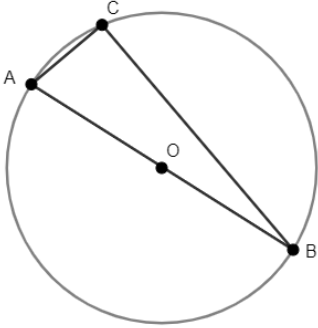# Circles

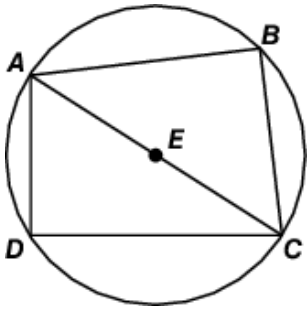**Triangles and Quadrilaterals Inscribed in a Circle**

1. Triangle ABC is inscribed in circle O. Segment AB is the diameter of the circle. If $m\angle ABC = 17.5°$, what is the measure of $\angle BAC$?

    A. $m\angle BAC = 17.5°$

    B. $m\angle BAC = 72.5°$ - correct

    C. $m\angle BAC = 90°$

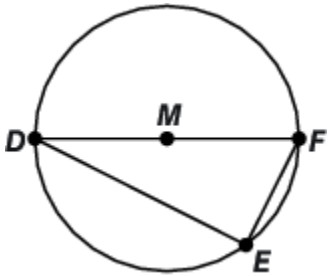   D. $m\angle BAC = 107.5°$

2. Points A, B, C, and D lie on circle E as shown in the figure below.
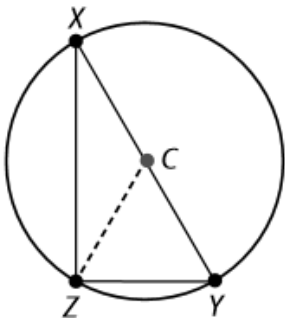
    Which statement must be true about the figure?

    A. $m\angle BCD = m\angle BAD = 90°$

    B. $m\angle ADC = m\angle ABC = 90°$ - correct

    C. $m\angle ABC = m\angle BCD = 90°$

    D. $m\angle BAD = m\angle ADC = 90°$

3. In circle M shown below, $m\angle DEF = (5x - 10)°$. What is the value of x?
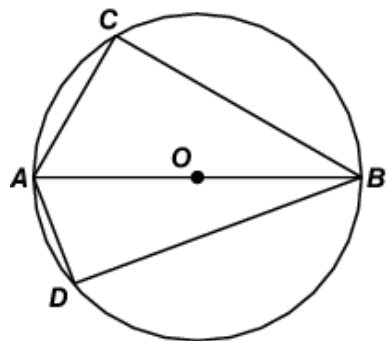
    $$x = 20$$

4. In the diagram, C is the center of the circle and $\angle YXZ$ is inscribed in the circle. Which of the following statements are true? Select All that apply.

    A. $\overline{CX} \cong \overline{CY}$ - correct

    B. $\overline{CZ} \cong \overline{XY}$

    C. ΔCXZ is isosceles. - correct

    D. ΔXYZ is acute.
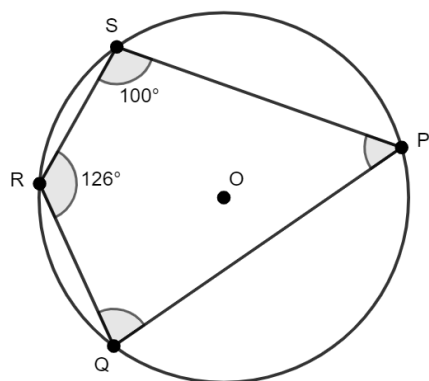
    E. $\overline{XY}$ is a diameter of circle C. - correct

Circles

5. In the figure below, $\overline{AB}$ is the diameter of the circle with center O. If $m\angle ABC = 30°$ and $m\angle CAD = 140°$, what is $m\angle BAD$?
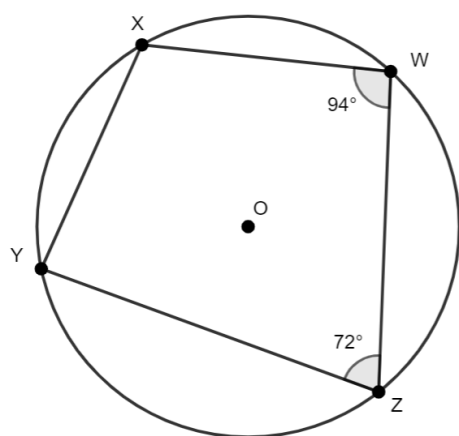

A. 60°

B. 70°

C. 80° - correct

D. 110°

6. In the diagram below, quadrilateral $PQRS$ is inscribed in circle O. Find $m\angle P$ and $m\angle Q$.

A. $m\angle P = 54°$ and $m\angle Q = 80°$ - correct

B. $m\angle P = 80°$ and $m\angle Q = 54°$

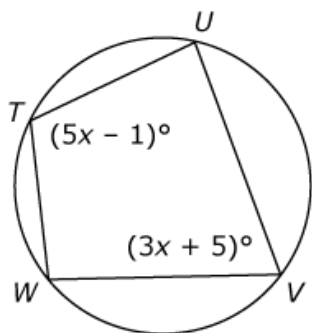C. $m\angle P = 100°$ and $m\angle Q = 126°$

D. $m\angle P = 126°$ and $m\angle Q = 100°$

7. In the diagram below, quadrilateral $WXYZ$ is inscribed in circle O. If $m\angle W = 94°$ and $m\angle Z = 72°$, find $m\angle X$ and $m\angle Y$.

A. $m\angle X = 72°$ and $m\angle Y = 94°$

B. $m\angle X = 94°$ and $m\angle Y = 72°$

C. $m\angle X = 86°$ and $m\angle Y = 108°$

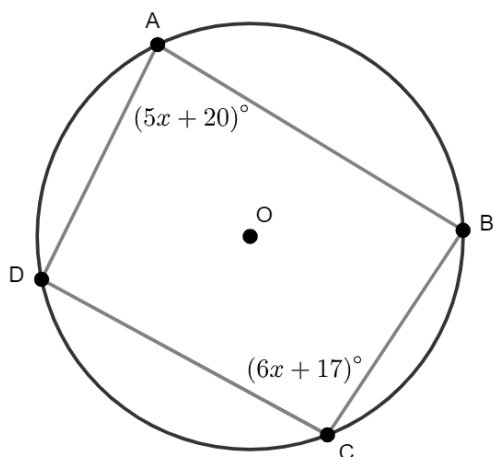D. $m\angle X = 108°$ and $m\angle Y = 86°$ - correct

Circles

8. This diagram shows a circle and an inscribed quadrilateral, with angle measures represented by expressions.
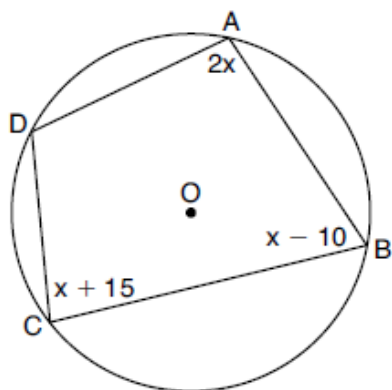

Based on the diagram, what is $m\angle V$?

    A.   68°

    B.   71° - correct

    C.   109°

    D.   136°

9. In the diagram below, quadrilateral $ABCD$ is inscribed in circle O, $m\angle A = (5x + 20)°$ and $m\angle C = (6x + 17)°$. What are the measures of $m\angle A$ and $m\angle C$?

    A. $m\angle A = 95°$ and $m\angle C = 85°$

    B. $m\angle A = 95°$ and $m\angle C = 95°$

    C. $m\angle A = 85°$ and $m\angle C = 85°$

    D. $m\angle A = 85°$ and $m\angle C = 95°$ - correct

10. In the diagram below, quadrilateral $ABCD$ is inscribed in circle O, $m\angle A = (2x)°$, $m\angle B = (x - 10)°$, and $m\angle C = (x + 15)°$.

What is $m\angle D$?
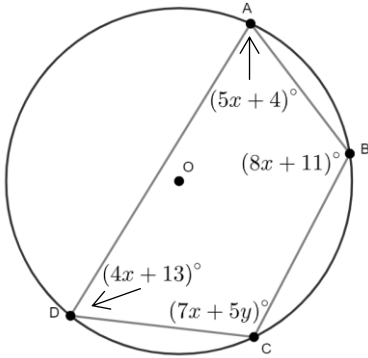
   A. 55°

    B. 70°

    C. 110°

    D. 135° - correct

Circles

11. In the diagram below, quadrilateral $ABCD$ is inscribed in circle O. If $m\angle A = (5x + 4)°$, $m\angle B = (8x + 11)°$, $m\angle C = (7x + 5y)°$, and $m\angle D = (4x + 13)°$, which of the following statements are true? Select All that apply.

A. $x = 13$ - correct

B. $y = 13$

C. $m\angle A = 69°$ - correct

D. $m\angle B = 115°$ - correct

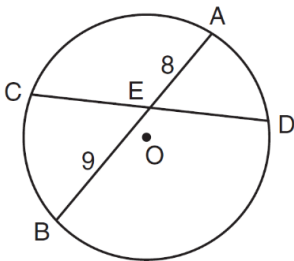E. $m\angle C = 111°$ - correct

F. $m\angle D = 65°$ - correct

Segment Relationships in Circles

12. In the diagram below of circle O, chords $\overline{AB}$ and $\overline{CD}$ intersect at E. If $CE = 10$, $ED = 6$, $AE = 4$, what is the length of $\overline{EB}$?
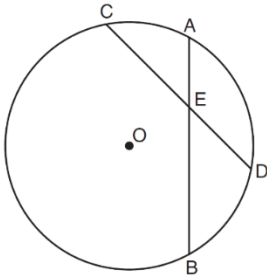
A. 15 - correct

B. 12

C. 6.7

D. 2.4

13. In the diagram below of circle O, chord $\overline{AB}$ bisects chord $\overline{CD}$ at E. If $AE = 8$ and $BE = 9$, find the length of $\overline{CE}$.

A. $2\sqrt{6}$

B. $6\sqrt{2}$ - correct

C. 36

D. 72
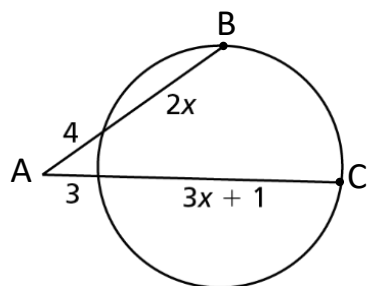
14. In the diagram below of circle O, chords $\overline{AB}$ and $\overline{CD}$ intersect at E, $DE = 2x + 8$, $EC = 3$, $AE = 4x - 3$, and $EB = 4$. What is the value of x?
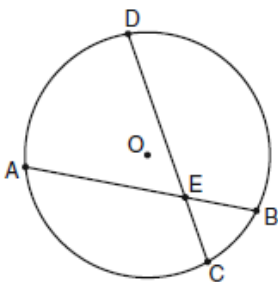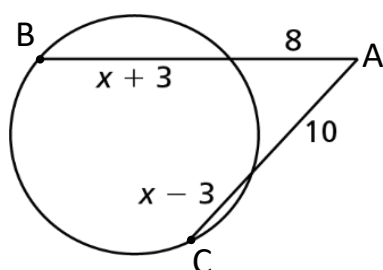

A. 1

B. 3.6 - correct

C. 5

D. 10.25

Circles

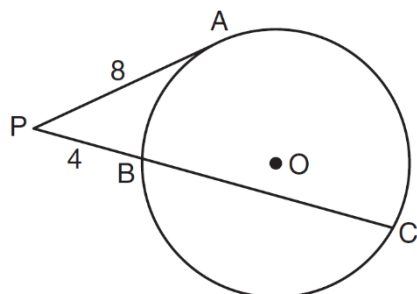15. Look at the figure below. If $\overline{AB}$ and $\overline{AC}$ are secants, what is the value of x?

A. -3

B. 2

C. 4 - correct

D. 13

16. Look at the figure below. If $\overline{AB}$ and $\overline{AC}$ are secants, find AC.

A. 9

B. 16 - correct

C. 18

D. 20

17. In the diagram below of circle O, $\overline{PA}$ is tangent to circle O at A, and $\overline{PC}$ is a secant with points B and C on the circle.

If $PA = 8$ and $PB = 4$, what is the length of $\overline{BC}$?

A. 20

B. 16

C. 15

D. 12 - correct

18. In the diagram below, tangent $\overline{PA}$ and secant $\overline{PC}$ are drawn to circle O from external point P.
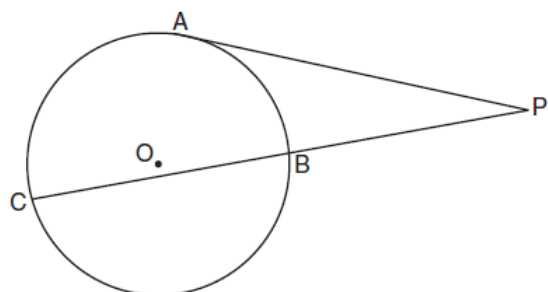
If $PB = 4$ and $BC = 5$, what is the length of $\overline{PA}$?

A. 20

B. 9

C. 8

D. 6 - correct

Circles

19. Circle O is drawn below with secant $\overline{BD}$. The length of $\overline{AD}$ is 24.

If the ratio of $DC:CB$ is 4:5, what is the length of $\overline{CB}$?

A. 36

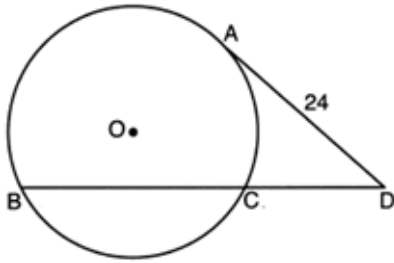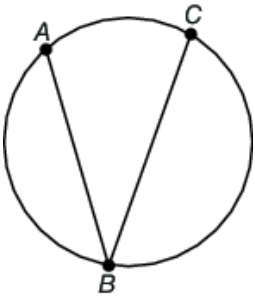B. 20 - correct

C. 16

D. 4

Angle Relationships in Circles

20. Use the circle shown to answer the question.

If $m\widehat{AC} = 76°$ and $m\angle ABC = (2x - 12)°$, find the value of x.

A. $x = 13$

B. $x = 25$ - correct

C. $x = 38$

D. $x = 44$

21. In circle M, below, $m\angle AMC = (10x - 12)°$ and $m\angle ABC = (4x + 6)°$. What is the measure of $\angle ABC$?
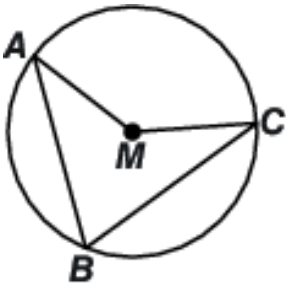
A. 12°

B. 18°

C. 54° - correct

D. 108°

22. In Circle A, segments $\overline{BC}$ and $\overline{CD}$ are tangents to the circle at B and D, respectively. Angle BGD is an inscribed angle with a measurement of $x°$. Which expression shows the relationship between $m\angle BCD$ and $m\angle BGD$?
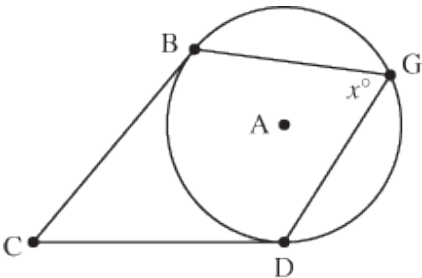
A. $m\angle BCD = \frac{360 - x}{2}$

B. $m\angle BCD = 360 - 2x$

C. $m\angle BCD = \frac{180 - x}{2}$

D. $m\angle BCD = 180 - 2x$ - correct

Circles

23. In the figure below, Circle C has tangent lines $\overleftrightarrow{SR}$ and $\overleftrightarrow{SQ}$ and diameter $\overline{PQ}$. If $m\angle QSR = 46°$, what is the measure of $\angle QPR$?

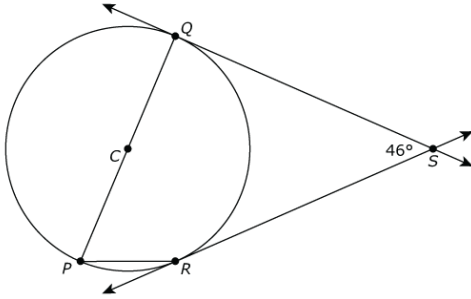

A. $23°$

B. $44°$

C. $46°$

D. $67°$ - correct

Circles in the Coordinate Plane

24. Which equation represents the circle whose center is $(-2, 3)$ and whose radius is 5?

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

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

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

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

25. Which equation represents the circle whose center is $(7, -3)$ and whose radius is 4?

A. $(x - 7)^2 + (y + 3)^2 = 4$

B. $(x + 7)^2 + (y - 3)^2 = 4$

C. $(x + 7)^2 + (y - 3)^2 = 16$

D. $(x - 7)^2 + (y + 3)^2 = 16$ - correct

26. What is the equation of a circle with a center at $(3, -1)$ and a diameter of 8?

A. $(x - 3)^2 + (y + 1)^2 = 16$ - correct

B. $(x - 3)^2 + (y + 1)^2 = 64$

C. $(x + 3)^2 + (y - 1)^2 = 16$

D. $(x - 3)^2 + (y - 1)^2 = 64$

27. What is the equation of a circle with center $(2, 3)$ that passes through the point $(5, 3)$?

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

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

C. $(x - 2)^2 + (y - 3)^2 = 9$ - correct

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

Circles

28. What is the equation of a circle with center $(-2, 3)$ that passes through the point $P(4, -3)$?

    A. $(x + 2)^2 + (y - 3)^2 = 72$ - correct

    B. $(x + 2)^2 + (y - 3)^2 = 36$

    C. $(x - 2)^2 + (y + 3)^2 = 72$

    D. $(x - 2)^2 + (y + 3)^2 = 36$

29. The points $(1, 4)$ and $(-3, 2)$ are the endpoints of a diameter of a circle. What is the standard equation of the circle?

    A. $(x - 1)^2 + (y + 3)^2 = 5$

    B. $(x - 1)^2 + (y + 3)^2 = \sqrt{5}$

    C. $(x + 1)^2 + (y - 3)^2 = 5$ - correct

    D. $(x + 1)^2 + (y - 3)^2 = \sqrt{5}$

30. On a coordinate plane, circle O has its center at the point $(2, 3)$. The point $(-1, -1)$ is on circle O. Which of these statements are correct? Choose All that are correct.

    A. The radius of the circle can be found by doubling the distance between $(2, 3)$ and $(-1, -1)$.

    B. The equation $(x - 2)^2 + (y - 3)^2 = 5$ describes circle O.

    C. The radius of the circle can be found by finding the distance between $(2, 3)$ and $(-1, -1)$. - correct

    D. The diameter of the circle can be found by finding the distance between $(2, 3)$ and $(-1, -1)$.

    E. The equation $(x + 2)^2 + (y + 3)^2 = 5$ describes circle O.

    F. The equation $(x - 2)^2 + (y - 3)^2 = 25$ describes circle O. - correct

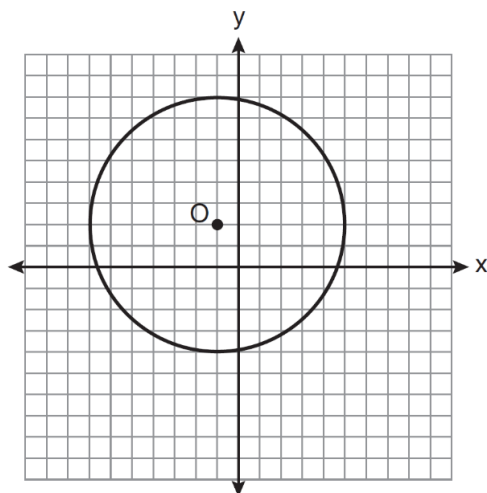31. A circle is drawn on the coordinate plane below. What is the equation of the circle shown?
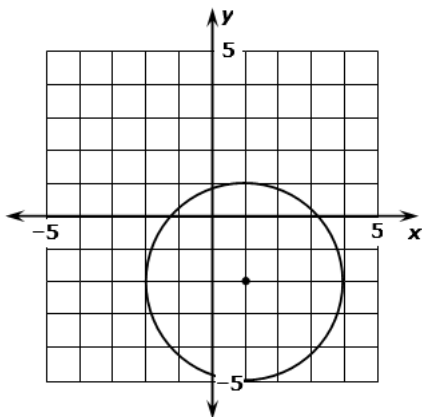
    A. $(x - 1)^2 + (y - 2)^2 = 9$

    B. $(x + 1)^2 + (y + 2)^2 = 9$ - correct

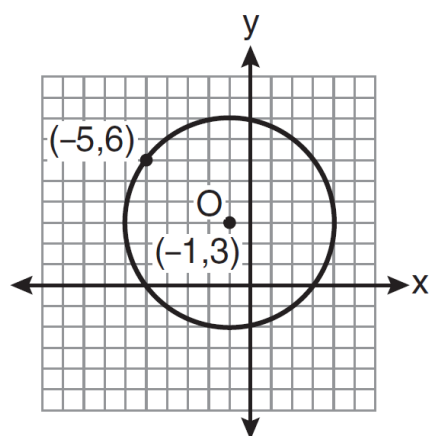   C. $(x + 1)^2 + (y - 2)^2 = 3$

    D. $(x - 1)^2 + (y + 2)^2 = 3$

Circles

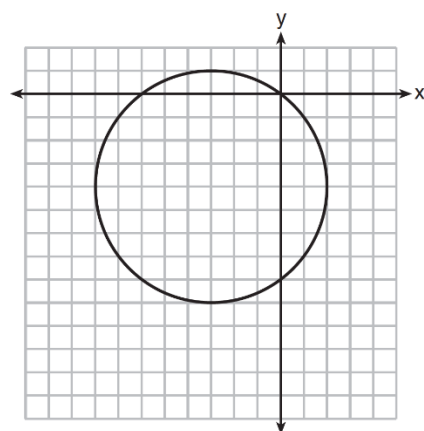32. Write an equation for circle O shown on the graph below.

A. $(x - 1)^2 + (y + 2)^2 = 6$

B. $(x + 1)^2 + (y - 2)^2 = 6$

C. $(x + 1)^2 + (y - 2)^2 = 36$ - correct

D. $(x - 1)^2 + (y + 2)^2 = 36$

33. Write an equation for circle O shown on the graph below.

A. $(x + 1)^2 + (y - 3)^2 = 5$

B. $(x + 1)^2 + (y - 3)^2 = 25$ - correct

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

D. $(x + 5)^2 + (y - 6)^2 = 25$

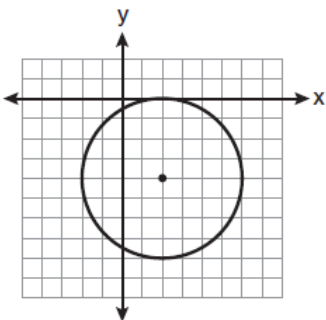34. What is an equation of the circle shown in the graph below?

A. $(x - 3)^2 + (y - 4)^2 = 25$

B. $(x + 3)^2 + (y + 4)^2 = 25$ - correct

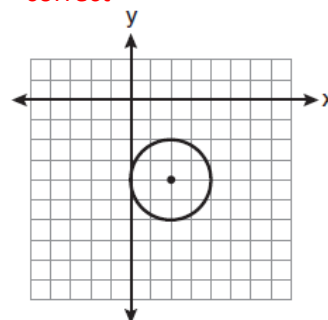C. $(x - 3)^2 + (y - 4)^2 = 10$

D. $(x + 3)^2 + (y + 4)^2 = 10$

Circles

35. Which graph represents a circle with the equation $(x - 2)^2 + (y + 4)^2 = 4$?
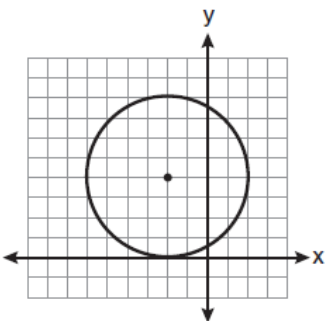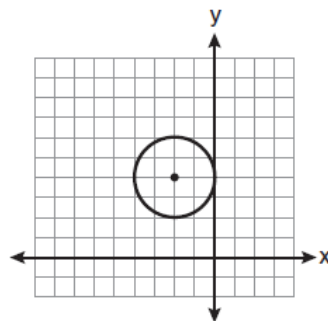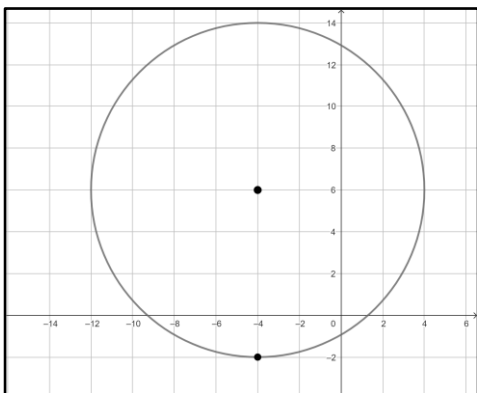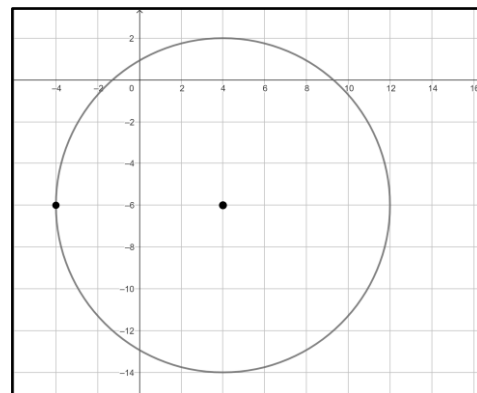
A.

B. - correct

C.

D.

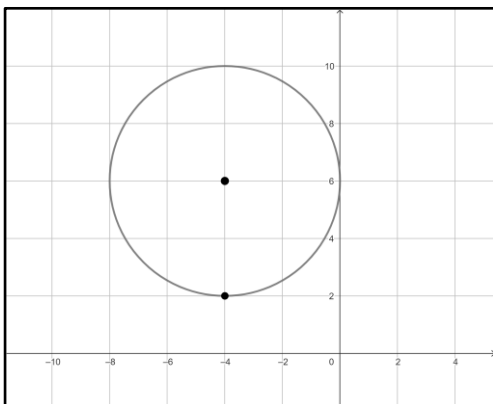36. Which graph represents a circle with the equation $(x + 4)^2 + (y - 6)^2 = 16$?
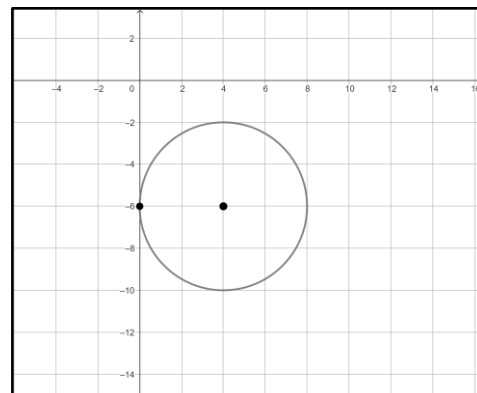
A.

B.

C. - correct

D.

Circles

37. The equation of a circle is $x^2 + (y - 7)^2 = 16$. What are the center and radius of the circle?

    A. Center $(0, -7)$ and radius 4
    B. Center $(0, -7)$ and radius 16
    C. Center $(0, 7)$ and radius 4 - correct
    D. Center $(0, 7)$ and radius 16

38. The equation of a circle is $(x - 5)^2 + (y + 3)^2 = 10$. What are the center and radius of the circle?

    A. Center $(-5, -3)$ and radius 10
    B. Center $(5, -3)$ and radius $\sqrt{10}$ - correct
    C. Center $(-5, 3)$ and radius 10
    D. Center $(5, 3)$ and radius $\sqrt{10}$

39. What are the center and the radius of the circle whose equation is $(x - 3)^2 + (y + 3)^2 = 36$?

    A. Center $(3, -3)$ and radius 6 - correct
    B. Center $(-3, 3)$ and radius 6
    C. Center $(3, -3)$ and radius 36
    D. Center $(-3, 3)$ and radius 36

40. What are the coordinates of the center and the length of the radius of the circle whose equation is $x^2 + y^2 + 2x - 16y + 49 = 0$?

    A. Center $(1, -8)$ and radius 4
    B. Center $(-1, 8)$ and radius 4 - correct
    C. Center $(1, -8)$ and radius 16
    D. Center $(-1, 8)$ and radius 16

41. What are the coordinates of the center and the length of the radius of the circle whose equation is $x^2 + y^2 - 12y - 20.25 = 0$?

    A. Center $(0, 6)$ and radius 7.5 - correct
    B. Center $(0, -6)$ and radius 7.5
    C. Center $(0, 12)$ and radius 4.5
   D. Center $(0, -12)$ and radius 4.5

Circles

42. The equation shown below represents a circle. Which statement describes the key features of the circle that can be determined from the equation?

$$x^2 + 10x + y^2 - 2y + 22 = 0$$

A. The circle has a center at $(-5, 1)$ and radius of 4 units.

B. The circle has a center at $(5, -1)$ and radius of 4 units.

C. The circle has a center at $(-5, 1)$ and radius of 2 units. - correct

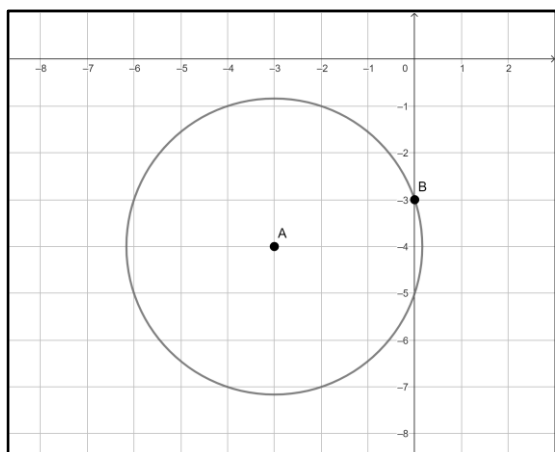D. The circle has a center at $(5, -1)$ and radius of 2 units.

43. A circle centered at the origin passes through $A(-3, 4)$.
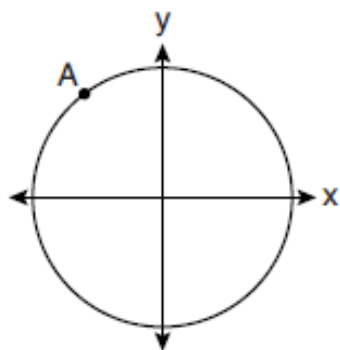
What is the equation of the line tangent to the circle at A?

A. $y - 4 = \frac{4}{3}(x + 3)$

B. $y - 4 = \frac{3}{4}(x + 3)$ - correct

C. $y + 4 = \frac{4}{3}(x - 3)$

D. $y + 4 = \frac{3}{4}(x - 3)$
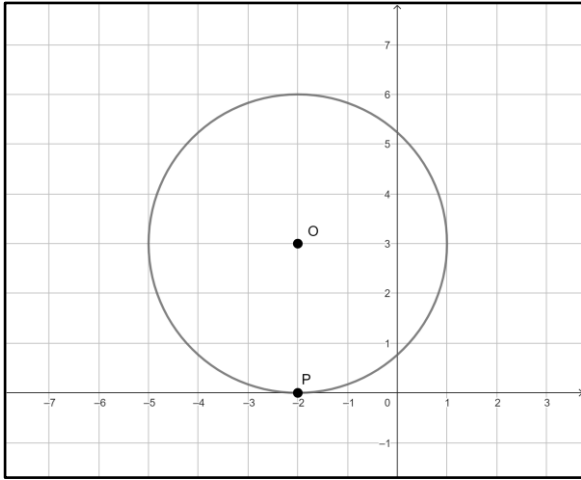
44. In the diagram below of circle A, point B is a point on the circle. What is the equation of the line tangent to the circle at point B?

A. $y = -\frac{1}{3}x - 3$

B. $y = \frac{1}{3}x - 3$

C. $y = -3x - 3$ - correct

D. $y = 3x - 3$

Circles

45. On a coordinate plane, circle O has its center at the point $(-2, \ 3)$. The point $P(-2, \ 0)$ is on circle O. Which of these statements are correct? Choose All that are correct.


A. The equation of the circle is $(x + 2)^2 + (y - 3)^2 = 9$ - correct

B. The domain of the circle is $-5 \le x \le 1$ - correct

C. The range of the circle is $-2 \le y \le 6$

D. The line $y = 0$ is tangent to circle O at P. - correct

E. The point $(0.75, 4)$ is on the circle.

F. The area of the circle is approximately 254.47 square units.

46. The border of circular garden can be modeled by the equation $(x + 6)^2 + (y - 4)^2 = 36$. Select All the true statements.

A. The center of the circle is $(-6, 4)$. - correct

B. The diameter of the circle is 18.

C. The point $(-6, 10)$ is on the circle. - correct

D. The domain of the circle is $-12 \le x \le 0$. - correct

E. The range of the circle is $-2 \le y \le 10$. - correct

F. The circumference of the circle is 12π. - correct

Circumference and Area

47. The diagram shows a $140°$ sector in a circle of radius 8 units.
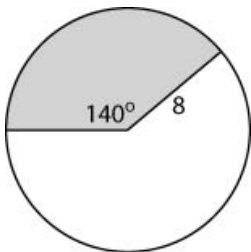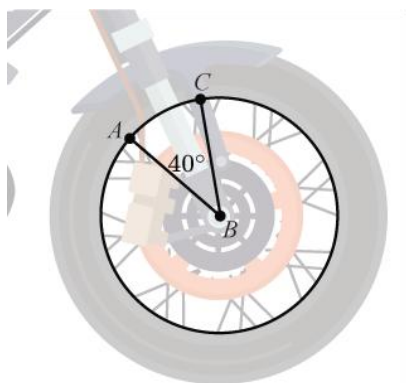

What is the approximate area of the shaded sector?

A. 26 square units

B. 67 square units - correct

C. 78 square units

D. 156 square units

Circles

48. A circle has a diameter of 30 centimeters. A sector has a central angle of 240 degrees. What is the area of the sector? Leave your answer in terms of π.

   A. $75\pi\ cm^2$

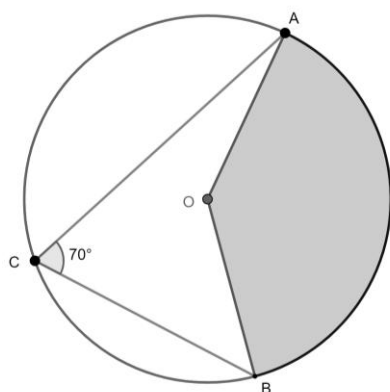   B. $150\pi\ cm^2$ - correct

   C. $225\pi\ cm^2$

   D. $600\pi\ cm^2$

49. The wheel of a motorcycle is shown.

If the radius AB is 12 inches, and the measure of central angle ABC is 40°, what is the approximate area of sector ABC? Use 3.14 for π.

   A. $12.56\ in^2$

   B. $50.24\ in^2$ - correct

   C. $113.04\ in^2$

   D. $452.16\ in^2$
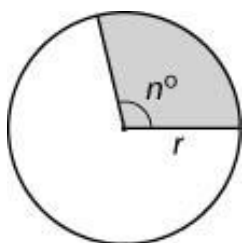
50. In the diagram below of circle O, $\overline{AC}$ and $\overline{BC}$ are chords, and $m\angle ACB = 70°$.

If $OA = 9$, the area of the shaded sector AOB is

   A. 3.5π

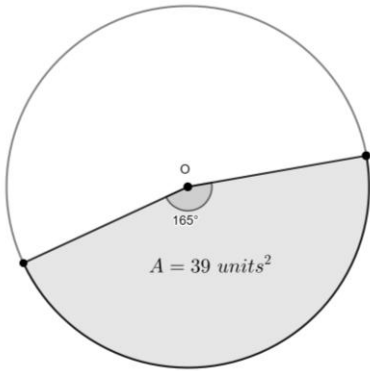   B. 7π

   C. 15.75π

   D. 31.5π - correct

51. Which equation could be used to solve for A, the area of the shaded sector in the circle below?

   A. $A = \frac{n}{360} \cdot \pi r^2$ - correct

   B. $A = \frac{n}{360} \cdot 2\pi r$

   C. $A = n + \pi r^2$

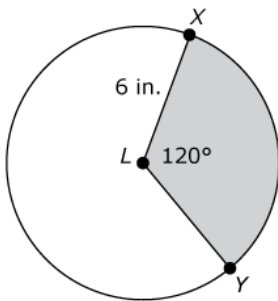   D. $A = n\pi r^2$

Circles

52. The diagram shows a 165° sector with area of $39\ units^2$ in circle O. What is the radius of Circle O?

A. $r = 3.5$

B. $r = 5.2$ - correct

C. $r = 6.2$

D. $r = 12.4$

53. This diagram shows circle L, central angle XLY, and some of their measurements.

Part A: Which of the following is closest to the area, in square inches, of the shaded sector of circle L?

A. 9.4

B. 18.8

C. 28.3

D. 37.7 - correct

Part B: What is the length, to the nearest tenth of an inch of arc XY?

12.6

54. A circular pizza has a diameter of 14 inches and is divided into 8 equal slices as shown. An engineer is asked to create a box that hold 3 pizza slices.
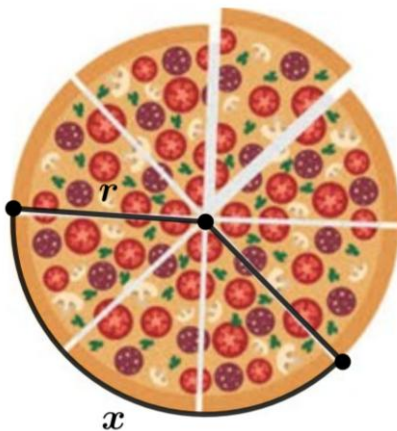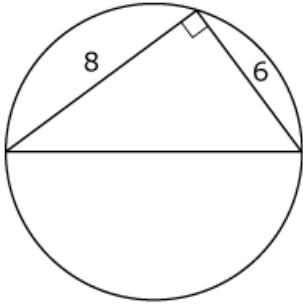

What should be the minimum measurement of the arc of the box, labeled x, to ensure it holds all of the slices? Round answer to the nearest whole number.
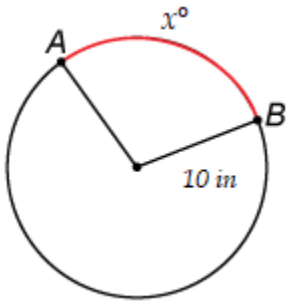
17 $inches$

Circles

55. This diagram shows a circle with an inscribed right triangle and some of its measurements, in units.

Based on the diagram, what is the circumference, in units, of the circle?

A. 5π

B. 10π - correct

C. 14π

D. 25π

56. Consider the circle with a radius of 10 inches and a central angle that subtends an arc of $x°$.

Select the proportion that can be used to find the length of arc AB.

A. $\dfrac{x°}{360°} = \dfrac{2(10)\pi}{length\ of\ arc\ AB}$

B. $\dfrac{360°}{x°} = \dfrac{length\ of\ arc\ AB}{2(10)\pi}$

C. $\dfrac{x°}{2(10)\pi} = \dfrac{length\ of\ arc\ AB}{110°}$

D. $\dfrac{x°}{length\ of\ arc\ AB} = \dfrac{360°}{2(10)\pi}$ - correct

57. A student draws a circle with a radius of 5 inches and highlights an arc on the circle that measures 18.5 inches. What is the degree measure of this central angle, to the nearest degree?

A. 72°

B. 85°

C. 212° - correct

D. 306°

58. A gardener planted new grass in the shaded area shown in the diagram below. In the diagram, point R is the center of a circle.
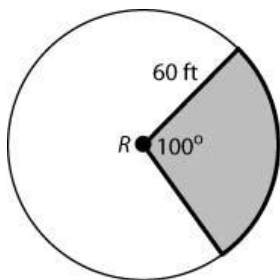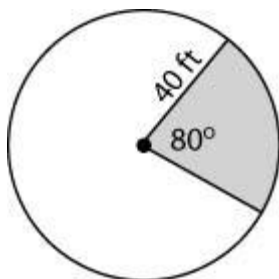

The gardener puts a rope around the entire perimeter of the shaded area. To the nearest foot, what is the length of the rope?

A. 105 feet

B. 172 feet

C. 225 feet - correct

D. 329 feet

Circles

59. A sector of a circular theater is being reserved for season ticket holders. This sector is represented as the shaded portion of the diagram below.

Part A: Find the length of roping needed to extend across the back of this section of the theater. Round to the nearest hundredth of a foot.

| 55.85 | $ft.$

Part B: Each seat in the theater occupies approximately 7 square feet of the floor space. About how many seats are there in the section for season ticket holders?

| 160 | $seats$

Part C: On opening night for a play, there are 221 reservations for season ticket holders. The theater manager decides to expand the sector by creating a larger central angle. What is the measure, to the nearest degree, of the new central angle?

| 111°

60. A tile manufacturer wants to create a set of flat, circular tiles that are painted in various colors. A sector of the tile has a radius of 4 inches and a central angle measure of 65 degrees.

Part A: Find the area of the sector of the tile. Round your answer to the nearest square inch.

| 9 | in^2

Part B: The cost to the manufacturer to paint the tiles is $0.07 per square inch. How much will it cost the manufacturer to paint a set of 250 tiles? Round your answer to the nearest dollar.

| 880 | $dollars$