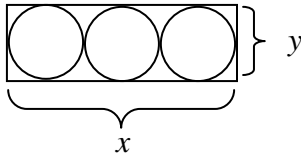


Choose the letter of the correct answer. If the correct answer is not present, choose e. NOTA

**NOTES: All angle measures are in degrees.**

**Figures are not drawn to scale.**

1. What is the relationship between  $x$  and  $y$  if the circles shown are tangent to each other and to the sides of the rectangle?



- a.  $x = 3y$
- b.  $x = 6y$
- c.  $x = \frac{y}{3}$
- d.  $x = 2\pi y$
- e. NOTA

2. If the area of a circle is doubled, what is the ratio of the new circumference to the new diameter?

- a. 3:1
- b.  $\pi$ :1
- c. 2:1
- d. 4:1
- e. NOTA

3. Find the area of an equilateral triangle whose apothem has a length of  $2\sqrt{3}$ .

- a.  $4\sqrt{3}$
- b.  $9\sqrt{3}$
- c. 12
- d.  $36\sqrt{3}$
- e. NOTA

4. Find the perimeter of a regular polygon with sides of length 10 and interior angles that each measure  $156^\circ$ .

- a. 24
- b. 120
- c. 150
- d. 180
- e. NOTA

5. The intersection of the medians of a triangle is called the

- a. orthocenter
- b. circumcenter
- c. incenter
- d. centroid
- e. NOTA

6. How many non-congruent triangles can be made from the set of segments whose lengths are 8 cm, 9 cm, 12 cm, and 20 cm?

- a. 2
- b. 3
- c. 4
- d. 5
- e. NOTA

7. Ann stood 300 feet from the base of a tower and she measured the angle of elevation from her line of sight to the top of the tower to be  $30^\circ$ . If her eye level is  $3\sqrt{3}$  feet from the ground, how tall is the tower in feet?

- a.  $103\sqrt{3}$
- b.  $150 + 3\sqrt{3}$
- c.  $153\sqrt{3}$
- d.  $303\sqrt{3}$
- e. NOTA

8. Corresponding sides of two similar triangles measure 4 cm and 6 cm. If the smaller triangle has an area of 32 square cm, find the area of the larger triangle in square cm.

- a. 48
- b. 72
- c. 84
- d. 96
- e. NOTA

9. Which of the following can be used to prove that a parallelogram is a rhombus?

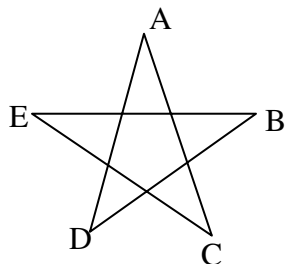
- a. The diagonals are congruent.
- b. The diagonals bisect each other.
- c. The diagonals are perpendicular.
- d. Opposite sides are congruent.
- e. NOTA

10. A regular polygon has an exterior angle that measures  $60^\circ$ . What is it?

- a. a hexagon
- b. a heptagon
- c. an octagon
- d. a decagon
- e. NOTA

11. In the given diagram, find  $m\angle A + m\angle B + m\angle C + m\angle D + m\angle E$ .

- a. 420
- b. 360
- c. 240
- d. 180
- e. NOTA



12. If the height of a cylinder is doubled and the diameter is cut in half, what is the ratio of the new volume to the original volume?

- a. 1:1
- b. 2:1
- c. 1:2
- d. 1:4
- e. NOTA

13. What is the radius of the inscribed circle in a triangle whose sides are 6, 8, and 10?

- a. 2
- b.  $5/2$
- c. 3
- d.  $7/2$
- e. NOTA

14.  $\overline{PQ}$  is the diameter of a circle with center C. Point R is on the circumference of circle C so that  $PC = CQ = QR = 1$ . Find the length of  $\overline{PR}$ .

- a. 1
- b.  $\sqrt{3}$
- c. 2
- d.  $\sqrt{5}$
- e. NOTA

15. A square piece of paper is folded along its diagonal. If the resulting figure has a perimeter of 8 cm, how long was each side of the square piece of paper in centimeters?

- a.  $8 - 4\sqrt{2}$
- b. 2
- c.  $8/3$
- d.  $8 - 2\sqrt{2}$
- e. NOTA

16. A box is shaped like a rectangular prism. The area of its base is 64 square inches and its volume is  $5/27$  cubic feet. Find the height of the box in inches.

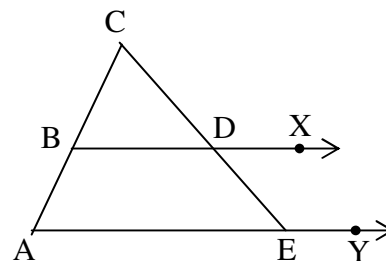
- a.  $5/144$
- b.  $4/12$
- c.  $5/6$
- d. 5
- e. NOTA

17. In the diagram  $\overline{BD}$  passes through X and  $\overline{AE}$  passes through Y.

$\overline{BD} \parallel \overline{AE}$ ,  $m\angle A = 42$  and  $m\angle C = 68$ .

Find  $m\angle CDX$ .

- a. 100
- b. 105
- c. 110
- d. 138
- e. NOTA



18. Two circles of radii 2 and 5 are externally tangent to each other. Find the length of the common external tangent segment.

- a.  $3\sqrt{3}$
- b.  $2\sqrt{10}$
- c.  $\sqrt{58}$
- d. 4
- e. NOTA

19. A piece of cardboard is shaped like a right triangle with legs 12 inches and 24 inches. A **square** is cut from the cardboard such that one right angle coincides with the right angle of the triangle and the opposite vertex lies on the hypotenuse of the right triangle. Find the area in square inches of the square that is cut out.

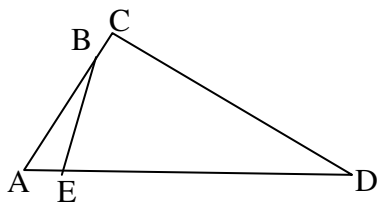
- a. 16
- b. 32
- c. 56
- d. 64
- e. NOTA

20. A regular hexagon is inscribed in a circle of radius 12. Find the perimeter of the hexagon.

- a.  $24\sqrt{3}$
- b. 72
- c.  $48\sqrt{3}$
- d. 36
- e. NOTA

21. In the diagram,  $\angle ABE \cong \angle D$  and  $\angle BEA \cong \angle C$ . If  $AB = 8$ ,  $BC = 2$  and  $AD = 12$ , find  $AE$ .

- a.  $16/3$
- b. 6
- c.  $20/3$
- d. 7
- e. NOTA



22. What is the area of the region in a coordinate plane that is less than 5 units from the point (1,4)?

- a.  $125\pi$
- b.  $24\pi$
- c.  $10\pi$
- d.  $5\pi$
- e. NOTA

23. Twice the complement of an angle is 25 degrees less than its supplement. Find the sum of the degree measures of the complement and the supplement of the angle.

- a. 220
- b. 200
- c. 190
- d. 180
- e. NOTA

24. A trapezoid has parallel bases of lengths 3 and 19 and non-parallel legs of lengths 8 and 16. Find the height of the trapezoid.

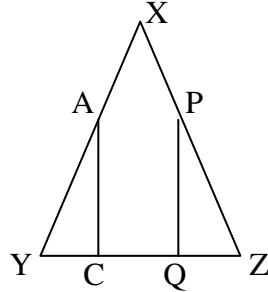
- a.  $5\sqrt{2}$
- b. 6
- c.  $3\sqrt{14}$
- d.  $2\sqrt{15}$
- e. NOTA

25. The perimeter of a rectangle is 280 and the ratio of a pair of adjacent sides is 2:5. Find the area of the rectangle.

- a. 3000
- b. 3600
- c. 4000
- d. 4200
- e. NOTA

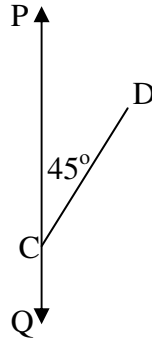
26. Angle X is the vertex angle of isosceles triangle XYZ. Points A and P are midpoints of  $\overline{XY}$  and  $\overline{XZ}$  respectively.  $\overline{AC} \perp \overline{YZ}$  and  $\overline{PQ} \perp \overline{YZ}$ . Which of the following **can be used** to prove  $\triangle AYC \cong \triangle PZQ$ ?

- a. AAS
- b. HL
- c. SSS
- d. AAA
- e. NOTA



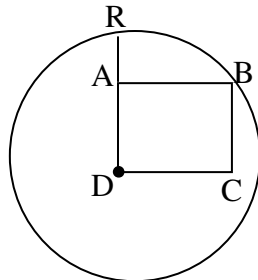
27.  $\overline{CD}$  and  $\overline{PQ}$  meet at a 45 degree angle. Find the volume of the solid when  $\overline{CD}$  is revolved about  $\overline{PQ}$  given that  $CD = 6$ .

- a.  $6\pi$
- b.  $18\pi\sqrt{2}$
- c.  $54\pi\sqrt{2}$
- d.  $144\pi\sqrt{2}$
- e. NOTA



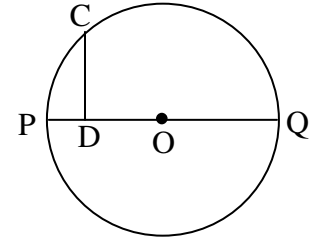
28. Rectangle ABCD has vertex D at the center of circle D and vertex B on the circle. Points D, A, and R are collinear. If  $DA = 8$  and  $AR = 2$ , find AC.

- a. 10
- b.  $2\sqrt{17}$
- c.  $2\sqrt{15}$
- d.  $\sqrt{62}$
- e. NOTA



29. In circle O,  $CD = 6$  and  $\overline{CD} \perp \overline{PQ}$ . If  $PD = 4$ , find PQ.

- a. 16
- b. 15
- c. 14
- d. 13
- e. NOTA



30. Points C and D lie on  $\overline{XY}$ . Point C is  $\frac{3}{5}$  of the way from X to Y and point D is  $\frac{3}{4}$  of the way from X to Y. CD is what fractional part of XY?

- a.  $\frac{7}{20}$
- b.  $\frac{3}{20}$
- c.  $\frac{1}{5}$
- d.  $\frac{2}{5}$
- e. NOTA