

2015 Academic Challenge

ENGINEERING GRAPHICS TEST – SECTIONAL

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!

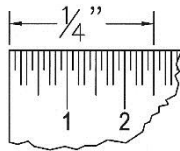
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WYSE – Academic Challenge
 Engineering Graphics Test (Sectional) - 2015

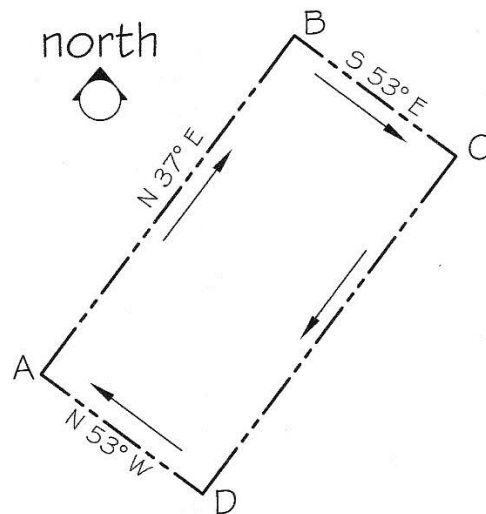
- The ASME organization oversees standards for engineering drawings. What does the M stand for?
 - Metric
 - Mechanical
 - Management
 - Manufacturing
 - Machining

- The illustration below was replicated and enlarged from the edge of a 6" machinist scale. The distance shown is 1/4". What whole number label will appear before and next to the 1" mark on this scale?



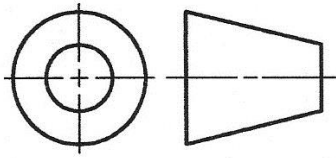
- 3
 - 4
 - 6
 - 8
 - 9
- With a 2D CAD system, the available drawing area for a metric drawing plotted 1:1 on 8-1/2" x 11" paper is approximately 216mm x 279mm. What is the size of the available drawing area if the 2D CAD system plots the drawing at a scale of 1:2?
 - 113mm x 140mm
 - 279mm x 558mm
 - 432mm x 558mm
 - 558mm x 864mm
 - 864mm x 1,116mm

- In civil engineering, a property line is labeled with a **bearing**, which gives the acute angle to the EAST or WEST of NORTH, or to the EAST or WEST of SOUTH, depending on the surveyor's path. In the illustration below, the surveyor records a bearing of N 37° E for property side AB. If the surveyor continues on around the rectangular property in a clockwise fashion, what is the bearing of property side CD?
 - S 53° W
 - N 37° E
 - N 37° W
 - S 37° W
 - S 53° E



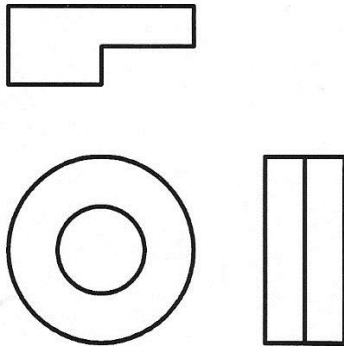
- S 53° W
 - N 37° E
 - N 37° W
 - S 37° W
 - S 53° E
- If a player rolls the two dice in a game of Monopoly®, how many sides of the dice are **perpendicular** to the table, and how many sides are **parallel**?
 - 2 ; 2
 - 4 ; 2
 - 4 ; 4
 - 8 ; 2
 - 8 ; 4

6. If the illustration below appears in the title block of an engineering drawing, what does it mean?



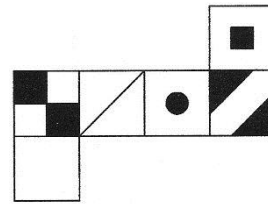
- A. The part is made on a lathe.
- B. The drawing is based on 1st-angle projection.
- C. The drawing is based on 3rd-angle projection.
- D. The tapered portion of the part has a tolerance.
- E. The views are NOT to scale.

7. The multiview illustrated below is missing _____ visible line segments, and _____ hidden line segments.



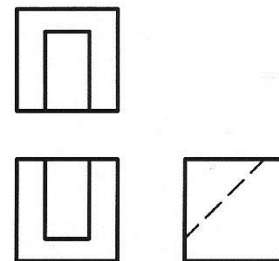
- A. 0 ; 0
- B. 0 ; 2
- C. 2 ; 2
- D. 2 ; 4
- E. 4 ; 4

8. In this test of spatial visualization, which of the cubes is a correct match of the flat pattern foldout?



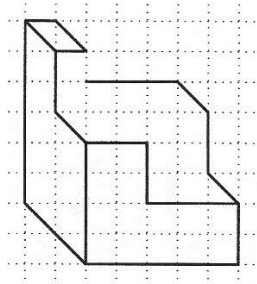
- A.
- B.
- C.
- D.
- E.

9. In engineering graphics, it is common to number the vertices of an object in order to help solve a problem. How many vertices does this object have?



- A. 14
- B. 15
- C. 16
- D. 17
- E. 18

10. The oblique pictorial illustration below illustrates an object with all normal surfaces. At minimum, how many line segments are missing?



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

11. If a cutting plane line is labeled with a capital "A" near each ending arrow, the type of section view would most likely be a(n) _____ section?

- A. half
- B. broken-out
- C. offset
- D. removed
- E. revolved

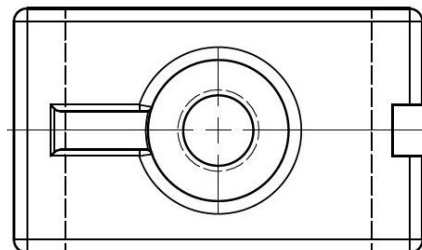
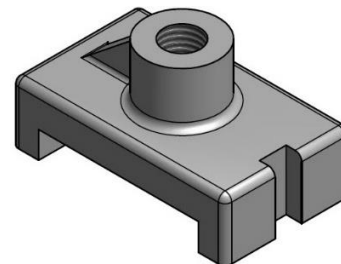
12. What is the most likely reason a sectional drawing would feature multiple hatched areas, with the section lines at various angles?

- A. Rib or webs are present
- B. An offset section
- C. Multiple parts in assembly
- D. A broken-out section
- E. Conventional "S" breaks

13. Identify the TRUE statement about auxiliary views:

- A. Auxiliary views are not to be dimensioned.
- B. An auxiliary view cannot be a section view.
- C. Auxiliary views do not have to be of the complete object.
- D. An auxiliary view cannot be projected for round or cylindrical features.
- E. Auxiliary views must be projected from the front view.

14. The top view shown below next to the pictorial view was computer generated. How is the top view different than what a traditional drafter may have created manually?

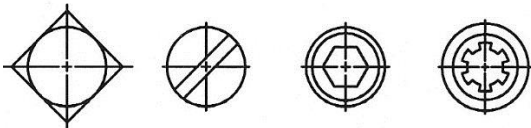


- A. The threaded hole is shown differently.
- B. "Tangency elements" are showing where flat surfaces meet curved surfaces.
- C. Some hidden lines are missing.
- D. The visible lines should not be thicker than the hidden lines.
- E. The center lines are incorrectly shown.

15. In computer-aided design practice, all of the following processes would likely benefit from a 3D CAD model. However, which of these might still be performed without a 3D model?
- A. Rapid prototyping
 - B. Finite element analysis
 - C. Mold flow analysis
 - D. Detail drawing documents
 - E. Photorealistic computer renderings of the product.

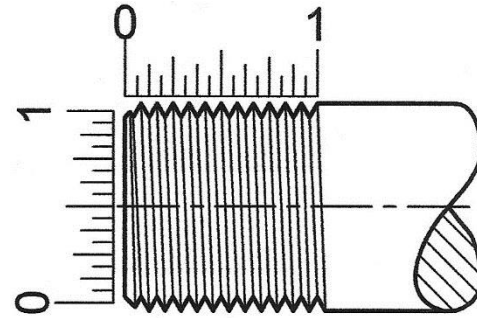
16. According to Wikipedia™, all of the following, except one, might have to do with manufacturing processes in which successive layers of material are laid down under computer control. Identify the one process that is different than the others in this respect.
- A. 3D printing
 - B. Additive manufacturing
 - C. Stereolithography
 - D. Rapid prototyping
 - E. CNC machining

17. What aspect of threads and fasteners are being illustrated below:



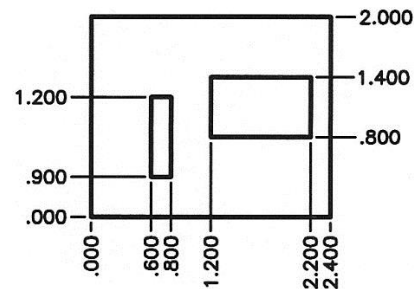
- A. Set screw heads
- B. Wood screw heads
- C. Rivet heads
- D. Key heads
- E. Cotter pin heads

18. Identify the pitch of the thread illustrated below:



- A. 1/4
- B. 1/8
- C. 1/10
- D. 1/12
- E. 1/16

19. Assume the proportion is correct, and identify the ONE dimension value that is therefore obviously incorrect.

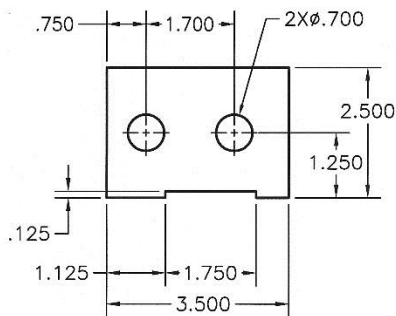


- A. .800
- B. .900
- C. 1.200
- D. 2.000
- E. 2.200

20. _____ dimensioning is a term applied to dimensions that feature both a metric and inch value. The values are shown for some, if not all, dimensional values in the drawing.

- A. Bracket
- B. Dual
- C. Limit
- D. Tolerance
- E. Metrical

21. As defined by ASME Y14.2M-2008 (Line Conventions and Lettering), the dimensioned drawing below contains _____ extension lines.

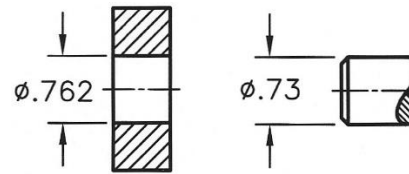


- A. 1
- B. 2
- C. 10
- D. 12
- E. 16

22. While general tolerancing is applied as a dimensional range for individual measurements, _____ tolerancing is a system for specifying variance in form, shape, or orientation, such as flatness, roundness, and parallelism.

- A. geometric
- B. oriental
- C. metrical
- D. surface
- E. positional

23. As dimensioned and toleranced, what is the tightest relationship between these two mating parts?



.X	= ±.1
.XX	= ±.01
.XXX	= ±.005

- A. .008" clearance
- B. .017" clearance
- C. .020" clearance
- D. .027" clearance
- E. .031" clearance

24. What area of study in engineering graphics would be useful for the design of a small box for raisins?



- A. prismations
- B. auxiliary views
- C. developments
- D. displacement diagrams
- E. schematics

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

TWO
OBLIQUE
SURFACES

25. NUMBER OF LINE SEGMENTS:
A. 13 B. 14 C. 15 D. 16 E. 17

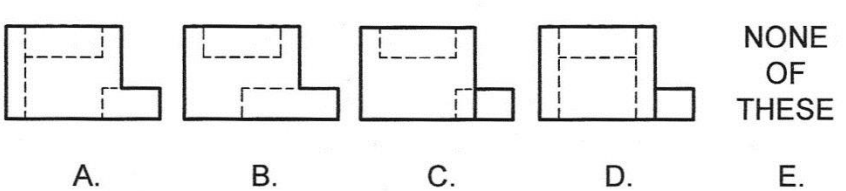
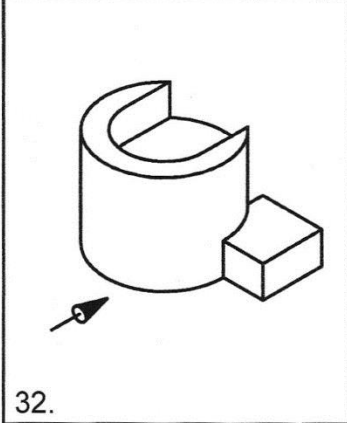
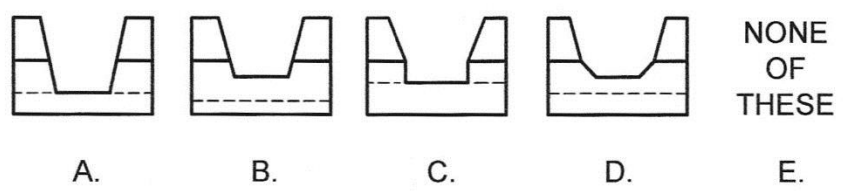
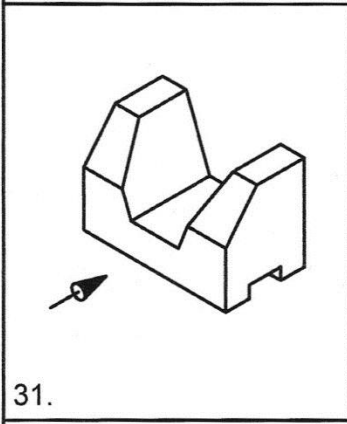
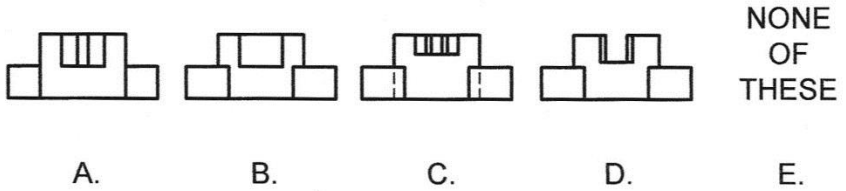
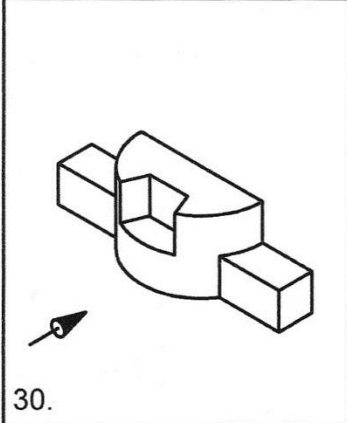
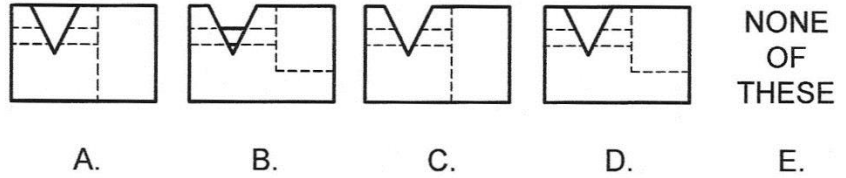
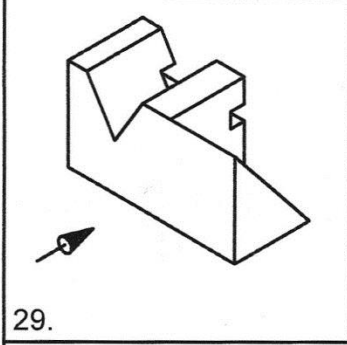
26. NUMBER OF LINE SEGMENTS:
A. 24 B. 26 C. 28 D. 30 E. 32

**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**

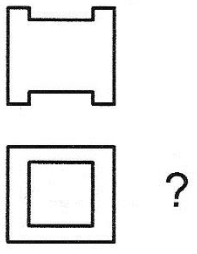
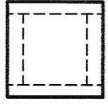
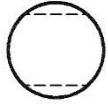
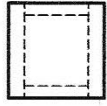
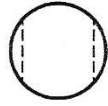
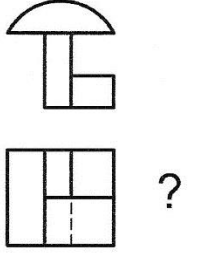
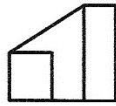
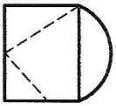
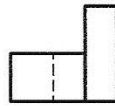
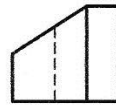
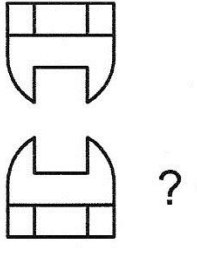
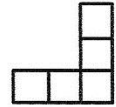
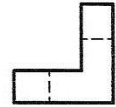
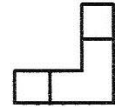
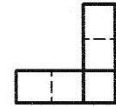
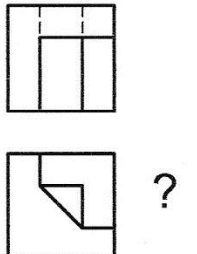
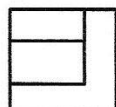
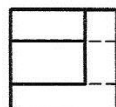
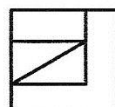
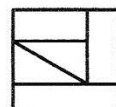
27. MINIMUM NUMBER OF LINES:
A. 5 B. 6 C. 7 D. 8 E. 9

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

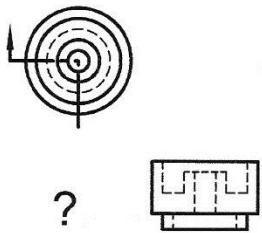

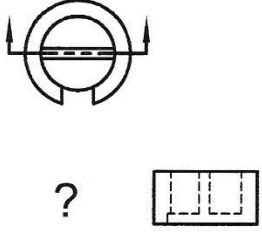
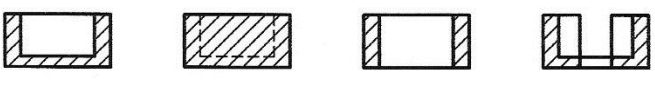
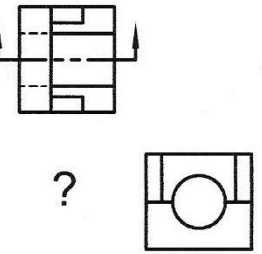
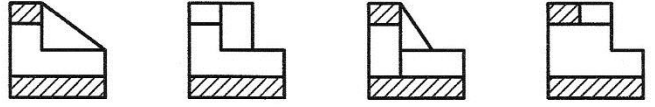
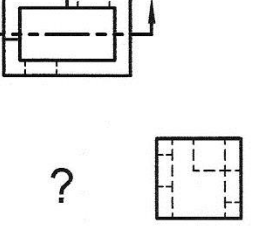

FOR EACH PROBLEM ON THIS PAGE, SELECT A FRONT VIEW
 NOTE: CENTER LINES OMITTED ON THIS TEST



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

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