

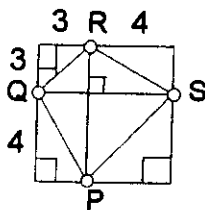
For each of the following choose the best answer. Choose "E" for none of the above.

1. $\angle A$ is supplementary to $\angle B$, $\angle B$ is complementary to $\angle C$, and the ratio of $m\angle A$ to $m\angle C$ is 7:2. Find the $m\angle B$.

- A. 54° B. 30° C. 60° D. 36° E. NOTA

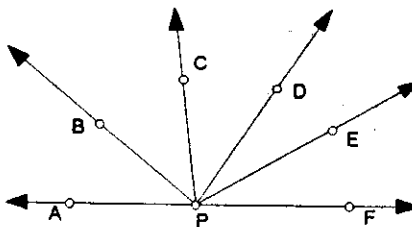
2. If $\overline{RP} \perp \overline{QS}$, find the perimeter of PQRS.

- A. 14
B. $7\sqrt{2} + 10$
C. $7\sqrt{2}$
D. $2\sqrt{58}$
E. NOTA



3. \overrightarrow{PB} and \overrightarrow{PC} trisect $\angle APD$. \overrightarrow{PE} bisects $\angle DPF$. If $m\angle CPE = 69^\circ$, find $m\angle APE$.

- A. 111°
B. 119°
C. 126°
D. 153°
E. NOTA

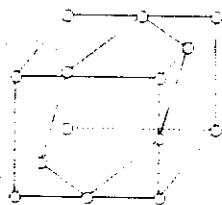


4. What is the length of a major arc of 270° in a circle whose diameter is 12?

- A. 24π B. 18π C. 12π D. 9π E. NOTA

5. Find the length of the longer diagonal of the hexagonal path formed by joining midpoints of the edges of a cube with volume 512.

- A. $8\sqrt{3}$
B. 8
C. $8\sqrt{2}$
D. 16
E. NOTA



6. In a right triangle, the shortest side has length 8 and the longest side has length 16. How long is the median to the longest side?

- A. 4 B. 8 C. $8\sqrt{3}$ D. $8\sqrt{5}$ E. NOTA

7. Two tangent segments to a circle from the same external point determine an angle of 58° . What is the measure of the minor arc of the circle?

- A. 116° B. 118° C. 122° D. 128° E. NOTA

8. A right circular cone is inscribed in a hemisphere of radius 8. Find the ratio of the lateral area of the cone to the lateral area of the hemisphere.

- A. $\frac{1}{2}$ B. $\frac{\sqrt{2}}{4}$ C. $\frac{1}{4}$ D. $\frac{\sqrt{2}}{2}$ E. NOTA

9. If the measure of one angle of an isosceles triangle is 50° , at least one other angle must have a measure of

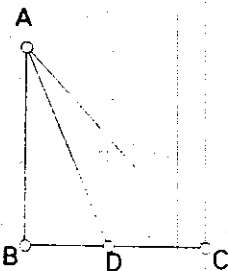
- A. 65° B. 65° OR 80° C. 80° D. 130° E. NOTA

10. A quadrilateral whose diagonals are perpendicular to each other must be a

- A. rectangle B. rhombus C. parallelogram D. square E. NOTA

11. \overrightarrow{AD} is an angle bisector, $AB = 9$, $AC = 15$, and $\angle ABC$ is a right angle. Find AD .

- A. $\frac{9\sqrt{5}}{2}$
 B. 12
 C. $\frac{9}{2}$
 D. $\frac{3\sqrt{61}}{2}$
 E. NOTA



12. A square with side of length 6 cm is revolved about a diagonal as an axis. Find the volume of the solid created by the revolution.

- A. $216\pi \text{ cm}^3$ B. $216\sqrt{2} \pi \text{ cm}^3$ C. $36\sqrt{2} \pi \text{ cm}^3$ D. $18\sqrt{2} \pi \text{ cm}^3$ E. NOTA

13. The diagonals of a rhombus are 12 and 24. Find the radius of the circle inscribed in the rhombus.

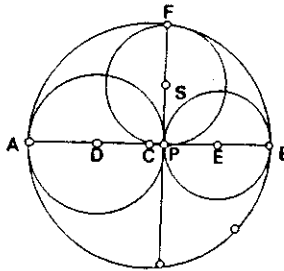
- A. $\frac{12\sqrt{5}}{5}$ B. $6\sqrt{5}$ C. $12\sqrt{5}$ D. $\frac{6\sqrt{5}}{25}$ E. NOTA

14. A vertical flag pole eighteen units high was broken by a hurricane. Its top touched the ground six units on a horizontal line from the base of the pole. Find the length of that portion of the pole that fell and is touching the ground.

- A. 8 B. 9 C. 10 D. 12 E. NOTA

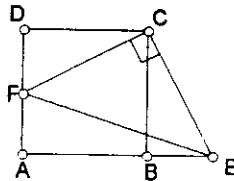
15. Given circle C, circle D, and circle E with $AC = 8$ and $EB = 3$, find the area of circle S, which is tangent to AB at P and intersects circle C at F.

- A. $2\sqrt{15}$
 B. 15π
 C. 30π
 D. 60π
 E. NOTA



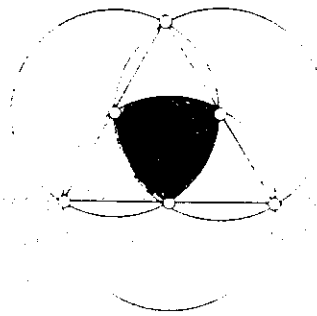
16. The area of square ABCD is 256. The area of right triangle CEF is 200. What is the length of \overline{BE} ?

- A. 8
 B. 9
 C. 12
 D. 14
 E. NOTA



17. Circles are constructed on the sides of an equilateral triangle with side length s . Find the shaded area.

- A. $\frac{\pi s^2}{8} - \frac{s^2 \sqrt{3}}{8}$
 B. $\frac{\pi s^2}{4} - \frac{s^2 \sqrt{3}}{4}$
 C. $\frac{\pi s^2}{2} - \frac{s^2 \sqrt{3}}{2}$
 D. $\pi s^2 - s^2 \sqrt{3}$
 E. NOTA

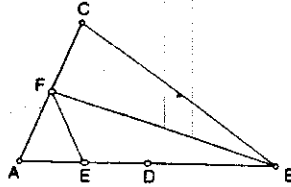


18. If one side of one square is the diagonal of a second square, what is the ratio of the area of the first square to the area of the second?

- A. $\frac{1}{2}$ B. 2 C. $\sqrt{2}$ D. $\frac{\sqrt{2}}{2}$ E. NOTA

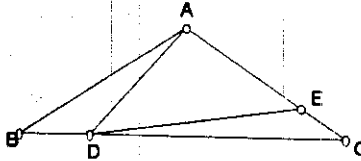
19. In $\triangle ABC$, F is the midpoint of \overline{AC} , D is the midpoint of \overline{AB} , and E is the midpoint of \overline{AD} . The area of $\triangle BEF$ is 63 square units. Find the area of $\triangle ABC$.

- A. 84
- B. 168
- C. 126
- D. 98
- E. NOTA



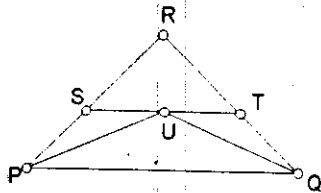
20. In the figure, $AB=AC$, $m\angle BAD = 30^\circ$, and $AE = AD$. What does $m\angle EDC$ equal?

- A. 12°
- B. 20°
- C. 18°
- D. 15°
- E. NOTA



21. In $\triangle RQR$, \overline{ST} is parallel to \overline{PQ} . \overline{QU} bisects $\angle PQT$. \overline{PU} bisects $\angle SPQ$. $PQ = 20$, $PR = 18$, and $RQ = 16$. Find the perimeter of $\triangle RST$.

- A. 24
- B. 27
- C. 34
- D. 36
- E. NOTA



22. An equilateral triangle with side of length 2 is inscribed in a circle. Find the area of the circle.

- A. $\frac{\pi}{3}$
- B. $\frac{4\pi}{3}$
- C. 3π
- D. $\frac{3\pi}{4}$
- E. NOTA

23. A circular cone with radius 6 and altitude 8 is cut by a plane parallel to its base so that the two resulting pieces have equal volume. What is the altitude of the piece which is a cone?

- A. $4\sqrt[3]{4}$
- B. 6
- C. $3\sqrt[3]{4}$
- D. $4\sqrt{3}$
- E. NOTA

24. Find the area of a triangle with sides 8, 9, and 15.

- A. 72
- B. 36
- C. $8\sqrt{13}$
- D. $8\sqrt{15}$
- E. NOTA

25. The measures of the angles in a triangle are in the ratio 3:5:7. Find the measure in degrees of the largest angle.

- A. 12° B. 36° C. 60° D. 74° E. NOTA

26. In a coordinate plane a circle with center (4,3) passes through the point (2,-3). What is the circumference of the circle?

- A. $\pi\sqrt{10}$ B. $2\pi\sqrt{10}$ C. $4\pi\sqrt{10}$ D. 6π E. NOTA

27. Find the area of the annulus formed by two concentric circles with radii 6 and 9.

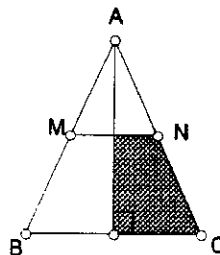
- A. 45π B. 36π C. $6\sqrt{5}\pi$ D. $3\sqrt{5}\pi$ E. NOTA

28. Find the area of a regular octagon with side of 8.

- A. 128 B. $64\sqrt{2} + 64$ C. $128\sqrt{2} + 128$ D. $512\sqrt{2}$ E. NOTA

29. Triangle ABC has AB equal to AC with M and N midpoints. What is the ratio of the area of the shaded region to the area of triangle ABC?

- A. 1:4
B. 3:8
C. 3:16
D. 5:16
E. NOTA



30. A sector contains two semicircles as shown. The radius of the quadrant sector and the diameter of the large semicircle are 2. The small semicircle is tangent to the large semicircle. Find the radius of the small semicircle.

- A. $\frac{1}{3}$
B. $\frac{1}{4}$
C. $\frac{2}{3}$
D. $\frac{2}{5}$
E. NOTA

