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Online Homework

Focused Exercises for Math SAT

Skill Set 10: Circles

Many of the problems in this exercise set came from The College Board, writers of the SAT exam.

1. Which of the following gives the number of revolutions that a tire with diameter x meters will make in traveling a distance of y kilometers without slipping? (1 kilometer = 1,000 meters)

(A) $\frac{1,000y}{\pi x}$

(B) $\frac{1,000}{\pi xy}$

(C) $\frac{500}{\pi x}$

(D) $\frac{y}{1,000\pi x}$

(E) $\frac{\pi x}{1,000y}$

2. Senai customized her bicycle by exchanging the front wheel for a wheel that had one half the diameter of the back wheel. Now when Senai rides the bicycle, how many revolutions does the front wheel make for each revolution of the back wheel?

(A) 8

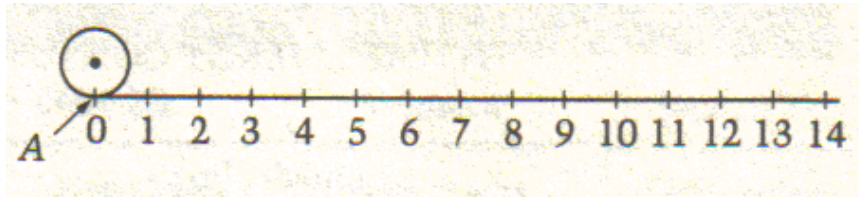
(B) 4

(C) 2

(D) $\frac{1}{2}$

(E) $\frac{1}{4}$

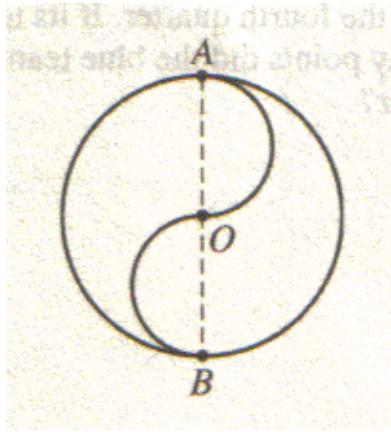
3.



A circle of radius $\frac{2}{\pi}$ rolls to the right along the line shown above without slipping. In the starting position, point A on the circle touches the line for the first time at point 0 on the line. At what point on the line will point A touch the line for the fourth time?

- (A) 12
 - (B) 10
 - (C) 8
 - (D) 6
 - (E) 4
4. A circular piece of cardboard is cut in half along a diameter. If the diameter is 12 inches, what is the perimeter, in inches, of one of the semicircular pieces?
- (A) $6\pi + 6$
 - (B) $6\pi + 12$
 - (C) $12\pi + 6$
 - (D) $12\pi + 12$
 - (E) $12\pi + 24$

5.



The circle above has center O and diameter AB . The two semicircles have diameters OA and OB . If the circumference of the circle is 36π , what is the length of the curved path from A to B through O ?

- (A) 6π
- (B) 9π
- (C) 18π
- (D) 24π
- (E) 36π

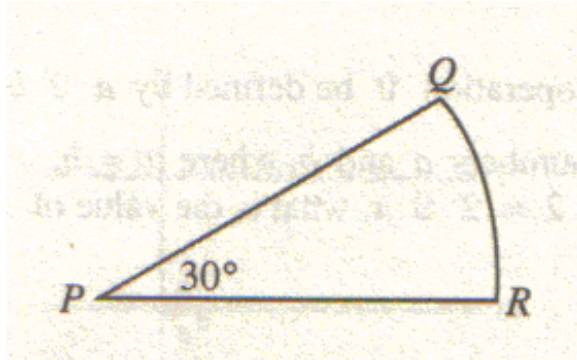
6



In the figure above, the circle is tangent to sides BC and AD of the 8-by-12 rectangle, $ABCD$. What is the area of the circle?

- (A) 16π
- (B) 20π
- (C) 36π
- (D) 64π
- (E) 96π

7.



In the figure above, QR is the arc of a circle with center P . If the length of arc QR is 6π , what is the area of sector PQR ?

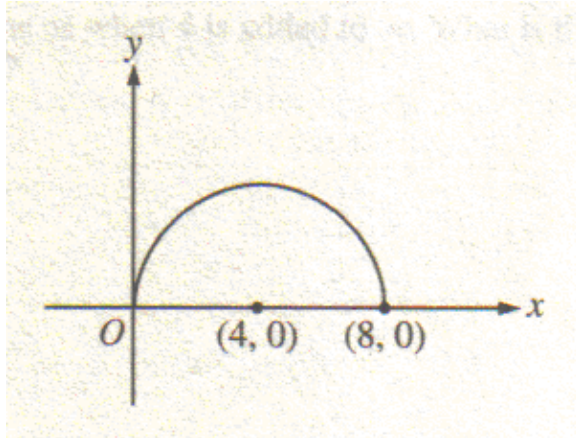
- (A) 108π
- (B) 72π
- (C) 54π
- (D) 36π
- (E) 9π

8.



Tameka cut a circular pizza into wedge-shaped pieces, one of which is shown above. The tip of each piece is at the center of the pizza and the angle at the tip is always greater than 20° , but less than 30° . What is one possible value for the number of pieces into which the pizza is cut?

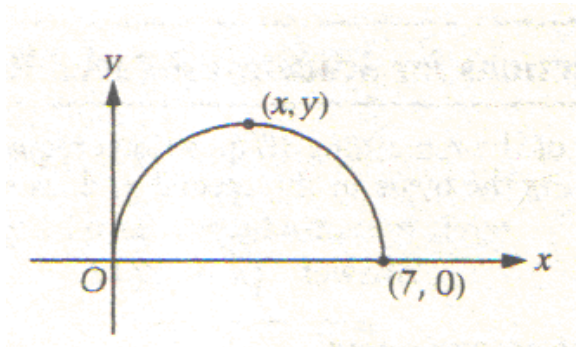
9.



In the semicircle above, the center is at $(4, 0)$. Which of the following are x -coordinates of two points on this semicircle whose y -coordinates are equal?

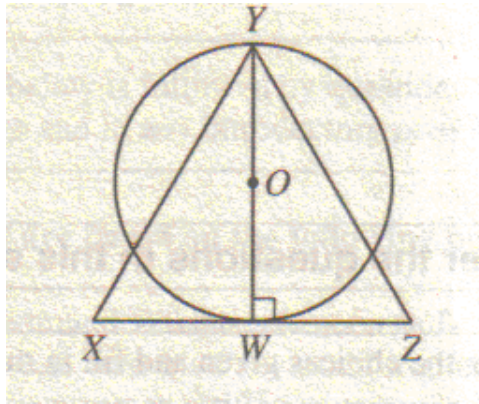
- (A) 1 and 6
- (B) 1 and 8
- (C) 2 and 6
- (D) 2 and 8
- (E) 3 and 6

10.



In the figure above, what is the y -coordinate of the point on the semicircle that is the farthest from the x -axis?

11.



In the figure above, $\triangle XYZ$ is equilateral, with side of length 2. If WY is a diameter of the circle with center O , then the area of the circle is

(A) $\frac{\sqrt{3\pi}}{4}$

(B) $\frac{2\pi}{3}$

(C) $\frac{3\pi}{4}$

(D) π

(E) $\frac{3\pi}{2}$

12. One circle has a radius of $\frac{1}{2}$ and another circle has a radius of 1. What is the ratio of the area of the larger circle to the area of the smaller circle?

(A) 2 : 1

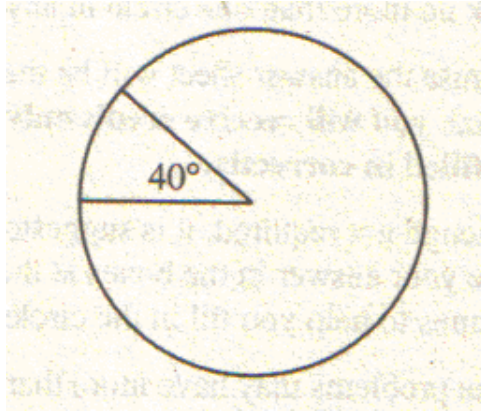
(B) 3 : 1

(C) 3 : 2

(D) 4 : 1

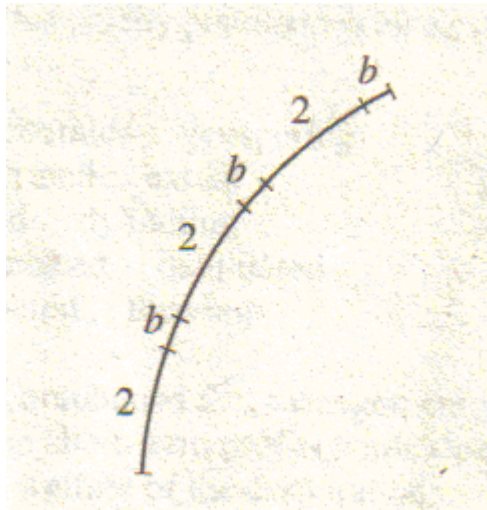
(E) 5 : 2

13.



Naomi makes silver jewelry. For one style of earrings, she cuts wedges from a silver disk, as shown in the figure above. Each wedge makes a 40° angle at the center of the disk. If the weight of each uncut disk is a uniformly distributed 2.5 grams, how many grams does each wedge weigh?

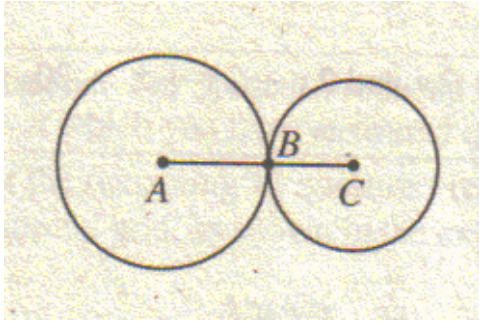
14.



The figure above shows part of a circle whose circumference is 45. If arcs of length 2 and length b continue to alternate around the entire circle so that there are 18 arcs of each length, what is the degree measure of each of the arcs of length b ?

- (A) 4°
- (B) 6°
- (C) 10°
- (D) 16°
- (E) 20°

15.

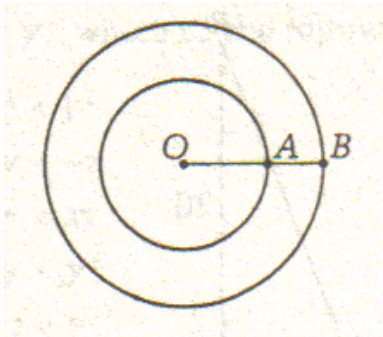


NOTE: Figure not drawn to scale.

In the figure above, the two circles are tangent at point B and $AC = 6$. If the circumference of the circle with center A is twice the circumference of the circle with center C , what is the length of \overline{BC} ?

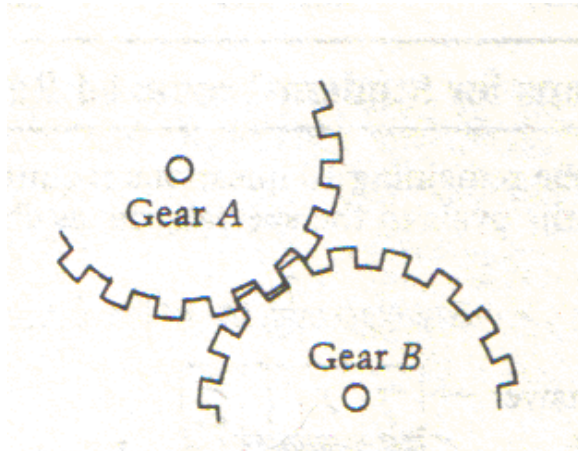
- (A) 1
- (B) 2
- (C) 3
- (D) 4
- (E) 6

16.



In the figure above, both circles have their centers at point O , and point A lies on segment OB . If $OA = 3$ and $AB = 2$, what is the ratio of the circumference of the smaller circle to the circumference of the larger circle?

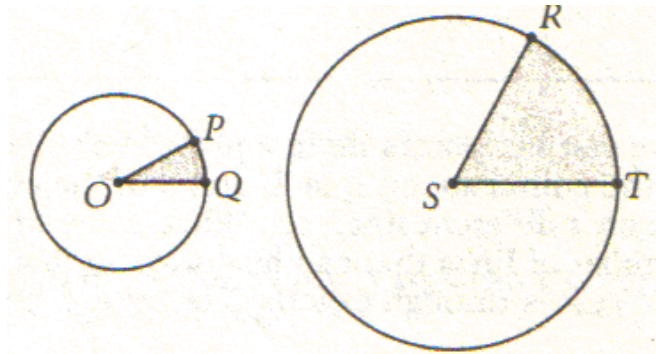
17.



NOTE: Figure not drawn to scale.

The figure above shows parts of two circular gears whose teeth interlock when the gears turn. Gear A has 72 teeth and gear B has 48 teeth. How many complete revolutions does gear A make when gear B makes 9 complete revolutions?

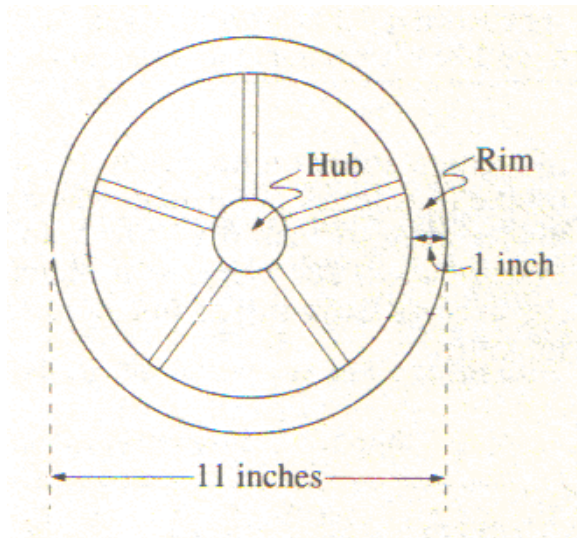
18.



In the figure above, the radius of the circle with center S is twice the radius of the circle with center O and the measure of $\angle RST$ is twice that of $\angle POQ$. If the area of the shaded region of circle O is 3, what is the area of the shaded region of circle S?

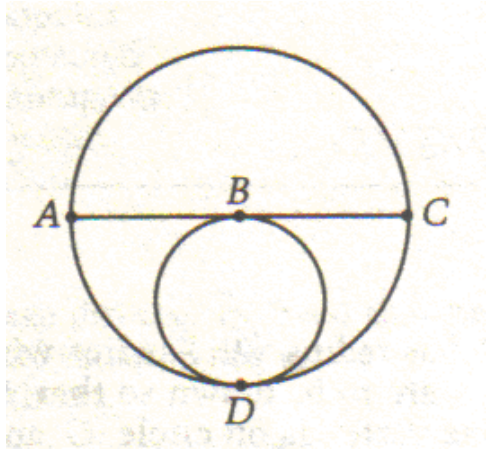
- (A) 24
- (B) 12
- (C) 6
- (D) 3
- (E) $\frac{3}{2}$

19.



A wheel has an outer diameter of 11 inches, as shown above. The rim is 1 inch wide and the diameter of the hub is 2 inches. If each spoke extends $\frac{1}{2}$ inch into the hub and $\frac{1}{2}$ inch into the rim, what is the sum of the lengths of the five spokes, in inches?

20.

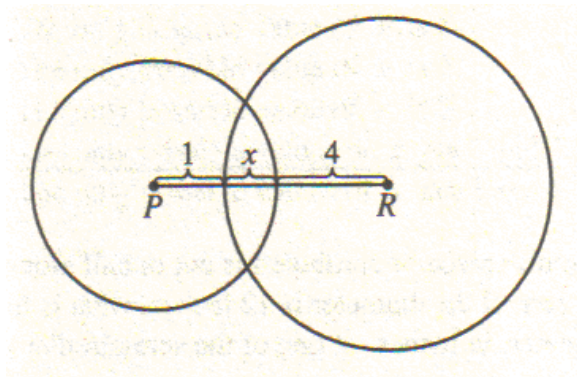


NOTE: Figure not drawn to scale.

In the figure above, B is the center of the larger circle. The smaller circle is tangent to the larger circle at D and contains point B . If the length of diameter AC is 12, what is the area of the smaller circle?

- (A) 6π
- (B) 9π
- (C) 12π
- (D) 16π
- (E) 36π

21.



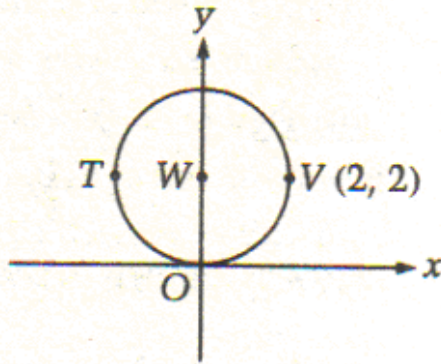
NOTE: Figure not drawn to scale.

In the figure above, the radius of the circle with center R is twice the radius of the circle with center P . What is the radius of the circle with center R ?

- (A) 5
- (B) 6
- (C) 7
- (D) 8
- (E) 10

22. In the xy -plane, the center of a circle has coordinates $(3, -7)$. If one endpoint of a diameter of the circle is $(-2, -7)$, what are the coordinates of the other endpoint of this diameter?
- (A) $(-7, -7)$
 - (B) $(-2, -2)$
 - (C) $(3, -2)$
 - (D) $(8, -2)$
 - (E) $(8, -7)$
23. What is the radius of a circle that has a circumference of π ?
- (A) $\frac{1}{4}$
 - (B) $\frac{1}{2}$
 - (C) 1
 - (D) 2
 - (E) 4
24. How many more degrees of arc are there in $\frac{1}{4}$ of a circle than in $\frac{1}{5}$ of a circle?
- (A) 9°
 - (B) 18°
 - (C) 24°
 - (D) 30°
 - (E) 36°

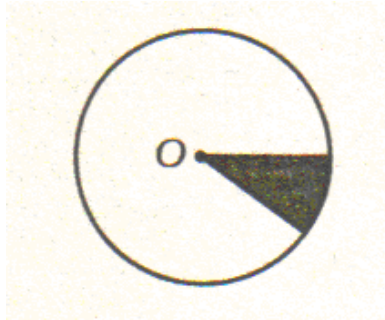
25.



In the circle with center W shown above, T and V are endpoints of a diameter that is parallel to the x -axis. What are the coordinates of point T ?

- (A) $(-2, -2)$
- (B) $(-2, 2)$
- (C) $(0, 2)$
- (D) $(2, -2)$
- (E) $(2, 2)$

26.

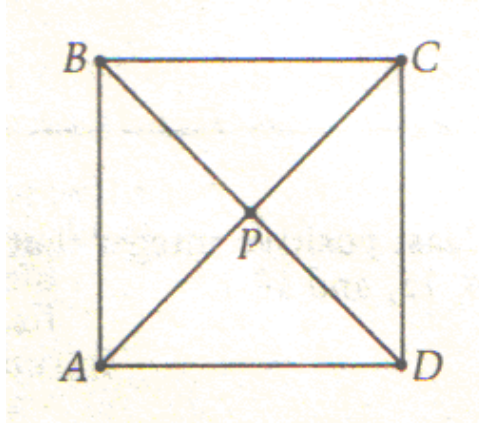


O is the center of the circle above. Approximately what percent of the circle is shaded?

- (A) 1%
- (B) 10%
- (C) 25%
- (D) 50%
- (E) 75%

27. In a rectangular coordinate system, the center of a circle has coordinates $(5, 12)$, and the circle touches the x -axis at one point only. What is the radius of the circle?

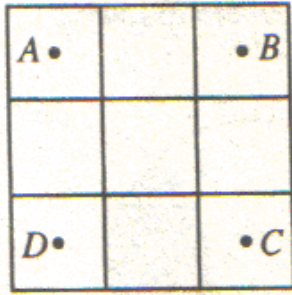
28.



The figure above shows a square and five labeled points. What is the least number of these five points that need to be moved so that all five points lie on the same circle?

- (A) One
- (B) Two
- (C) Three
- (D) Four
- (E) Five

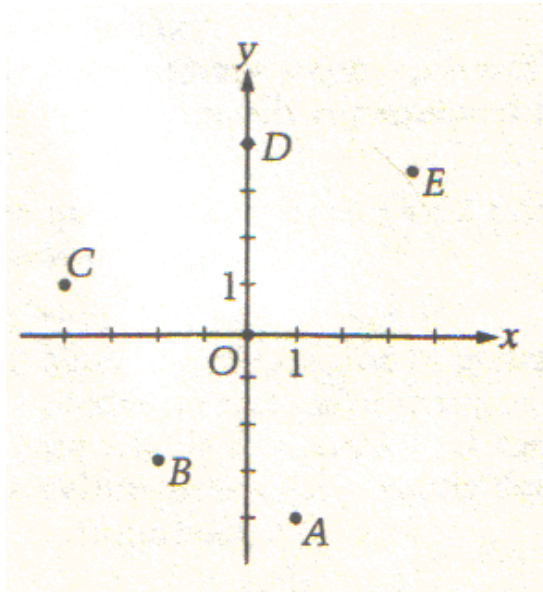
29.



In the figure above, a square with sides of length 6 units is divided into 9 squares. What is the area of the circle (not shown) that passes through the points A , B , C , and D , which are the centers of the four corner squares?

- (A) 6π square units
 - (B) 8π square units
 - (C) 9π square units
 - (D) 10π square units
 - (E) 18π square units
30. Line ℓ and m and two circles lie in a plane. If ℓ passes through the centers of the two circles and if m is parallel to ℓ , which of the following could NOT be the number of points at which m intersects the circles?
- (A) 0
 - (B) 1
 - (C) 3
 - (D) 4
 - (E) 5

31.



In the figure above, which lettered point, other than point O , lies in the interior of a circle with center O and radius 4 ?

- (A) A
- (B) B
- (C) C
- (D) D
- (E) E