



**ENGINEERING
AT ILLINOIS**

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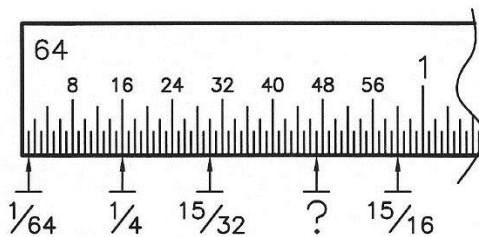
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WYSE – Academic Challenge
Engineering Graphics Test (State) – 2016

1. At www.asme.org, a “Shop ASME” link has several sub-category links (see choices below.) Which link leads to engineering graphics materials that express the proper representation of graphic information within engineering drawings?

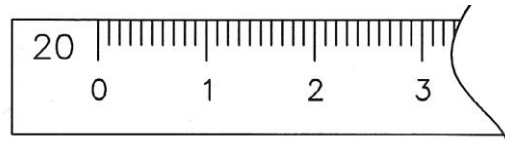
- A. Journals
- B. Proceedings
- C. Books
- D. Standards
- E. Certificates

2. Identify the measurement at the indicated question mark.



- A. $\frac{9}{16}$ "
 - B. .812"
 - C. $\frac{23}{32}$ "
 - D. .512"
 - E. $\frac{47}{64}$ "
3. What does the “M” stand for if it appears at the beginning of a thread note?
- A. Manufactured
 - B. Metric
 - C. Millimeters
 - D. Major diameter
 - E. Machine

4. One type of triangular engineering scale has an edge similar to the illustration below, which is useful for scales such as 1" = 2', 1" = 20', 1" = 200', etc. What is the name of that scaling instrument?



- A. Civil Engineer’s Scale
- B. Facility Engineer’s Scale
- C. Mechanical Engineer’s Scale
- D. Manufacturing Engineer’s Scale
- E. Industrial Engineer’s Scale

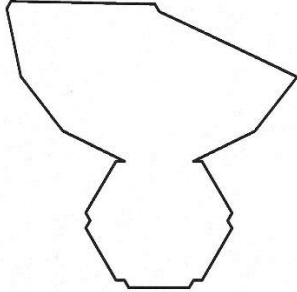
5. The following paragraph is quoted from Wikipedia™ in an article about **Solid Modeling**:

“Example: A shaft is created by extruding a circle 100 mm. A hub is assembled to the end of the shaft. Later, the shaft is modified to be 200 mm long (click on the shaft, select the length dimension, modify to 200). When the model is updated the shaft will be 200 mm long, the hub will relocate to the end of the shaft to which it was assembled, and the engineering drawings and mass properties will reflect all changes automatically.”

What is the appropriate **sub-heading** for the section from which this quote was taken?

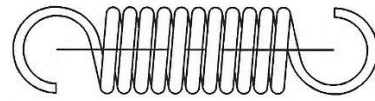
- A. Surface Mesh Modeling
- B. Parametric Modeling
- C. Implicit Representation
- D. Boundary Representation
- E. Spatial Occupancy Enumeration

6. The development of a hexagon pyramid illustrated below does not show folding lines, and it also includes "glue flaps." How many folding lines are missing?

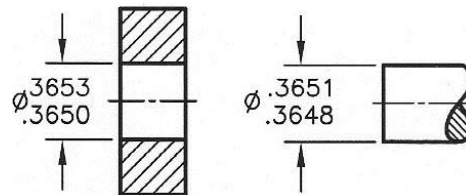


- A. 6
 B. 8
 C. 10
 D. 12
 E. 14
7. In local notes and callouts, "X" can mean number of "times" or "places", such as 2X Ø.25. In other notes, such as chamfer notes and countersink notes, what other word might be represented by "X"?
- A. For
 B. Maximum
 C. By
 D. Pattern
 E. Unknown
8. If an engineering drawing for a part has callout notes or references to "ejector pins", which of the following materials is most likely for that part?
- A. Steel
 B. Wood
 C. Plastic
 D. Copper
 E. Sheet metal

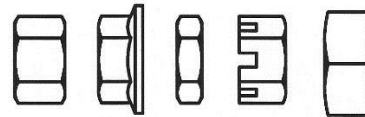
9. Identify a geometric shape that would be pertinent to the computer modeling of the tension spring illustrated below.



- A. Spiral
 B. Parabola
 C. Ogee curve
 D. Involute
 E. Helix
10. Based on the dimensions given in the illustration below, identify the classification of the "fit".

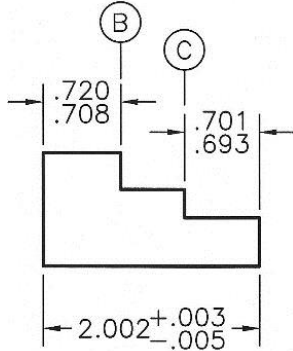


- A. Clearance fit
 B. Press fit
 C. Transition fit
 D. Interference fit
 E. Sliding fit
11. What caption would be appropriate for the illustration below, which appears in the **Threads and Fasteners** unit of a print reading text?



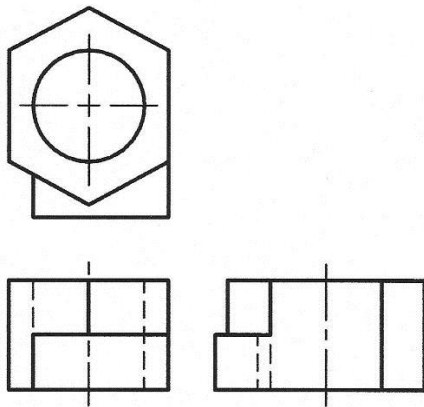
- A. Nuts
 B. Spacers
 C. Keys
 D. Locks
 E. Rivets

12. A dimension indicating the distance from B to C would be superfluous. What are the limits of size for the distance from B to C based on the other dimensions?



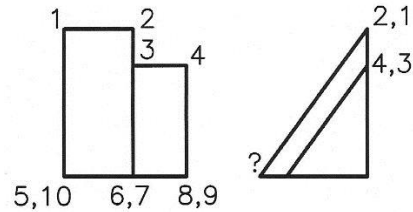
- A. .576" - .602"
- B. .581" - .588"
- C. .596" - .604"
- D. .584" - .596"
- E. .576" - .604"

13. In the multiview drawing below, how many times does a **visible** line take precedence over all or part of a **hidden** line or **center** line?



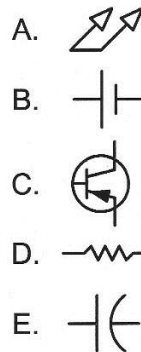
- A. 1
- B. 2
- C. 3
- D. 4
- E. 5

14. In engineering education, it is common to number the vertices of an object to help solve a problem. In the illustration, what numbers should be assigned to the lower left corner of the side view?



- A. 6,5
- B. 8,6,5
- C. 9,7
- D. 7,10
- E. 10,5

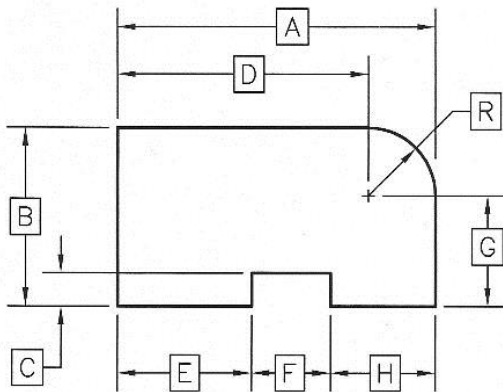
15. Which of the CAD symbols below is "out-of-place", and is not the same field of study as the other four?



16. In engineering textbooks, in the unit on **Dimensioning**, there are several adjectives associated with the study of dimensioning. Which of the following is a FICTITIOUS term?

- A. Contour dimensioning
- B. Schematic dimensioning
- C. Coordinate dimensioning
- D. Dual dimensioning
- E. Baseline dimensioning

17. How many superfluous dimensions, if any, are there in the illustration below?

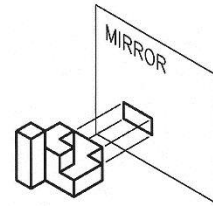


- A. 0
- B. 1
- C. 2
- D. 3
- E. 4

18. Identify the FALSE statement with respect to an assembly drawing of several parts shown in a full section manner.

- A. Section lines for smaller parts should be more closely spaced
- B. A major cylindrical shaft centered with the cutting plane should remain unsectioned
- C. Section lines should all be the same angle
- D. Thin gaskets and rubber parts can be shaded solid rather than have section lines
- E. Nuts and bolts on the cutting plane should remain unsectioned

19. Select the correct isometric pictorial reflection of the object illustrated below, as reflected on the mirror plane. (Note: one surface is shown reflected on the mirror plane.)

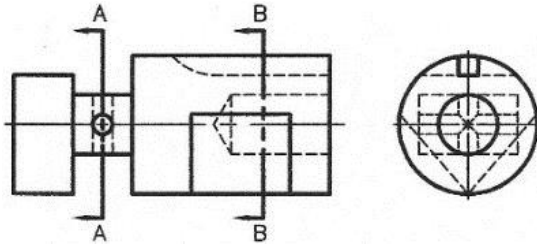


- A.
- B.
- C.
- D.
- E.

20. Of the five terms listed in the answer choices, which term represents the **overall** process into which CAD and the other four would be integrated?

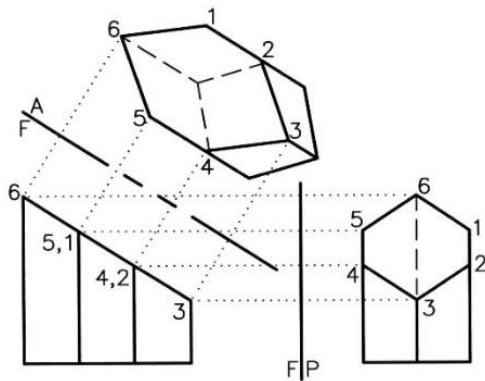
- A. Finite Element Analysis (FEA)
- B. Digital Product Development (DPD)
- C. Computer-Aided Manufacturing (CAM)
- D. Computer-Aided Engineering (CAE)
- E. Product Lifecycle Management (PLM)

21. How many "bounded areas" will need to be hatched for section B-B?



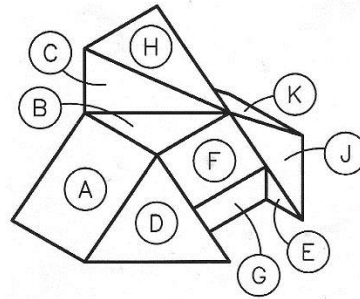
- A. 1
- B. 2
- C. 3
- D. 4
- E. 5

22. With respect to the textbook auxiliary view drawing below, identify the FALSE statement.



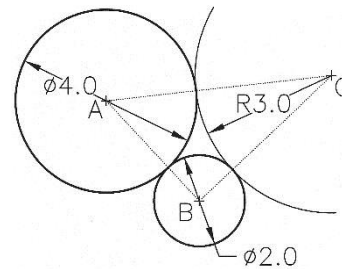
- A. The P stands for profile plane
- B. Edge 3-4 is foreshortened in all three views
- C. The lines between the views labeled F/A and F/P represent folding lines for projection planes
- D. Edge 5-6 is only true length in the auxiliary view
- E. Since edge 4-3 is parallel with edge 6-1 in the side view, it is also parallel in the auxiliary view.

23. In engineering graphics education, surfaces often are identified as **normal**, **inclined**, or **oblique**, depending on the relationship to the principal projection planes. All three are represented in the illustration below. Of the choices, identify one pair of surface letters that is comprised of DIFFERENT types of surfaces.



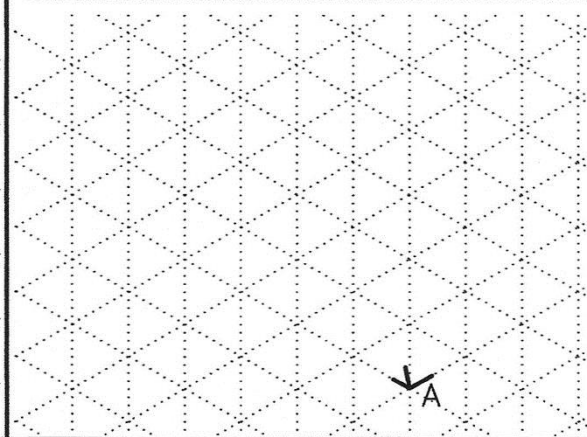
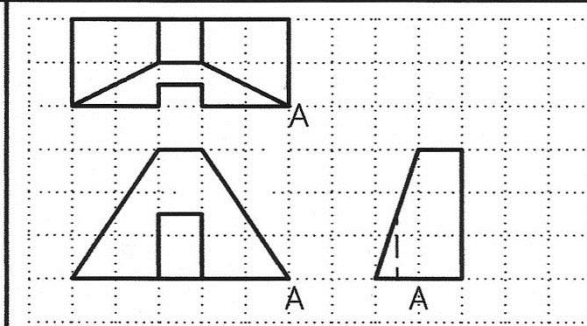
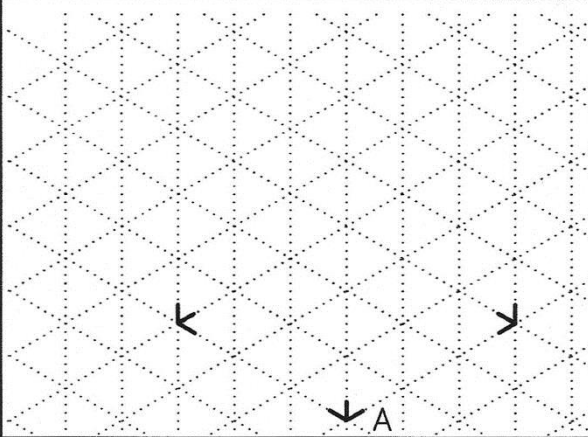
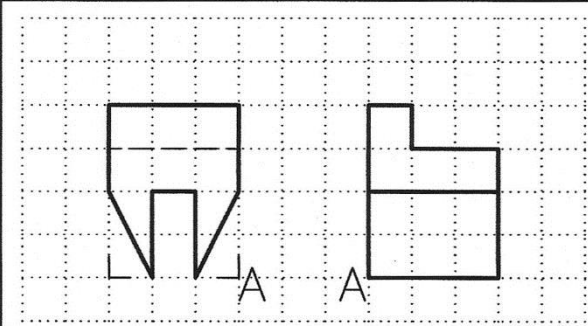
- A. A & F
- B. B & G
- C. C & H
- D. D & J
- E. E & K

24. Analyze the geometric construction diagram below, and then identify the one TRUE statement.



- A. Triangle A-B-C is an equilateral triangle
- B. There are six points of tangency shown
- C. Triangle A-B-C is a right triangle
- D. Line AB is the same angle "away from" horizontal as Line BC
- E. Triangle A-B-C is an isosceles triangle

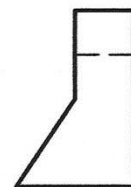
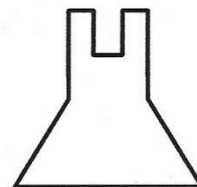
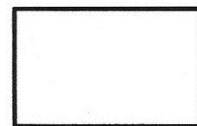
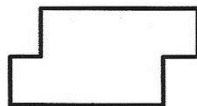
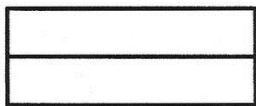
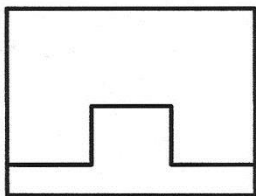
**PROBLEMS 25 & 26: CREATE ISOMETRIC SKETCHES
SELECT AN ANSWER THAT REPRESENTS THE NUMBER OF SEGMENTS REQUIRED**



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

26. NUMBER OF LINE SEGMENTS:
A. 16 B. 17 C. 18 D. 19 E. 20

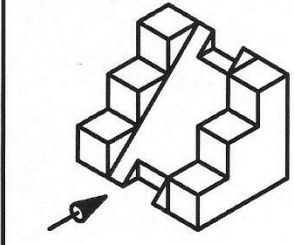
**PROBLEMS 27 & 28: MISSING LINE PROBLEMS: SELECT AN ANSWER THAT
CORRESPONDS WITH THE LEAST NUMBER OF MISSING LINE SEGMENTS (VISIBLE
AND HIDDEN) IT WILL TAKE TO CREATE A CORRECT MULTIVIEW DRAWING**



27. MINIMUM NUMBER OF LINES:
A. 2 B. 3 C. 4 D. 5 E. 6

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

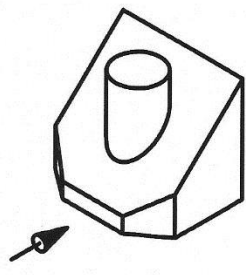
FOR EACH PROBLEM ON THIS PAGE, SELECT A FRONT VIEW
 NOTE: CENTER LINES OMITTED ON THIS TEST



29.

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

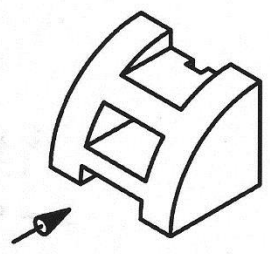
E.



30.

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

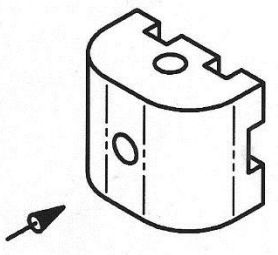
E.



31.

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

E.



32.

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

E.

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

33.

?

A. B. C. D. NONE OF THESE

E.

34.

?

A. B. C. D. NONE OF THESE

E.

35.

?

A. B. C. D. NONE OF THESE

E.

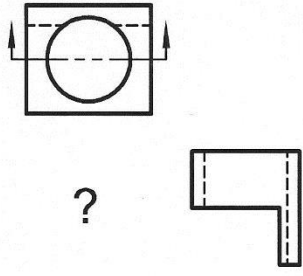
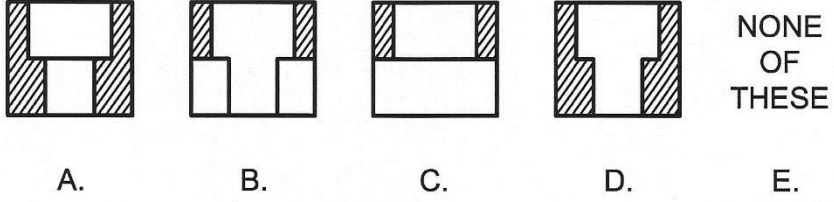
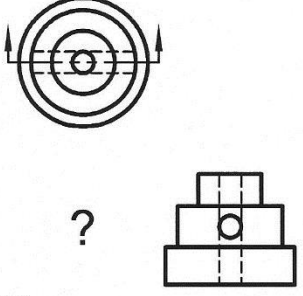
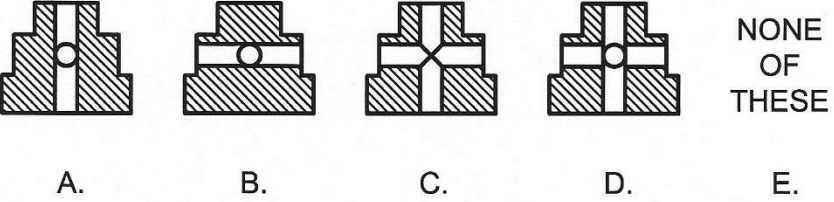
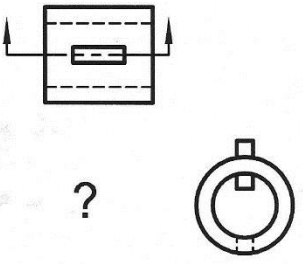
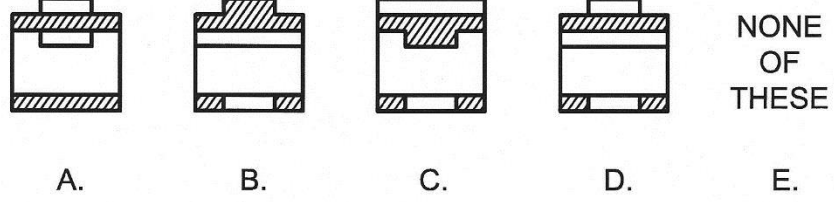
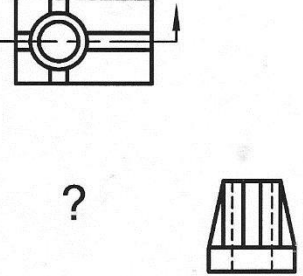
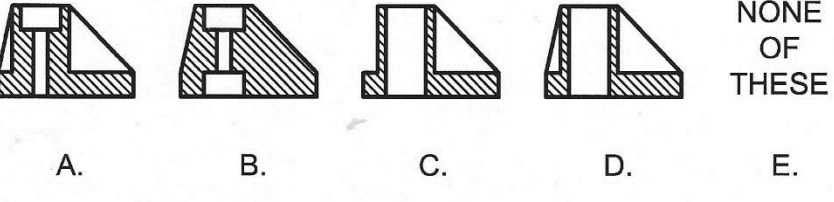
36.

?

A. B. C. D. NONE OF THESE

E.

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>