



2015 Academic Challenge

ENGINEERING GRAPHICS TEST – STATE

This Test Consists of 40 Questions

Engineering Graphics Test Production Team

Ryan Brown, Illinois State University – Author/Team Leader

Mark Laingen, Illinois State University – Reviewer

Kathryn Torrey, 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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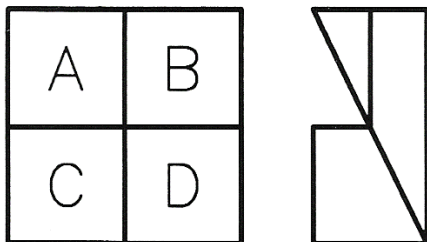
WYSE - Academic Challenge
 Engineering Graphics (State Finals) - 2015

1. At Wikipedia™, in the **Overview** section for **Engineering Drawing**, the following sentence is used:

“In fact, engineering drawing has evolved into a _____ that is more precise and unambiguous than natural _____s; in this sense it is closer to a programming _____ in its communication ability.”

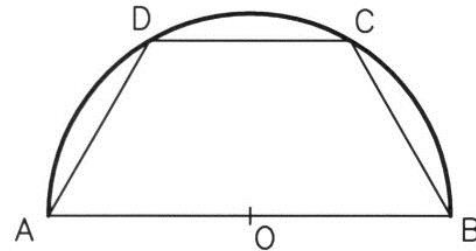
Select the one word that describes engineering drawings and best fills in the quote above:

- A. drawing
 - B. model
 - C. style
 - D. language
 - E. shape
2. With respect to a viewer in front of the object, looking at the front view (the one with labels), which of the following statements is TRUE?

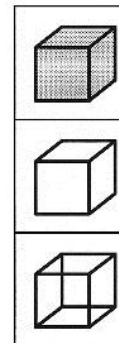


- A. B & C are inclined to the viewer
- B. A & D are inclined to the viewer
- C. B is closer to the viewer than C
- D. D is closer to the viewer than A
- E. All of A is further away than all of C

3. A semi-circular arc shown below has a radius of 2.5". A series of three equal chords connect with points C & D on the arc. What is the sum distance A to D to C to B?

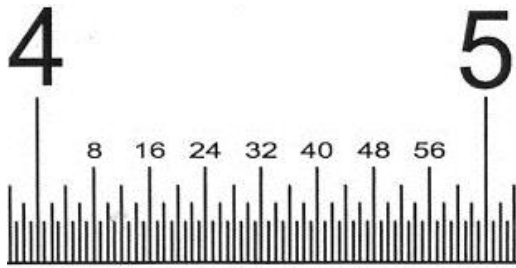


- A. 5.5"
 - B. 6.0"
 - C. 6.5"
 - D. 7.0"
 - E. 7.5"
4. The illustration below shows a three-icon cascading menu in a 3D CAD viewer program. What does the bottom icon represent?



- A. Wireframe viewing mode
- B. Isometric viewing mode
- C. Hidden edge viewing mode
- D. Perspective viewing mode
- E. Shaded surface viewing mode

5. In the illustration below, what do the numbers between the 4 and the 5 represent?

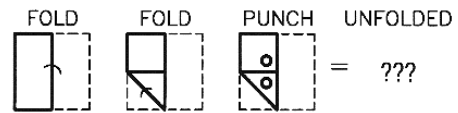
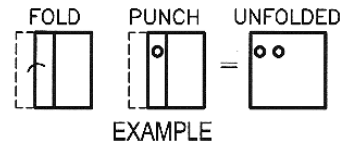


- A. Thousandths of an inch
 B. Hundredths of an inch
 C. Numerators for 1/32" divisions
 D. Numerators for 1/64" divisions
 E. Metric millimeter labels
6. A cap screw head size (across the flats) is 1.5 times the body diameter. The AutoCAD™ POLYGON command prompts for three inputs: 1) Number of sides?; 2) Circumscribe or Inscribe?; and 3) Radius Value? Which of the following answer sets would be the proper three answers to draw the head of a 1/2" body diameter cap screw?
- A. 6; Circumscribe; 3/8
 B. 8; Inscribe; 3/8
 C. 6; Inscribe; 3/4
 D. 8; Circumscribe; 3/4
 E. 6; Circumscribe; 3/4

7. Of the 17 standard colors supported by all browsers, which three are also commonly used by current 3D CAD programs to visually assist the user in the X, Y, and Z directions of space?

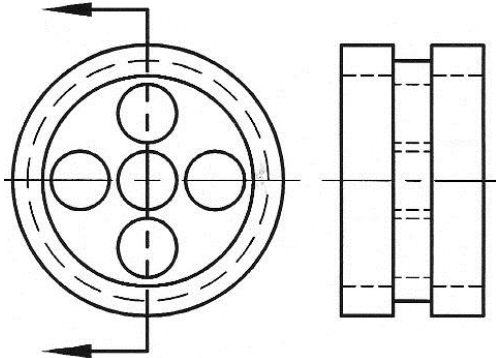
- A. Maroon, Fuchsia, Lime
 B. Gray, Teal, Orange
 C. Red, Green, Blue
 D. Navy, Olive, Aqua
 E. Purple, Silver, Yellow

8. Based on a perceptual ability test (even used in dental admission testing), the following "folded paper/punched hole" item tests your spatial visualization. Imagine a paper is folded, as shown in the example, and then a hole punched, and then the paper is unfolded. Which answer choice is correct?



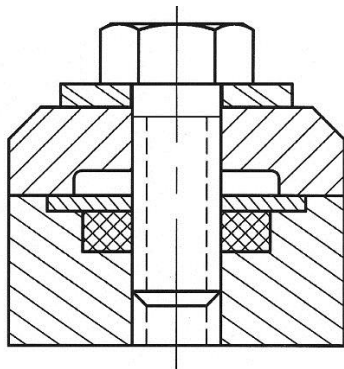
- A.
- B.
- C.
- D.
- E.

9. If the right side view of this drawing is converted into a full section view, how many "bounded areas" will the new section view have that feature section lines (hatching)?



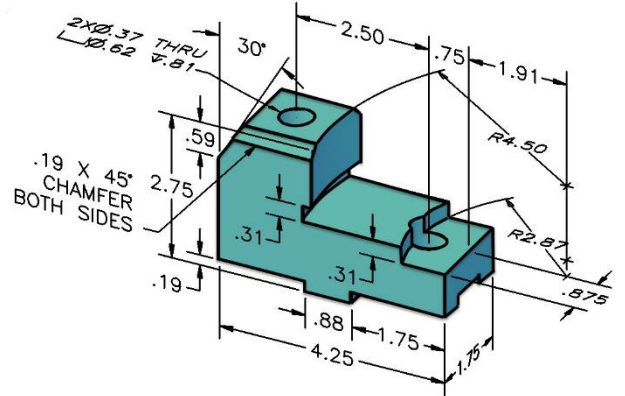
- A. 2
- B. 4
- C. 5
- D. 6
- E. 8

10. In the sectional assembly drawing illustrated below, how many parts are bolted together? (Note: Do not count the bolt.)



- A. 3
- B. 4
- C. 5
- D. 6
- E. 7

11. Newer standards have set forth guidelines for dimensions added within 3D space along with the CAD model. Which of the following is a TRUE statement based on this example?



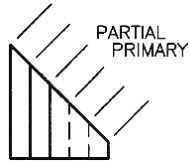
- A. The dimensions reside on 2D planes that are coplanar with surface planes or center planes of the object.
- B. Dimensions are always limited to two-place precision.
- C. Local notes cannot be incorporated with this method.
- D. Angular dimensions are not able to be shown
- E. Dimensions cannot reside on the surface of the model or they will not show.

12. A two-point perspective pictorial drawing gets its name from the number of _____ points.

- A. measuring
- B. ground
- C. station
- D. picture
- E. vanishing

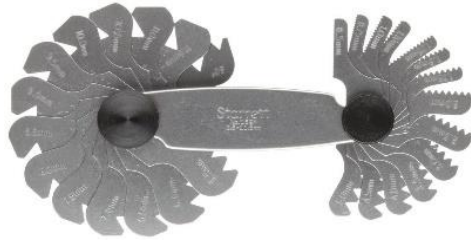
13. For the thread note, .500-28UNEF-2B, what does the "E" stand for?
- A. Extra
 - B. Engaged
 - C. English
 - D. Endless
 - E. Engineered

14. Which one of the views below could be a partial primary auxiliary view of the inclined surface projected from the front view in this illustration?



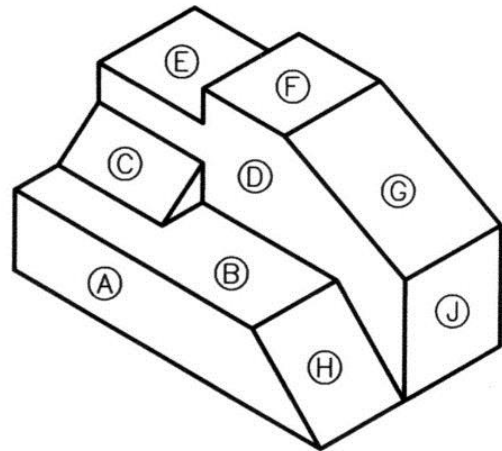
- A.
- B.
- C.
- D.
- E. ALL OF THE ABOVE

15. The tool illustrated below is related to what type of feature common to engineering design?



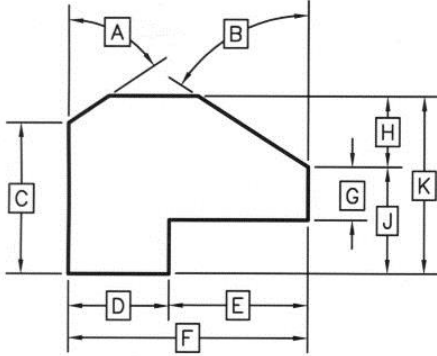
- A. gears
- B. threads
- C. springs
- D. knurls
- E. ring grooves

16. In this illustration, the **profile** plane is parallel with surface J. How many of the labeled surfaces are NOT perpendicular to the profile plane?



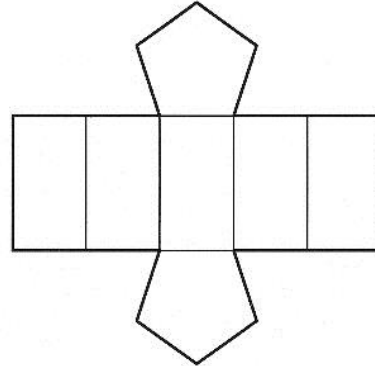
- A. 1
- B. 2
- C. 3
- D. 4
- E. 5

17. In the illustration below, if the angular dimensions are removed, how many additional linear dimensions, if any, would need to be added to adequately describe the geometry?



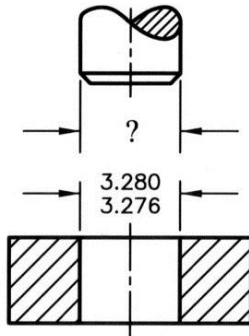
- A. 0
- B. 1
- C. 2
- D. 3
- E. 4

19. In the illustration below, a pentagonal prism has been developed into a flat pattern. How many “glue flaps” will need to be added to ensure all neighboring edges are sealed?



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

18. Select the clearance fit solution that has a tolerance of .004” and an allowance of .004”:



- A. $\begin{array}{c} \rightarrow | 3.276 \\ | 3.272 \leftarrow \end{array}$
- B. $\begin{array}{c} \rightarrow | 3.272 \\ | 3.268 \leftarrow \end{array}$
- C. $\begin{array}{c} \rightarrow | 3.274 \\ | 3.270 \leftarrow \end{array}$
- D. $\begin{array}{c} \rightarrow | 3.270 \\ | 3.266 \leftarrow \end{array}$
- E. $\begin{array}{c} \rightarrow | 3.284 \\ | 3.278 \leftarrow \end{array}$

20. Which one of the following symbols would NOT be found in a local note or callout, although it might be found in a feature control frame?

- A. ∇
- B. \perp
- C. \square
- D. \square
- E. \checkmark

21. Within modern CAD systems, both 2D and 3D, one of the first and critical parameters the user must choose is between _____ and _____.

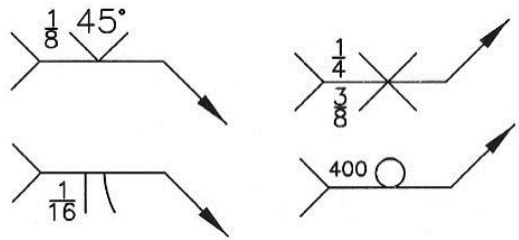
- A. imperial units; metric units
- B. paper space; model space
- C. full scale; half scale
- D. metal material; plastic material
- E. baseline dimensioning; chain dimensioning

22. The tools illustrated below are related to keyways and other features that need to be _____.



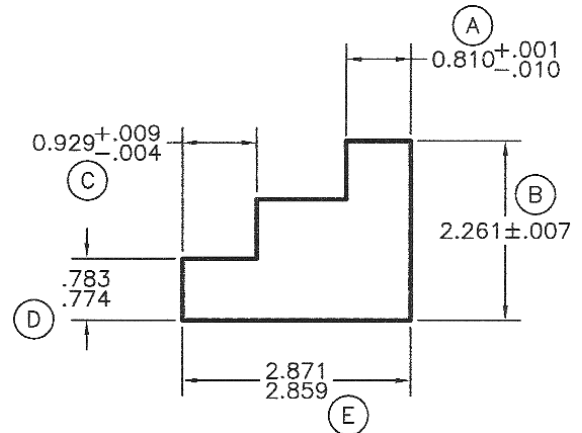
- A. punched
- B. broached
- C. knurled
- D. chiseled
- E. scraped

23. In the illustration below, to what general category of engineering drawings or drafting do these belong?



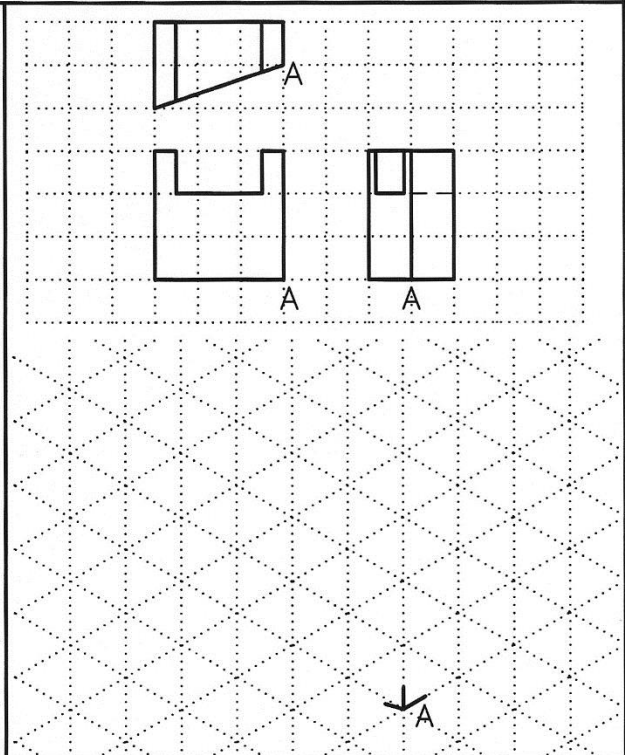
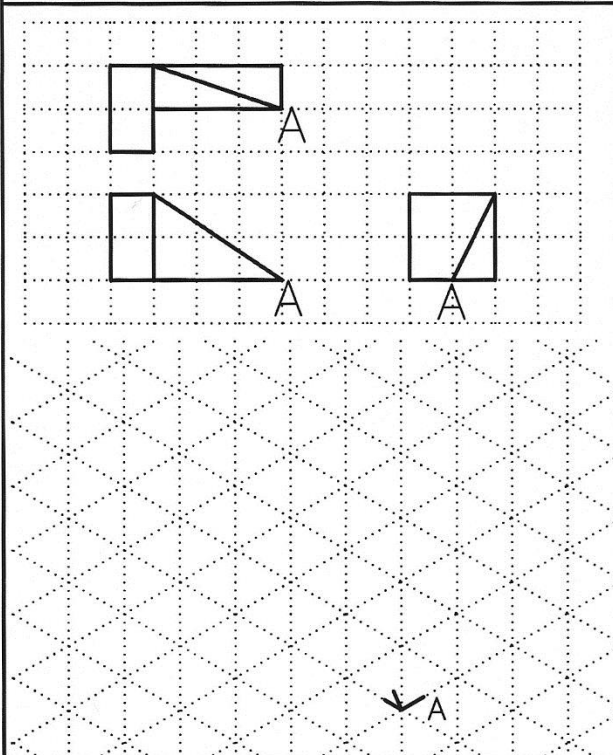
- A. Geometric tolerancing
- B. Surface texture specifications
- C. Welding drawings
- D. HVAC drawings
- E. Electronic diagrams

24. Which dimension in the illustration has the SMALLEST tolerance?



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

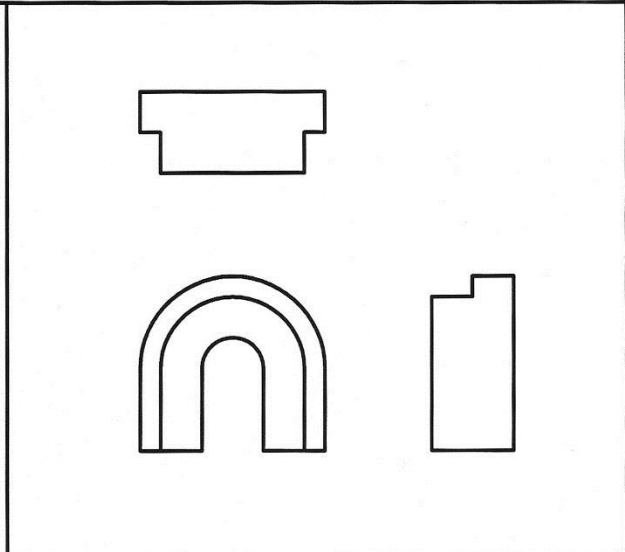
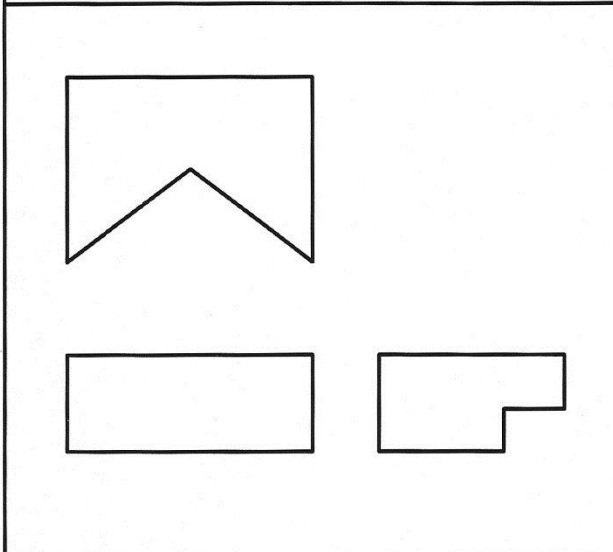
**PROBLEMS 25 & 26: CREATE ISOMETRIC SKETCHES
SELECT AN ANSWER THAT REPRESENTS THE NUMBER OF SEGMENTS REQUIRED**



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

26. NUMBER OF LINE SEGMENTS:
A. 18 B. 19 C. 20 D. 21 E. 22

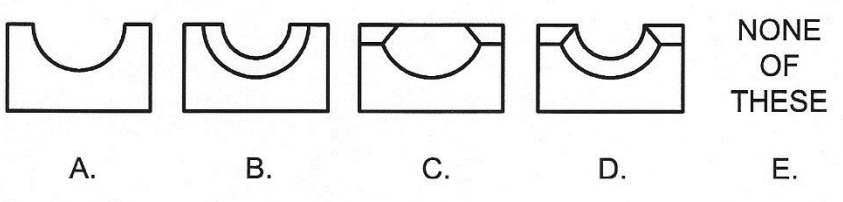
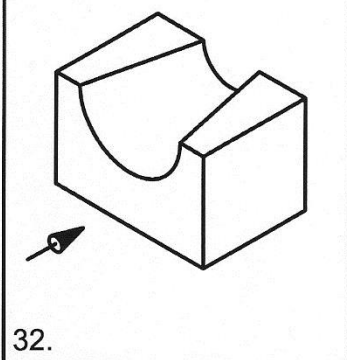
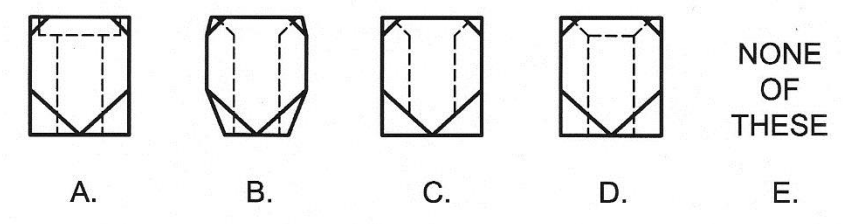
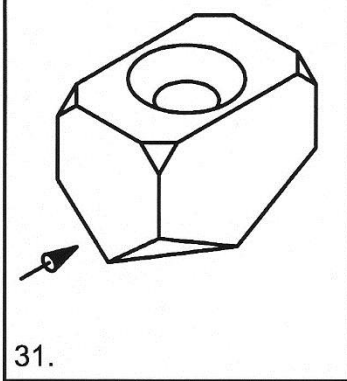
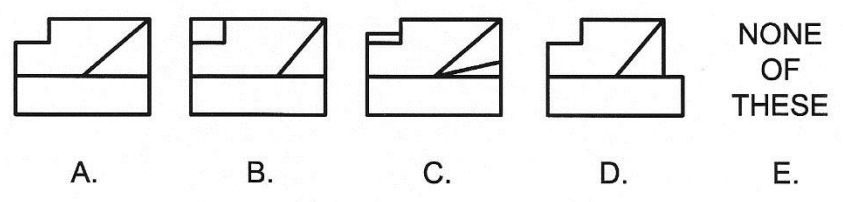
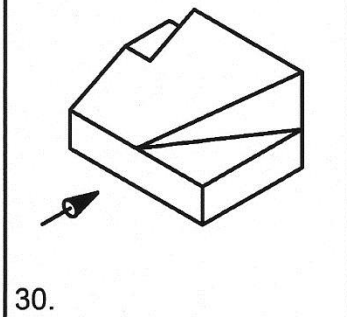
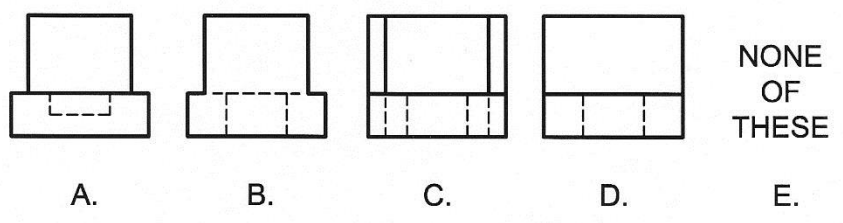
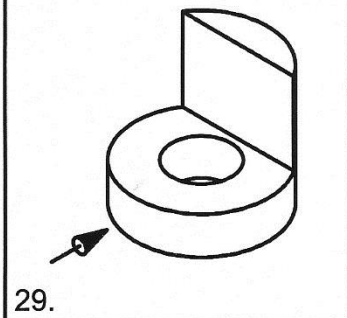
**PROBLEMS 27 & 28: MISSING LINE PROBLEMS: SELECT AN ANSWER THAT
CORRESPONDS WITH THE LEAST NUMBER OF MISSING LINE SEGMENTS (VISIBLE
AND HIDDEN) IT WILL TAKE TO CREATE A CORRECT MULTIVIEW DRAWING**

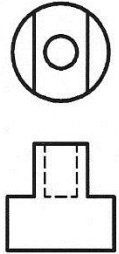
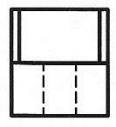
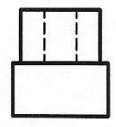
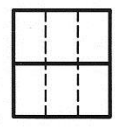
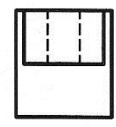
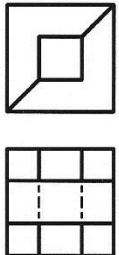
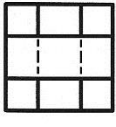
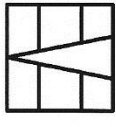
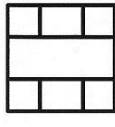
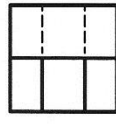
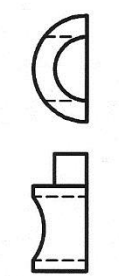
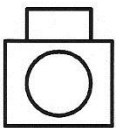
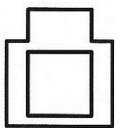
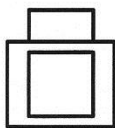
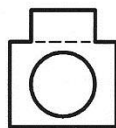
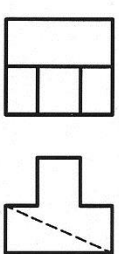
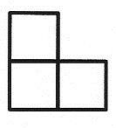
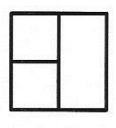
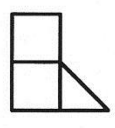
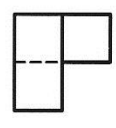


27. MINIMUM NUMBER OF LINES:
A. 2 B. 4 C. 6 D. 8 E. 10

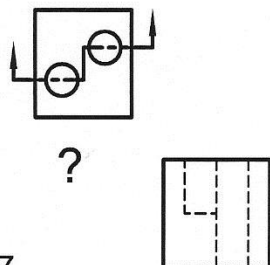
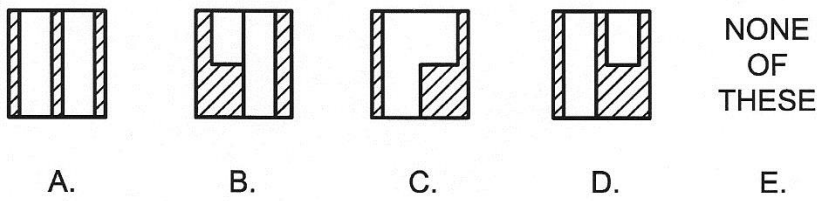
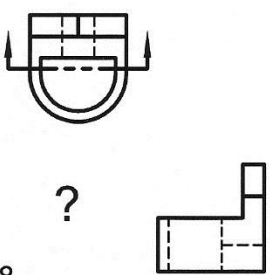
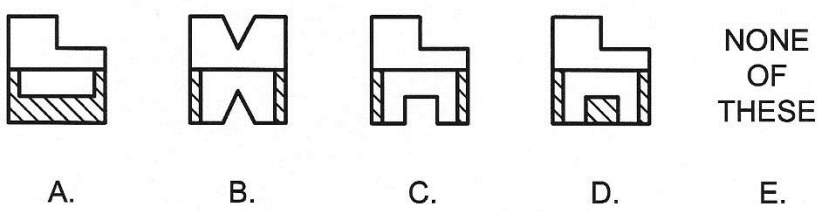
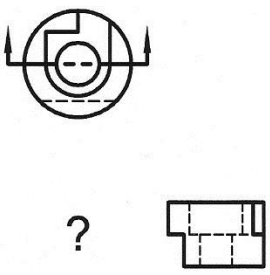
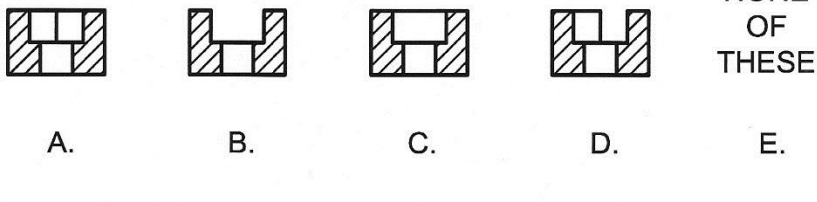
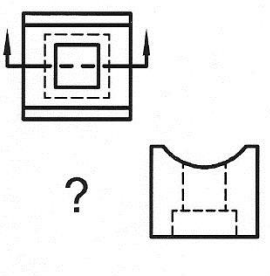
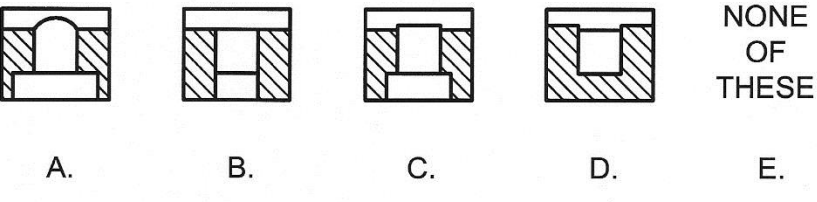
28. MINIMUM NUMBER OF LINES:
A. 1 B. 2 C. 3 D. 4 E. 5

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				
33.	 <p style="text-align: right; font-size: 24px; margin-top: 10px;">?</p>	 <p>A.</p>	 <p>B.</p>	 <p>C.</p>	 <p>D.</p>	<p>NONE OF THESE</p> <p>E.</p>
34.	 <p style="text-align: right; font-size: 24px; margin-top: 10px;">?</p>	 <p>A.</p>	 <p>B.</p>	 <p>C.</p>	 <p>D.</p>	<p>NONE OF THESE</p> <p>E.</p>
35.	 <p style="text-align: right; font-size: 24px; margin-top: 10px;">?</p>	 <p>A.</p>	 <p>B.</p>	 <p>C.</p>	 <p>D.</p>	<p>NONE OF THESE</p> <p>E.</p>
36.	 <p style="text-align: right; font-size: 24px; margin-top: 10px;">?</p>	 <p>A.</p>	 <p>B.</p>	 <p>C.</p>	 <p>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>