

Circles. Form A

1. In the standard (x, y) coordinate plane, what is the radius and center of the circle

$$(x - 5)^2 + (y + 4)^2 = 9$$

- (A) Center: $(-5, 4)$ Radius 9
 (B) Center: $(5, -4)$ Radius 9
 (C) Center: $(-5, 4)$ Radius 3
 (D) Center: $(5, -4)$ Radius 3
 (E) Center: $(-5, 4)$ Radius 81

$$(x - a)^2 + (y - b)^2 = r^2$$

center radius

$C(5, -4) \quad r = \sqrt{9} = 3$

2. In the standard (x, y) coordinate plane, what is the radius and center of the circle

$$(x + 5)^2 + (y + 4)^2 = 27$$

- (A) Center: $(5, 4)$ Radius $3\sqrt{3}$
 (B) Center: $(5, -4)$ Radius 27
 (C) Center: $(-5, -4)$ Radius 27
 (D) Center: $(-5, -4)$ Radius $3\sqrt{3}$
 (E) Center: $(-5, 4)$ Radius $3\sqrt{3}$

$$r = \sqrt{27} = \sqrt{9 \cdot 3} = \sqrt{9} \sqrt{3} = 3\sqrt{3}$$

$$C(-5, -4)$$

3. Find the equation of circle with center coordinates of $(2, 4)$ and a radius of 3.

- (A) $(x - 2)^2 + (y - 4)^2 = 3$
 (B) $(x - 2)^2 + (y - 4)^2 = 9$
 (C) $(x + 2)^2 + (y + 4)^2 = 9$
 (D) $(x + 2)^2 + (y + 4)^2 = \sqrt{3}$
 (E) $(x - 2)^2 + (y - 4)^2 = \sqrt{3}$

$$(x - a)^2 + (y - b)^2 = r^2$$

a b

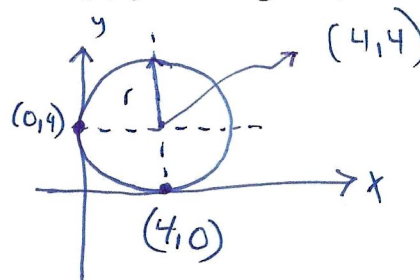
$$(x - 2)^2 + (y - 4)^2 = 9$$

4. A circle in the standard coordinate plane is tangent to the x-axis at $(4, 0)$ and tangent to the y-axis at $(0, 4)$. What is the equation of the circle?

- (A) $(x - 4)^2 + (y - 4)^2 = 4$
 (B) $(x + 4)^2 + (y + 4)^2 = 16$
 (C) $(x - 4)^2 + (y - 4)^2 = 16$
 (D) $(x - 4)^2 + (y - 4)^2 = \sqrt{8}$
 (E) $(x)^2 + (y)^2 = 16$

$$r = 4$$

$$C(4, 4)$$



5. On the xy plane, what is the area of a circle with the following equation:

$$(x + 2)^2 + (y - 3)^2 = 25$$

$$r = \sqrt{25} = 5$$

$$A = \pi r^2 = \pi(25) = 25\pi$$

(A) 25π

(B) 5π

(C) 4π

(D) 3π

(E) $\sqrt{8}\pi$

6. If the center of a circle is at $(2, -4)$ and the diameter of the circle is 6, what is the equation of that circle?

so $r=3$

(A) $(x+2)^2 + (y-4)^2 = \sqrt{6}$

(B) $(x+2)^2 + (y+4)^2 = 36$

(C) $(x-2)^2 + (y+4)^2 = 3$

(D) $(x-2)^2 + (y+4)^2 = 9$

(E) $(x+2)^2 + (y-4)^2 = 9$

$$(x-2)^2 + (y-(-4))^2 = 3^2$$

$$(x-2)^2 + (y+4)^2 = 9$$

7. Circle A is given by the equation $(x-4)^2 + (y+3)^2 = 36$. Circle A is shifted up five units and left by six units. What is the new equation for circle A?

x shift

y shift

(A) $(x+2)^2 + (y-2)^2 = 6$

(B) $(x-9)^2 + (y+9)^2 = 36$

(C) $(x-10)^2 + (y+8)^2 = 36$

(D) $(x-9)^2 + (y+9)^2 = 6$

(E) $(x+2)^2 + (y-2)^2 = 36$

C (4, -3)

shift left by 6 units: replace x with $x+6$

shift up by 5 units: replace y with $y-5$

new center $(x+6-4, y-5+3) = (x+2)^2 + (y-2)^2 = 36$

8. Which of the following equations describes all the points (x, y) in a coordinate plane that are five units away from the point $(-3, 6)$?

(A) $(x-3)^2 + (y+6)^2 = 5$

(B) $(x+3)^2 + (y-6)^2 = 5$

(C) $(x+3)^2 + (y-6)^2 = 25$

(D) $(x+3)^2 - (y-6)^2 = 25$

(E) $(x-3)^2 + (y-6)^2 = 5$

radius = 5

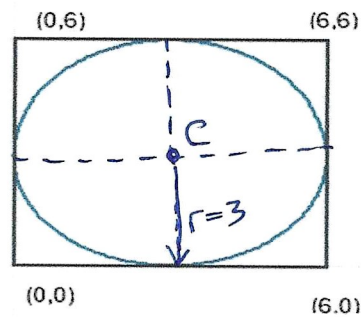
$$(x-(-3))^2 + (y-6)^2 = 5^2$$

$$(x+3)^2 + (y-6)^2 = 25$$

9. In the standard (x, y) coordinate plane below, the vertices of the square have coordinates $(0, 0)$, $(6, 0)$, $(6, 6)$, $(0, 6)$. Which of the following is an equation of the circle that is inscribed in the square?

(A) $(x-3)^2 + (y-3)^2 = 9$

- (B) $(x - 3)^2 + (y - 3)^2 = 3$
 (C) $(x + 3)^2 + (y + 3)^2 = 9$
 (D) $(x - 3)^2 + (y - 3)^2 = 6$
 (E) $(x + 3)^2 + (y + 3)^2 = 9$

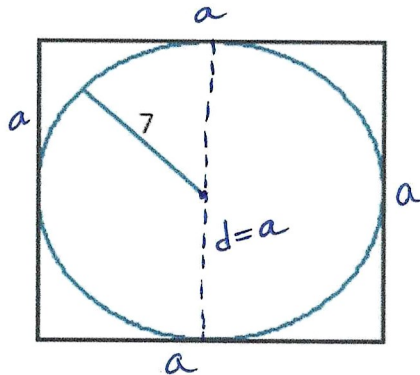


$c(3,3)$
 $r=3$

10. A square is circumscribed about a circle of 7-foot radius as shown below. What is the area of the square, in square feet?

$r=7 \Rightarrow \text{diameter} = 14 = \text{side of square}$

- (A) 49
 (B) 56
 (C) 98
 (D) 49π
 (E) 196

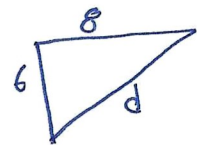
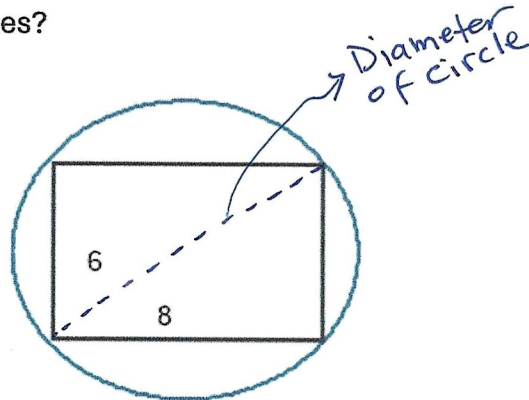


$A = \frac{1}{2} d^2$
 $= \frac{1}{2} (14)^2 = 98$

Area of square $= a^2$
 $= d^2 = 14^2$
 $= 196$

11. A 6-inch-by-8-inch rectangle is inscribed in a circle as shown below. What is the area of the circle, in square inches?

- (A) 5π
 (B) 16π
 (C) 25π
 (D) 48π
 (E) 96π



This is a 3-4-5 triangle so $d=10$

OR
 $d^2 = 6^2 + 8^2$
 $d^2 = 36 + 64 = 100$
 $d = 10$
 so $r=5$

$A_{\text{circle}} = \pi r^2$
 $= \pi 5^2 = 25\pi$

12. What is the area of the square inside the circle with radius 2 cm?

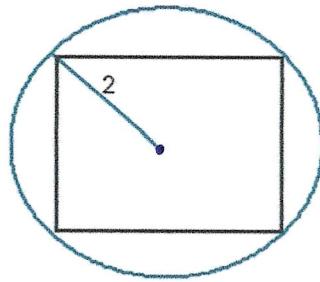
(A) 16

(B) 8

(C) 4

(D) 8π

(E) 2



$$= 2r^2 = 2 \cdot 2^2 = 2 \cdot 4 = 8$$

13. The circle in the figure below has a radius of 3 centimeters. What is the length, in centimeters, of the arc intercepted by the central angle of 45° ?

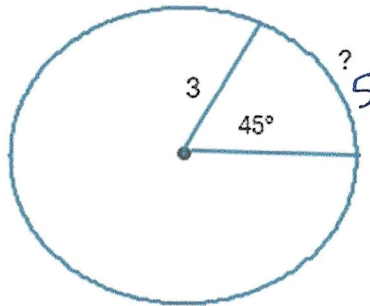
(A) $\frac{4}{3}\pi$

(B) $\frac{1}{3}\pi$

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

(D) π

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



$$\begin{aligned} S &= r\theta \rightarrow \text{in radians} \\ &= 3 \cdot 45^\circ \frac{\pi}{180^\circ} \\ &= 3 \cdot \frac{1}{4} \frac{\pi}{1} \\ &= \frac{3}{4}\pi \end{aligned}$$

14. Points A and B lie on the circle below, where central angle $\angle ACB$ measure 100° . What is the measure of $\angle ABC$?

This is an example of an isosceles triangle inside circle

$$AC = AB = r$$

so the two angles a and b are equal

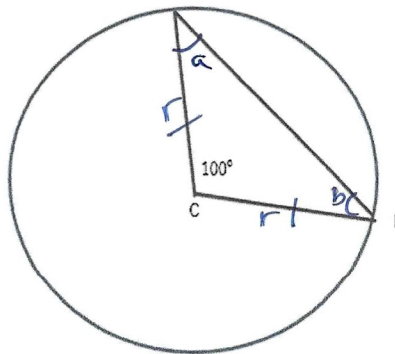
(A) 40°

(B) 35°

(C) 50°

(D) 55°

(E) 45°



$$100 + a + b = 180$$

$$a + b = 80$$

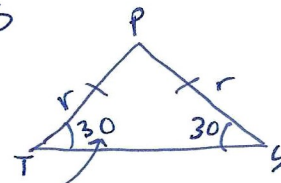
$$a = b \text{ so}$$

$$a = 40$$

$$b = 40$$

15. In the circle shown below, chords $\overline{TR}$ and $\overline{QS}$ intersect at P, which is the center of the circle, and the measure of $\angle PST$ is 30° . What is the degree measure of minor arc $\widehat{RS}$?

$\triangle PST$ is an isosceles
so base angles
are equal



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$$a + 30 + 30 = 180$$

$$a = 180 - 60 = 120$$

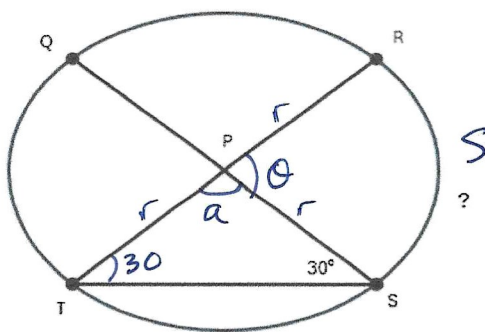
(A) 30° (B) 45° (C) 60° (D) 90° (E) 70°

$$a + \theta = 180$$

$$\theta = 180 - a$$

$$\theta = 180 - 120$$

$$= 60$$



16. A chord 24 inches long is 5 inches from the center of a circle, as shown below. What is the radius of the circle, to the nearest tenth of an inch?

Radius bisecting chord problem

Radius that is $\perp$ to a chord cuts the chord into two equal segments

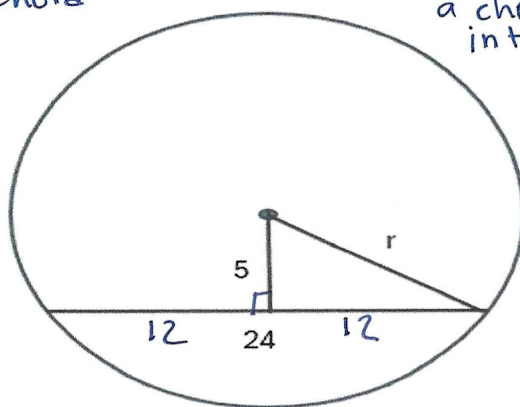
(A) 29.0

(B) 24.5

(C) 16.9

(D) 13.0

(E) 10.9



$$r^2 = 5^2 + 12^2$$

$$r^2 = 25 + 144$$

$$r^2 = 169$$

$$r = \sqrt{169} = 13$$

17. The figure below shows 2 tangent circles such that the 10 centimeter diameter of the smaller circle is equal to the radius of the larger circle. What is the area, in square centimeters, of the shaded region?

$$A_{\text{circle}} = \pi r^2$$

$$A_{\text{shaded}} = A_{\text{large}} - A_{\text{small}}$$

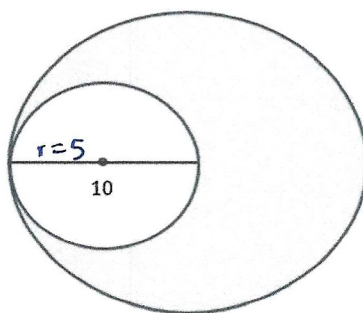
$$= \pi(10)^2 - \pi(5)^2$$

$$= 100\pi - 25\pi$$

$$= 75\pi$$

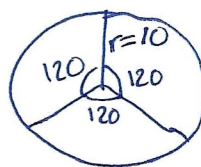
(A) 10

(B) 75

(C) 5π (D) 10π (E) 75π 

$$360 \div 3 = 120^\circ$$

18. A circle with radius 10 centimeters is divided into three congruent arcs. What is the length, in centimeters, of each of the 3 arcs?



(A) $\frac{10\pi}{3}$

(B) $\frac{20\pi}{3}$

(C) $\frac{40\pi}{3}$

(D) 10π

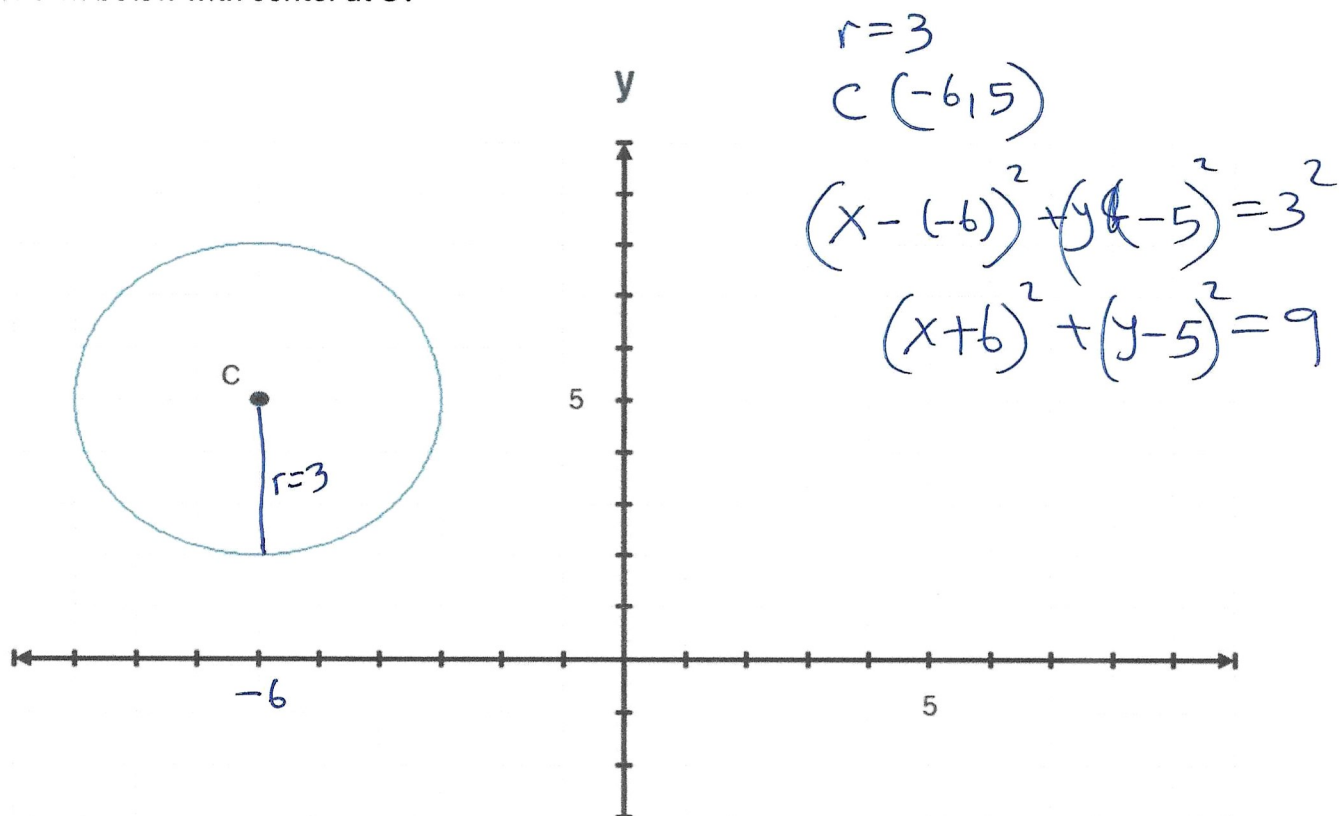
(E) 20π

$$S = r\theta \quad \theta \text{ in radians}$$

$$S = 10 \cdot 120^\circ \frac{\pi}{180^\circ}$$

$$= \frac{20}{3} \pi$$

19. In the standard (x, y) coordinate plane, what is the radius and center of the circle shown below with center at C?



(A) $(x - 3)^2 + (y - 5)^2 = 9$

(B) $(x - 6)^2 + (y - 5)^2 = 3$

(C) $(x + 6)^2 + (y - 5)^2 = 9$

(D) $(x - 3)^2 + (y - 3)^2 = 6$

(E) $(x + 6)^2 + (y - 5)^2 = 3$

20. In the circle shown below, chord $\overline{DF}$ is parallel to the diameter $\overline{AC}$. The length of $\overline{DF}$ is 20 centimeters and the length of $\overline{AC}$ is 28 centimeters. What is the distance, in centimeters, from B, the center of the circle, to E, the midpoint of $\overline{DF}$.

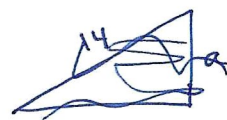
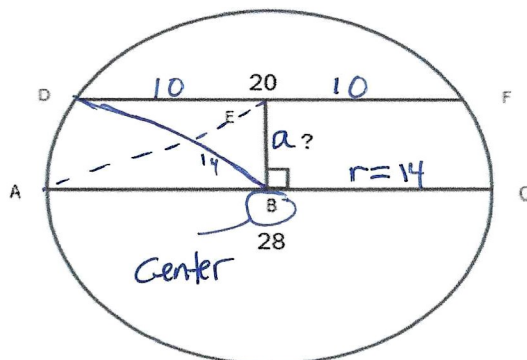
(A) $\sqrt{44}$

(B) $\sqrt{96}$

(C) $\sqrt{20}$

(D) 8

(E) 10



$$14^2 = 10^2 + a^2$$

$$a^2 = 14^2 - 10^2 = 196 - 100$$

$$a^2 = 96 \quad a = \sqrt{96}$$

21. In the figure below, P and Q lie on the circle R, which has a radius of 9. If the angle PRQ is 120° , what is the area of sector PRQ?

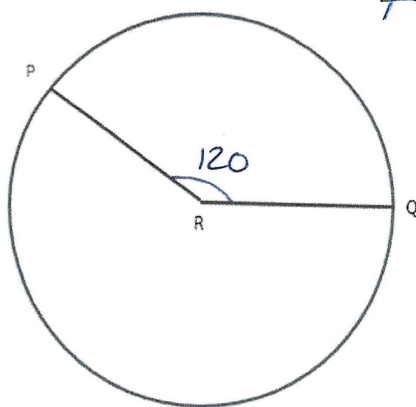
(A) 343π

(B) 81π

(C) 3π

(D) 9π

(E) 27π



$$A_{\text{sector}} = \frac{120}{360} \pi r^2$$

↳ Ratio of part to whole

$$A_{\text{sector}} = \frac{120}{360} \pi 9^2$$

$$= \frac{1}{3} \pi 81 = 27\pi$$

22. The figure below shows the diameter of a circle defined by the two end points $(-6,0)$ and $(0,0)$ in the standard (x,y) coordinate plane. What is the equation of the circle?

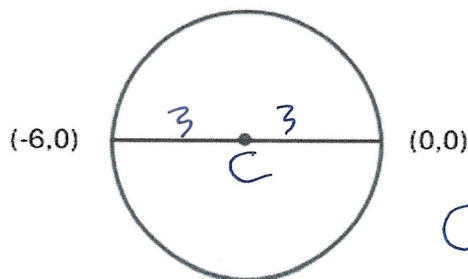
(A) $(x+6)^2 + (y-6)^2 = 9$

(B) $(x+6)^2 + y^2 = 9$

(C) $x^2 + (y-6)^2 = 6$

(D) $(x+3)^2 + y^2 = 9$

(E) $(x-3)^2 + y^2 = 9$



Diameter = 6
so $r=3$

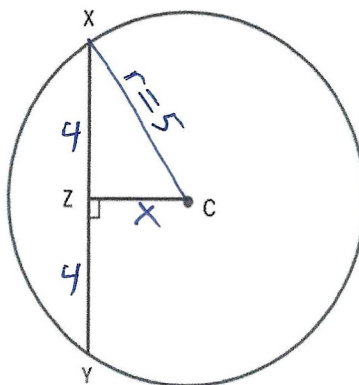
center at midpoint

$$C\left(\frac{0-6}{2}, \frac{0+0}{2}\right)$$

$$C(-3,0)$$

23. The circle shown below has a radius of 5 meters, and the length of chord XY is 8 meters. If C marks the center of the circle, what is the length, in meters, of segment CZ?

- (A) $2\sqrt{3}$
 (B) 3
 (C) $\sqrt{13}$
 (D) 5
 (E) 9



5-4-3 Triangle

OR

$$5^2 = 4^2 + x^2$$

$$x^2 = 5^2 - 4^2 = 25 - 16$$

$$x^2 = 9$$

$$x = 3$$

Answers

- | | | |
|-------|-------|-------|
| 1. D | 11. C | 21. E |
| 2. D | 12. B | 22. D |
| 3. B | 13. C | 23. B |
| 4. C | 14. A | |
| 5. A | 15. C | |
| 6. D | 16. D | |
| 7. E | 17. E | |
| 8. C | 18. B | |
| 9. A | 19. C | |
| 10. E | 20. B | |