

ACADEMIC CHALLENGE FOR
ACES
ENGINEERING AND SCIENCE



EASTERN ILLINOIS UNIVERSITY

2020 Academic Challenge

ENGINEERING GRAPHICS TEST – REGIONAL

Engineering Graphics Test Production Team

Ryan Brown, Illinois State University – Author/Team Leader

Ted Branoff, Illinois State University – Reviewer

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!

©2020 Eastern Illinois University

All rights reserved

Academic Challenge
2020 Regional Engineering Graphics Exam

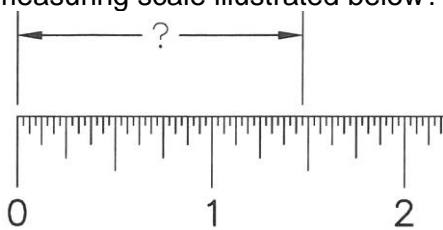
1. This Academic Challenge test is more related to _____ engineering than other types of engineering.

- A. electrical
- B. aerospace
- C. civil
- D. chemical
- E. mechanical

2. Model cars are commonly produced at 1/25th scale. What would be the closest approximate length of a 2019 MINI Cooper model, given the real-life bumper-to-bumper distance is 3,821mm?

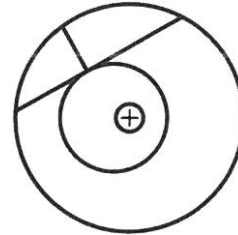
- A. 4.78"
- B. 5.37"
- C. 6.02"
- D. 6.89"
- E. 7.25"

3. What distance is indicated on the measuring scale illustrated below?



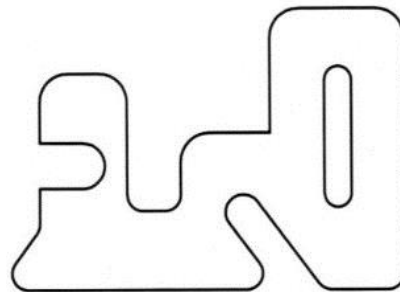
- A. 1-7/16"
- B. 1-15/16"
- C. 1-3/8"
- D. 1-31/64"
- E. 1-15/32"

4. Which of the terms below is not featured in the illustration below?



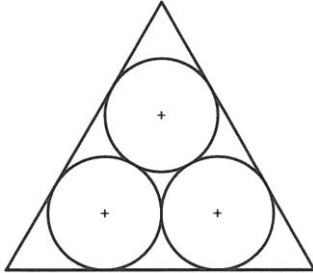
- A. Parallelism
- B. Concentricity
- C. Eccentricity
- D. Perpendicularity
- E. Tangency

5. How many 180° degree arcs are featured in the gasket shape illustrated below?



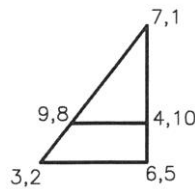
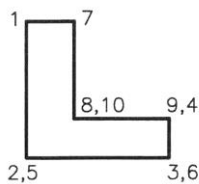
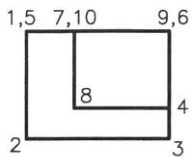
- A. 1
- B. 2
- C. 3
- D. 4
- E. 5

6. How many line segments are required to connect all the tangency points in the graphic design below, beginning from, and returning to, the same point, and making sure no line segments cross?



- A. 3
- B. 6
- C. 9
- D. 12
- E. 15

7. If the vertex numerals are correct for the front and side views, which set of top view numerals are **incorrect**?



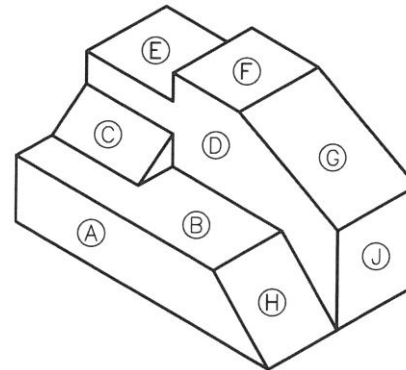
- A. 4 & 10
- B. 5 & 6
- C. 8 & 9
- D. 4 & 9
- E. 1 & 7

8. The following is similar to a test item from the **Purdue Visualization of Rotations** test. Select the correct answer:



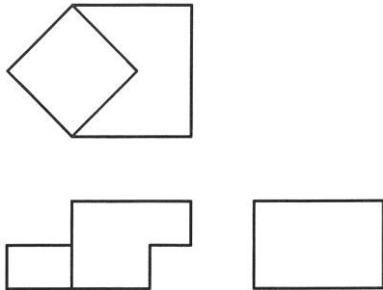
- A.
- B.
- C.
- D.
- E.

9. For the object illustrated below, WITH surface 'A' parallel with a frontal plane, identify the **FALSE** statement with respect to how the identified surfaces appear in the **FRONT** view.



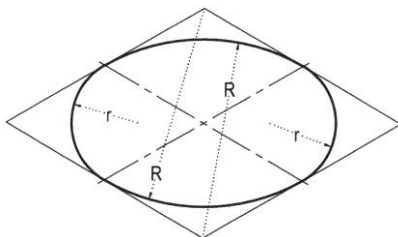
- A. Surface D is true size and shape
- B. Surface J appears simply as a line
- C. Surface C is foreshortened
- D. Surface B appears simply as a line
- E. Surface G is foreshortened

10. Each view is missing one or more lines. To correct the views with the least amount of line segments will require ____ more visible segment(s) and ____ hidden segments.



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

11. One method of creating an ellipse for isometric drawings is called the _____ method.

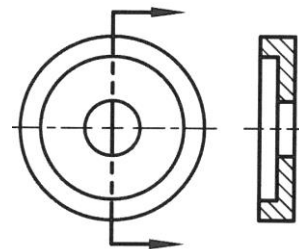


- A. two radius
- B. four center
- C. perpendicular bisector
- D. diamond box
- E. approximate curve

12. Which type of section view most likely incorporates the use of a short break line?

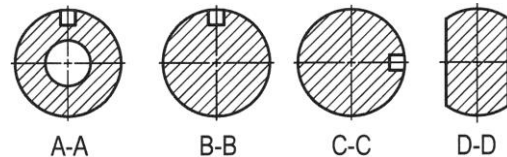
- A. Broken-out section
- B. Aligned section
- C. Removed section
- D. Offset section
- E. Half section

13. What is wrong with the illustration below?



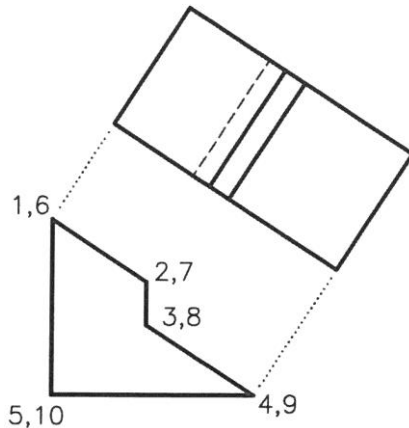
- A. Arrows are pointing the wrong way
- B. Cutting plane line is too thick
- C. Section lines should be drawn as thick as the visible lines
- D. Cutting plane line dash pattern is incorrect
- E. Section lines should be rotated 90°

14. What area of engineering graphics would describe the collection of views illustrated below?



- A. Conventional breaks
- B. Removed sections
- C. Schematic threads
- D. Keyway standards
- E. Aligned sections

15. Which of the line segments identified by vertex numerals would **NOT** be TRUE LENGTH in the auxiliary view?



- A. 1-2
 B. 8-9
 C. 3-4
 D. 2-7
 E. 6-10
16. Within a company handbook that sets forth engineering graphics standards, what topic would likely be connected to the chart depicted below?

VIS	RED	.6mm	CONTINUOUS
HID	GREEN	.3mm	HIDDEN
CEN	CYAN	.3mm	CENTER
SEC	WHITE	.3mm	CONTINUOUS
CUT	GREY	.6mm	PHANTOM

- A. Font sizes and types
 B. File name prefixes
 C. Layer standards
 D. Dimensioning styles
 E. Sectional hatching patterns

17. Within the acronym CAD, if the 'D' represents aspects of engineering such as creation, modification, analysis, and optimization for increasing productivity, then the most appropriate 'D' word is _____.

- A. design
 B. drawing
 C. drafting
 D. diagnosis
 E. diagrams

18. In the area of manufacturing processes, what is the name of the device illustrated below?



- A. Collet
 B. Broach
 C. Die
 D. 3-Jaw chuck
 E. Injection mold
19. Compare thread A's thread note of 9/16-12UNC-2A with thread B's thread note of 9/16-18UNF-2B, and then identify the **FALSE** statement:
- A. A has a pitch of .083
 B. B has a pitch of .056
 C. B is an internal thread
 D. A & B have the same major diameter
 E. A & B have different thread forms

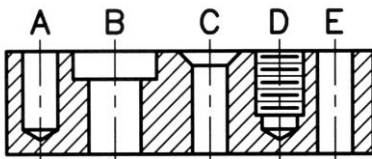
20. Which of the thread notes below indicates the greatest *pitch*?

- A. #10-32UNF-2A
- B. 1/4-32UNEF-2B
- C. #6-40UNF-1A
- D. 5/8-11UNC-1B
- E. 3/8-16UNC-3B

21. In engineering drawings, there can be occasions where a dimension is added for reference purpose, but it is not to be used for manufacturing or quality control [i.e. inspection]. How is a reference dimension to be expressed?

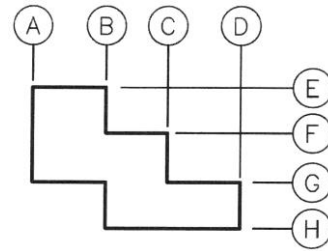
- A. Underline the numeral value
- B. Place the numeral value in parentheses
- C. Use circles instead of arrows
- D. The numeral is to be italicized
- E. The numeral is to be in a box

22. Which of the answer choices does not match the corresponding hole in the illustration below?



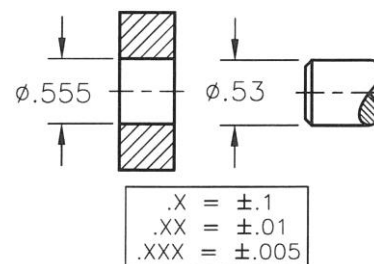
- A. blind hole
- B. spotface
- C. countersink
- D. blind tapped hole
- E. through hole

23. With respect to dimensioning this shape, which of the following is a **TRUE** statement?



- A. Six [6] dimensions are required for this shape, assuming the lower left notch aligns with B and G
- B. A dimension from A to D, if used, must be placed below the view
- C. Three *baseline* dimensions are required from top to bottom, and they are H to G, H to F, and H to E
- D. A dimension from E to H, if used, must be placed on the left side of the view
- E. Two sets of *chain* dimensions are required for this shape

24. What are the *limits of fit* for the mating parts illustrated below?



- A. .015-.025
- B. .020-.050
- C. .010-.040
- D. .015-.030
- E. .010-.045

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

Isometric sketching area with a diamond grid. A cutting plane A-A is shown at the bottom center of the grid.

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

Isometric sketching area with a diamond grid. A cutting plane A-A is shown at the bottom center of the grid.

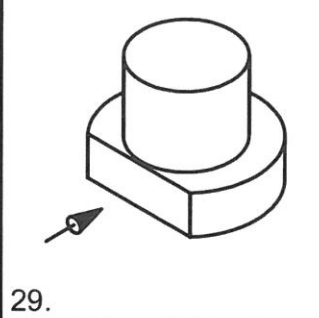
26. NUMBER OF LINE SEGMENTS:
 A. 20 B. 21 C. 22 D. 23 E. 24

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

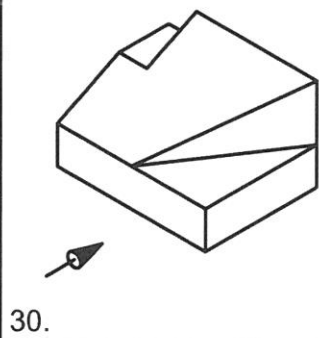
27. MINIMUM NUMBER OF LINES:
 A. 2 B. 4 C. 6 D. 8 E. 10

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

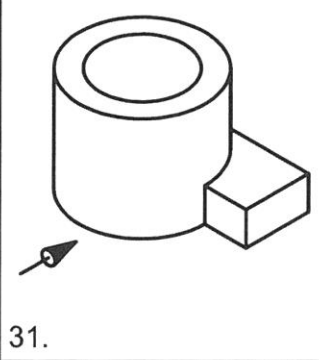
FOR EACH PROBLEM ON THIS PAGE, SELECT A FRONT VIEW
NOTE: CENTER LINES OMITTED ON THIS TEST



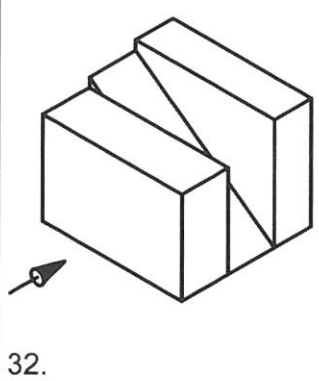
- A.
- B.
- C.
- D.
- NONE
OF
THESE
E.



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

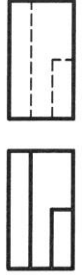
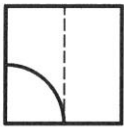

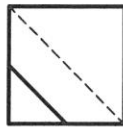
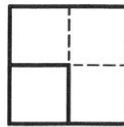
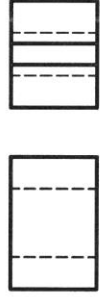

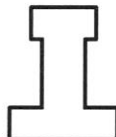

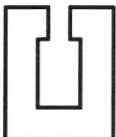
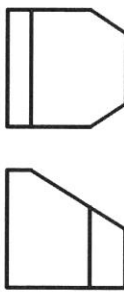




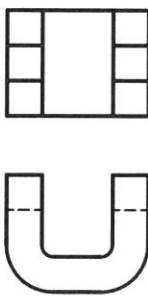

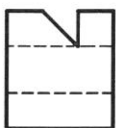

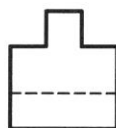


- A.
- B.
- C.
- D.
- NONE
OF
THESE
E.

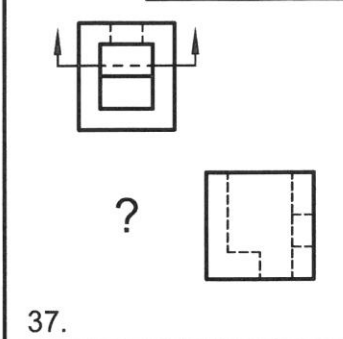


- A.
- B.
- C.
- D.
- NONE
OF
THESE
E.

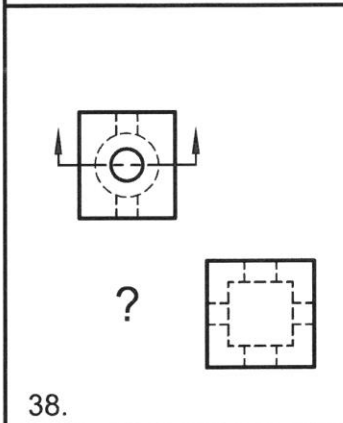
FOR EACH PROBLEM ON THIS PAGE, SELECT A SIDE VIEW
NOTE: CENTER LINES OMITTED ON THIS TEST

<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>

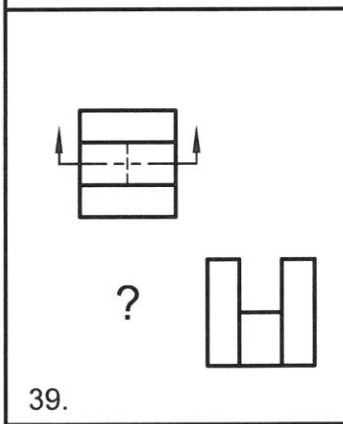
FOR EACH PROBLEM ON THIS PAGE, SELECT A FRONT SECTIONAL VIEW
NOTE: CENTER LINES OMITTED ON THIS TEST



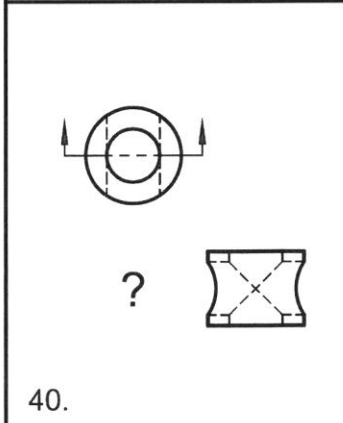
				NONE OF THESE
A.	B.	C.	D.	E.



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



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



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