



**ENGINEERING
AT ILLINOIS**

2018 Academic Challenge

ENGINEERING GRAPHICS TEST – STATE

– This Test Consists of 40 Questions –

Engineering Graphics Test Production Team

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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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WYSE – Academic Challenge
Engineering Graphics Test (State) – 2018

1. ASME Y14.3-2012 is entitled **Orthographic and _____ Views**. According to ASME, this standard establishes the requirements for creating orthographic and _____ views on engineering drawing graphic sheets and in models.

A. sectional
B. pictorial
C. auxiliary
D. oblique
E. perspective

2. A bolt circle has a diameter of 3.25", and is the circle of centers for six equally spaced holes. One hole is 7° above horizontal near 3 o'clock. For the hole nearest 12 o'clock, how many degrees is it away from 12 o'clock?

A. 3°
B. 7°
C. 14°
D. 18°
E. 23°

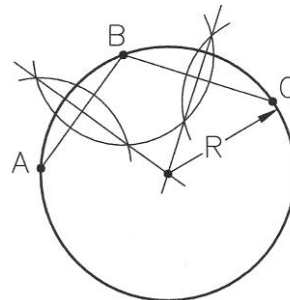
3. In CAD drawings plotted at a reduced scale, lettering is usually calculated to be a precise, readable size on the print. If a factory floor plan drawing has 24" tall labels in the CAD system, what size will the labels be when plotted at a scale of 1" = 20'-0"?

A. 1/16"
B. 3/32"
C. .10"
D. 1/8"
E. .20"

4. Identify the **FALSE** statement about projection systems common to engineering graphics education.

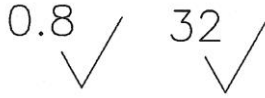
A. Orthographic is a sub-division of parallel projection.
B. Axonometric projection is a sub-division of orthographic projection.
C. Orthographic "projectors" are parallel to each other.
D. Oblique projection is a sub-division of orthographic projection.
E. Orthographic "projectors" are perpendicular to a projection plane.

5. What is being illustrated by the drawing below?



A. Bisect two chords of a circle to find a center point of the circle.
B. Two chords found by bisection will be equal in length to the radius.
C. A pentagon can be constructed one side at a time beginning at 9 o'clock.
D. Two chords larger than the radius of a circle passing through them will create a scalene triangle.
E. An ellipse tangent to AB and BC will need a center point located at the bisector intersection.

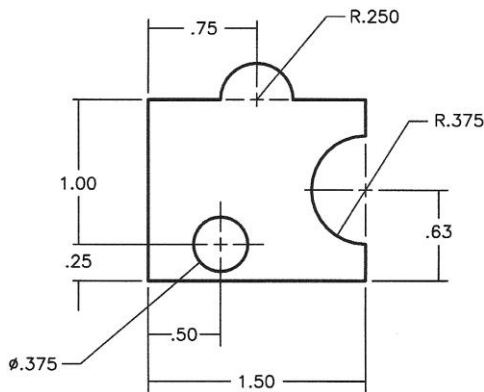
6. As standardized by ASME Y14.36, engineering drawings may contain surface texture symbols that specify the allowable "roughness" of a surface.



As illustrated above, these symbols indicate a surface may be no rougher than .8 micrometers (metric system) or 32 microinches (imperial system), as measured by a profilometer.

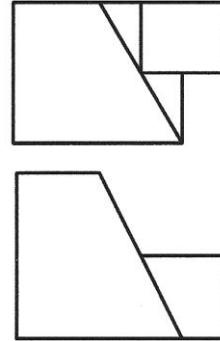
What does the "micro" prefix indicate?

- A. Tenths
 - B. Hundredths
 - C. Thousandths
 - D. Ten-thousandths
 - E. Millionths
7. The geometric shape illustrated below has been dimensioned, but all the arrows are missing! How many arrows need to be added?



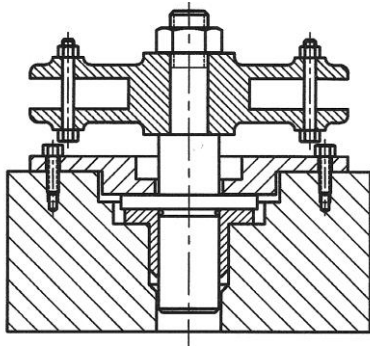
- A. 14
- B. 15
- C. 16
- D. 17
- E. 18

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



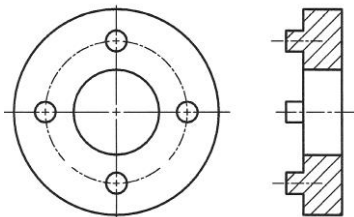
- A. 12
 - B. 14
 - C. 16
 - D. 18
 - E. 20
9. Oblique projection is the basis for a type of pictorial drawing. Identify the **FALSE** statement about oblique projection theory.
- A. Projection lines are parallel with each other
 - B. Projection lines are not perpendicular to the projection plane
 - C. The angle of projection does not always result in a 45° depth axis
 - D. There are no ellipses, because circles are always parallel with the projection plane
 - E. Some surfaces parallel with the projection plane retain their true shape and size

10. Counting nuts and bolts, how many total objects are there in the sectional assembly view?



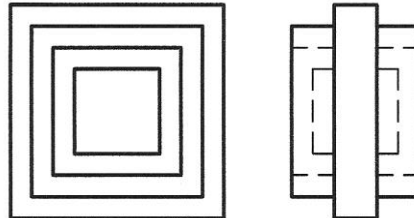
- A. 10
- B. 11
- C. 12
- D. 13
- E. 14

11. Based on standard dimensioning practice, including the cylinder rule, how many dimensions should be placed on the front (F) view, and how many should be placed on the sectional (S) view? (Note: The size of the four pins will only need one dimension.)



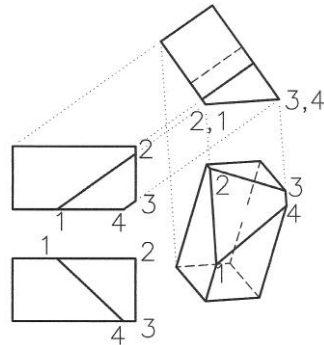
- A. F=1 S=5
- B. F=2 S=4
- C. F=3 S=3
- D. F=4 S=2
- E. F=5 S=1

12. If the right side view of the object illustrated below is converted into a full section view, reflecting a section through the center of the part, how many "bounded areas" will the view have that feature section lines (hatching)?



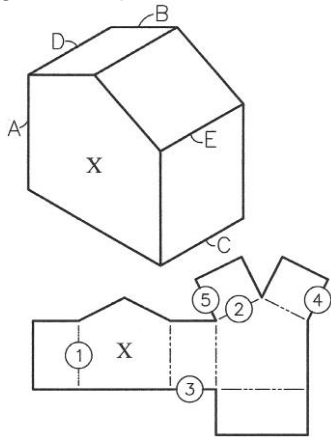
- A. 1
- B. 2
- C. 3
- D. 4
- E. 5

13. The secondary auxiliary view below was constructed to solve for the true size and shape of surface 1-2-3-4. Select the **FALSE** statement:



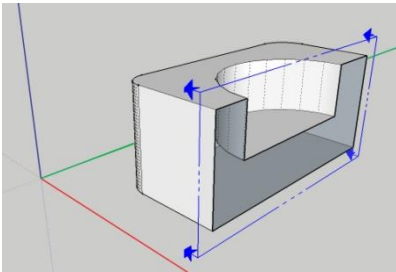
- A. Edge 1-2 is true length in the top view
- B. Edge 3-4 is foreshortened in the front view
- C. Edge 3-4 is a point view in the primary auxiliary view
- D. Edge 1-4 is true length in the front view
- E. Edge 2-3 is true length in the primary auxiliary view

14. Of the five choices below, select the one numbered edge that does not correspond correctly with the lettered edge in the pictorial.



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

15. Identify the **FALSE** statement about the CAD model illustrated below.



- A. The model appears to be a surface model rather than a solid model
- B. There appears to be a cutting plane that shows a "temporary" section of the object
- C. The X-Y-Z axes are shown
- D. The curved surfaces appear to have facets (segments) showing
- E. The drawing environment appears to be *parallel* projection rather than *perspective*

16. What fastener is best associated with the variety of head types illustrated below?



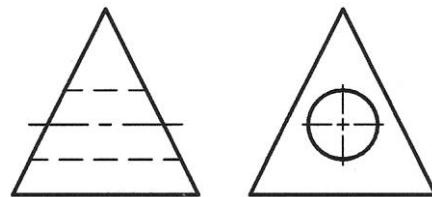
- A. Cotter pins
- B. Set screws
- C. Taper Pins
- D. Rivets
- E. Woodruff keys

17. Identify the thread form illustrated below:



- A. Square
- B. Buttress
- C. Acme
- D. Knuckle
- E. Unified

18. Given the front view and right side view below, identify a **FALSE** statement about the top view.



- A. The perimeter shape is a square
- B. There are six straight visible line segments
- C. There are two hidden line segments
- D. There are two visible circles
- E. There are two lines that cross in an "X" pattern

19. Which of the following manufacturing processes is "out-of-place" with the category in which the other four would be placed?

- A. Welding
- B. Soldering
- C. Grinding
- D. Adhesive bonding
- E. Brazing

20. Structural steel is a specialized field of engineering graphics. Fill the blank:

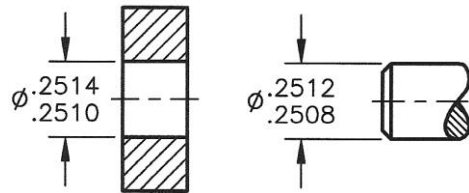
According to Wikipedia™, "The _____ prepares detailed plans, drawings and other documents for the manufacture and erection of steel members (columns, beams, braces, trusses, stairs, handrails, joists, metal decking, etc.) used in the construction of buildings, bridges, industrial plants, and non-building structures."

- A. detailer
- B. planner
- C. technician
- D. programmer
- E. printer

21. With respect to CAD commands, procedures, and/or techniques, and given the words *endpoint*, *midpoint*, *intersection*, *tangent*, *perpendicular*, and *quadrant* - what best describes a category these words represent?

- A. Solid modeling constraints
- B. "Object snap" options
- C. Circle creation commands
- D. Trimming and extending functions
- E. Dimensioning variables

22. With respect to the mating parts and toleranced dimensions illustrated below, identify the **FALSE** statement.

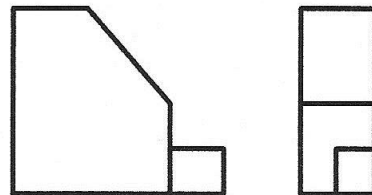


- A. The allowance is $-.0002$ "
- B. The MMC of the hole is $.2510$ "
- C. The "loosest fit" is $.0006$ "
- D. The MMC of the shaft is $.2512$ "
- E. This is classified as a clearance fit

23. Select the term that best describes why engineering drawings have dimensions with tolerances.

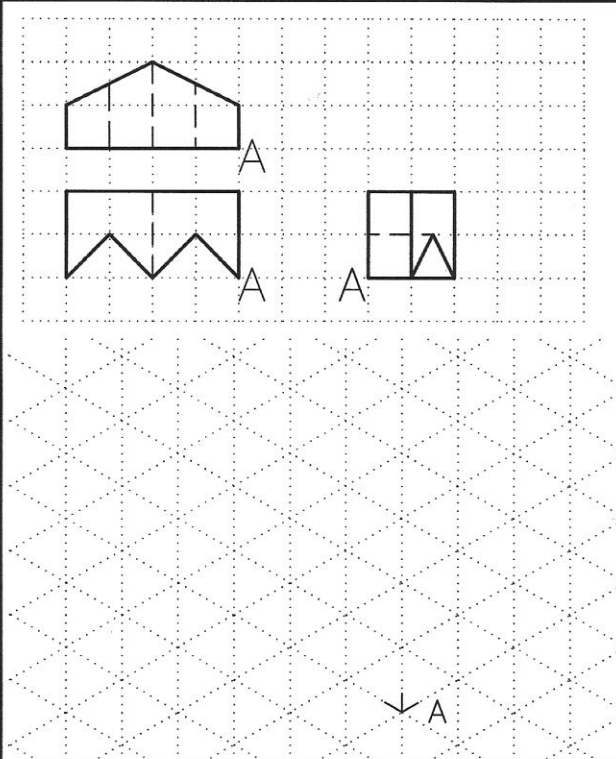
- A. Injection molding
- B. Additive manufacturing
- C. Custom fitting
- D. Interchangeable manufacturing
- E. Rapid prototyping

24. How many dimensions will be required, at minimum, to completely define the object illustrated below?

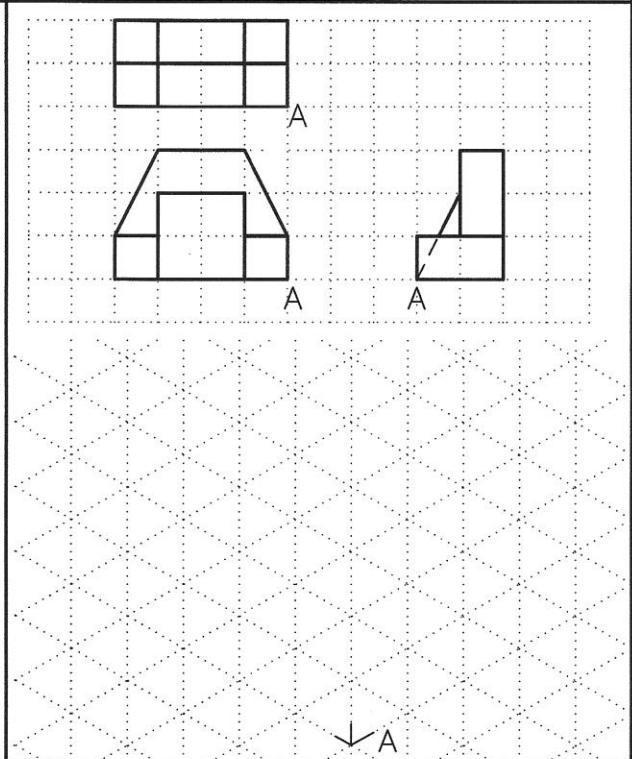


- A. 6
- B. 7
- C. 8
- D. 9
- E. 10

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

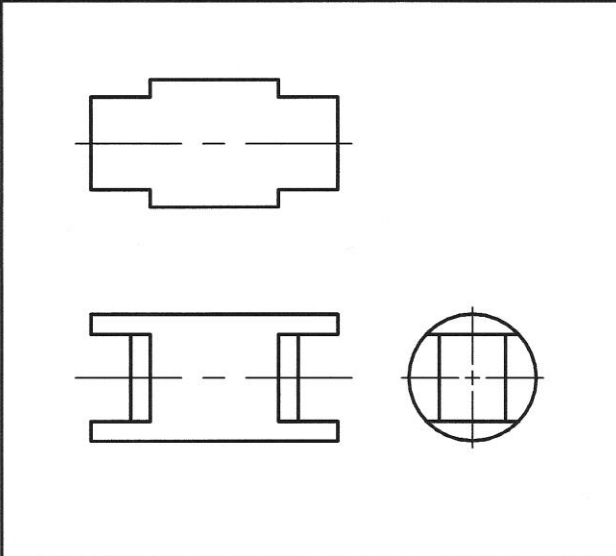


25. NUMBER OF LINE SEGMENTS:
A. 12 B. 13 C. 14 D. 15 E. 16

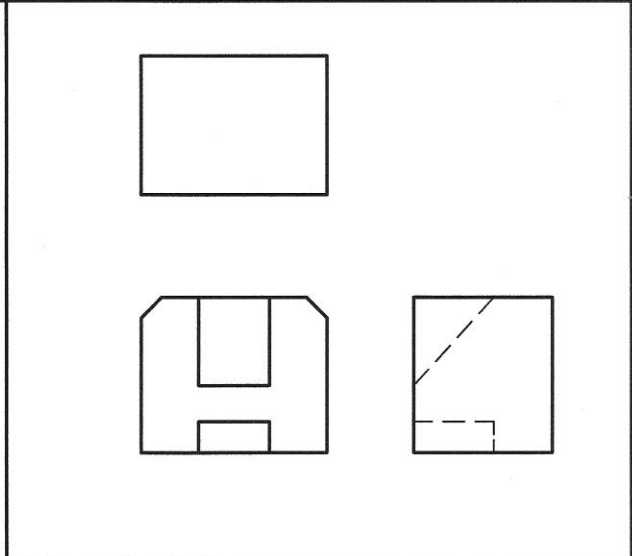


26. NUMBER OF LINE SEGMENTS:
A. 23 B. 24 C. 25 D. 26 E. 27

**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**

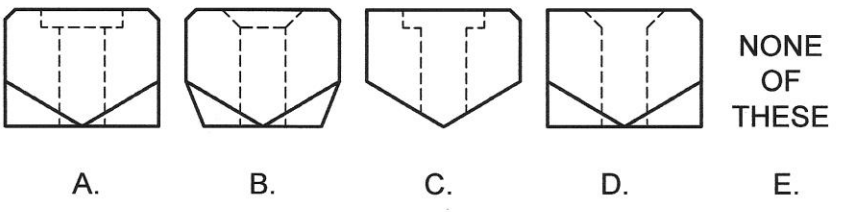
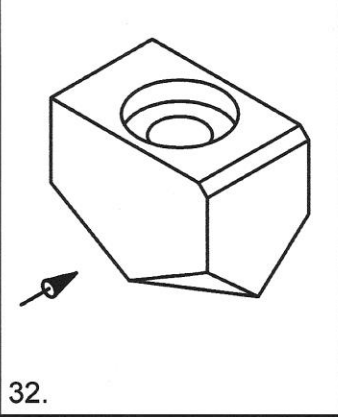
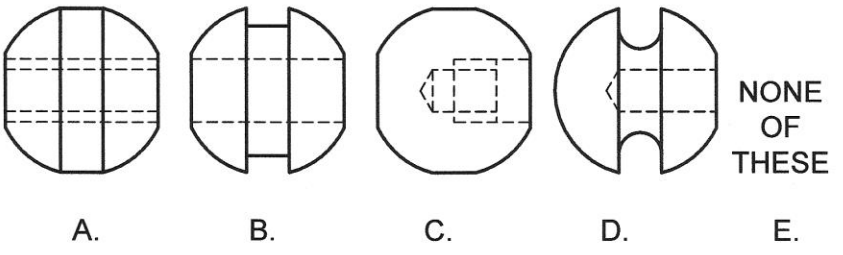
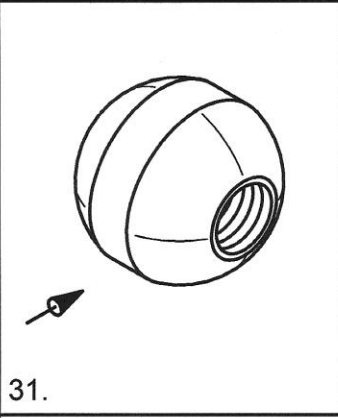
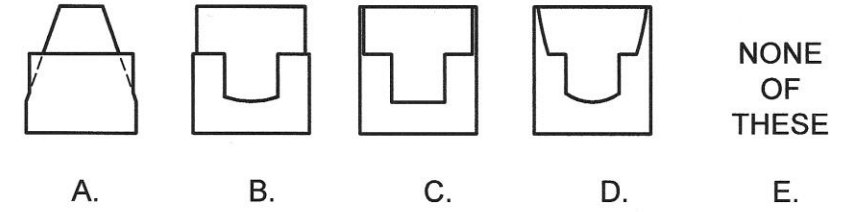
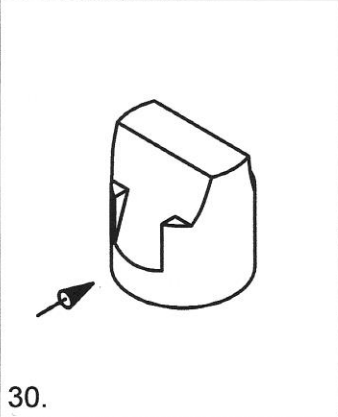
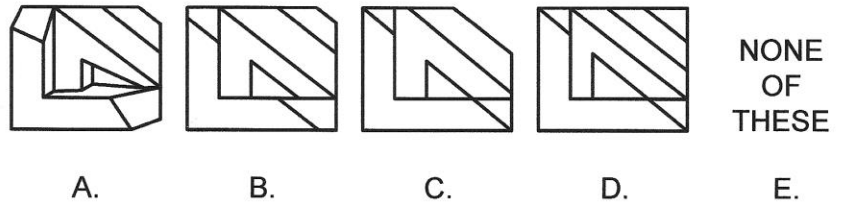
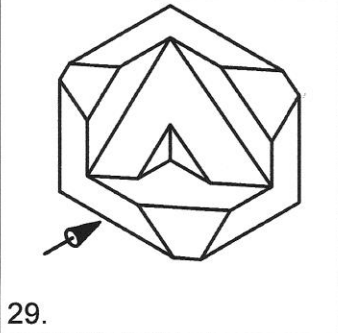


27. MINIMUM NUMBER OF LINES:
A. 4 B. 5 C. 7 D. 8 E. 10

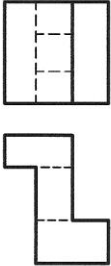
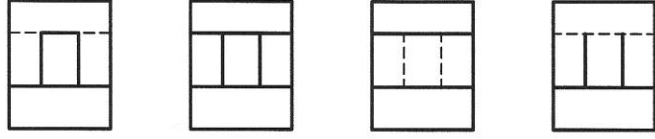
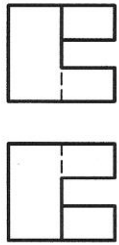
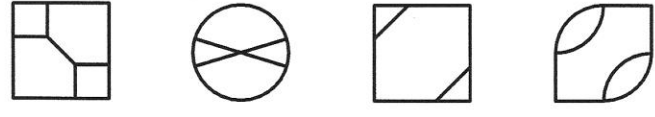
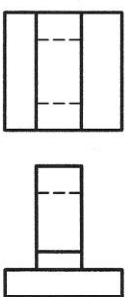
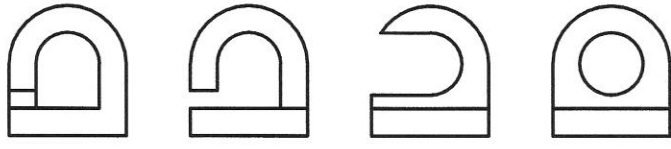
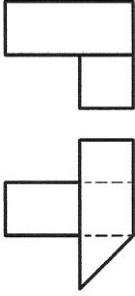
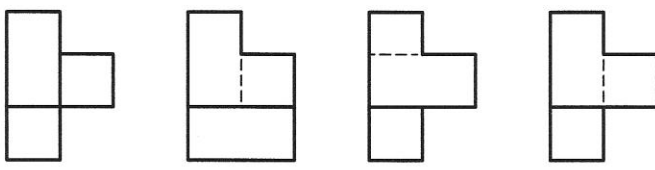


28. MINIMUM NUMBER OF LINES:
A. 4 B. 5 C. 6 D. 7 E. 8

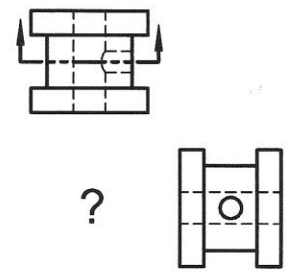
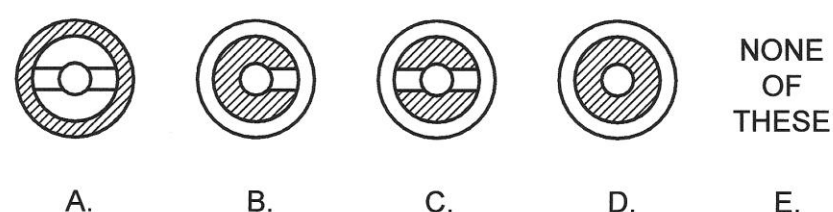
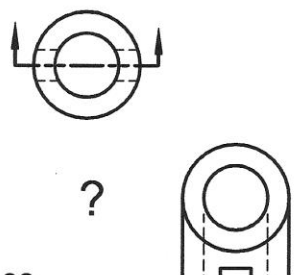
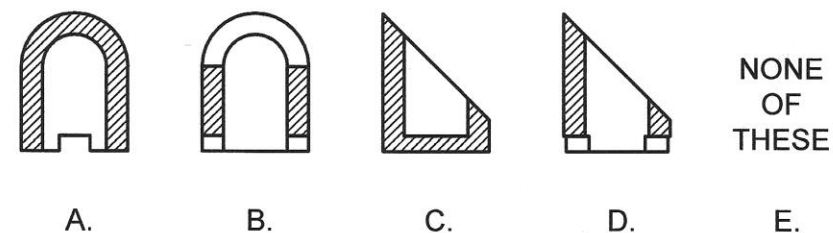
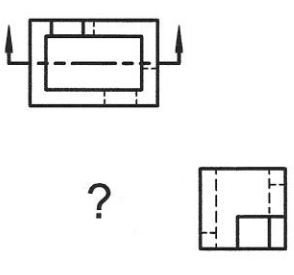
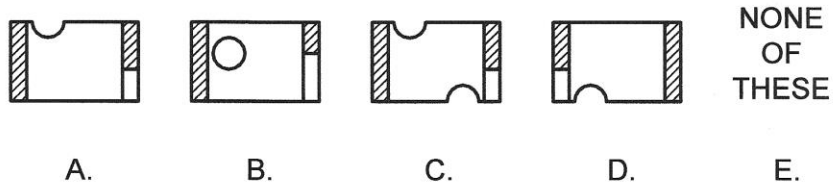
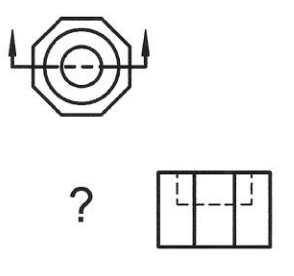
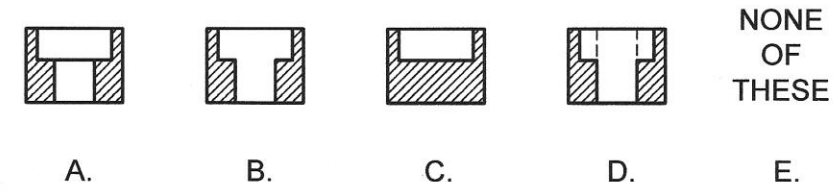
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 NOTE: CENTER LINES OMITTED ON THIS TEST



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.</p>
<p>38.</p> 	 <p>A. B. C. D. E.</p>
<p>39.</p> 	 <p>A. B. C. D. E.</p>
<p>40.</p> 	 <p>A. B. C. D. E.</p>