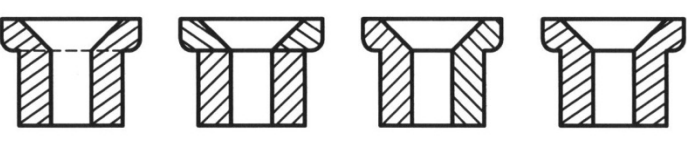
NONE  
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THESE

E.



		FOR EACH PROBLEM ON THIS PAGE, SELECT A SIDE VIEW NOTE: CENTER LINES OMITTED ON THIS TEST				
<p>33.</p>  <p>?</p>	 <p>A.      B.      C.      D.</p> <p>NONE OF THESE</p> <p>E.</p>					
<p>34.</p>  <p>?</p>	 <p>A.      B.      C.      D.</p> <p>NONE OF THESE</p> <p>E.</p>					
<p>35.</p>  <p>?</p>	 <p>A.      B.      C.      D.</p> <p>NONE OF THESE</p> <p>E.</p>					
<p>36.</p>  <p>?</p>	 <p>A.      B.      C.      D.</p> <p>NONE OF THESE</p> <p>E.</p>					

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

<p>37.</p> 	 <p>A.      B.      C.      D.      E. NONE OF THESE</p>
<p>38.</p> 	 <p>A.      B.      C.      D.      E. NONE OF THESE</p>
<p>39.</p> 	 <p>A.      B.      C.      D.      E. NONE OF THESE</p>
<p>40.</p> 	 <p>A.      B.      C.      D.      E. NONE OF THESE</p>