



2018 Academic Challenge

ENGINEERING GRAPHICS TEST – REGIONAL

– This Test Consists of 40 Questions –

Engineering Graphics Test Production Team

Ryan K. Brown, Illinois State University – Author/Team Leader

Mark Laingen, Illinois State University – Reviewer

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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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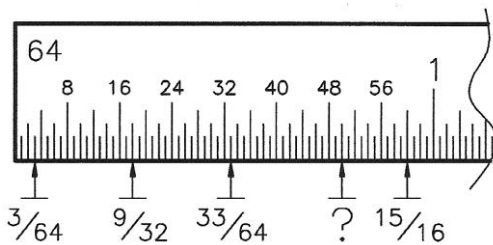
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WYSE – Academic Challenge
Engineering Graphics Test (Regional) – 2018

1. Select the best four words to fill in the blank for the sentence below:
Professional drafters _____ engineers and manufacturers.
- A. design several things for
 - B. have more education than
 - C. create preliminary sketches for
 - D. bridge the gap between
 - E. used to work for

2. In 1959, the standard definition of the inch was redefined, and is now derived from SI units. The imperial inch is now defined as exactly _____ meters.
- A. 254.0
 - B. 25.40
 - C. 2.540
 - D. 0.254
 - E. .0254

3. Identify the measurement at the question mark arrow.



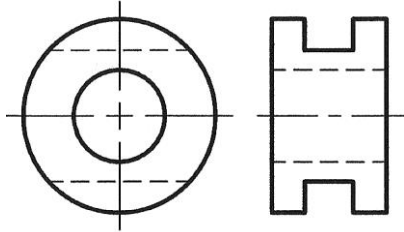
- A. 5/8"
- B. .440"
- C. 25/32"
- D. .625"
- E. 11/16"

4. If the "across the flats" measurement for a hex-head bolt is 1-1/2", what is the radius of the circle about which the hexagon is circumscribed?
- A. .250"
 - B. .500"
 - C. .667"
 - D. .750"
 - E. 1.500"

5. Two circles, each with a radius of 1", are located 4" apart (center-to-center). If the designer wishes to construct a 3" radius circle **tangent** to those two circles, but with the stipulation that both smaller circles are included within the new circle, how many options are there?
- A. 0
 - B. 1
 - C. 2
 - D. 3
 - E. 4

6. The formula $180^\circ(n-2)$, where n is the number of sides, is applied to the sum of all internal angles of a polygon. Therefore, the sum of all the angles of a **decagon** is _____.
- A. 1080°
 - B. 1260°
 - C. 1440°
 - D. 1620°
 - E. 1800°

7. In a multiview drawing, some lines represent the "maximum contour of a curved surface." In the drawing below, how many lines have that meaning?

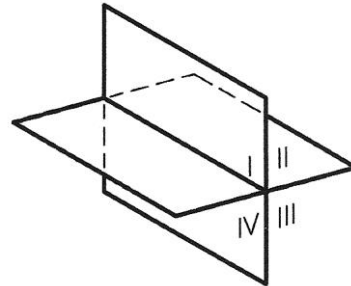


- A. 2
 B. 4
 C. 6
 D. 8
 E. 10
8. In multiview drawings, some lines represent the "edge view of a FLAT surface." In the previous illustration, how many lines (visible and/or hidden) have this meaning?

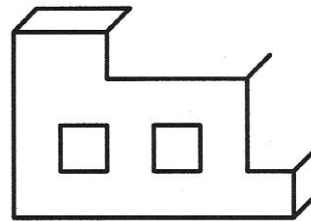
- A. 2
 B. 4
 C. 6
 D. 8
 E. 10

9. Which of the following projection systems below is a "subset" of orthographic projection?
- A. oblique projection
 B. axonometric projection
 C. 1-point perspective projection
 D. 2-point perspective projection
 E. 3-point perspective projection

10. The theory of orthographic projection defines "quadrants of space," as illustrated below. Which quadrant(s) of space is/are standard for ASME standard engineering drawings common in the United States?



- A. 1st and 2nd quadrants
 B. 3rd and 4th quadrants
 C. 1st quadrant only
 D. 2nd quadrant only
 E. 3rd quadrant only
11. Finish the **oblique** drawing of this block. It has two square "through" holes, and only one depth dimension. How many line segments are needed to finish the drawing?








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

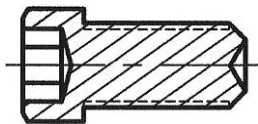
12. In engineering drawings, a section view that shows an object "cut in half" directly by a single flat cutting plane is referred to as a _____ section.

- A. full
- B. half
- C. broken
- D. single
- E. regular

13. Section lines can be created in patterns to represent different materials. Which of the "hatching" patterns illustrated below is for a "non-metallic" material?

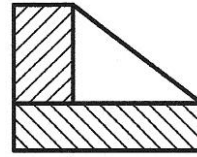
- A. 
- B. 
- C. 
- D. 
- E. 

14. Identify the type of fastener illustrated below:



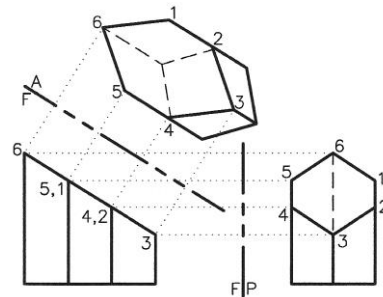
- A. Cotter pin
- B. Set screw
- C. Grease plug
- D. Woodruff key
- E. Threaded stud

15. For the section view illustrated below, identify a **FALSE** statement.



- A. The triangle might be a "rib" or "web", and thus is not section-lined.
- B. The object may be created by welding sub-parts together, (the section lines running at different angles indicate more than one part).
- C. The triangle might be a feature that is "behind" the cutting plane, and thus is not cut by the plane.
- D. The section lines may be general purpose section lines, and are not necessarily **cast iron**, which is also represented by that pattern.
- E. The object is obviously one cast (or molded) part.

16. In the illustration below, the auxiliary view was created with the help of reference lines that are also referred to as _____ lines. They are shown as thick phantom lines.



- A. key-in
- B. folding
- C. frontal
- D. profile
- E. horizontal

17. The following is quoted from an article found online in Wikipedia™: "The term **3D printing** originally referred to a process that deposits a binder material onto a powder bed with inkjet printer heads layer by layer. More recently, the term is being used in popular vernacular to encompass a wider variety of _____ techniques. United States and global technical standards use the official term _____ for this broader sense."

What two-word term fills both sets of blanks?

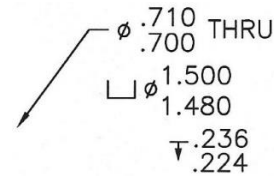
- A. computer modeling
- B. additive manufacturing
- C. routine prototyping
- D. stereo lithography
- E. material jetting

18. A table within a CAD file might have headings such as NAME, ON, FREEZE, LOCK, COLOR, LINETYPE, and more. What is the most likely information represented in the table?

Status	Name	On	Freeze	Lock	Color	Linetype	Lineweight
	0				<input type="checkbox"/> white	Continuous	Default
	BORDER				<input type="checkbox"/> white	Continuous	0.60 mm
	CENTER				<input checked="" type="checkbox"/> green	CENTER	0.25 mm
	HIDDEN				<input checked="" type="checkbox"/> green	HIDDEN	0.25 mm
	SECTION				<input type="checkbox"/> white	Continuous	0.25 mm
	TEXT				<input checked="" type="checkbox"/> yellow	Continuous	0.30 mm
	VISIBLE				<input checked="" type="checkbox"/> red	Continuous	0.50 mm

- A. History of the drawing steps
- B. Individual drawing entities
- C. Drawing layers
- D. Individual part files
- E. Symbols within a library

19. Identify the **TRUE** statement with respect to the values expressed in this local note callout.



- A. The depth diameter has the least amount of tolerance
- B. The counterbore has a **maximum material condition** of 1.500
- C. The counterbore diameter has the least tolerance
- D. The THRU hole has a **maximum material condition** of .700
- E. The hole tolerance could also be expressed as .700+/-0.005

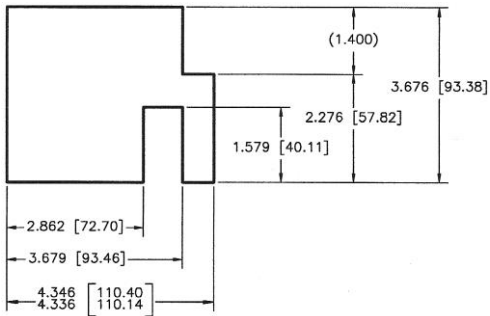
20. Which of the processes below is **least likely** to ever be described as a process for creating a non-threaded cylindrical hole in a metal part?

- A. Boring
- B. Tapping
- C. Punching
- D. Reaming
- E. Drilling

21. Most architectural drawings feature the dimensional numerals on the page in an **aligned** format. Most engineering drawings use the _____ system, wherein values are all horizontal.

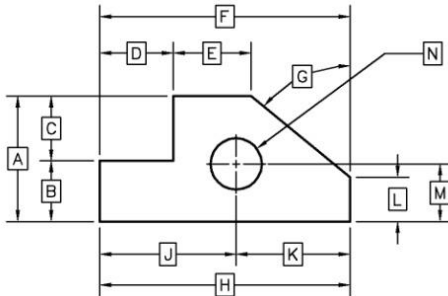
- A. unidirectional
- B. contour
- C. bidirectional
- D. linear
- E. polar

22. What aspect of engineering drawing dimensioning is NOT featured in the illustration below?



- A. Baseline dimensioning
- B. Dual dimensioning
- C. Limit method tolerance
- D. Reference dimension
- E. Arrowless dimensioning

23. For the illustration below, find a set of superfluous dimensions that could be deleted, leaving a properly dimensioned view:



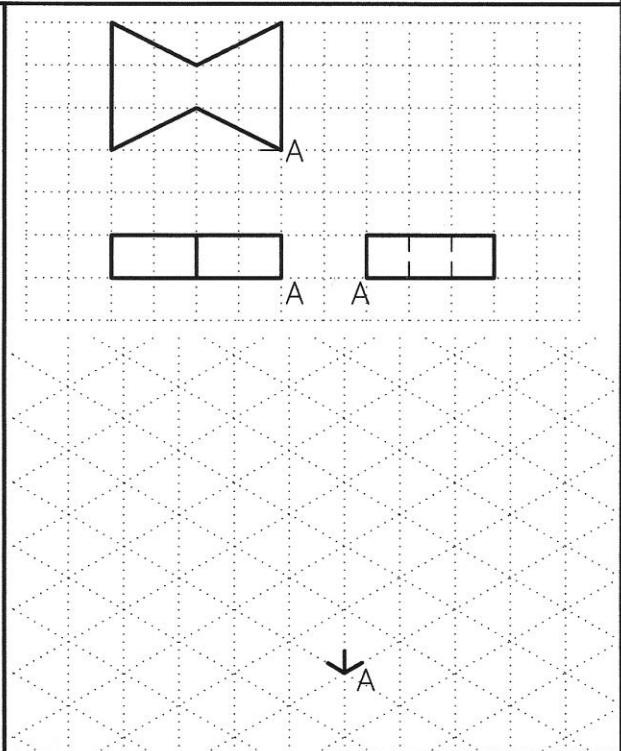
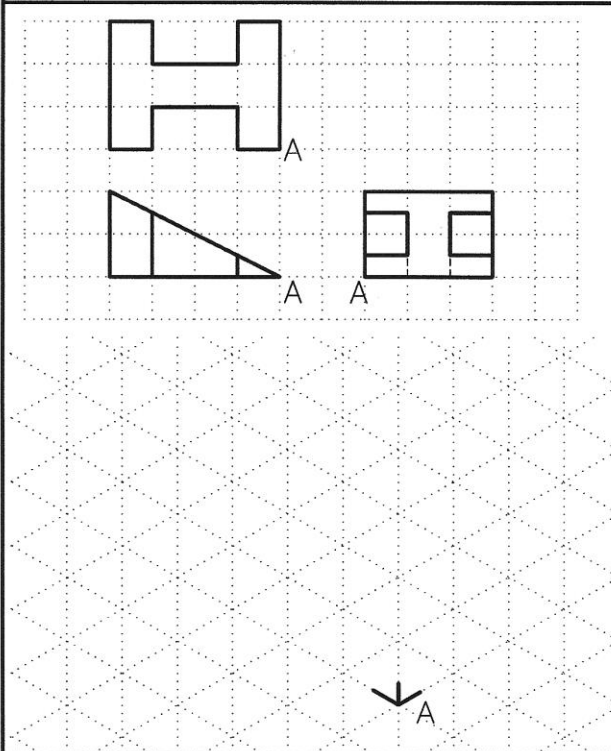
- A. E, G, & L
- B. J, K, & N
- C. B, F, J, & L
- D. A, F, & H
- E. D, E, & L

24. Identify the items in the illustration below:



- A. Dies for cutting threads
- B. Plugs for cutting keyways
- C. Cutters for a milling machine
- D. Guides for a drilling jig
- E. Ports for plastic molding

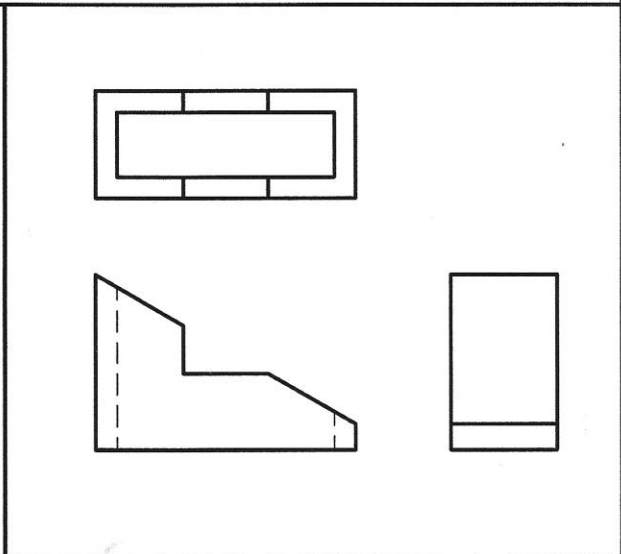
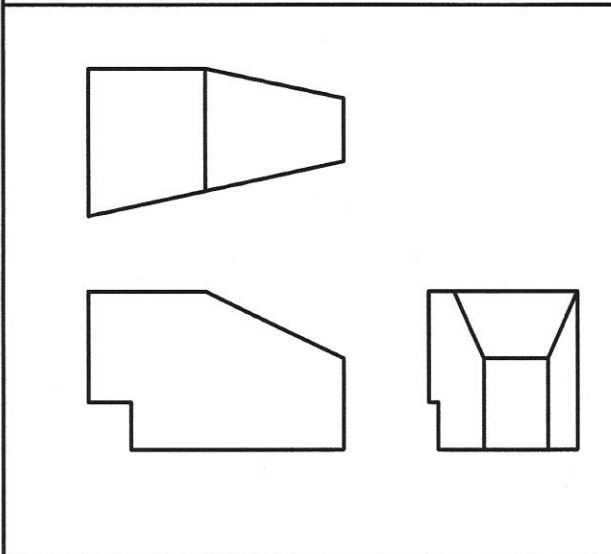
**PROBLEMS 25 & 26: CREATE ISOMETRIC SKETCHES
SELECT AN ANSWER THAT REPRESENTS THE NUMBER OF SEGMENTS REQUIRED**



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

26. NUMBER OF LINE SEGMENTS:
A. 12 B. 13 C. 14 D. 15 E. 16

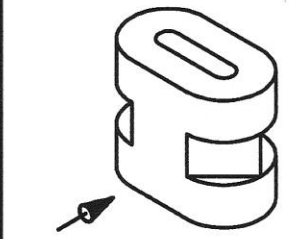
**PROBLEMS 27 & 28: MISSING LINE PROBLEMS: SELECT AN ANSWER THAT
CORRESPONDS WITH THE LEAST NUMBER OF LINE SEGMENTS (VISIBLE AND/OR
HIDDEN) STILL NEEDED TO CREATE A CORRECT AND VALID MULTIVIEW DRAWING**



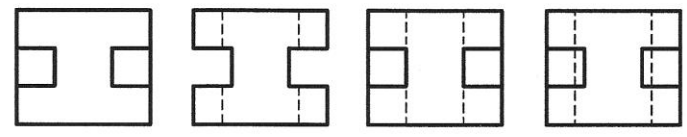
27. MINIMUM NUMBER OF LINES:
A. 3 B. 4 C. 5 D. 6 E. 7

28. MINIMUM NUMBER OF LINES:
A. 4 B. 6 C. 8 D. 10 E. 12

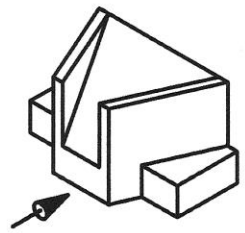
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 NOTE: CENTER LINES OMITTED ON THIS TEST



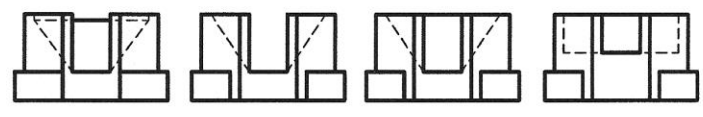
29.



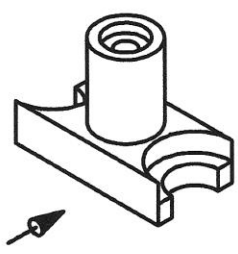
A. B. C. D. E. NONE OF THESE



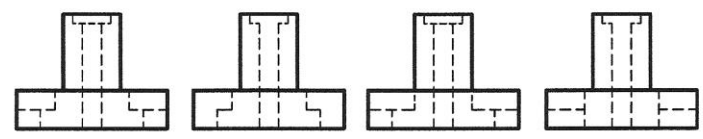
30.



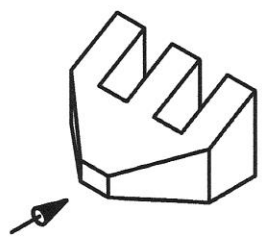
A. B. C. D. E. NONE OF THESE



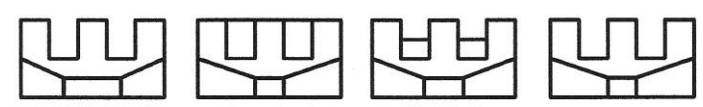
31.



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

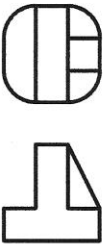


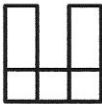
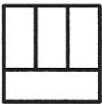
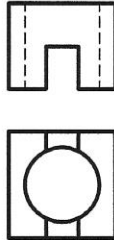
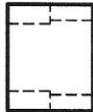
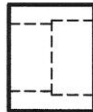

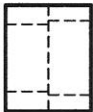
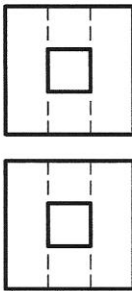
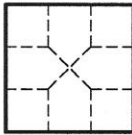
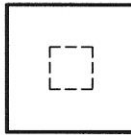
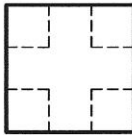
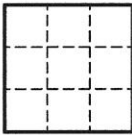



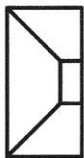



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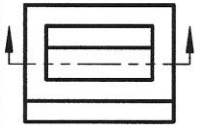


A. B. C. D. E. NONE OF THESE

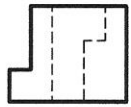
FOR EACH PROBLEM ON THIS PAGE, SELECT A SIDE VIEW
 NOTE: CENTER LINES OMITTED ON THIS TEST

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

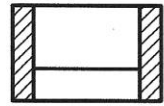
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 NOTE: CENTER LINES OMITTED ON THIS TEST



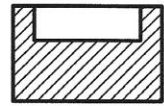
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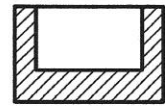
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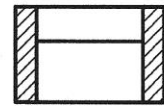
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B.



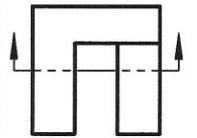
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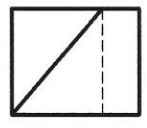
D.

NONE OF THESE

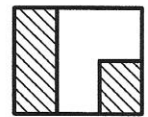
E.



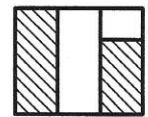
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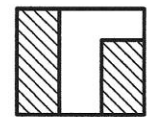
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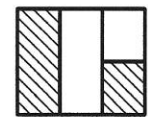
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B.



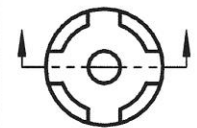
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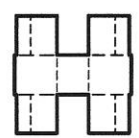
D.

NONE OF THESE

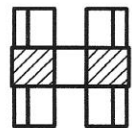
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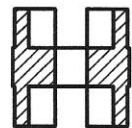
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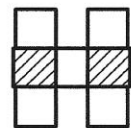
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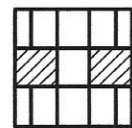
A.



B.



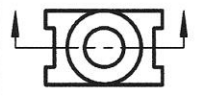
C.



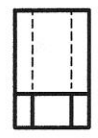
D.

NONE OF THESE

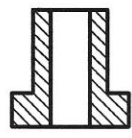
E.



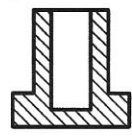
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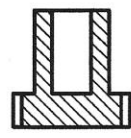
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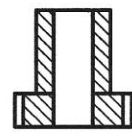
A.



B.



C.



D.

NONE OF THESE

E.