



2016 Academic Challenge

ENGINEERING GRAPHICS TEST – SECTIONAL

– This Test Consists of 40 Questions –

Engineering Graphics Test Production Team

Ryan K. Brown, Illinois State University – Author/Team Leader

Mark Laingen, Illinois State University – Reviewer

Sahid L. Rosado Lausell, 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. 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!

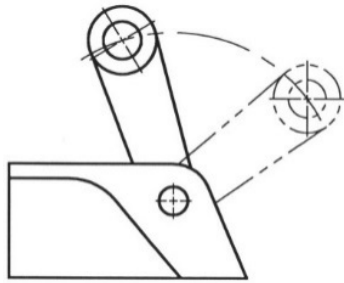
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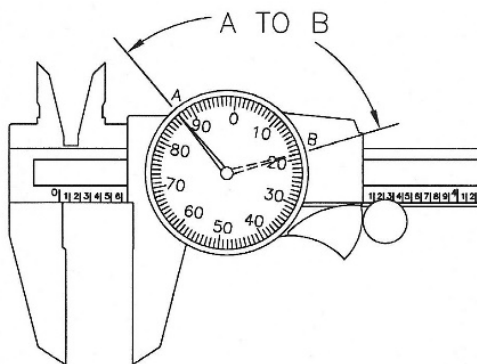
WYSE – Academic Challenge
Engineering Graphics Test (Sectional) – 2016

1. What type of line is used to represent the possible position of the swing arm, approximately 60° clockwise of the visible line shape of the swing arm?



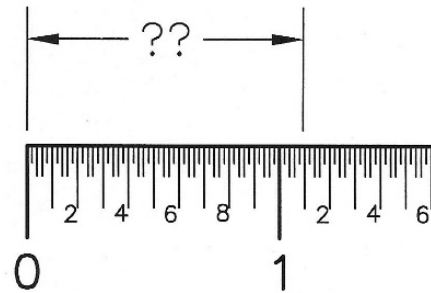
- A. Stitch
- B. Short break
- C. Center
- D. Hidden
- E. Phantom

2. If the dial calipers below were used to measure inside and outside of a tube, and the needle movement increased from reading A to reading B, what is the **wall thickness** of the tube in inches?



- A. .010"
- B. .016"
- C. .020"
- D. .026"
- E. .032"

3. What is the closest fractional equivalent to the measurement shown in the illustration below?



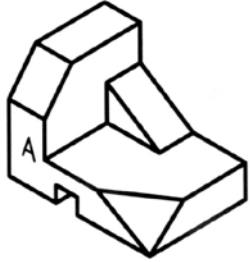
- A. 1-3/8"
- B. 1-3/16"
- C. 1-3/32"
- D. 1-3/64"
- E. 1-3/128"

4. What engineering design application has a "rule" illustrated by the right hand illustration below?



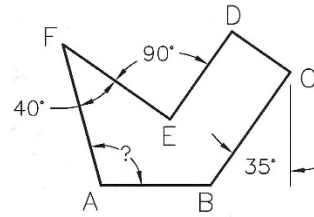
- A. Screw thread handedness
- B. Direction for runout control check
- C. Helical axis direction for torsion spring
- D. 3D CAD modeling - rotation about an axis
- E. Worm gear rotation direction

5. Given normal surface "A" parallel with a frontal plane, how many normal surfaces of this object (counting ALL surfaces) are parallel with a horizontal projection plane above?

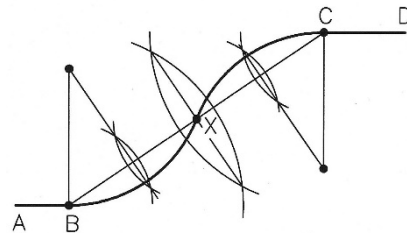


- A. 2
 B. 3
 C. 4
 D. 5
 E. 6
6. To what aspect of engineering graphics is the term **unidirectional** most likely applied?
- A. Acme threads
 B. Dimensional values
 C. Limit method tolerances
 D. Surface texture symbols
 E. Welding joints
7. For plastic parts, and other parts that are molded, the engineering drawing may show or describe the amount of _____ to be applied to some surfaces so the part will come out of the mold more easily.
- A. parallelism
 B. lay
 C. draft
 D. waviness
 E. flatness

8. Given the geometric shape, with CD perpendicular to BC, and DE parallel with BC, identify the number of degrees for angle F-A-B.

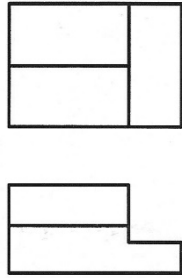


- A. 60°
 B. 75°
 C. 95°
 D. 100°
 E. 105°
9. This ogee curve was constructed with the help of three _____.



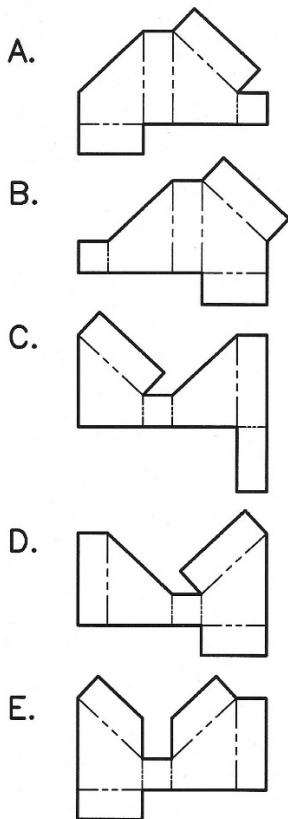
- A. tangent arcs
 B. chord lines
 C. 45° lines
 D. perpendicular bisectors
 E. 60° lines
10. If a shaft has a limit dimension value of .725"-.733", and the hole with which it mates has a limit dimension value of .736"-.747", what is the **allowance**?
- A. .003"
 B. .011"
 C. .012"
 D. .014"
 E. .022"

11. Given the following front and top views, how many different objects could there be, each having a different right side view?



- A. 1
- B. 2
- C. 3
- D. 4
- E. More than 4

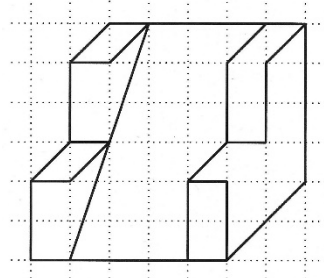
12. Which of these developments, each for the same object, has an error?



13. Consider the six principal views, each of which exhibit width, height, and/or depth. Height is exhibited in ___ views, width is exhibited in ___ views, while depth is exhibited in ___ views.

- A. 4-4-4
- B. 4-2-4
- C. 2-4-4
- D. 4-4-2
- E. 2-2-2

14. The oblique pictorial illustration below illustrates an object with one inclined surface. At minimum, how many line segments are missing?

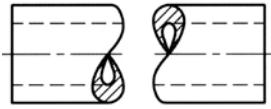


- A. 4
- B. 5
- C. 6
- D. 7
- E. 8

15. For creating a part with a **3D Printer**, the CAD system may need to generate an STL file, a common file format for additive manufacturing programs. Which of the following was the name of an early rapid prototyping technology that led to the STL acronym?

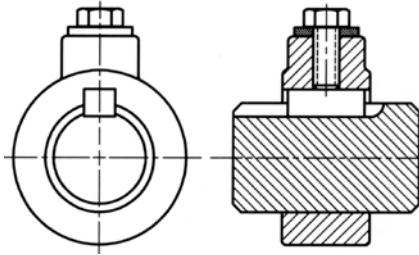
- A. SequenTial Liquid technology
- B. STereoLithography
- C. Solid Thermo-Laminating
- D. SelecTive Laser sintering
- E. Systematic Thin Layer

16. Identify the conventional practice illustrated below.



- A. Revolved section of a tube
- B. S-break of a tube
- C. Simplified section of a threaded hole
- D. Removed section of a cylinder
- E. S-break of a cylinder

17. How many total parts are shown in the sectioned assembly drawing below?

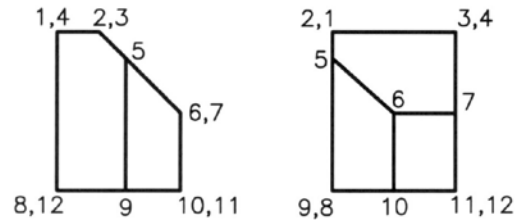


- A. 4
- B. 5
- C. 6
- D. 7
- E. 8

18. Imagine, or sketch, a three-view (front, top, right side) drawing of a 2" diameter sphere with a 1" diameter hole through it from front to back. The final drawing will have _____ circles, _____ arcs, and _____ straight line segments, some or all of which are hidden lines.

- A. 4-4-6
- B. 4-0-4
- C. 2-4-8
- D. 2-6-6
- E. 2-2-8

19. For the object illustrated below, choose a TRUE statement with respect to the **true size and shape** of inclined surface 5-6-10-9.

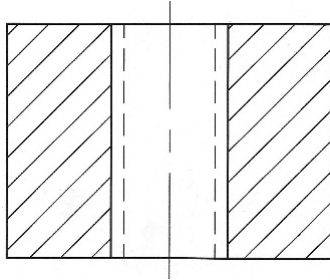


- A. It could be found in a primary auxiliary view projected from the right side view
- B. It could be found in a primary auxiliary view projected from the front view
- C. It could be found in a primary auxiliary view projected from a top view where 5-6-10-9 is shown as a line
- D. It could be found in a secondary auxiliary view projected from a primary auxiliary view that shows the true size and shape of surface 2-5-6-7-3
- E. An auxiliary view to show the true size and shape would not be necessary if a top view were present

20. What effect will **increasing** the amount of tolerance for several dimensions of a part have on the production of that part, if any?

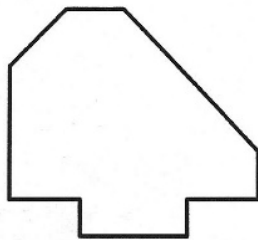
- A. No effect should be expected
- B. An increase in the production costs is likely
- C. More expensive cutting tools may be required
- D. A decrease in the production costs may occur
- E. The inspection process is likely to be more complicated

21. For this full section view of an object cutting through a threaded hole represented in the simplified method, what is NOT expressed in standard fashion?



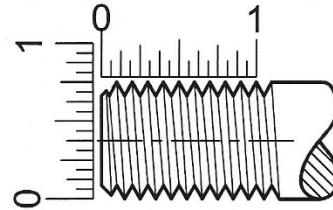
- A. There should be thick ROOT lines and thin CREST lines shown
- B. The hatching pattern on the left should not be at the same angle as the pattern on the right
- C. The thread form should be shown
- D. The threaded hole should be countersunk 30° on each end
- E. The minor diameter should be visible lines while the major diameter should be hidden lines within the hatching

22. How many dimensions are needed to fully describe (constrain) this geometry?



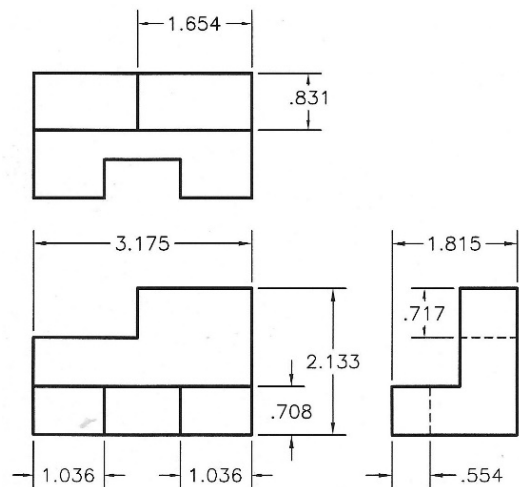
- A. 5
- B. 6
- C. 7
- D. 8
- E. 9

23. What is the **pitch** of the external thread illustrated below?



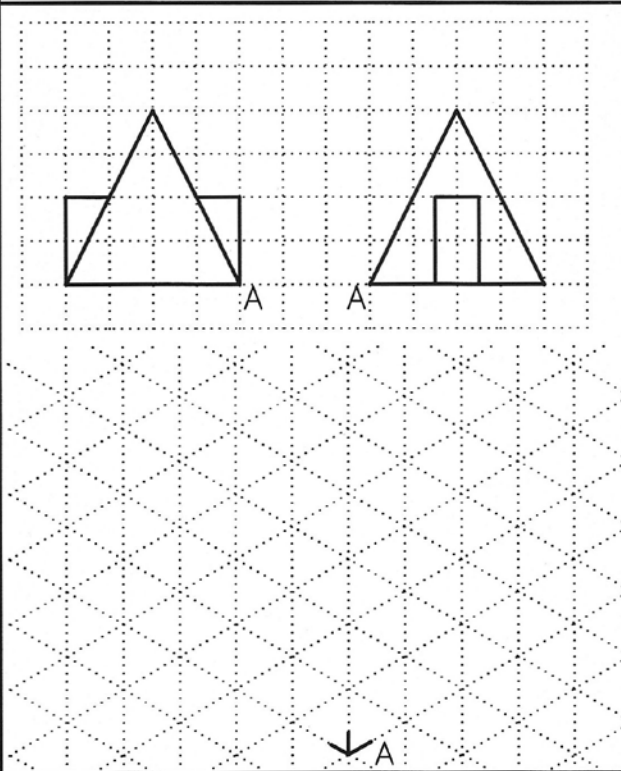
- A. .10"
- B. .25"
- C. .30"
- D. .50"
- E. .75"

24. In dimensioning, the "contour rule" means placing the dimension in the view where the shape or profile of the feature is best seen. In the illustration, how many dimensions, if any, break the contour rule?

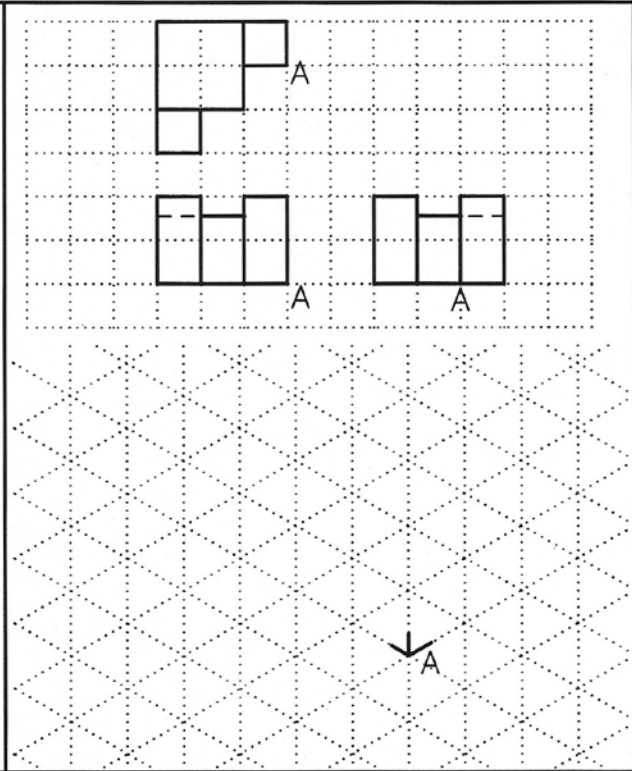


- A. 4
- B. 5
- C. 6
- D. 7
- E. 8

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

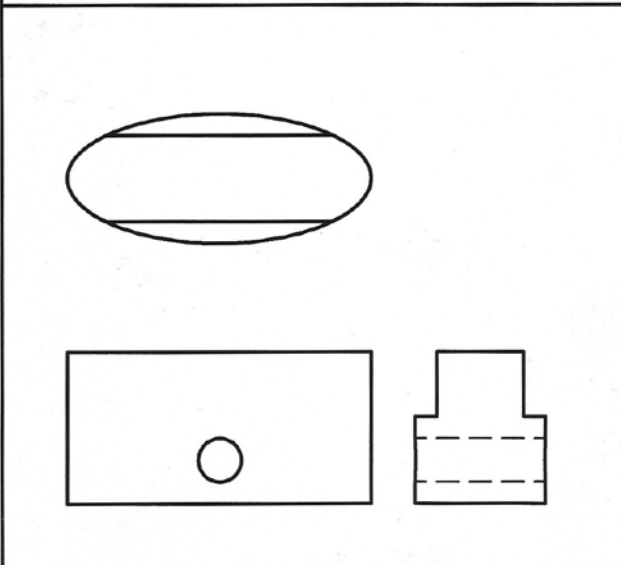


25. NUMBER OF LINE SEGMENTS:
A. 12 B. 13 C. 14 D. 15 E. 16

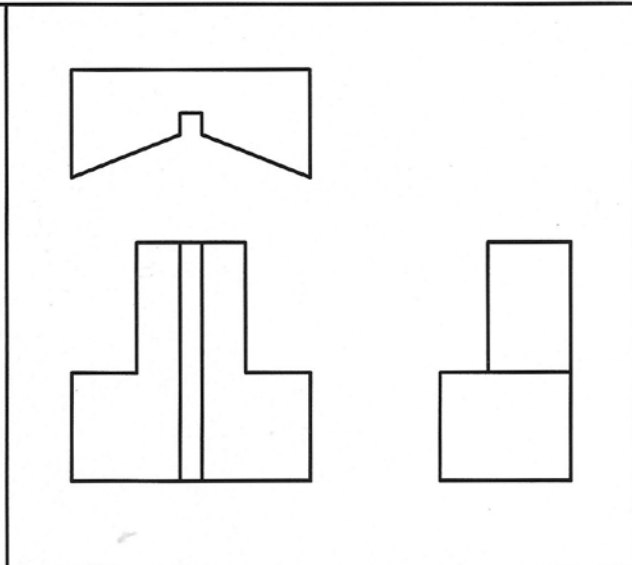


26. NUMBER OF LINE SEGMENTS:
A. 21 B. 23 C. 25 D. 27 E. 29

**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**

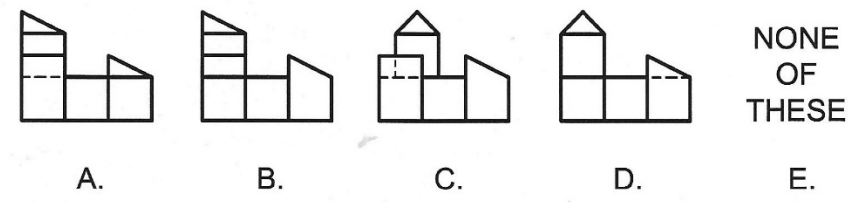
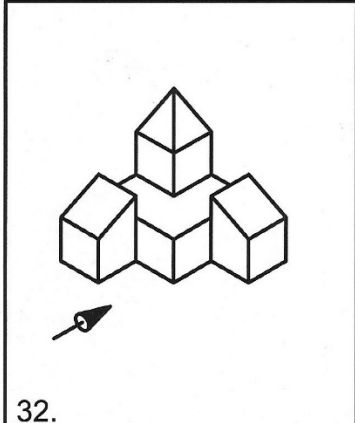
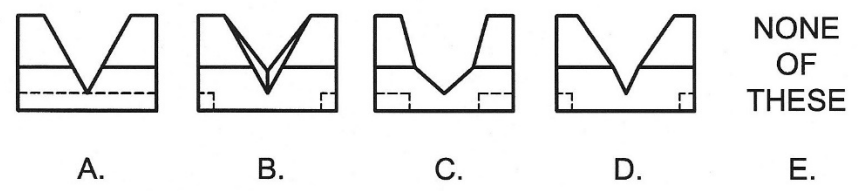
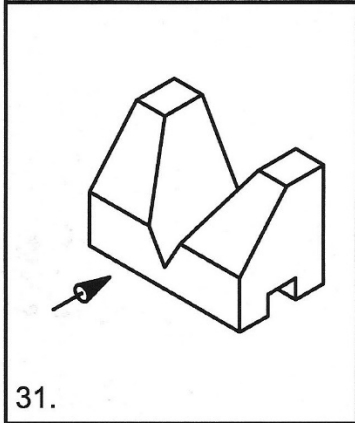
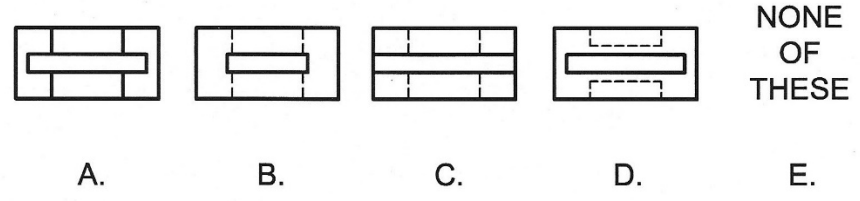
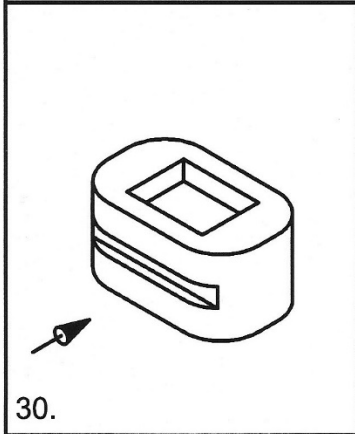
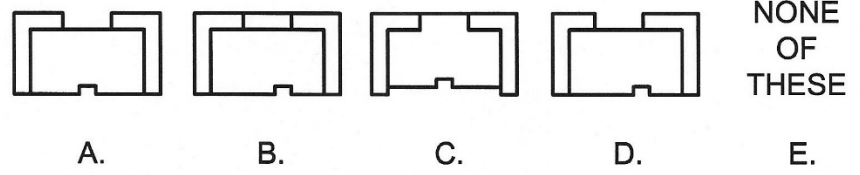
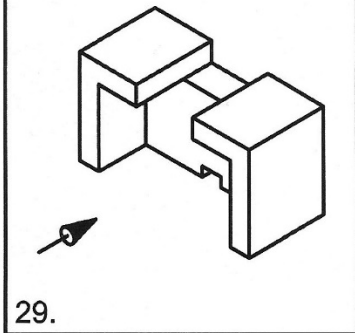


27. MINIMUM NUMBER OF LINES:
A. 3 B. 4 C. 5 D. 6 E. 7

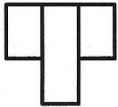
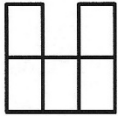


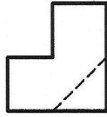
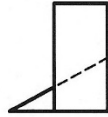
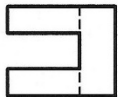

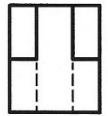
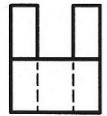
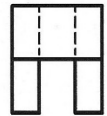
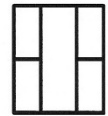
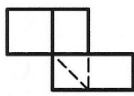
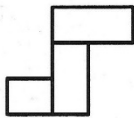
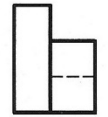
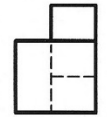
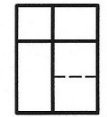
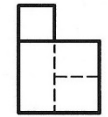
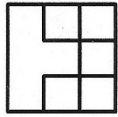
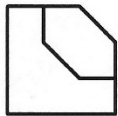
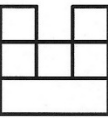
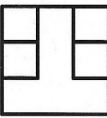

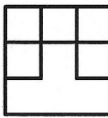


28. MINIMUM NUMBER OF LINES:
A. 3 B. 4 C. 5 D. 6 E. 7

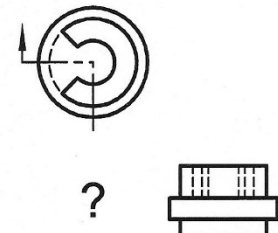
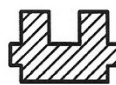



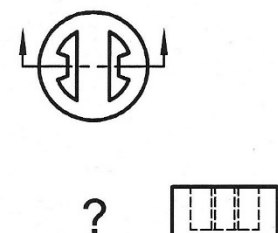

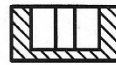


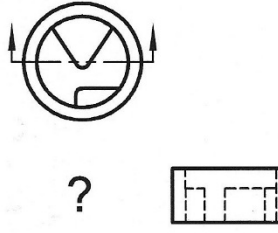


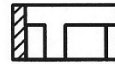
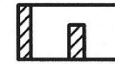
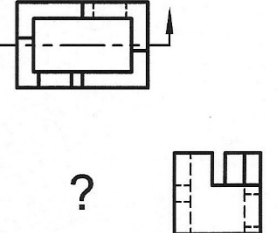

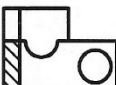


FOR EACH PROBLEM ON THIS PAGE, SELECT A FRONT VIEW
 NOTE: CENTER LINES OMITTED ON THIS TEST



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

<p>33.</p>   <p>?</p>	    <p>NONE OF THESE</p> <p>A. B. C. D. E.</p>
<p>34.</p>   <p>?</p>	    <p>NONE OF THESE</p> <p>A. B. C. D. E.</p>
<p>35.</p>   <p>?</p>	    <p>NONE OF THESE</p> <p>A. B. C. D. E.</p>
<p>36.</p>   <p>?</p>	    <p>NONE OF THESE</p> <p>A. B. C. D. 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.</p>  <p>B.</p>  <p>C.</p>  <p>D.</p> <p>NONE OF THESE</p> <p>E.</p>
<p>38.</p> 	 <p>A.</p>  <p>B.</p>  <p>C.</p>  <p>D.</p> <p>NONE OF THESE</p> <p>E.</p>
<p>39.</p> 	 <p>A.</p>  <p>B.</p>  <p>C.</p>  <p>D.</p> <p>NONE OF THESE</p> <p>E.</p>
<p>40.</p> 	 <p>A.</p>  <p>B.</p>  <p>C.</p>  <p>D.</p> <p>NONE OF THESE</p> <p>E.</p>