

NOTE: Choice E) N.O.T. at the end of every question means *none of these*. Bubble E if the correct answer is not listed.

1. The ratio of an angle to its complement is 2:5. Find the ratio of the angle to its supplement.

A) 1:5 C) 1:7 E) N.O.T.
 B) 1:6 D) 2:7
2. The sum of the exterior angles of an octagon, one at each vertex, is

A) 360° C) 900° E) N.O.T.
 B) 540° D) 1080°
3. Name the set of points on the number line with coordinates x such that $|x - 3| \geq 8$.

A) line
 B) two non-intersecting rays
 C) segment
 D) empty set
 E) N.O.T.
4. If the lengths of both bases of a trapezoid are halved, then the area of the trapezoid is

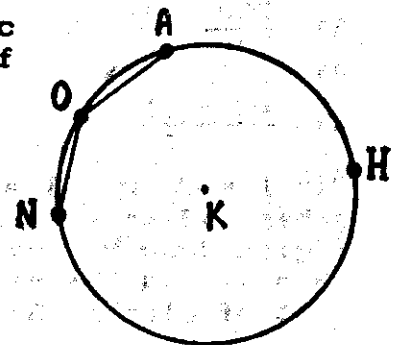
A) divided by $\sqrt{2}$ C) divided by 4
 B) decreased by 2 D) not enough information
 E) N.O.T.
5. The area of a circle with diameter $\frac{2\sqrt{\pi}}{\pi}$ is

A) 1 C) 3 E) N.O.T.
 B) 2 D) 4
6. One angle of a triangle is both the geometric and the arithmetic mean of the other angles of the triangle. Find the measure of the angle.

A) 30° C) 60° E) N.O.T.
 B) 45° D) 90°
7. In circle K, $\angle NOA = 140^\circ$ and $\widehat{AH} = 100^\circ$. Arc NAH is a

A) minor arc C) major arc
 B) semi-circle D) not enough information
 E) N.O.T.
8. Two chords on the same circle form a right angle at a common endpoint. Their lengths are $2\sqrt{3}$ and 6. Find the area of the smallest region bounded by the circle and one of the chords.

A) $2\pi - 3\sqrt{3}$ C) $\pi - \sqrt{3}$ E) N.O.T.
 B) $4\pi - 6\sqrt{3}$ D) not enough information



17. A paratrooper falls perpendicular to a mined plane. Mines are points hidden at the vertices of a grid of squares 4 meters on a side. If the paratrooper's point of impact is within 1 meter of a mine, the mine will explode. Find the probability that the paratrooper's landing does not detonate a mine.

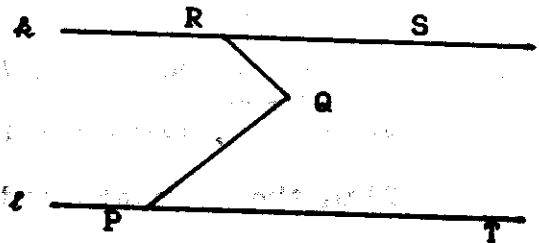
- A) $\frac{\pi}{16}$ C) $1 - \frac{\pi}{4}$ E) N.O.T.
 B) $\frac{\pi}{4}$ D) $1 - \frac{\pi}{16}$

18. The ratio of the surface areas of a certain pair of similar pyramids is 4:3. What is the ratio of their volumes?

- A) $2\sqrt{3} : 2$ C) $8\sqrt{3} : 9$ E) N.O.T.
 B) $2\sqrt{3} : 3$ D) $2\sqrt{2} : 3$

19. In the figure, $\ell \parallel AS$, $\angle PQR = 70^\circ$, and $\angle QRS = 45^\circ$. $\angle QPT = ?$

- A) 25°
 B) 30°
 C) 35°
 D) 40°
 E) N.O.T.

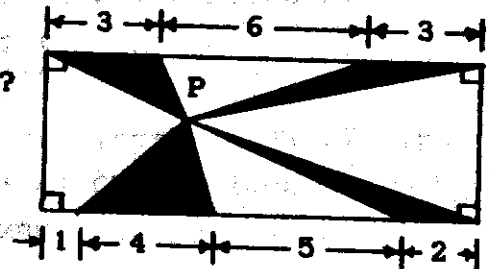


20. One of the shorter diagonals of a regular hexagon measures 6. Find the length of one of the longer diagonals.

- A) $4\sqrt{3}$ C) $6\sqrt{3}$ E) N.O.T.
 B) 8 D) 12

21. Point P is anywhere inside the rectangle. What fraction of the rectangle's area is shaded?

- A) $\frac{1}{4}$ C) $\frac{1}{2}$ E) N.O.T.
 B) $\frac{1}{3}$ D) not enough information

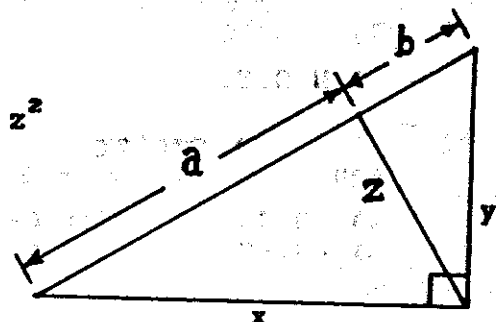


22. A piece of paper in the shape of a semicircle with radius 8 is formed into a cone with no overlap. The height of the cone is

- A) $4\sqrt{2}$ C) $4\sqrt{3}$ E) N.O.T.
 B) 4 D) 6

23. Use the figure at the right to find $x^2 + y^2 + z^2$

- A) $a^2 + ab + b^2$
 B) $a^2 + 2ab + b^2$
 C) $a^2 + 3ab + b^2$
 D) $a^2 + 4ab + b^2$
 E) N.O.T.



24. Two tangents to circle C from exterior point P form a right angle at P. If the area of the circle is 2π , how far is P from C?

- A) 1 C) 2 E) N.O.T.
 B) $\sqrt{2}$ D) $2\sqrt{2}$

25. Two spheres are inscribed in a cylinder as shown. If the spheres' combined surface area is 8π , what is the volume of the cylinder?

- A) $\frac{\pi}{4}$ C) 4π E) N.O.T.
 B) π D) 6π



26. How many arcs measuring less than 360° are determined by five different points on a circle?

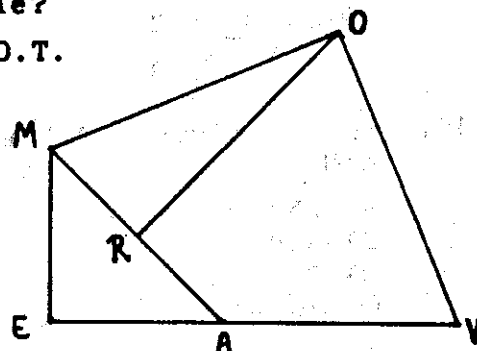
- A) 5 B) 10 C) 15 D) 20 E) N.O.T.

27. In the figure, $\overline{ME} \perp \overline{VE}$, $ME = EA = 1$,

\overline{OR} bisects \overline{MA} , $MO = VO = \sqrt{2} + \sqrt{2}$,
 $VA = \sqrt{2}$, and $OR = 1 + \frac{\sqrt{2}}{2}$.

Find the area of quadrilateral MOVE.

- A) $\frac{3}{2} + \sqrt{2}$ C) $\frac{1 + \sqrt{5}}{2}$ E) N.O.T.
 B) $2 + \sqrt{2}$ D) 4

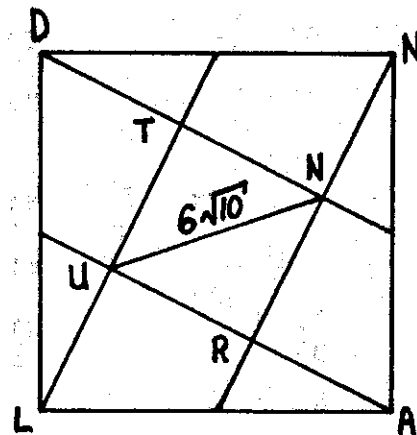


28. Diameter \overline{AB} and chord \overline{BC} in circle T form angle $\angle ABC$ with measure β . Name the trigonometric function given by the ratio $AC:AB$.

- A) $\sin \beta$ C) $\tan \beta$ E) N.O.T.
 B) $\cos \beta$ D) not enough information

29. In the figure, segments extend from the corners of square LAND to the midpoints of its sides, forming square TURN. Find LA if $UN = 6\sqrt{10}$.

- A) 15
 B) 30
 C) 60
 D) $10\sqrt{10}$
 E) N.O.T.



30. Find the center of the circle determined by the equation $x^2 + y^2 - 6x + 14y + 22 = 0$.

- A) (3, 7) C) (-3, 7) E) N.O.T.
 B) (3, -7) D) (-3, -7)