



## 2014 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

Mary Weaver, 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!**

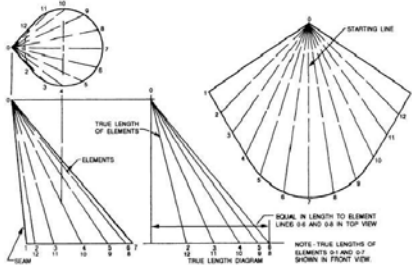
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WYSE – Academic Challenge  
Engineering Graphics Test (State) - 2014

1. What would be an appropriate title for the illustration below?



- A. Diagramming the volume of a cone  
B. Construction of a parabola  
C. The development of a cone  
D. Secondary auxiliary view projection  
E. Spotlight hotspot/falloff diagram

2. With an assembly of parts, a worst-case maximum and minimum values as a result of several dimensions and tolerances between two or more features (on two or more parts) is often referred to as a tolerance \_\_\_\_\_.

- A. mosaic  
B. stackup  
C. zone  
D. metric  
E. result

3. While 45° section lines spaced about 1/8" apart are used for general purpose "hatching", they can also be used to specify what material?

- A. Steel  
B. Bronze  
C. Zinc  
D. Titanium  
E. Cast iron

4. The 3D *block lettering* shown below was drawn utilizing the principles of \_\_\_\_\_ projection.



- A. oblique  
B. isometric  
C. one-point perspective  
D. trimetric  
E. two-point perspective

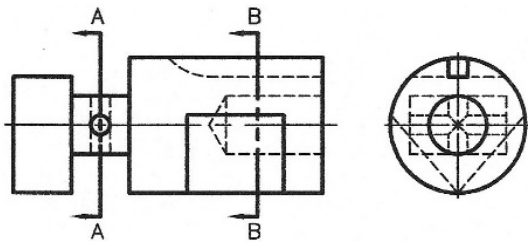
5. If a drawing of a new 24" x 24" x 24" packaging crate for shipping padlocks needs to exhibit a front view and top view, and can be placed on C-size (17" x 22") paper in *portrait* mode, which of the following scales would allow the two views to be drawn as large as possible, and still have about 3 inches around each view?

- A. 1:1  
B. 1:2  
C. 1:4  
D. 1:8  
E. 1:10

6. With respect to engineering graphics and various standards, what is standardized as A0, A1, A2, A3, and A4?

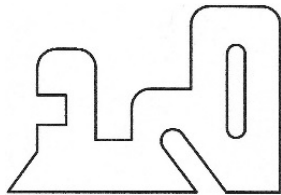
- A. Drafting pencils  
B. CAD layers for border lines  
C. Metric thread tolerances  
D. International paper sizes  
E. Font definitions for engineering text

7. How many "bounded areas" will need to be hatched for section A-A?



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

8. How many "tangency points" can be identified in the gasket shape illustrated below?

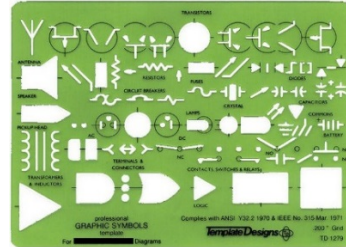


- A. 8
- B. 10
- C. 12
- D. 14
- E. 16

9. If a hexagon is inscribed within a 2" diameter circle, then which of the following statements is TRUE?

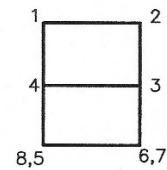
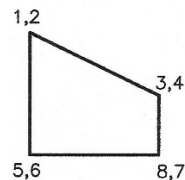
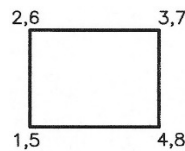
- A. "Across the corners" measurement of the hexagon is 2"
- B. "Across the flats" measurement of the hexagon is 2"
- C. Sides of the hexagon are 2" each
- D. "Across the flats" measurement of the hexagon is 1.5"
- E. Sides of the hexagon are 1.5" each

10. Before CAD programs and 3D modeling, the specialized drafter created schematic diagrams and drawings with instruments and equipment, including templates. What type of specialized drafting benefited from the template pictured below?



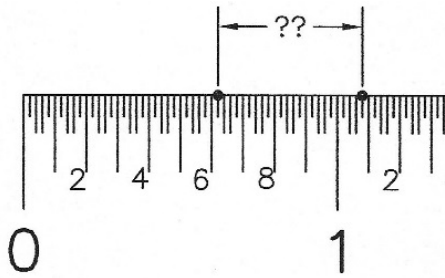
- A. Hydraulics/pneumatics diagrams
- B. Welding drawings
- C. Piping drawings
- D. Architectural details
- E. Electronics diagrams

11. The technique of corner numbering is often used in engineering graphics education. In the "point view of a line", the closest endpoint number should come first (i.e. 1,5 in the top view shown below). How many of the corners in the three views below are incorrectly labeled?



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

12. What distance is indicated by the dimension in the illustration below?



- A. .23"
- B. .46"
- C. 1.08"
- D. 1.8"
- E. 4.6"

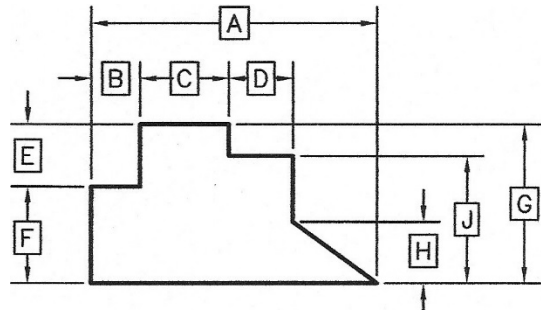
13. With respect to scaling, there are two categories of CAD entities. One is the **model** lines, or objects, that are drawn, or modeled, full size. The other is \_\_\_\_\_, which have to be scaled (sometimes automatically by the CAD program) with respect to the model in order to be readable when output to paper or the screen.

- A. groups
- B. templates
- C. annotations
- D. gadgets
- E. constraints

14. If a dimension has two numbers for every dimension, one explanation is that the drawing exhibits \_\_\_\_\_ method tolerance expression.

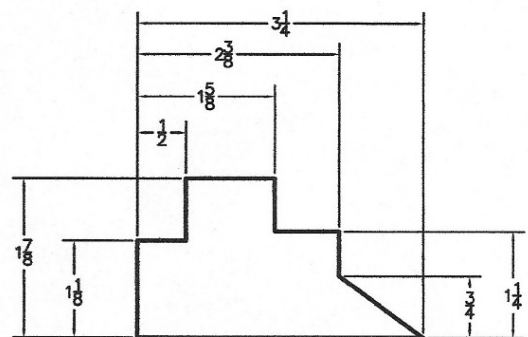
- A. limit
- B. metric
- C. statistical
- D. quality
- E. allowance

15. Which of the following dimensions could be removed from the drawing, since it could be considered superfluous?



- A. Dimension A
- B. Dimension B
- C. Dimension E
- D. Dimension H
- E. Dimension J

16. What dimensioning term is featured in the dimensioned shape shown below?

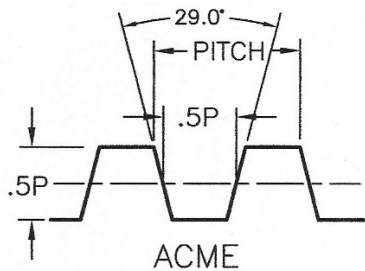


- A. Geometric tolerancing
- B. Location dimensioning
- C. Superfluous dimensioning
- D. Coordinate dimensioning
- E. Baseline dimensioning

17. The principles of orthographic projection are usually explained with three projection planes, *Frontal*, *Horizontal*, and *Profile*. If a surface is perpendicular with the **horizontal** plane, what is its relationship to the other two planes?

- A. It may be inclined to one of the other planes, but not both
- B. It may be parallel to both of the other planes
- C. It will be perpendicular to all three planes
- D. It may be parallel to one of the other planes, but not both
- E. None of the above statements are valid.

18. A thread note for Acme threads indicates 2- 4 ACME-LH. Based on the thread form illustration below, what is the thread depth?

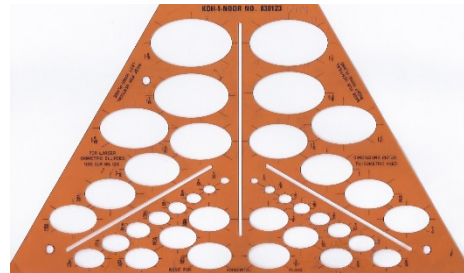


- A. 1/8"
- B. 1/4"
- C. 1/2"
- D. 3/4"
- E. 1"

19. International drawings most often incorporate first angle projection for orthographic drawings. What is one characteristic of a drawing that has been created with first angle projection?

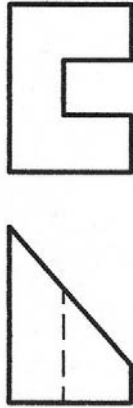
- A. The hidden line dashes are much longer
- B. There are no center lines used
- C. The linework will all be the same thickness
- D. The drawing will not have a right side view, but rather a left side view
- E. The top view will be "below" the front view

20. Before CAD programs and 3D modeling, the drafter created pictorials drawings with instruments and equipment, including templates. What type of pictorial drawing benefited from the template pictured below?



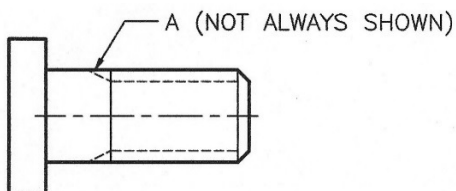
- A. Oblique
- B. One-point perspective
- C. Isometric
- D. Two-point perspective
- E. Dimetric

21. How many hidden lines will there be in a **full** primary auxiliary view of the object, projected in such a way as to show the true size and shape of the inclined surface?



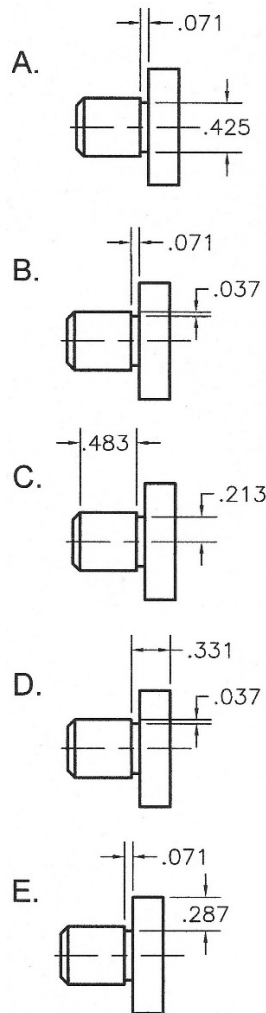
- A. None
- B. 1
- C. 2
- D. 3
- E. 4

22. Newer standards indicate that simplified representation of threads may also incorporate some beveled lines between the minor diameter of the thread, and the major diameter, as indicated at A. What do these lines represent, if shown?



- A. A chamfer
- B. A countersink
- C. The thread form angle
- D. Runouts
- E. Threaded portion less than full depth

23. What method of dimensioning the undercut on this part will best serve the manufacturing team?



24. On most CAD systems, what angle would be specified to draw a line that heads southwest toward 8 o'clock, 30° below horizontal?

- A. -30°
- B. 30°
- C. 150°
- D. 210°
- E. 330°

**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

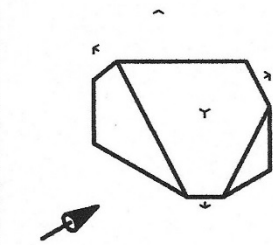
26. NUMBER OF LINE SEGMENTS:  
A. 10 B. 11 C. 12 D. 13 E. 14

**PROBLEMS 27 & 28: DIMENSION THE MULTIVIEW DRAWINGS  
SELECT AN ANSWER THAT REPRESENTS THE MINIMUM DIMENSIONS REQUIRED**

27. MINIMUM NUMBER OF DIMENSIONS:  
A. 16 B. 17 C. 18 D. 19 E. 20

28. MINIMUM NUMBER OF DIMENSIONS:  
A. 6 B. 7 C. 8 D. 9 E. 10

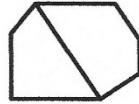
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 NOTE: CENTER LINES OMITTED ON THIS TEST



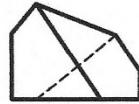
29.



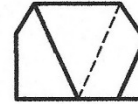
A.



B.



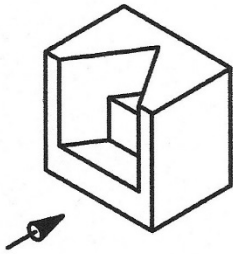
C.



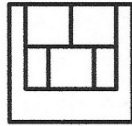
D.

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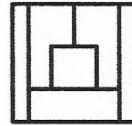
E.



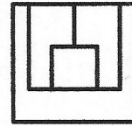
30.



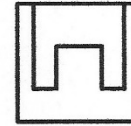
A.



B.



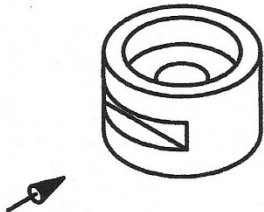
C.



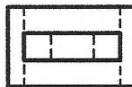
D.

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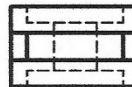
E.



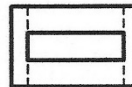
31.



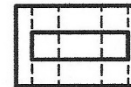
A.



B.



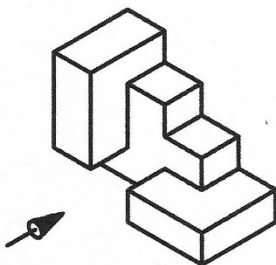
C.



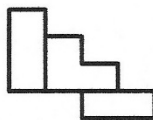
D.

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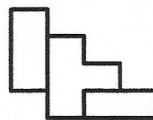
E.



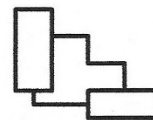
32.



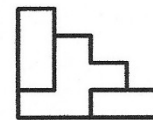
A.



B.



C.



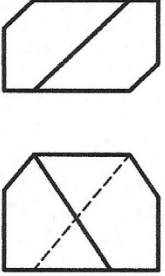
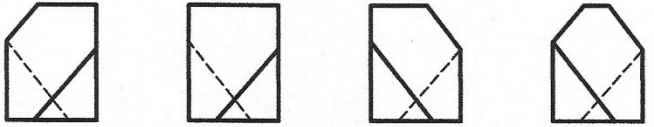
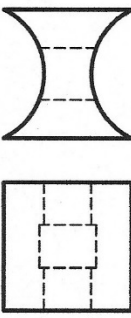

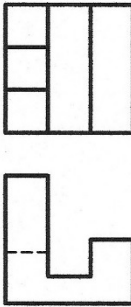
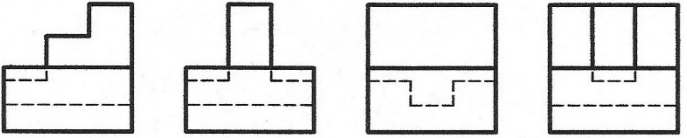
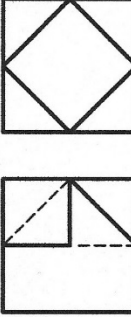
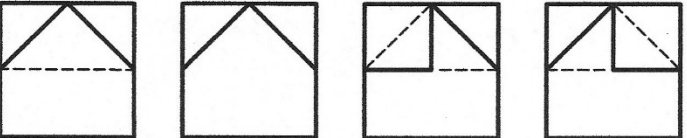
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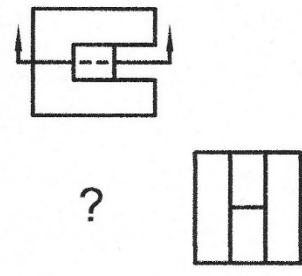
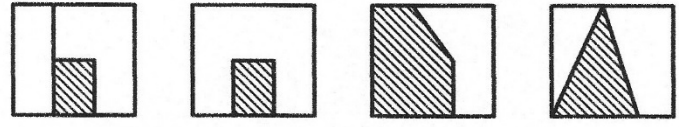
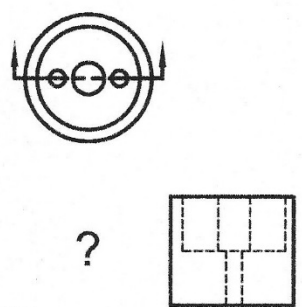
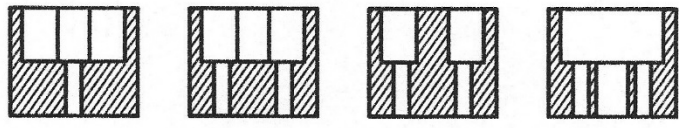
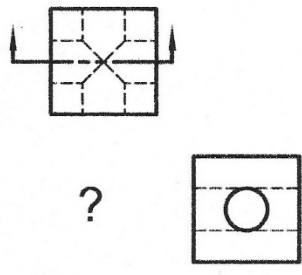
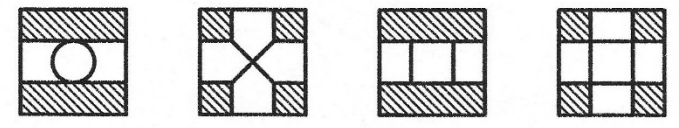
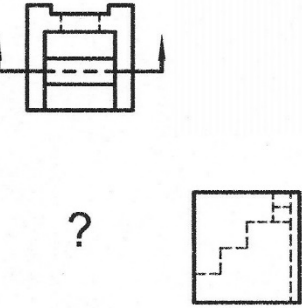
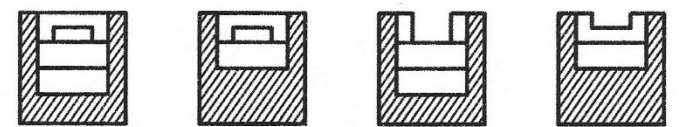
E.



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

<p>33.</p>  <p>?</p>	 <p>A.      B.      C.      D.      E.</p>
<p>34.</p>  <p>?</p>	 <p>A.      B.      C.      D.      E.</p>
<p>35.</p>  <p>?</p>	 <p>A.      B.      C.      D.      E.</p>
<p>36.</p>  <p>?</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>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>