



**ENGINEERING  
AT ILLINOIS**

## 2018 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!**

©2018 Worldwide Youth in Science and Engineering

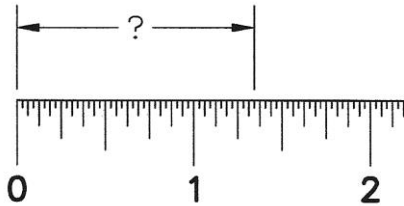
“WYSE”, “Worldwide Youth in Science and Engineering” and the “WYSE Design” are service marks of and this work is Copyright ©2018 by the Board of Trustees of the University of Illinois at Urbana – Champaign.  
All rights reserved



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

1. In the area of engineering drawings and prints, which of the following paper sizes is considered "D" size?
- A. 36" x 48"
  - B. 24" x 36"
  - C. 17" x 22"
  - D. 22" x 34"
  - E. 34" x 44"

2. What measurement is shown on the illustration below?



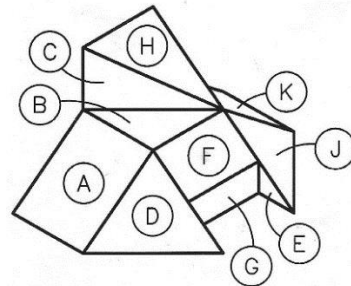
- A. 1-5/16"
  - B. 1-5/16"
  - C. 1-3/8"
  - D. 1-11/32"
  - E. 1-3/8"
3. If given a factory floor plan drawing plotted on paper at 1" = 30'-0", which of the following scales would you use to extract measurements?
- A. Mechanical engineer's scale
  - B. Architect's scale
  - C. Civil engineer's scale
  - D. Industrial metric scale
  - E. Landscape architect's scale

4. According to Wikipedia™, in the field of CAD, "the term \_\_\_\_\_ more frequently refers to a piecewise polynomial curve. The term \_\_\_\_\_ comes from the flexible \_\_\_\_\_ devices used by shipbuilders and draftsmen to draw smooth shapes."

Identify one word that fills in all three blanks.

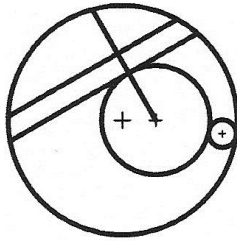
- A. freeform
- B. coaxial
- C. tangent
- D. chord
- E. spline

5. In engineering graphics textbooks, flat surfaces are often identified as **normal**, **inclined**, or **oblique**. Identify the set of surface labels below wherein all three are the **SAME** type.

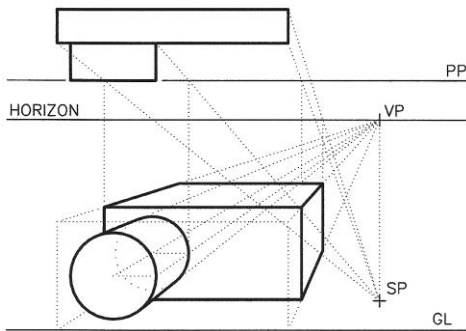


- A. A, C, and G
- B. A, F, and H
- C. C, D, and F
- D. B, E, and J
- E. D, G, and K

6. Which of the following terms is NOT featured in the illustration below?

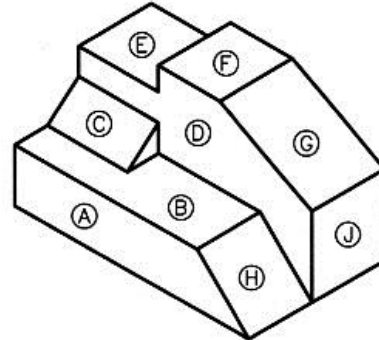


- A. Eccentricity
  - B. Parallelism
  - C. Tangency
  - D. Perpendicularity
  - E. Concentricity
7. The one-point perspective below was constructed with 2D drafting equipment. Identify the **FALSE** statement about this type of pictorial drawing.

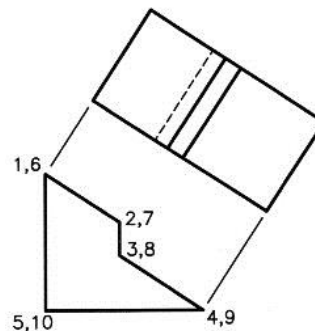


- A. The point marked station point is part of the front view.
- B. The cylinder is touching the picture plane.
- C. The vanishing point is on the horizon line, which is technically an "eye level line."
- D. The depth dimensions are all determined by projecting down lines that are intersecting the picture plane.
- E. The horizon line could have been raised or lowered for desired effect.

8. For the object illustrated below, identify the **FALSE** statement with respect to how the identified surfaces appear in the **TOP** view?



- A. Surface D is just a line
  - B. Surface J is foreshortened
  - C. Surface C is foreshortened
  - D. Surface B is true size and shape
  - E. Surface G is foreshortened
9. The edges of the object below can be identified by their endpoint numerals. For example, EDGE 1-6 is a "point view" in the front view, whereas EDGE 1-5 is shown "true length" in the front view. From the given answer list, identify an edge that is **NOT** true length in the auxiliary view.



- A. EDGE 1-2
- B. EDGE 3-4
- C. EDGE 6-7
- D. EDGE 7-8
- E. EDGE 8-9

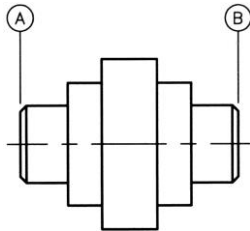
10. In dimensioning there are symbols for many words. Which of the following **words** is simply expressed with an alphabetic character?

- A. square
- B. diameter
- C. spherical
- D. counterbore
- E. deep

11. With respect to the field of CAD, there are additional acronyms that are closely related to CAD, such as CAM and CAE. What does the "E" stand for in CAE?

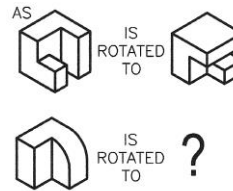
- A. Engineering
- B. Enterprise
- C. Extrusion
- D. Elements
- E. Envelope

12. If there are five chain dimensions between A and B, each with a +/- .005" tolerance specified, what is the **total** tolerance for the overall distance between A & B?



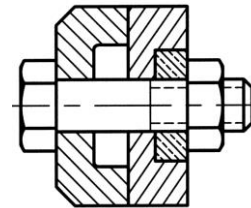
- A. .005"
- B. .010"
- C. .025"
- D. .040"
- E. .050"

13. The following is similar to a test item from the **Purdue Visualization of Rotations** test:



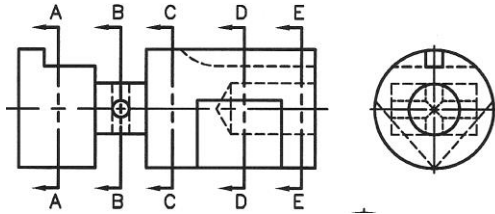
- A.
- B.
- C.
- D.
- E.

14. Identify the **TRUE** statement about the sectional assembly view below.



- A. The square head bolt is only sectioned below the head.
- B. The bolt and nut are not shown as cut by the cutting plane.
- C. The nut is not shown.
- D. The section lines of one part are shown with some dashes, indicating a cast iron material.
- E. The white space on each side of the central bolt indicates a rubber washer.

15. Which of the removed sections would simply be a circle filled with section lines?

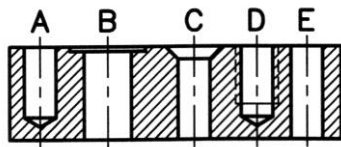


- A. A
- B. B
- C. C
- D. D
- E. E

16. **AutoCAD™** software features three commands very useful when creating basic solid models. Each one has a keyboard shortcut: **IN**, **SU**, and **UNI**. Even without knowing this software, these three commands most logically fall into the category of \_\_\_\_\_

- A. Boolean operators
- B. tolerance stackup
- C. sheet metal
- D. profile constraints
- E. rapid prototyping

17. Study the illustration below, and then identify the improper identification.

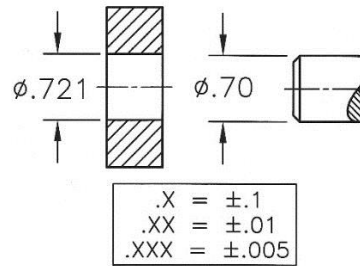


- A. Blind hole
- B. Spotface
- C. Counterbore
- D. Blind tapped hole
- E. Through hole

18. What is the **pitch** for a #6-32 UNC-2B thread?

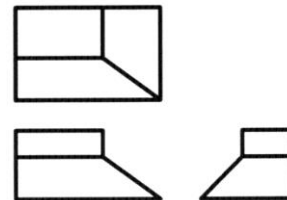
- A. 1/6"
- B. 3/16"
- C. 1/32"
- D. 1/2"
- E. 3/32"

19. What is the **allowance** for the mating parts illustrated below?



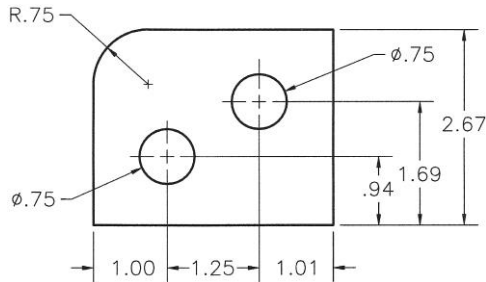
- A. .006
- B. .011
- C. .016
- D. .021
- E. .026

20. Counting all surfaces, even the bottom and back, how many surfaces does this object have?



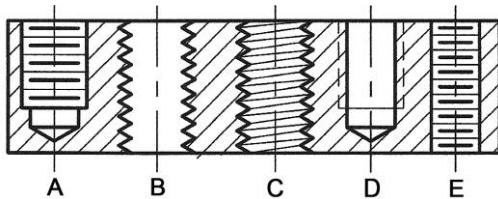
- A. 5
- B. 6
- C. 7
- D. 8
- E. 9

21. With respect to dimensioning, study the illustration below and select the **TRUE** statement.



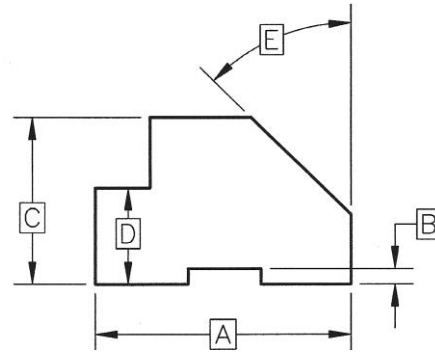
- A. There should always be a total width dimension, so one of the three sub-dimensions needs to be replaced with an overall dimension.
- B. The two holes could have one leader dimension with a "2X" indicating "two places," and omit the other leader.
- C. The rounded corner needs location dimensions.
- D. The height dimension should be on the left side.
- E. The holes should be given as radii, and not diameter.

22. In the illustration below, which threaded hole is properly shown in the **simplified** method?



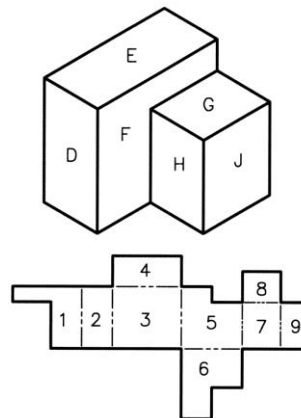
- A. A
- B. B
- C. C
- D. D
- E. E

23. In the illustration below, which of the dimensions identified below is the **poorest** location?



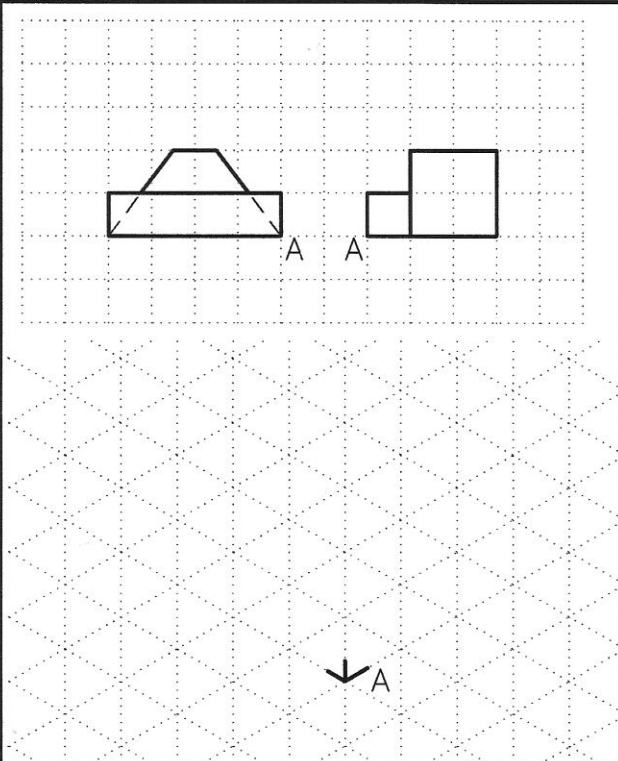
- A. A
- B. B
- C. C
- D. D
- E. E

24. Of the five choices below, select the one surface number that does not have a corresponding letter shown on the pictorial.

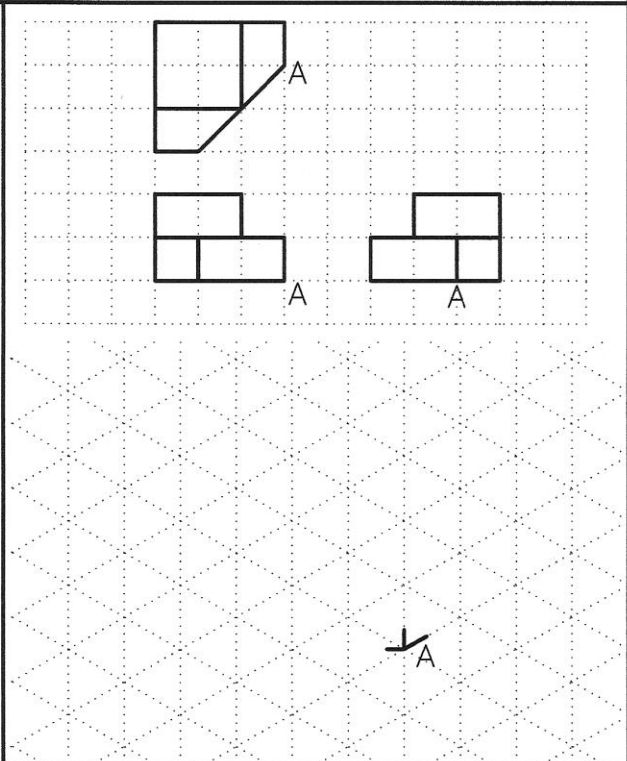


- A. 1
- B. 2
- C. 3
- D. 7
- E. 8

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

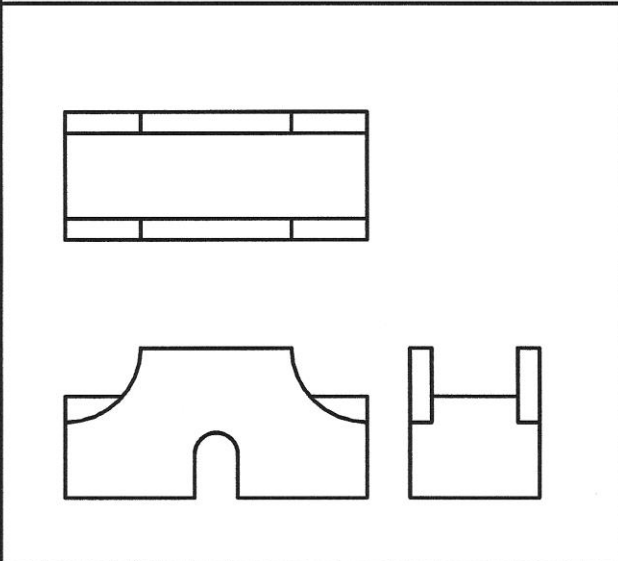


25. NUMBER OF LINE SEGMENTS:  
A. 15 B. 16 C. 17 D. 18 E. 19

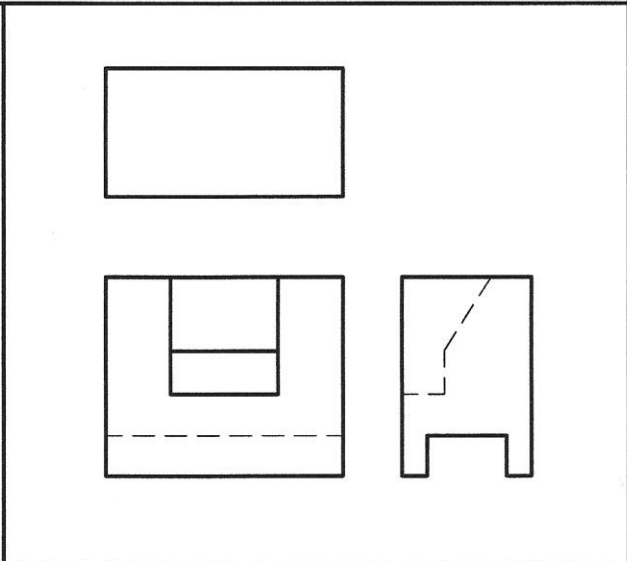


26. NUMBER OF LINE SEGMENTS:  
A. 17 B. 18 C. 19 D. 20 E. 21

**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**



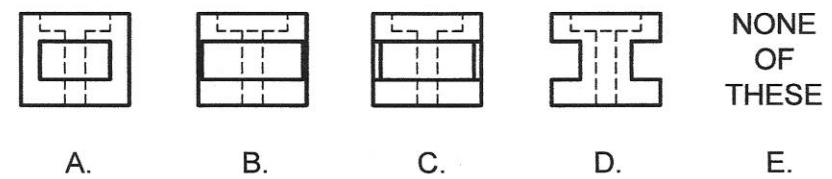
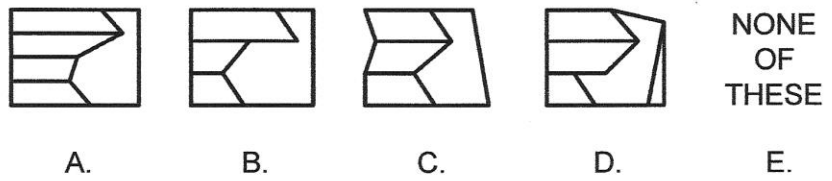
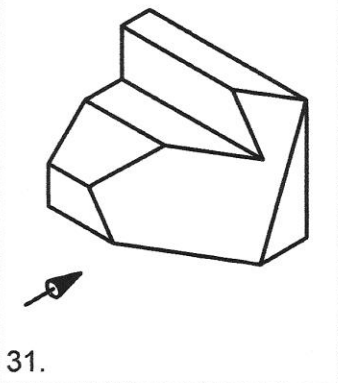
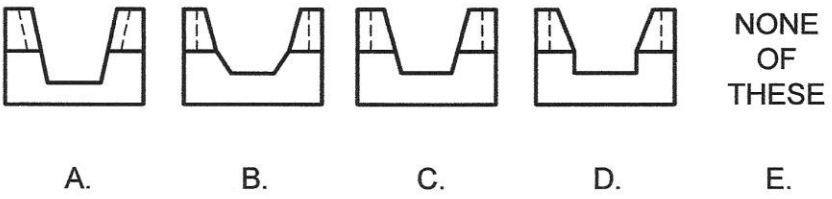
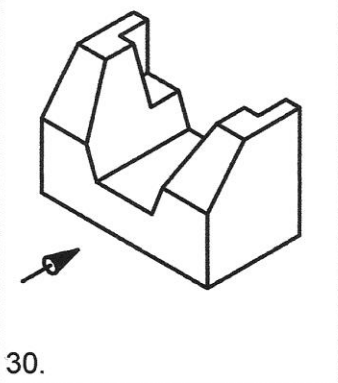
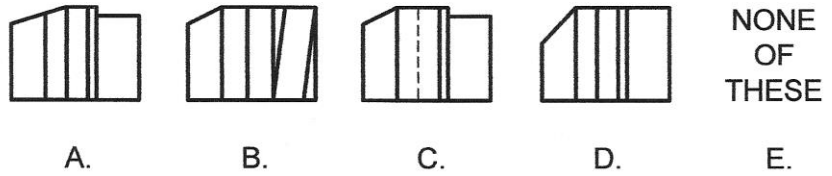
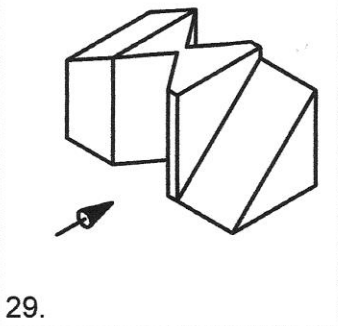
27. MINIMUM NUMBER OF LINES:  
A. 4 B. 5 C. 6 D. 7 E. 8




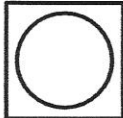
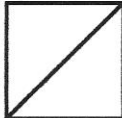








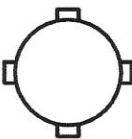
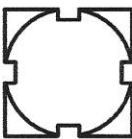
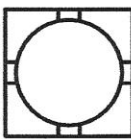
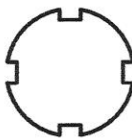


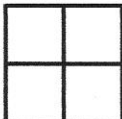
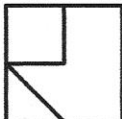
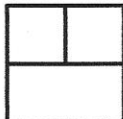
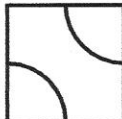


28. MINIMUM NUMBER OF LINES:  
A. 4 B. 5 C. 6 D. 7 E. 8

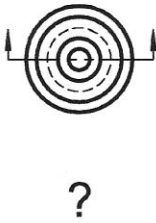
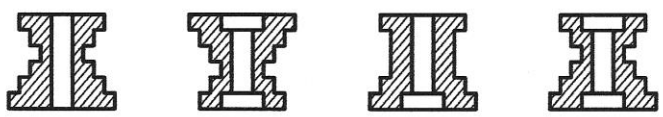
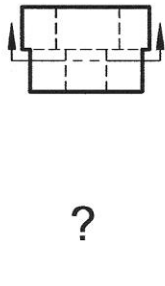
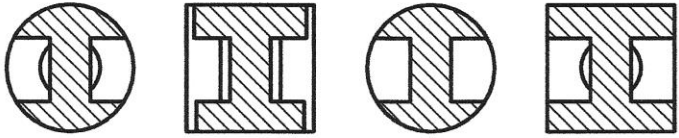
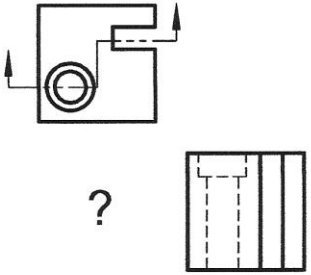
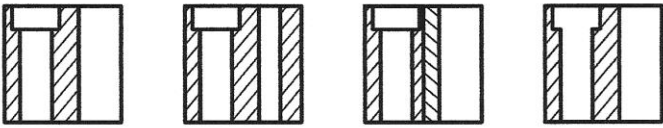
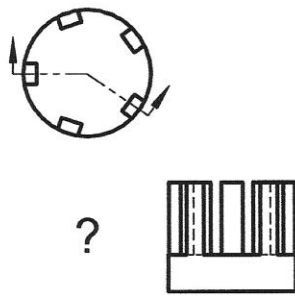
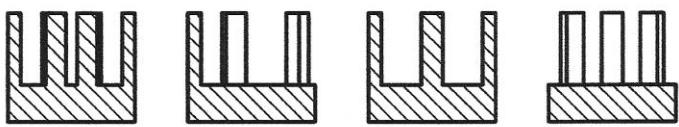


FOR EACH PROBLEM ON THIS PAGE, SELECT A FRONT VIEW  
 NOTE: CENTER LINES OMITTED ON THIS TEST



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