

Select e. NOTA if no other answer is correct. Figures are not drawn to scale. Angle measures are in degrees.

1. Find the length of the altitude drawn to the hypotenuse of a right triangle whose legs are 6 and 8.

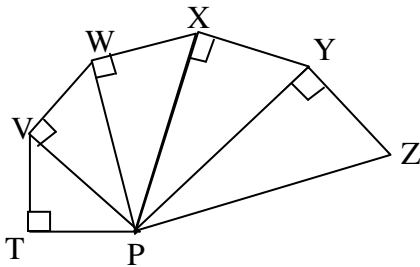
- a. 2.4
- b. 4.8
- c. 5
- d. 10
- e. NOTA

2. In $\triangle ABC$, $AB = 8$, $AC = 10$, and $BC = 9$. \overline{AD} bisects angle A and meets \overline{BC} at D . Find BD .

- a. 4
- b. 5
- c. 5.5
- d. 6
- e. NOTA

3. In the figure with right angles as marked, $PT = TV = VW = WX = XY = YZ = 2$. Find PZ . (Adjacent triangles share a side.)

- a. $2\sqrt{5}$
- b. $2\sqrt{6}$
- c. $2\sqrt{7}$
- d. 6
- e. NOTA



4. E and F are points on \overline{AB} and \overline{AC} , respectively, of $\triangle ABC$ such that $\overline{EF} \parallel \overline{BC}$. If $EF = 4$ and $BC = 6$, find the ratio of AE to EB .

- a. $2/3$
- b. $3/2$
- c. $5/3$
- d. $2/1$
- e. NOTA

5. $\triangle XYZ$ has a right angle at Z and a 30 degree angle at X . If $XY = 2$, find the volume of the solid formed when $\triangle XYZ$ is rotated 360 degrees about \overline{YZ} .

- a. 3π
- b. $\sqrt{3}\pi$
- c. π
- d. $\frac{\sqrt{3}}{3}\pi$
- e. NOTA

6. In $\triangle ABC$, $m\angle A = (x+15)$, $m\angle B = (x+5)$, and $m\angle C = (2x-20)$. Find the measure of the smallest angle of the triangle.

- a. 70
- b. 60
- c. 50
- d. 45
- e. NOTA

7. A regular hexagon with area $48\sqrt{3}$ is separated into six congruent triangles. Find the perimeter of one of the six congruent triangles.

- a. $4\sqrt{2}$
- b. $8\sqrt{3}$
- c. $12\sqrt{2}$
- d. $24\sqrt{3}$
- e. NOTA

8. The sides of $\triangle ABC$ have lengths of 8, 9, and 13. If the midpoints of its sides are joined, find the perimeter of the triangle formed.

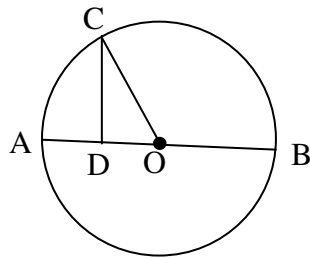
- a. 15
- b. 18
- c. 24
- d. 30
- e. NOTA

9. In $\triangle ABC$, $m\angle C = 105$, $m\angle A = 45$ and $AC = 6\sqrt{2}$. Find the perimeter of $\triangle ABC$.

- a. $12 + 6\sqrt{2} + 6\sqrt{3}$
- b. $6 + 9\sqrt{2} + 3\sqrt{6}$
- c. $18 + 6\sqrt{2} + 3\sqrt{3}$
- d. $18 + 6(\sqrt{2} + \sqrt{3})$
- e. NOTA

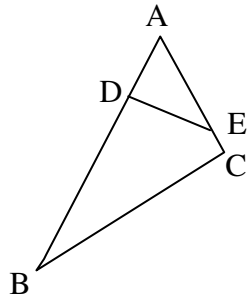
10. The figure shows circle O with $CD = 4$, $\overline{AB} \perp \overline{CD}$ and points A, C , and B on the circle. If $AD = 2$, find the diameter of the circle.

- a. 10
- b. $8\sqrt{2}$
- c. 8.5
- d. 8
- e. NOTA



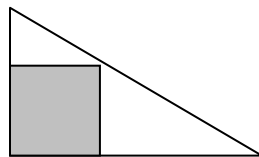
11. In the given figure, $\triangle ABC \sim \triangle AED$. If $AE = 8$, $EC = 2$, and AB is 11 more than AD , find the sum of the digits in the length of \overline{AB} .

- a. 4
- b. 5
- c. 6
- d. 7
- e. NOTA



12. A carpenter has a piece of plywood in the shape of a right triangle with legs 4 inches and 12 inches. He wants to cut out a square piece as shown in the diagram by the shaded region. The vertices of the square lie on the sides of the triangle. Find the area in square inches of the square.

- a. 3
- b. 6
- c. 9
- d. 12
- e. NOTA



13. Find the length of the apothem of an equilateral triangle that is inscribed in a circle with radius 4.

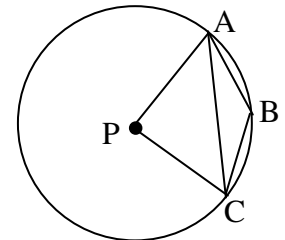
- a. 6
- b. 4
- c. $2\sqrt{3}$
- d. 2
- e. NOTA

14. The angle bisectors of any triangle are concurrent. Their intersection point is the

- a. center of the circle circumscribed about the triangle.
- b. center of the circle inscribed in the triangle.
- c. centroid of the triangle.
- d. orthocenter of the triangle.
- e. NOTA

15. In circle P , points A, B , and C are on the circle, $AB = BC$ and $m\angle APC = 84$. Find $m\angle BAC$.

- a. 20
- b. 21
- c. 25
- d. 28
- e. NOTA



16. In $\triangle ABC$, the median from A to \overline{BC} is half the length of \overline{BC} . Find the measure of $\angle A$.

- a. 90
- b. 60
- c. 45
- d. 30
- e. NOTA

17. The medians of a triangle are 15, 15, and 18. Find the area of the triangle.

- a. 72
- b. 98
- c. 126
- d. 144
- e. NOTA

18. Two equilateral triangles have a side of one that is equal to the altitude of the other. Find the ratio of the area of the larger to the area of the smaller.

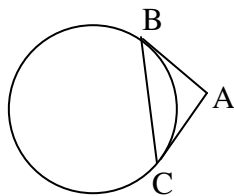
- a. $4/3$
- b. $4\sqrt{3}/3$
- c. $\sqrt{3}/1$
- d. $2\sqrt{3}/3$
- e. NOTA

19. The sides of a triangle are 3, 4, and 5. If an altitude is drawn from the largest angle to the opposite side, find the area of the smaller triangle that is formed.

- a. $108/25$
- b. $54/25$
- c. $48/25$
- d. $9/5$
- e. NOTA

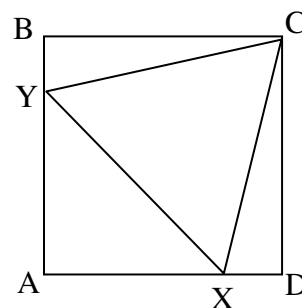
20. In the diagram, \overline{AB} and \overline{AC} are tangent to the circle at points B and C . $m\angle BAC = 120$ and $AB = 16$. Find the perimeter of $\triangle ABC$.

- a. 48
- b. $16 + 32\sqrt{3}$
- c. $32 + 16\sqrt{2}$
- d. $32 + 8\sqrt{3}$
- e. NOTA



21. In the given figure, $ABCD$ is a square with area 4 and $\triangle XYC$ is equilateral. Find the length of a side of $\triangle XYC$. Points Y and X lie on the sides of the square.

- a. $-2 + 2\sqrt{3}$
- b. $-2\sqrt{2} + 2\sqrt{6}$
- c. $-2\sqrt{2} + 4\sqrt{6}$
- d. $-2\sqrt{2} + 4\sqrt{3}$
- e. NOTA

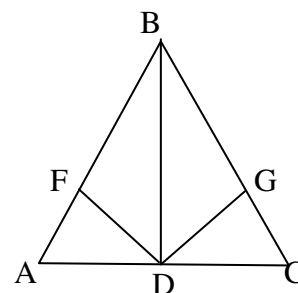


22. A right triangle is placed on a coordinate plane such that one leg lies on the line $x + 2y - 4 = 0$. Which of the following lines could contain the other leg of the right triangle?

- a. $x + 2y - 8 = 0$
- b. $2x + y - 8 = 0$
- c. $2x - y + 8 = 0$
- d. $x - 2y - 8 = 0$
- e. NOTA

23. Given: $\overline{AB} \cong \overline{BC}$ and $\overline{BF} \cong \overline{BG}$. Which of the following additional given statements would be sufficient to prove $\triangle AFD \cong \triangle CGD$ by SAS?

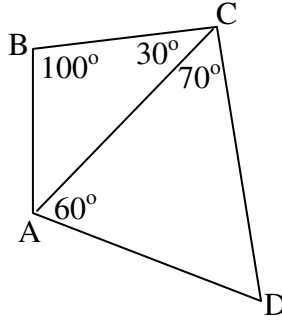
- a. $\overline{AD} \cong \overline{CD}$
- b. $\overline{FD} \cong \overline{GD}$
- c. $\angle AFD \cong \angle CGD$
- d. $\angle FDA \cong \angle GDC$
- e. NOTA



24. The sides of a triangle are 3 inches, 12 inches, and n inches where n is an integer. How many values of n are possible?

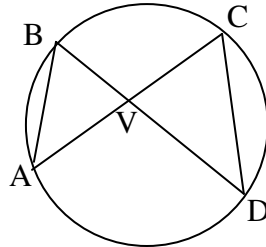
- a. 6
- b. 7
- c. 8
- d. 9
- e. NOTA

25. The figure shows quadrilateral $ABCD$ with diagonal \overline{AC} . According to the measures of the angles shown, which segment in the figure would be the longest?



- a. \overline{AD}
- b. \overline{AC}
- c. \overline{CD}
- d. \overline{AB}
- e. NOTA

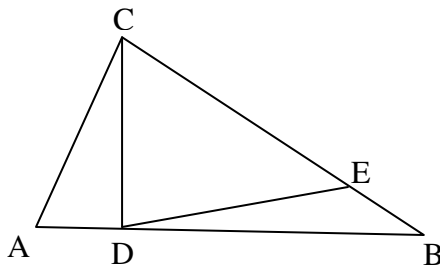
26. In the figure, chords \overline{AC} and \overline{BD} intersect at V such that $m\widehat{AB} : m\widehat{BC} : m\widehat{CD} : m\widehat{DA} = 2 : 4 : 3 : 6$. Find the measure of the largest angle of $\triangle BVA$.



- a. 80
- b. 72
- c. 70
- d. 68
- e. NOTA

27. In the figure, $\triangle ABC$ is a right triangle with the right angle at C . $\overline{CD} \perp \overline{AB}$, and $BE = \frac{1}{4}CB$.

If $AD = 4$ cm and $BD = 16$ cm, find the area of $\triangle BDE$ in cm^2 .



- a. $16\sqrt{5}$
- b. $8\sqrt{5}$
- c. 16
- d. 8
- e. NOTA

28. The diagonals of a rhombus are in the ratio of 2:3 and when drawn, they form 4 non-overlapping congruent triangles with the sides of the rhombus. If the area of the rhombus is 300 square inches, find the length in inches of the longest side of each of the 4 non-overlapping congruent triangles formed.

- a. $26\sqrt{5}$
- b. $32\sqrt{5}$
- c. $5\sqrt{13}$
- d. 13
- e. NOTA

29. Find the area in square inches which remains after the inscribed circle is removed from a triangle whose sides are 3 inches, 4 inches, and 5 inches.

- a. π
- b. $2\pi - 6$
- c. $6 - \frac{\pi}{2}$
- d. $6 - \pi$
- e. NOTA

30. In the figure, $ABCD$ is a parallelogram with diagonals \overline{AC} and \overline{BD} intersecting at O . \overline{AM} and \overline{BD} intersect at P such that M is the midpoint of \overline{BC} . If $BD = 18$ and $AC = 30$, find BP .

- a. 6
- b. $4\sqrt{2}$
- c. 5
- d. 4
- e. NOTA

