



2017 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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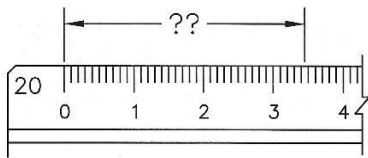
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WYSE – Academic Challenge
Engineering Graphics Test (State) - 2017

1. ASME 14.1, **Decimal Inch Drawing Sheet Size and Format**, states items that are likely to be found within a title block. Which of the following items would also be found “outside” the title block, and along the border?

- A. Company name and address
- B. Drawing/Part number
- C. Scale
- D. Title
- E. Sheet size

2. A triangular civil engineer’s scale has one edge marked 20, as illustrated below. If that edge is used for measuring at a scale of 1” = 20’-0”, identify the measurement shown.



- A. 3.45'
- B. 6.90'
- C. 34.5'
- D. 69.0'
- E. 345'

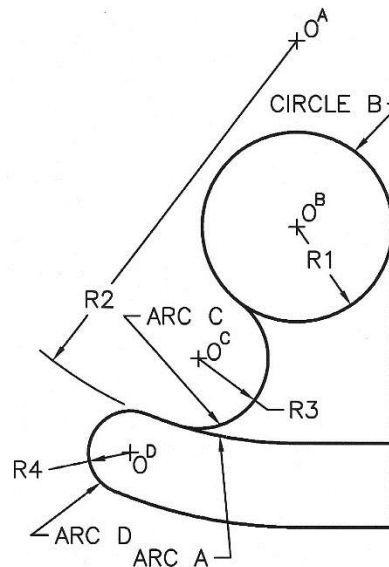
3. A robotic work-cell will be designed for a space of 10' x 16'. What architectural scale allows the largest print of a floor plan of the work-cell to fit on A-size paper without clipping?

- A. 1/4" = 1'-0"
- B. 3/8" = 1'-0"
- C. 1/2" = 1'-0"
- D. 3/4" = 1'-0"
- E. 1" = 1'-0"

4. Given a 1" diameter circle and a .50" diameter circle fixed at 3" apart, how many different **locations** could there be for a 6" diameter circle tangent to both of the small circles?

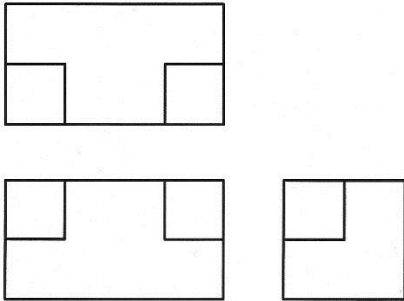
- A. 4
- B. 5
- C. 6
- D. 7
- E. 8

5. The designer has constructed Arc C as a transition between Arc A and Circle B. Identify a FALSE statement below:



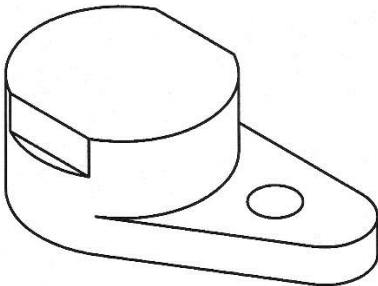
- A. R3 must equal R1
- B. O^C is $R1+R3$ from O^B
- C. O^C is $R2-R3$ from O^A
- D. Arc C is tangent to Circle B on a line between O^B and O^C
- E. Arc C is tangent to Arc A on a line extended through O^A and O^C

6. Analyze and visualize the object illustrated in the multiview below, comprised entirely of **normal** surfaces. Considering all surfaces, even behind and below, how many are there?



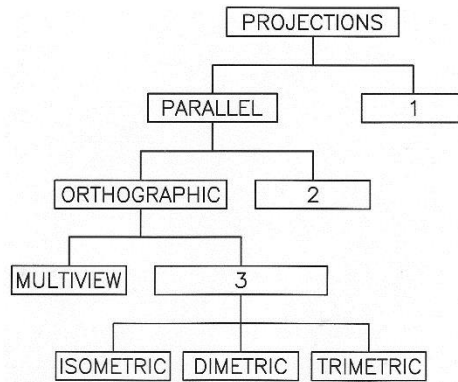
- A. 6
- B. 8
- C. 10
- D. 12
- E. 14

7. Often in a multiview drawing, a line represents the maximum contour element of a curved surface. In the front and right side views of the object shown below, how many visible and hidden lines will have that meaning?



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

8. Within the realm of pictorial drawings, which are based on scientific projection methods, choose the proper sequence to fill in the chart below.

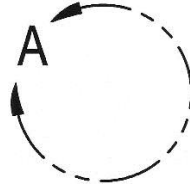


- A. 1 = Perspective
2 = Oblique
3 = Axonometric
- B. 1 = Oblique
2 = Perspective
3 = Axonometric
- C. 1 = Axonometric
2 = Oblique
3 = Perspective
- D. 1 = Oblique
2 = Axonometric
3 = Perspective
- E. 1 = Perspective
2 = Axonometric
3 = Oblique

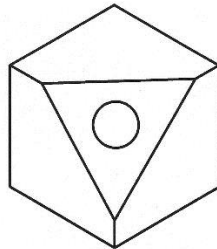
9. What is being specified if a hole or shaft has dimensional notes such as 12h6, 14d9, 10H7, or 22G7?

- A. A surface roughness
- B. An ISO standard tolerance for a precision fit
- C. A statistical process control
- D. A metric screw thread size
- E. A coating or plating thickness

10. If this phantom circle, arrows, and alphabet character are featured in a multiview drawing, what additional information will likely be present on that drawing?



- A. A broken-out section
 - B. A revision block
 - C. A detail view
 - D. Zone markers
 - E. An auxiliary view
11. The object illustrated below features an oblique surface and a hole drilled through the block perpendicular to that surface. What view would best feature the hole as a true shape circle?

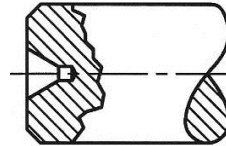


- A. A primary auxiliary view projected from the front view.
- B. A primary auxiliary view projected from the top view.
- C. A primary auxiliary view projected from the right side view.
- D. A secondary auxiliary view projected from a primary auxiliary view that shows the oblique surface as an edge view (line).
- E. A secondary auxiliary view projected from any primary auxiliary view.

12. Identify the FALSE statement about sectional views.

- A. Sectional views are often used to describe objects with internal hidden detail.
- B. There are standard section line patterns for materials such as steel, bronze, or copper.
- C. Assembly sections show nuts and bolts “un-sectioned” when a cutting plane passes parallel and central to the axis.
- D. Revolved sections should be moved out of projection with the main views.
- E. Thin materials such as webs and ribs are not usually “hatched” with section lines when the cutting plane passes through them lengthwise (versus crosswise).

13. What purpose might be served by the feature shown below?



- A. For mounting the part in a lathe
 - B. Woodruff key cavity
 - C. Pop rivet hole
 - D. Ejector pin spot for molded part
 - E. For a pan head set screw
14. In thread terminology, CREST is to MAJOR DIAMETER as _____ is to MINOR DIAMETER.
- A. PITCH
 - B. ROOT
 - C. VALLEY
 - D. BOTTOM
 - E. LEAD

15. One of the common formats for creating a CAD drawing file that can be printed as a hard-copy or viewed on a device without the CAD software itself being present is the PDF format. What does PDF stand for?

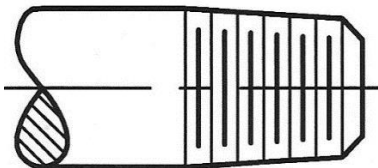
- A. Private Design File
- B. Public Drawing Format
- C. Portable Document Format
- D. Printable Digital Format
- E. Personal Drafting File

16. "A digital _____ is a computer-generated model or original design that has not been released for production. The most common and useful digital _____ is a 3D solid model."
(Engineering Drawing & Design, 5th Ed., Madsen & Madsen, p. 81)

Which one word best fills both blanks?

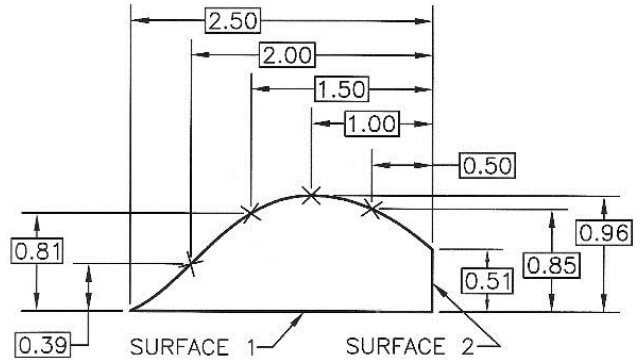
- A. element
- B. hardcopy
- C. format
- D. database
- E. prototype

17. Which thread note is the most likely for the part illustrated below?



- A. 3/4 – 14NPT
- B. 7/8 – 4 ACME
- C. 5/8 – TAPER – 2A
- D. 2 – 3 SQUARE - 2
- E. M14 X 1.75

18. The illustration below shows a common method for dimensioning a contour not defined by arcs. Identify the FALSE statement.

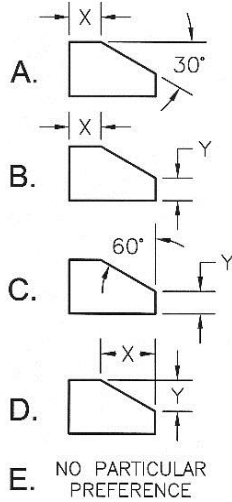


- A. Surfaces 1 & 2 are assumed to be perpendicular.
- B. The dimensional points along the contour should have been numbered for clarity.
- C. Surfaces 1 & 2 are often identified as X & Y.
- D. This method of dimensioning is often called baseline dimensioning
- E. Surfaces 1 & 2 can be identified as datums.

19. In precision sheet metal drafting, a development of the part is often referred to as a _____ .

- A. bend diagram
- B. formed part
- C. solid model
- D. flat pattern
- E. multiview drawing

20. Given a part to dimension, but not knowing how the part functions or the purpose of the sloped surface, which of the following, if any, would be the preferred method of dimensioning the slope?



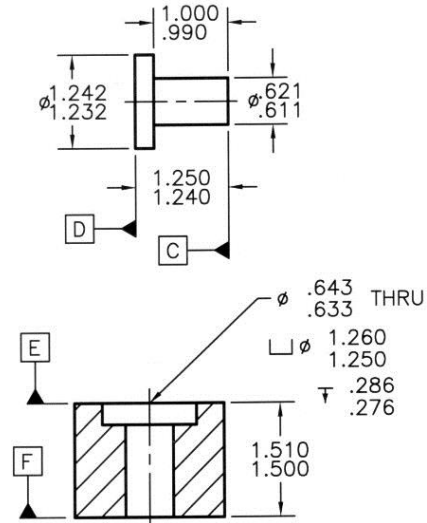
21. Which specialized area of drafting would MOST likely implement a CAD library of symbols for parts such as a TEE, ELBOW, LATERAL, COUPLING, REDUCER, or CAP?

- A. Electrical wiring
- B. Structural steel
- C. Electronics
- D. Piping
- E. HVAC

22. Which of the following section view types NEVER features a cutting plane line?

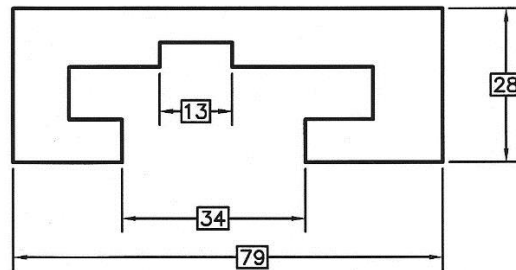
- A. Broken-out
- B. Aligned
- C. Removed
- D. Offset
- E. Half

23. Based on the tolerances given, if the cylindrical part is dropped into the counter-bored hole of the second part, what is the **least** distance between Datum C and Datum F?



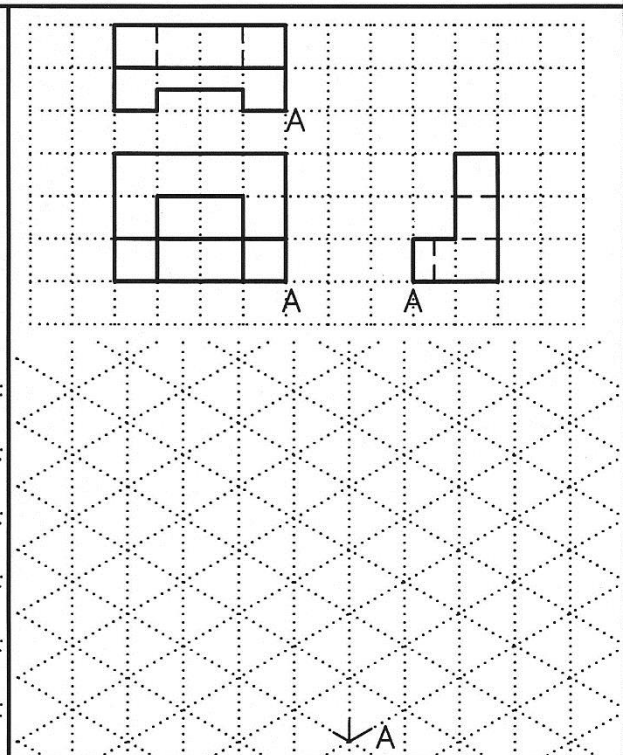
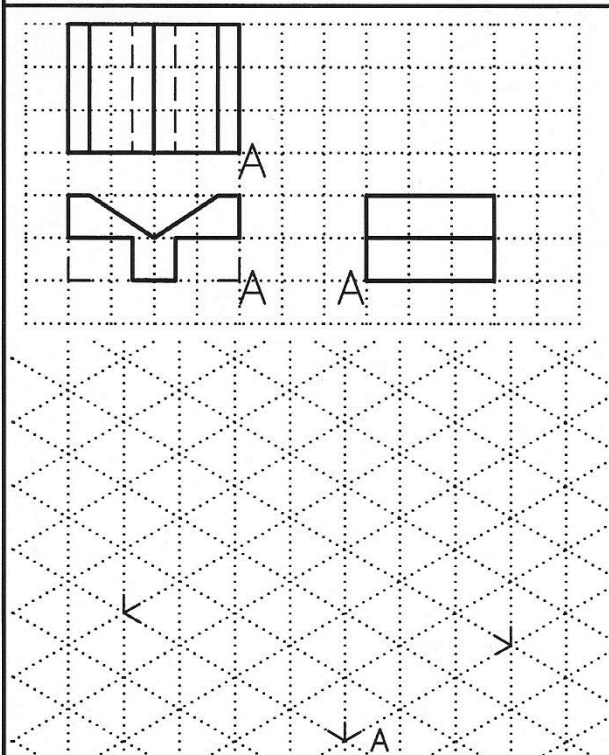
- A. .204"
- B. .214"
- C. .224"
- D. .234"
- E. .244"

24. How many additional dimensions are needed to fully dimension this non-symmetrical shape?



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

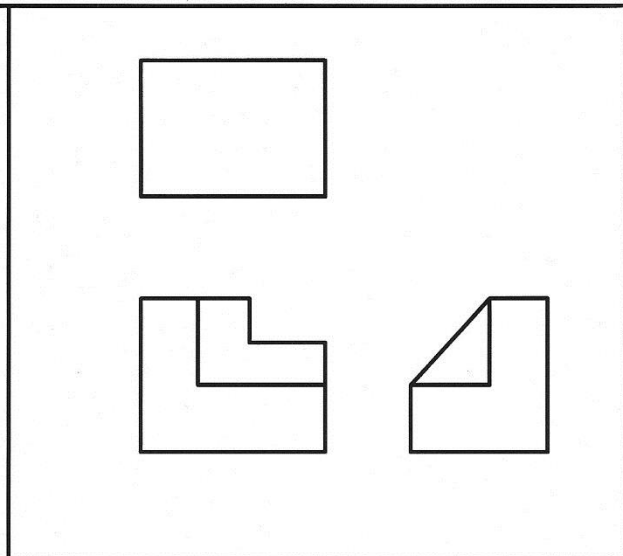
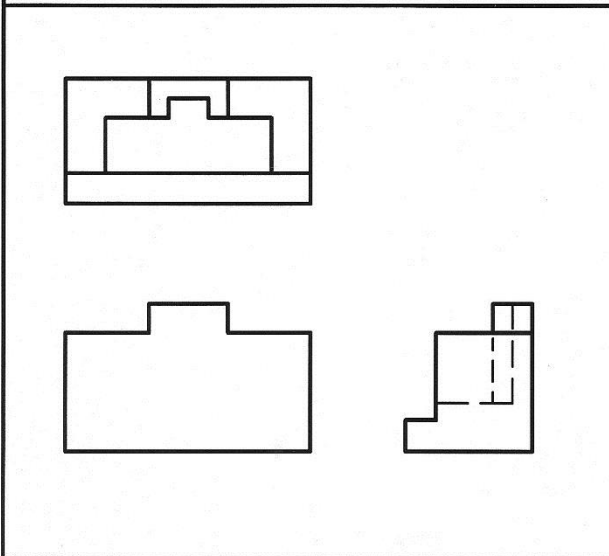
PROBLEMS 25 & 26: CREATE ISOMETRIC SKETCHES
SELECT AN ANSWER THAT REPRESENTS THE NUMBER OF SEGMENTS REQUIRED



25. NUMBER OF LINE SEGMENTS:
 A. 19 B. 20 C. 21 D. 22 E. 23

26. NUMBER OF LINE SEGMENTS:
 A. 26 B. 27 C. 28 D. 29 E. 30

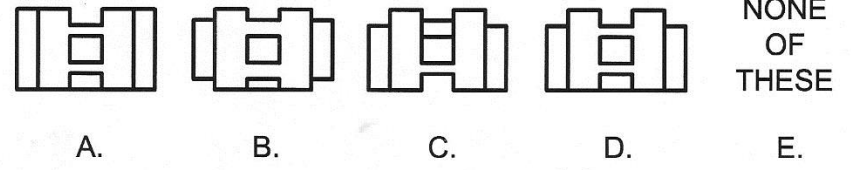
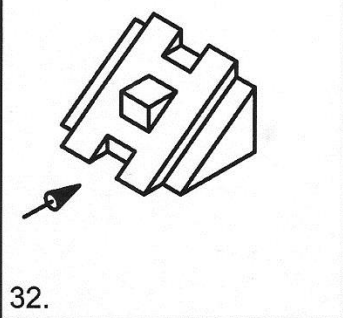
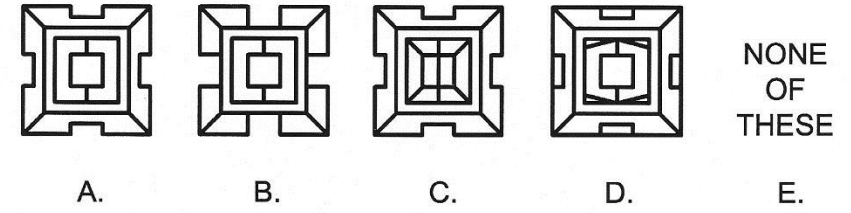
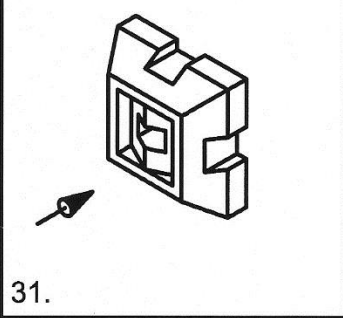
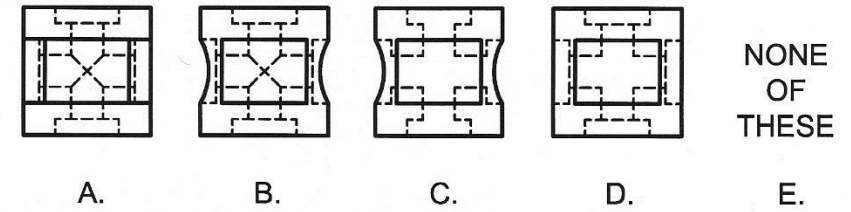
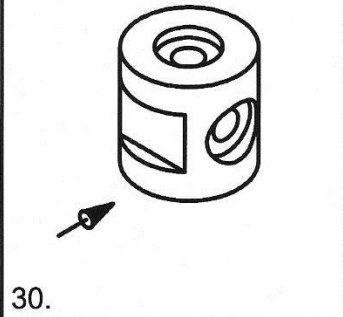
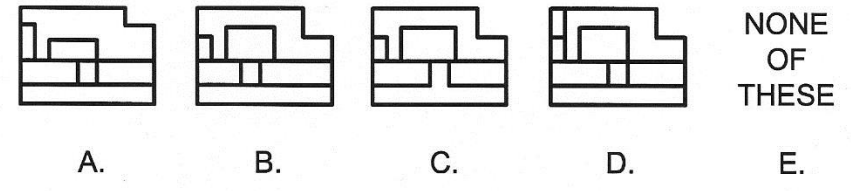
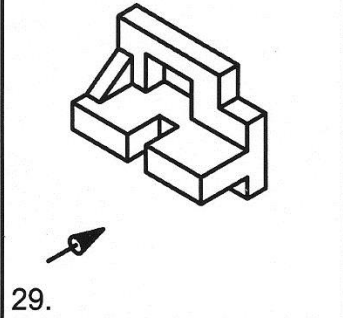
PROBLEMS 27 & 28: MISSING LINE PROBLEMS: SELECT AN ANSWER THAT CORRESPONDS WITH THE LEAST NUMBER OF MISSING LINE SEGMENTS (VISIBLE AND HIDDEN) IT WILL TAKE TO CREATE A CORRECT MULTIVIEW DRAWING



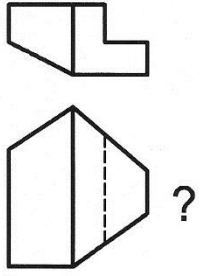
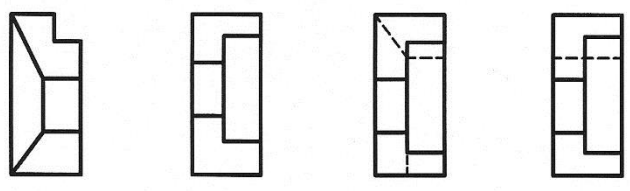
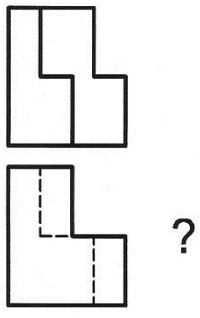
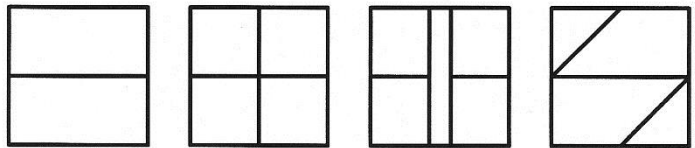
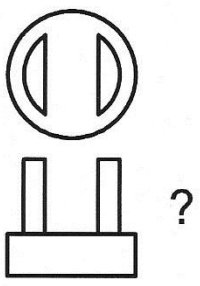
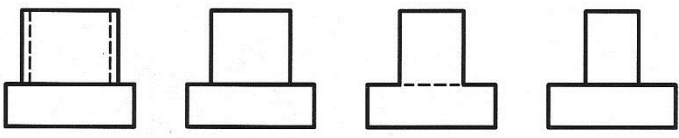
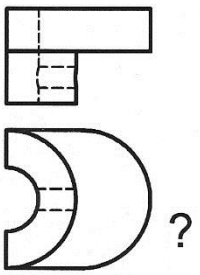
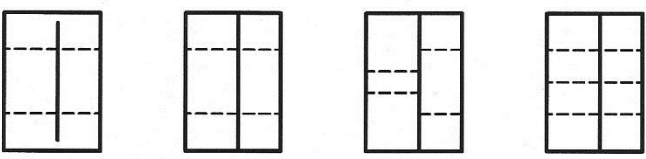
27. MINIMUM NUMBER OF LINES:
 A. 5 B. 6 C. 7 D. 8 E. 9

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>A. B. C. D.</p> <p>NONE OF THESE</p> <p>E.</p>
<p>34.</p> 	 <p>A. B. C. D.</p> <p>NONE OF THESE</p> <p>E.</p>
<p>35.</p> 	 <p>A. B. C. D.</p> <p>NONE OF THESE</p> <p>E.</p>
<p>36.</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

37.

?

A. B. C. D. E. NONE OF THESE

38.

?

NOTE: CENTER LINES INCLUDED FOR THESE HALF SECTION SOLUTIONS

A. B. C. D. E. NONE OF THESE

39.

?

A. B. C. D. E. NONE OF THESE

40.

?

A. B. C. D. E. NONE OF THESE