

Academic Challenge



EASTERN ILLINOIS UNIVERSITY

2019 Academic Challenge

ENGINEERING GRAPHICS TEST – STATE

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

Number of Questions: 40

DO NOT OPEN TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO!

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Academic Challenge
2019 State Engineering Graphics Exam

1. In the engineering system of paper sizes, which of these is NOT "double" or "half" of one of the other sizes?

A. F
B. E
C. D
D. C
E. B

2. Which answer choice is TRUE about a device such as the one shown below?

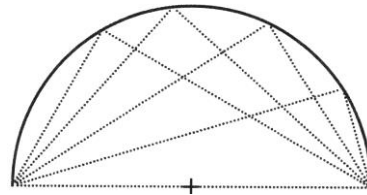


- A. Is also available with an electronic "readout" instead of a dial face
B. Can only measure "external" distances
C. Is only available for inches, not millimeters
D. Is a type of compass
E. Could appropriately be called a micrometer
3. Which of the following geometric shapes is incorporated into the design of gear teeth?
- A. Parabola
B. Ellipse
C. Hyperbola
D. Cycloid
E. Involute

4. The diameter of a half dollar coin is measured at 30.61mm. Which of the following diameters would be the optimal outside diameter for a storage tube for these coins made of 1/16" plastic?

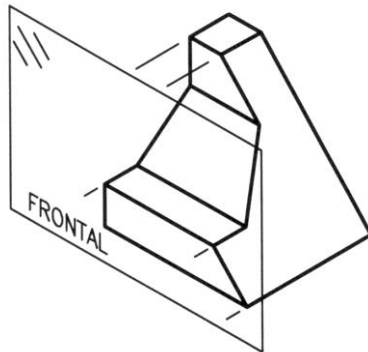
A. 31mm
B. 32mm
C. 33mm
D. 34mm
E. 35mm

5. A principle illustrated below is that triangles "inscribed" within a semi-circle will be _____ triangles.



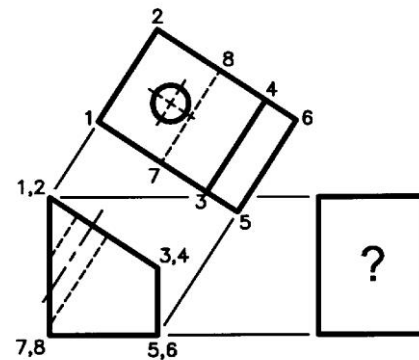
- A. equilateral
B. obtuse
C. acute
D. right
E. isosceles
6. Imagine [or sketch] a three-view (front, top & side) drawing of a 2" diameter sphere with a 1" diameter hole running through it from left to right, how many complete circles will there be in the drawing?
- A. 2
B. 3
C. 4
D. 5
E. 6

7. Considering ALL surfaces on the object illustrated below, how many will be represented **true size and shape** in the front view?



- A. 1
 B. 2
 C. 3
 D. 4
 E. 5
8. With respect to a design engineer who must consider how much tolerance to apply to critical dimensions, there are a few factors. Which of the following is **less** important than the others?
- A. Title block tolerances that are specified at +/- .005" for three-place precision unless otherwise noted
 B. The ability of machinists to work within the level of precision specified
 C. The possible increase in the cost of producing parts at the level of precision specified
 D. The risk of parts not functioning well if mating parts are too loose
 E. The risk of parts wearing out more quickly if the parts don't fit together well

9. The illustration below features an auxiliary view looking through a hole drilled perpendicular to the inclined surface, and corner vertices labeled as common to graphics education. With respect to the incomplete right side view, identify the **TRUE** statement below:



- A. A visible line segment for edge 5-6 is missing
 B. The hole intersecting onto surface 1-2-8-7 will appear as a hidden ellipse
 C. The rim of the hole on the inclined surface should appear as a visible circle
 D. Edge 3-4 will appear as a hidden line
 E. Surface 1-2-4-3 appears true size and shape

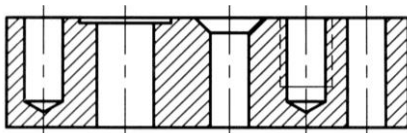
10. Imagine [or sketch] a three-view (front, top & side) drawing of a right pyramidal frustum with a 3" square base, a 1" square top surface, and 1" for the height. Which of the following statements is **TRUE**?

- A. All three views are identical
- B. There are four [4] hidden lines in the drawing
- C. There are 24 visible lines in the drawing
- D. None of the views are identical
- E. There are eight [8] lines in the drawing that are inclined 45°

11. Which of the following processes is exclusively for plastic parts?

- A. Heat Treating
- B. Injection Molding
- C. Extruding
- D. Casting
- E. Thread Rolling

12. What term describes the method of representation for the threaded hole featured in the illustration below?



- A. Simplified
- B. Schematic
- C. Spotface
- D. Reamed
- E. Detailed

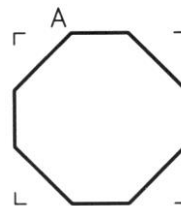
13. Isometric drawings are based on the principles of isometric projection. A projection is technically a view of an object that has been rotated 45° and tilted 35.26°. Identify the **FALSE** statement about an isometric projection of a 2" cube with two 1" diameter through holes:

- A. All the surfaces will have the same **size** and **shape** (except for the hole shape on some surfaces).
- B. All ellipses, if seen, will be the same **size** and **shape**.
- C. All edge measurements of the cube will be the same.
- D. All axes (height, width, and depth) will be 30° apart.
- E. The measurements of the "projection" are smaller than the measurements of an isometric drawing of the same cube.

14. The octagon shape shown below was drawn with a CAD system using relative Cartesian coordinate input syntax of " $=x,y$ ". After starting at point A, relative coordinates were used to draw counter-clockwise, and the user keyed in:

$=-1,-1; =0,-1; =1,-1; =1,0; etc.$

Based on this explanation, what is the area of this shape?

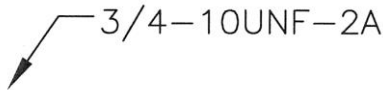


- A. 5 in²
- B. 6 in²
- C. 7 in²
- D. 8 in²
- E. 9 in²

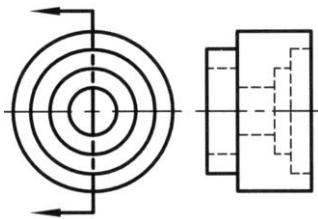
15. What name applies to the lettering below, as found in the lower corner of the engineering drawing?

**BREAK ALL CORNERS R.031 MAX
UNLESS OTHERWISE SPECIFIED**

- A. General note
B. Surface quality specification
C. Local note
D. Reference dimension
E. Welding specification
16. Which question **cannot** be answered by analyzing the thread note illustrated below:

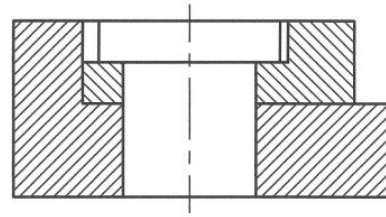


- A. Is the thread a reverse thread?
B. What is the pitch?
C. Is the thread internal or external?
D. What is the minor diameter?
E. What is the thread form?
17. If the side view of this drawing is converted into a full section view, how many *bounded areas* will the new sectional view have that need section lines (hatching)?



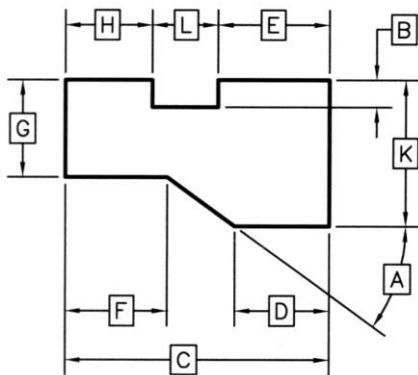
- A. 2
B. 3
C. 4
D. 5
E. 6

18. Which of the following can be determined by looking at the sectional view below?



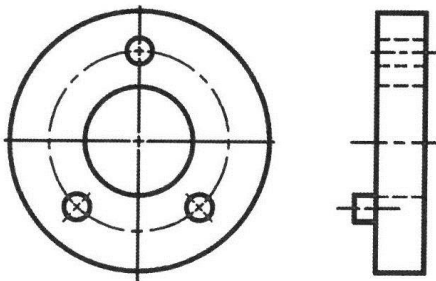
- A. There are two counterbores
B. The design is comprised of more than one part
C. The parts are made of brass
D. The larger part is cylindrical
E. One hole features a countersink
19. According to an engineering website, www.concurrent-engineering.co.uk, newer 3D CAD modeling methods are allowing designers to interact directly with the geometry of the model by such manipulative means as **pushing, pulling, or twisting**. This method is referred to as _____ modeling.
- A. parametric
B. direct
C. surface
D. wireframe
E. rapid

20. How many of the following dimensions should be removed from this drawing to eliminate superfluous dimensioning?



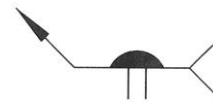
- A. 0
- B. 1
- C. 2
- D. 3
- E. 4

21. Based on standard dimensioning practice, how many dimensions should be placed on the right side view of this part? (Note: consider the cylinder rule.)



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

22. Which chapter in an engineering graphics text would address the graphic illustration below?

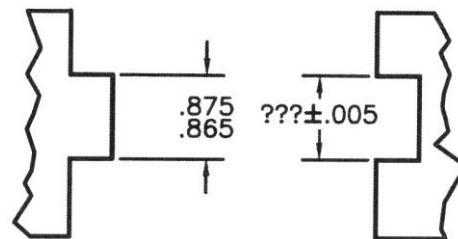


- A. Surface Quality Specifications
- B. Threads and Fasteners
- C. Sectional Views
- D. Developments and Intersections
- E. Welding Specifications

23. The design and manufacture of various objects requires a broad understanding of geometric constructions, as well as various materials and processes. What area of study would greatly benefit the designer of a sheet metal casing for a computer workstation?

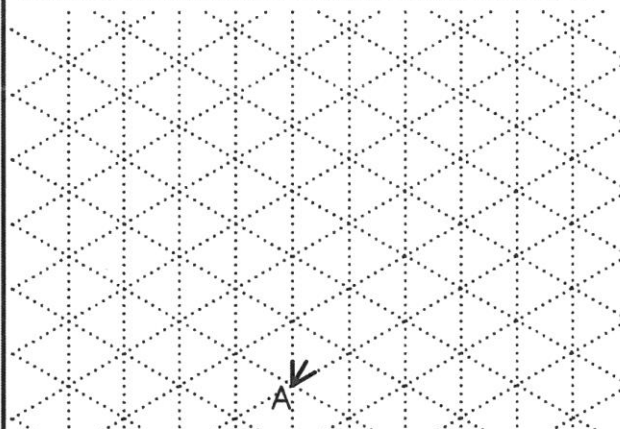
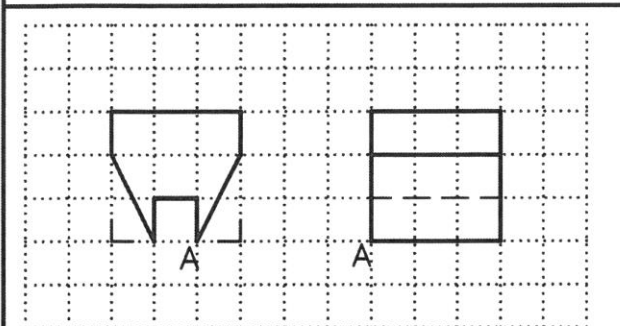
- A. Injection molding
- B. Metal lathe-work
- C. Fillet welding
- D. Woodruff keys and keyways
- E. Developments

24. What basic size should be specified for the slot illustrated below so that it will have a clearance range of .006" to .026" with the tab?

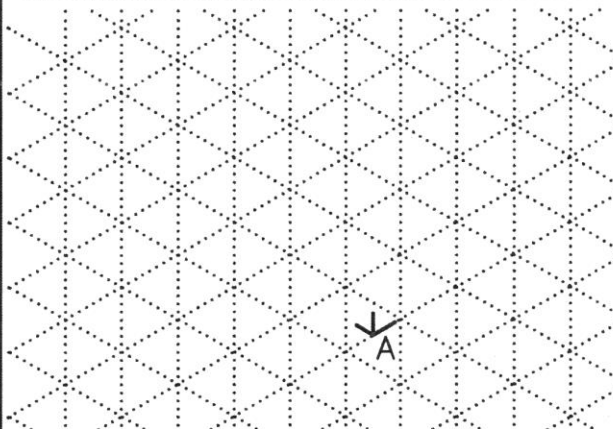
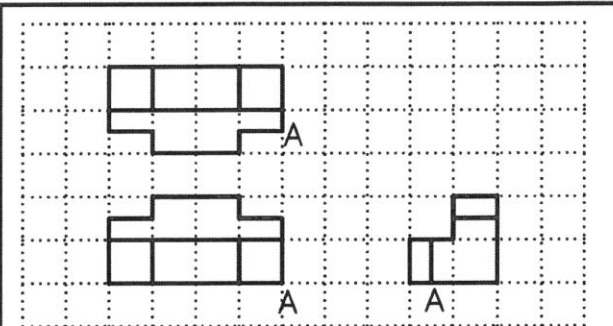


- A. .886
- B. .881
- C. .871
- D. .891
- E. .901

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

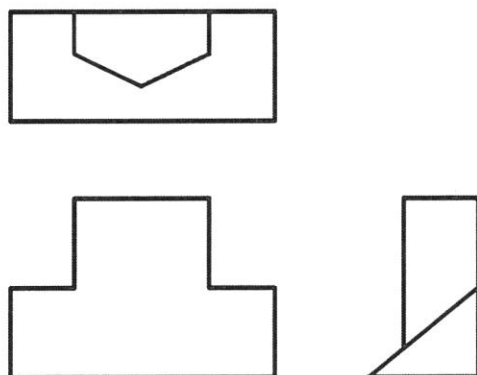


25. NUMBER OF LINE SEGMENTS:
 A. 14 B. 15 C. 16 D. 17 E. 18

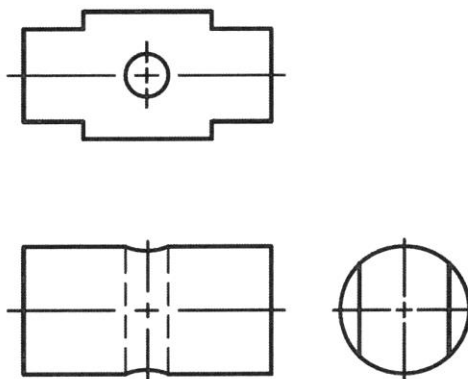


26. NUMBER OF LINE SEGMENTS:
 A. 27 B. 29 C. 31 D. 33 E. 35

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

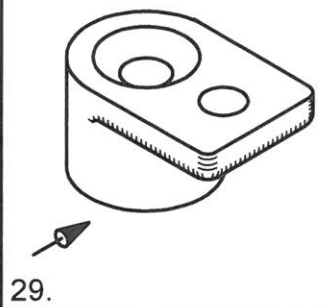


27. MINIMUM NUMBER OF LINES:
 A. 2 B. 4 C. 6 D. 8 E. 10

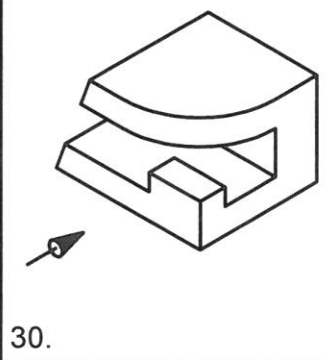


28. MINIMUM NUMBER OF LINES:
 A. 2 B. 4 C. 6 D. 8 E. 10

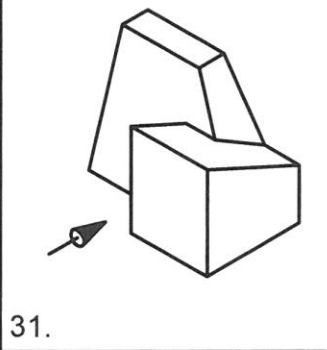
FOR EACH PROBLEM ON THIS PAGE, SELECT A FRONT VIEW
NOTE: CENTER LINES OMITTED ON THIS TEST



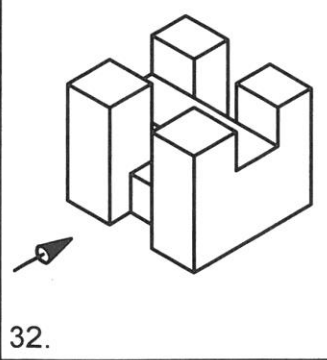
- A.
- B.
- C.
- D.
- E. NONE OF THESE



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

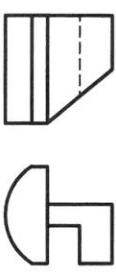
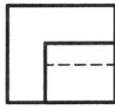

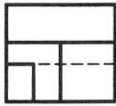
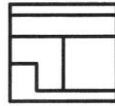
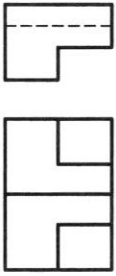




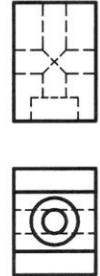
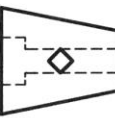
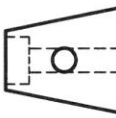
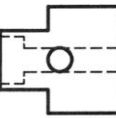
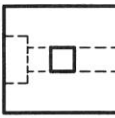
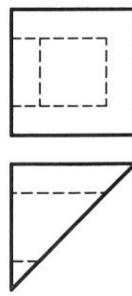



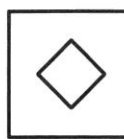


- A.
- B.
- C.
- D.
- E. NONE OF THESE




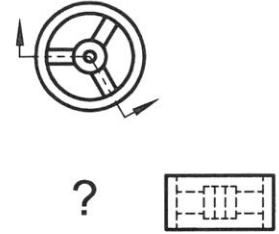
- A.
- B.
- C.
- D.
- E. NONE OF THESE

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

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

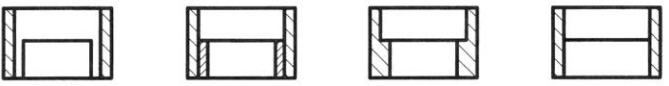
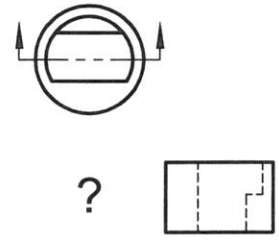
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NOTE: CENTER LINES OMITTED ON THIS TEST

37.



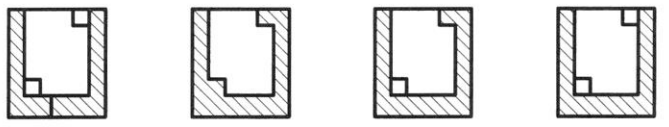
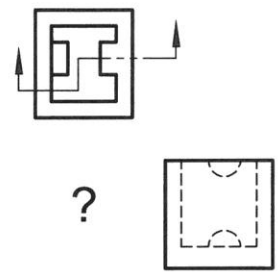
A. B. C. D. E. NONE OF THESE

38.



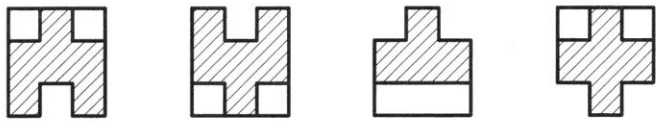
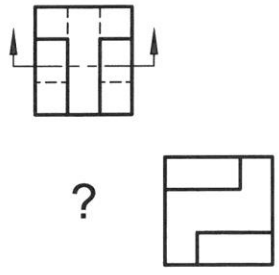
A. B. C. D. E. NONE OF THESE

39.



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

40.



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

