2012 Academic Challenge

ENGINEERING GRAPHICS TEST – STATE FINAL

– This Test Consists of 40 Questions –

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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!**

1. If a front view features four cutting-plane lines, there is also a chance there are four _____ section views within the drawing.

   A. offset

   B. broken-out

   C. revolved

   D. half

   E. removed

2. Which principle is illustrated by this T-square and triangle illustration?
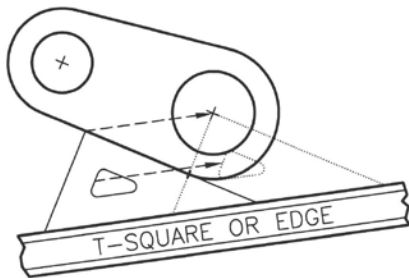
   A. A line tangent to a circle has a point of tangency on a line perpendicular to the center point of the circle.

   B. A line tangent to two circles will be parallel with a line connecting the two circle center points.

   C. The short side of a 30-60 triangle is perpendicular to the hypotenuse of the triangle.

   D. There are only two possible locations for a line tangent to two circles.

   E. The points of tangency for a line and two circles are spaced the same distance as the distance between center points of the circles.

3. The definitions for both *normal* and *inclined* surfaces describe them as being perpendicular to at least one principal plane of projection. For the object illustrated below, counting ALL surfaces, how many are perpendicular to a *frontal* projection plane in front of the object?
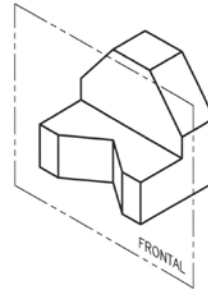
   A. 6

   B. 7

   C. 8

   D. 9

   E. 10

4. In general, which of the following is a FALSE statement with respect to dimensioning machine parts?

   A. The dimension value has a tolerance, even if by general note or title block specification.

   B. The drawing will not be over-dimensioned.

   C. Manufacturing methods will be specified whenever possible.

   D. Dimensions will most likely be placed in views that show the shape of the feature.

   E. There will not be location or size dimension values that have to be guessed.

5. Which of the following would NOT be a POOR technique for section lines?

    A. Spacing too dense

    B. Uneven spacing

    C. Lines are parallel with major edges

    D. Uneven lineweight

    E. Linework is thin, not thick

6. For the symmetrical geometric shape shown below, a quantity of _____ diameter dimensions and _____ radius dimensions should be specified. (Assume 2X is used in some cases.)
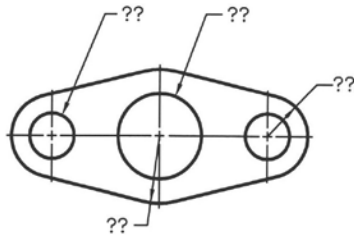
    A. 4; 0

    B. 3; 1

    C. 2; 2

    D. 1; 3

    E. 0; 4

7. Given a threaded feature noted as 9/16-24UNEF-2A, what number, if any, would replace the 24 if the UNEF was changed to UNC?

    A. 12

    B. 24 (no change)

    C. 30

    D. 36

    E. 48

8. Select the correct reflection of the object illustrated below, as reflected on the mirror plane. (Note: one surface is shown reflected on the mirror plane.)
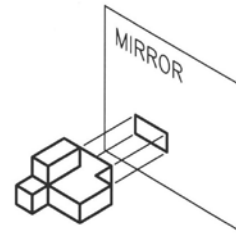
    A.

    B.

    C.

    D.

    E.

9. When completing the front view of the object illustrated below, how are the **rounded edges** to be created, if at all?

    A. Show edges as phantom lines

    B. Show edges as object lines

    C. Show edges as hidden lines

    D. Leave front view as is

    E. Show edges as center lines

10. The engineering graphics specialist must be aware of machining processes. Identify the machine into which these tools will be placed:
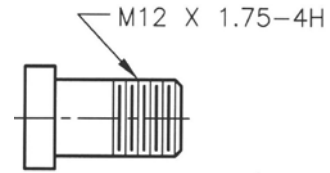
A. Broaching press

B. Drill press

C. CNC lathe

D. Rapid prototyping machine

E. Milling machine

11. In the illustration below, a pictorial model was created to match the top view with height codes. Select the pictorial model that matches the second set of height codes:
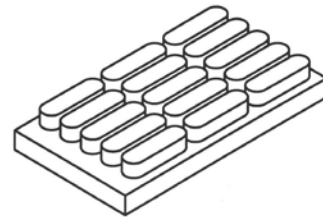
IF
| 2 | 1 | 3 | 1 |
| 1 | 2 | 2 | |
=

THEN
| 1 | 2 | 3 | 2 |
| 2 | 2 | 1 | |
= ?
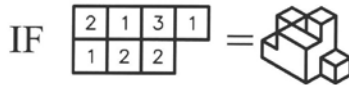
A.

B.

C.

D.

E.

12. What is the pitch of the threaded part illustrated below?

M12 X 1.75−4H

A. 1/12 mm

B. 1/4 mm

C. 1.75 mm

D. 4 mm

E. 12 mm

13. What common term or CAD command would be especially unique to the model illustrated below?

A. Rubric

B. List

C. Height

D. Array

E. Spline

14. On a triangular metric scale, one edge appears as illustrated below. The 1:100 indicates that from the '0' mark to the '1' mark is a _____.

.01
1:100
0   1   2   3

A. Centimeter

B. Decimeter

C. Millimeter

D. Kilometer

E. Hectometer

15. How many ellipses will be needed to describe the hole as projected in the four views illustrated below?
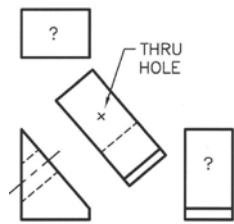
A. 0

B. 1

C. 2

D. 3

E. 4

16. How many hidden lines are missing from the multiview drawing below?
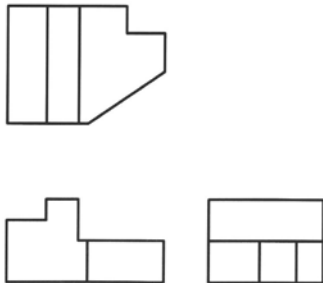

A. 0

B. 1

C. 2

D. 3

E. 4

17. The engineer graphics specialist must be familiar with circles, ellipses, hyperbolas and parabolas, which can all be defined as sections of a _____.

A. cylinder

B. cone

C. prism

D. pyramid

E. torus

18. In this set of answers illustrated below, 2D "shapes" or "regions" are shown next to an axis of revolution. Select the answer that is NOT showing a correct 3D model to match the 2D shape and center axis.
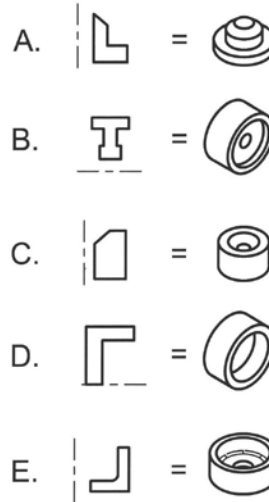
19. What specialized area of engineering graphics is represented by the collection of drafting symbols shown below?
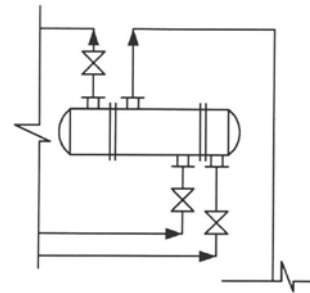
A. Electrical diagrams

B. Electronic schematics

C. Welding drawings

D. Piping diagrams

E. Geometric tolerancing

20. One tool common to the engineering graphic specialist comes in a variety of shapes, as illustrated by the cross sectional views below. Which of the following represents the best answer?

A. Lettering device

B. Erasing shield

C. Template

D. Protractor

E. Scale

21. The ASME alphabet of lines includes a line that is made up of short dashes (approximately 1/16") with equivalent spacing (also 1/16"). What is the name of this line?

A. Phantom

B. Dotted

C. Chain

D. Stitch

E. Short-break

22. For the two parts illustrated here, if the designer applies a tolerance of .010" to the shaft size, .020" to the hole size, and an allowance of .005" to this clearance fit, what will be the *tightest* fit of these mating parts?
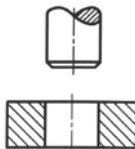
A. .005"

B. .010"

C. .015"

D. .020"

E. .025"

23. Illustrated below is Scenario Baseline and Scenario Chain. Which of the following is TRUE with respect to the total cumulative tolerance between surfaces X & Y?

±.005
±.005
±.005
±.005

±.005
±.005
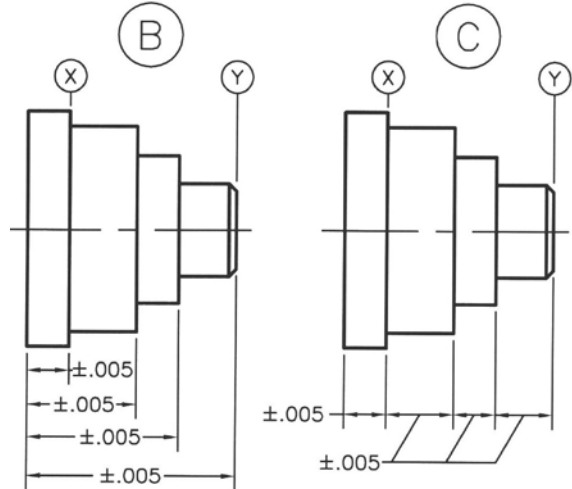
A. Baseline cumulative X-Y = .010"

B. Chain cumulative X-Y = .010"

C. Baseline cumulative X-Y = .020"

D. Chain cumulative X-Y = .020"

E. Baseline cumulative X-Y = .030"

24. For this classic multiview intersection problem, how many STRAIGHT line segments will be needed in the front view solution? (Note: Include the four that are shown.)
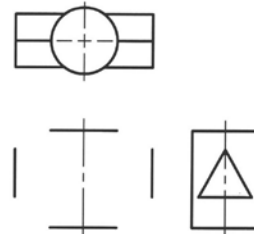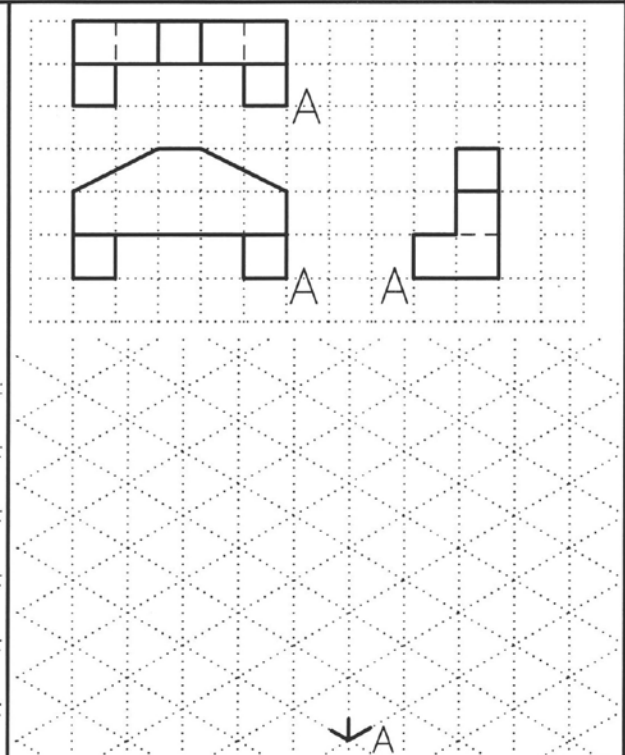
A. 8

B. 10
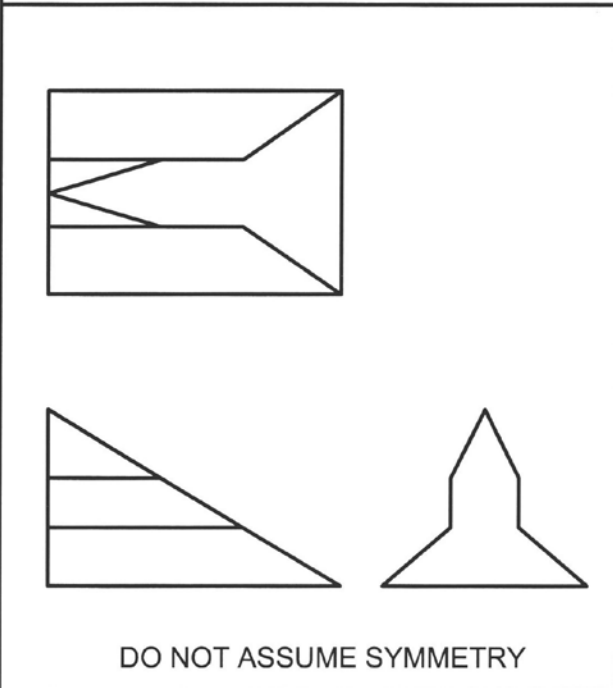
C. 12

D. 14

E. 16

PROBLEMS 25 & 26: CREATE ISOMETRIC SKETCHES.
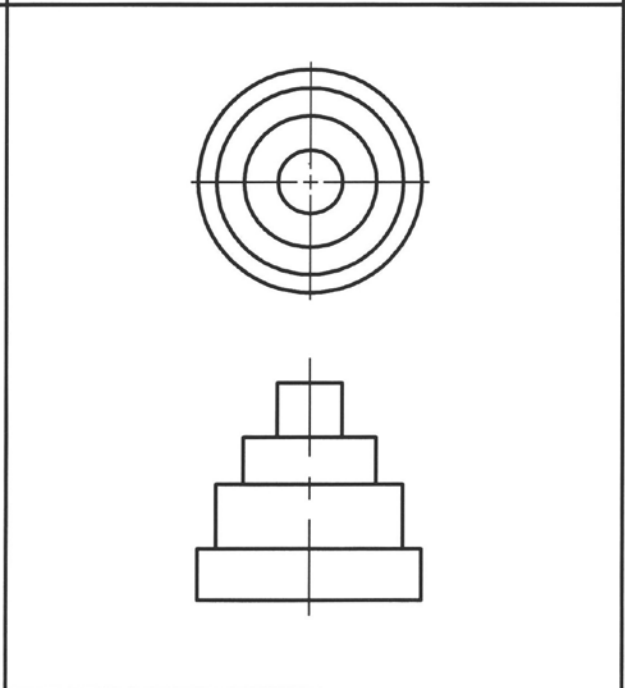PROBLEMS 27 & 28, DIMENSION COMPLETELY, BUT NO SUPERFLUOUS.
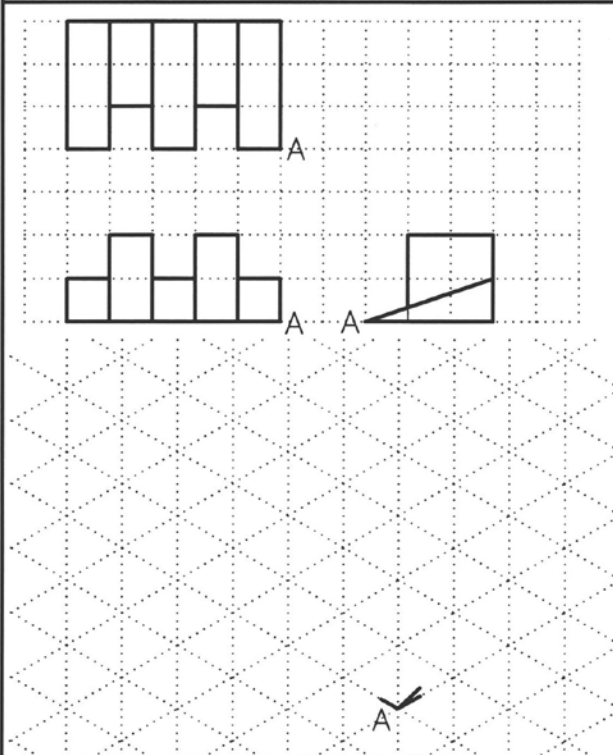
25. NUMBER OF LINE SEGMENTS:
A. 26   B. 27   C. 28   D. 29   E. 30

26. NUMBER OF LINE SEGMENTS:
A. 26   B. 27   C. 28   D. 29   E. 30
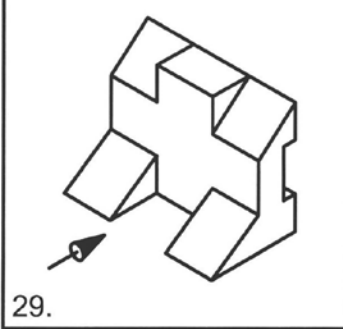
DO NOT ASSUME SYMMETRY

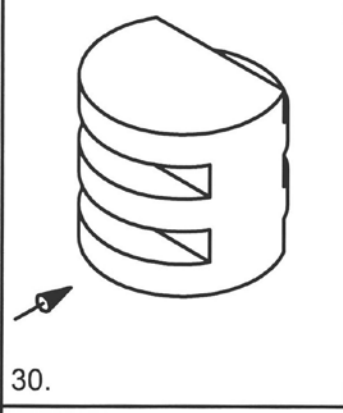27. MINIMUM NUMBER OF DIMENSIONS:
A. 8   B. 9   C. 10   D. 11   E. 12

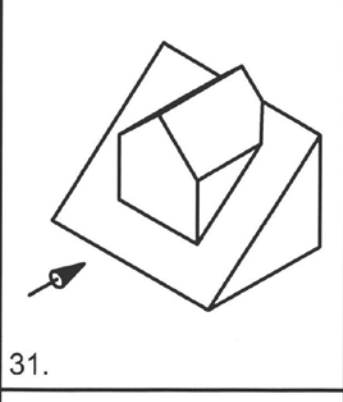28. MINIMUM NUMBER OF DIMENSIONS:
A. 7   B. 8   C. 9   D. 10   E. 11

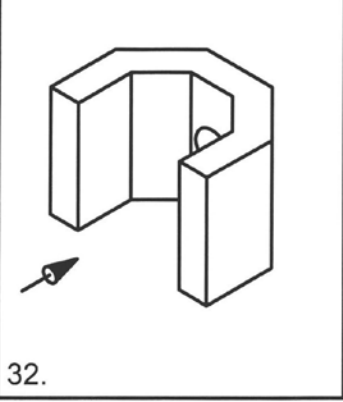FOR EACH PROBLEM ON THIS PAGE, SELECT A FRONT VIEW
NOTE: CENTER LINES OMITTED ON THIS TEST

29.

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

30.

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

31.
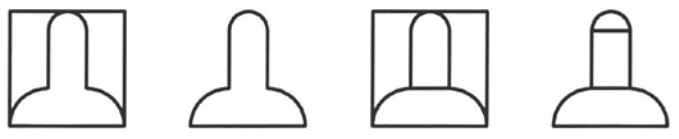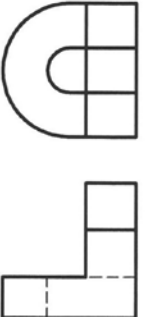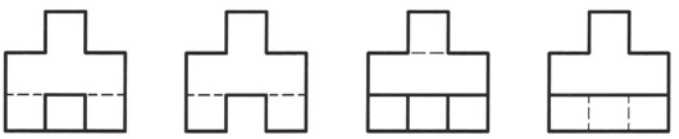
A.   B.   C.   D.   E. NONE OF THESE

32.
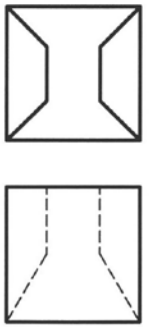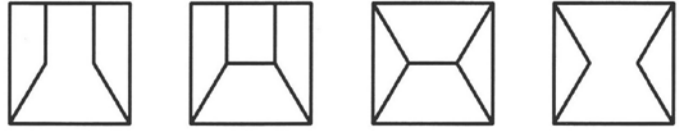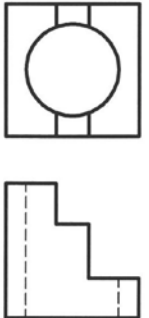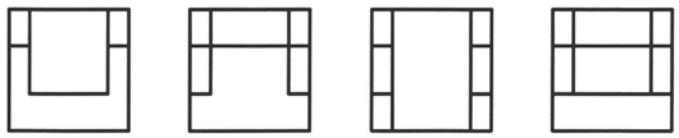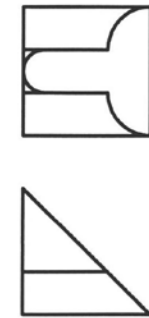
A.   B.   C.   D.   E. NONE OF THESE

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

33. ?

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

34. ?

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

35. ?

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

36. ?

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

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

37.

?

A.　B.　C.　D.　NONE OF THESE　E.

38.

?

A.　B.　C.　D.　NONE OF THESE　E.

39.

?

A.　B.　C.　D.　NONE OF THESE　E.

40.

?

A.　B.　C.　D.　NONE OF THESE　E.