1. Identify all radii for circle O.
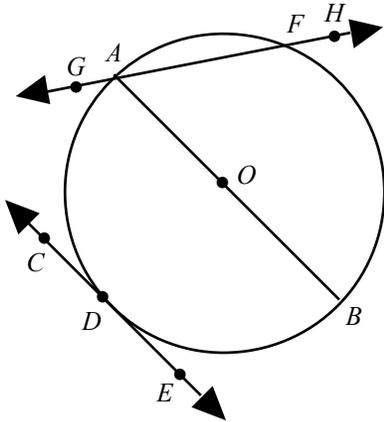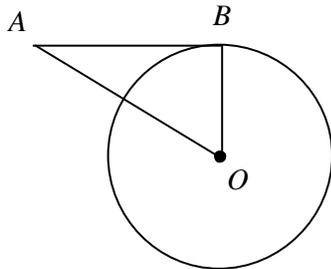

2. $\overline{FG} \perp \overline{OP}, \overline{RS} \perp \overline{OQ}, FG = 40, RS = 37, OP = 19$
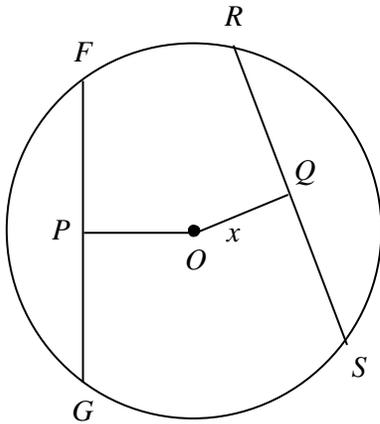
a. 27.2   b. 18.5   c. 19   d. 20.5

3. Determine whether a tangent line is shown in the diagram, for $AB = 3.6$, $OB = 1.5$, and $AO = 3.9$. Explain your reasoning. (The figure is not drawn to scale.)

4. If a circle has a diameter of 12, then it has _____.

[A] a radius of 4   [B] a radius of 6   [C] a radius of 24   [D] a diameter of 6

5. Two coplanar circles are concentric if _____.

[A] they have congruent radii   [B] they have the same center

[C] they have exactly one point of intersection   [D] they have no points of intersection

6. A line which intersects a circle at exactly one point is called a _____.

[A] tangent of the circle   [B] point of tangency [C] chord   [D] secant of the circle

7. In $\triangle NML$, $NL = NM$, and the perimeter is 52 cm. A, B, and C are points of tangency to the circle. $MC = 6$ cm. Find NL. Explain your reasoning. (The figure is not drawn to scale.)
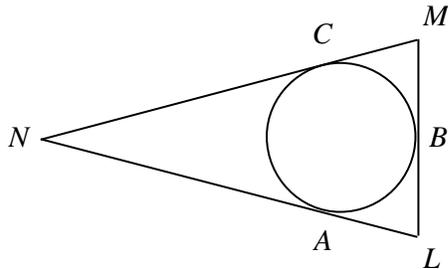
8. You are standing at point B. Point B is 15 feet from the center of the circular water storage tank and 14 feet from point A. $\overline{AB}$ is tangent to $\odot O$ at A. Find the radius of the tank. (Round answer to one decimal place)
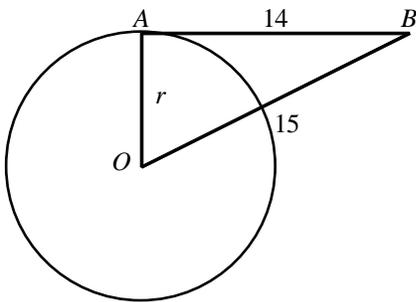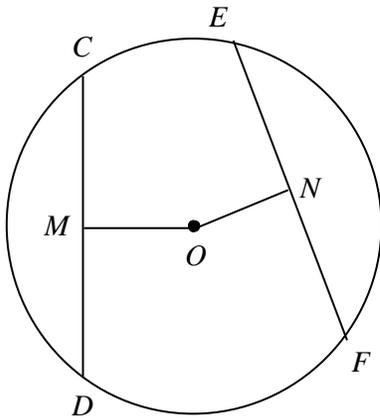

9. Given: In $\odot O, m\widehat{BAC} = 292°$. Find $m\angle B$.
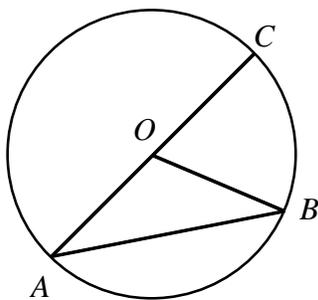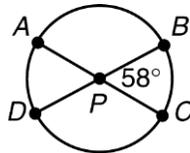

[A] 17 °   [B] 34 °   [C] 40 °   [D] 20 °

10. $CD = 56$, $OM = 20$, $ON = 16$, $\overline{CD} \perp \overline{OM}$, $\overline{EF} \perp \overline{ON}$ (The figure is not drawn to scale.)


a.   Find the radius. If your answer is not an integer, express it in radical form.
b.   Find *FN*. If your answer is not an integer, express it in radical form.
c.   Find *EF*. Express it as a decimal rounded to the nearest tenth.

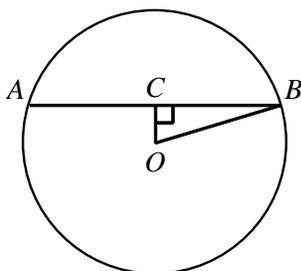11. Find the measure of $\overset{\frown}{DBC}$ in $\odot P$.

12. Assume that lines that appear to be tangent are tangent. *O* is the center of the circle. Find the value of *x*. (Figures are not drawn to scale.)
$m\angle O = 111$
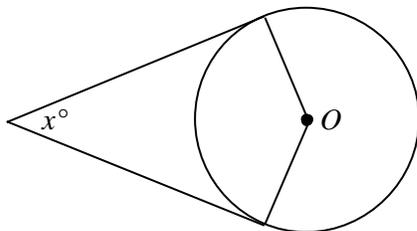
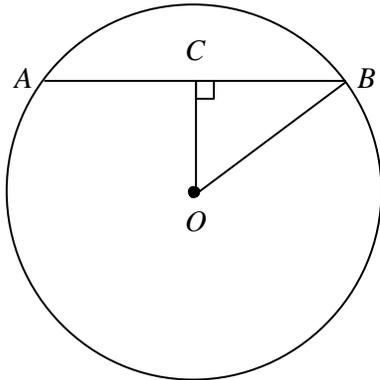a.   291   b.   69   c.   55.5   d.   222

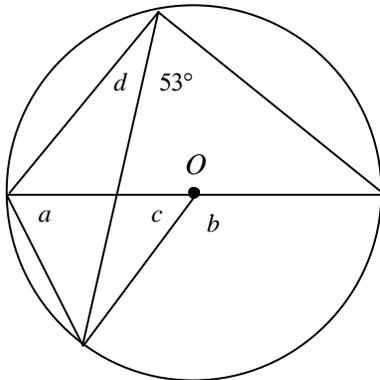13. Given circle *O* with radius 25 and $OC = 7$. Find the measure of $\overline{AB}$.

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15. The radius of circle O is 18, and $OC = 13$. Find AB. Round to the nearest tenth, if necessary. (The figure is not drawn to scale.)

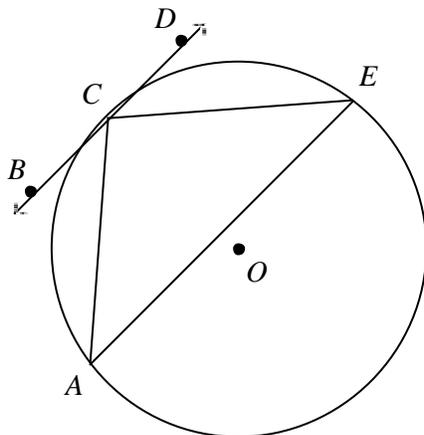a.   12.4   b.   3.8   c.   24.9   d.   44.4

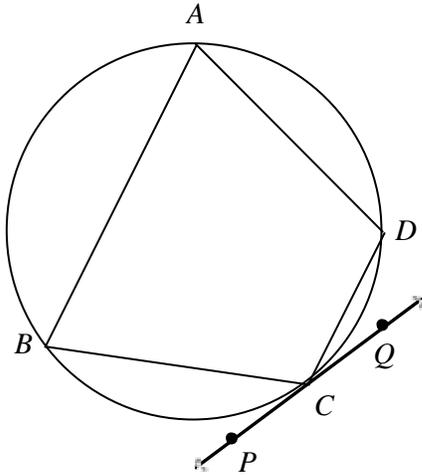16. Find the measures of the indicated angles. (The figure is not drawn to scale.)

17. $\overleftrightarrow{BD}$ is tangent to circle O at C, $m\widehat{AEC} = 295$, and $m\widehat{ACE} = 81$. Find $m\angle DCE$. (The figure is not drawn to scale.)
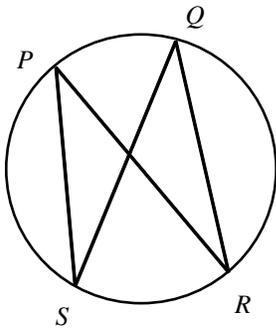
18. In the circle, $m\widehat{AD} = 100$, and $m\angle D = 99$. Find $m\angle DCQ$. (The figure is not drawn to scale.)

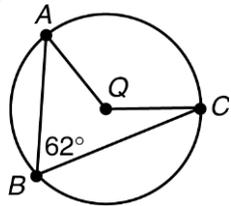a.   31   b.   161   c.   62   d.   80.5

19. Find $m\angle PSQ$ if $m\angle PSQ = 2y - 15$ and $m\angle PRQ = y + 25$.

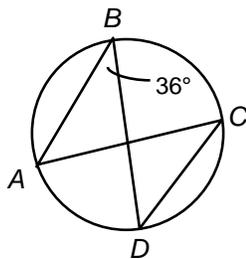[A] 40 °   [B] 32.5 °

[C] 65 °   [D] 35 °

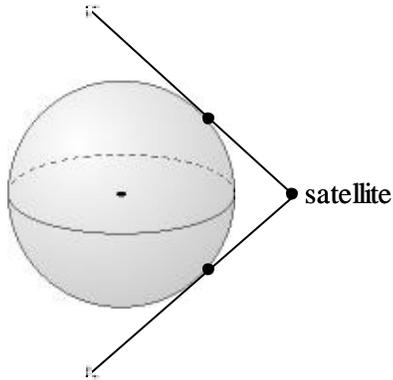20. Given: $\odot Q$ and $m\angle B = 62°$
Find $m\widehat{AC}$.

[A] 236 °   [B] 248 °   [C] 124 °   [D] 62 °

21. Find $m\widehat{ABD}$ and $m\angle C$.

36°

22. The farthest distance a satellite signal can directly reach is the length of the segment tangent to the curve of Earth's surface. If the angle formed by the tangent satellite signals is 155, what is the measure of the intercepted arc on Earth? (The figure is not drawn to scale.)
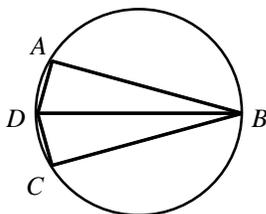
satellite

a. 310   b. 50   c. 25   d. 77.5

23. Given: $m\sphericalangle IED = 117°$ and $m\sphericalangle JFG = 105°$
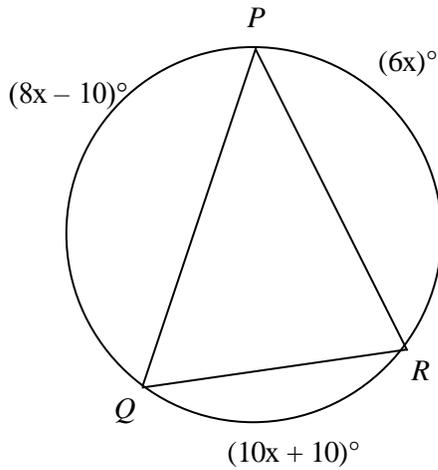Find the measure of each unknown angle. (not drawn to scale)
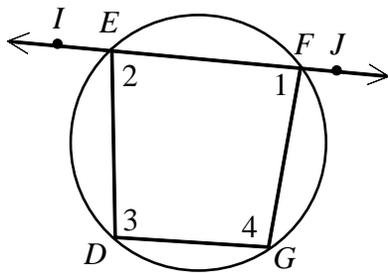
[A] $m\angle 1 = 75°$, $m\angle 2 = 63°$, $m\angle 3 = 117°$, $m\angle 4 = 105°$

[B] $m\angle 1 = 63°$, $m\angle 2 = 75°$, $m\angle 3 = 105°$, $m\angle 4 = 117°$

[C] $m\angle 1 = 75°$, $m\angle 2 = 63°$, $m\angle 3 = 105°$, $m\angle 4 = 117°$

[D] $m\angle 1 = 63°$, $m\angle 2 = 75°$, $m\angle 3 = 117°$, $m\angle 4 = 105°$

24. Given that $\angle DAB$ and $\angle DCB$ are right angles and $m\angle ABD = 15°$, what is the measure of $\overarc{ACB}$?
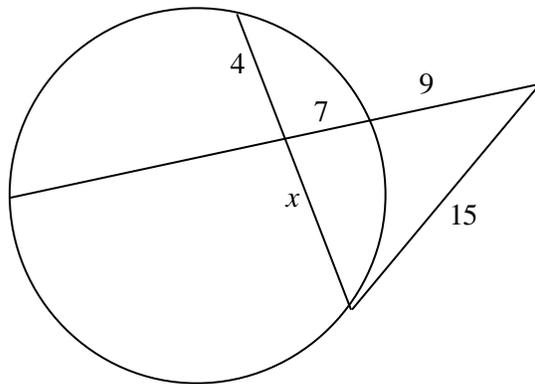
25. **a.** Find x. (The figure is not drawn to scale.)
    b. Is the triangle equilateral, isosceles, or scalene? Explain.

P

$(6x)°$

$(8x - 10)°$

R

Q

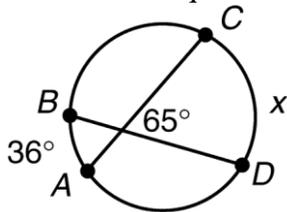$(10x + 10)°$

26. The figure consists of a chord, a secant, and a tangent to the circle. Round to the nearest hundredth, if necessary.

4

9

7

x

15

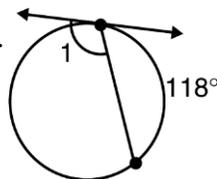a. 15.75   b. 9   c. 5.14   d. 28

27. Write an equation that can be used to solve for x. Then solve the equation for x.

C

B

$65°$

x

$36°$

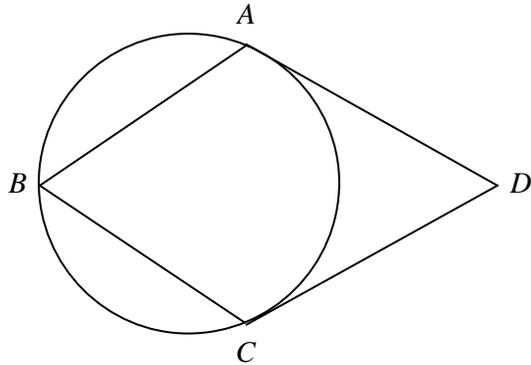*A*

D

28. Find the measure of $\angle 1$.
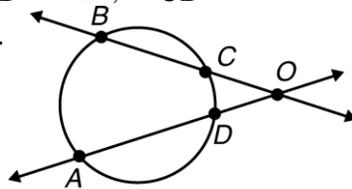
1

$118°$

29. Find $m\angle D$ for $m\angle B = 53$. (The figure is not drawn to scale.)

a.   148   b.   63.5   c.   127   d.   74

30. Given: $m \stackrel{\frown}{AB} = 82°$, $m \stackrel{\frown}{CD} = 30°$
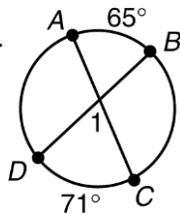Find $m \angle DOC$.

Not drawn to scale

[A] 52°   [B] 112°   [C] 56°   [D] 26°

31. A park maintenance person stands 21 m from a circular monument. If you assume her lines of sight form tangents to the monument and make an angle of 46°, what is the measure of the arc of the monument that her lines of sight intersect?

[A] 134°   [B] 88°   [C] 136°   [D] 44°
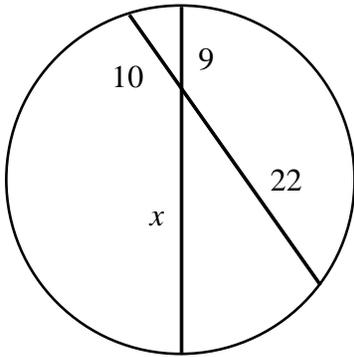
32. Find the measure of $\angle 1$.

33. A hummingbird is flying toward a large tree with a radius of 7 feet. When it is 34 feet from the center of the tree, its lines of sight form two tangents. What is the measure of the arc on the tree that the hummingbird can see? (Round to two decimal places.)
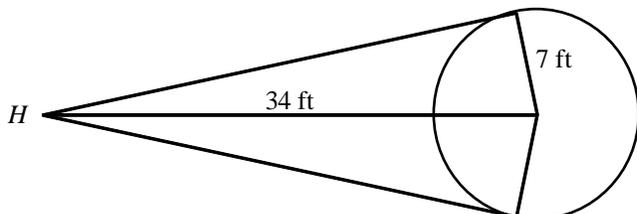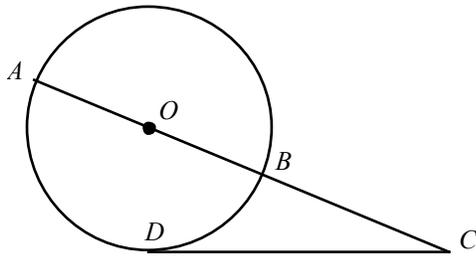
34. Find the value of x.

35. Find the diameter of the circle. $BC = 16$, and $DC = 24$. Round your answer to the nearest tenth.


[A] 20.0   [B] 22.7   [C] 52.0   [D] 13.3

36. Find the equation of the circle with center $(5, -2)$ and radius of 2.

37. The diameter of a circle has endpoints $P(-10, -8)$ and $Q(4, 4)$.
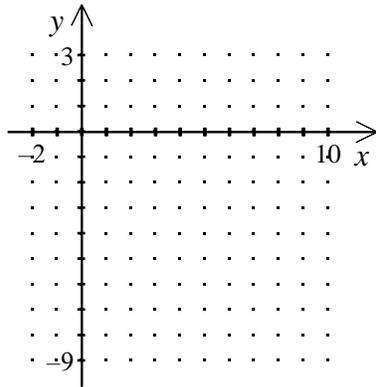**a.** Find the center of the circle.
b. Find the radius. If your answer is not an integer, express it in radical form.
c. Write an equation for the circle.

38. A certain low-watt radio station is able to be heard in a small part of the city. Write an equation for the boundary where the radio station can be heard, and find its radius. Each grid unit represents one block.
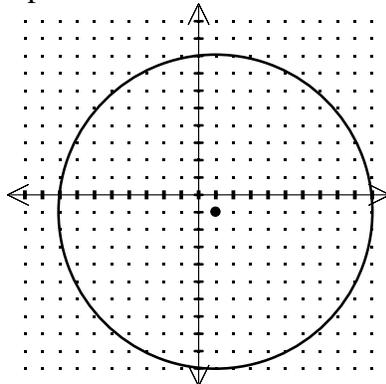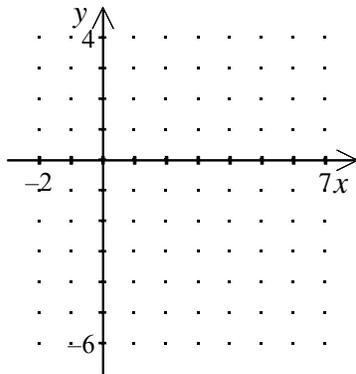
CIRCLES

39. Sketch the graph of $(x-4)^2 + (y+3)^2 = 25$. Label the coordinates of the center and the radius.
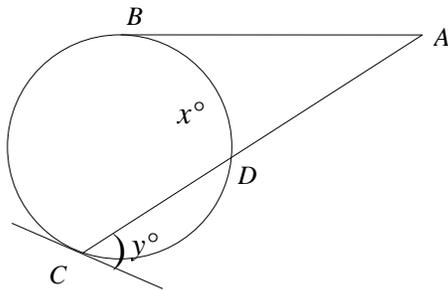

40. Sketch the graph of the equation $(x-2)^2 + (y+1)^2 = 13$. Label the coordinates of the center and the radius.

41. The center of a circle is $(h, 7)$ and the radius is 10. The circle passes through $(3, -1)$. Find all possible values of h.

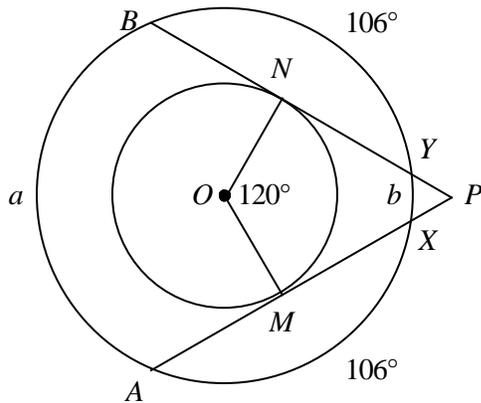a.   8, –7   b.   9, –3   c.   9, –5   d.   10, 3

42. $m\angle A = 24$ and $m\widehat{BC} = 88$. (The figure is not drawn to scale.)
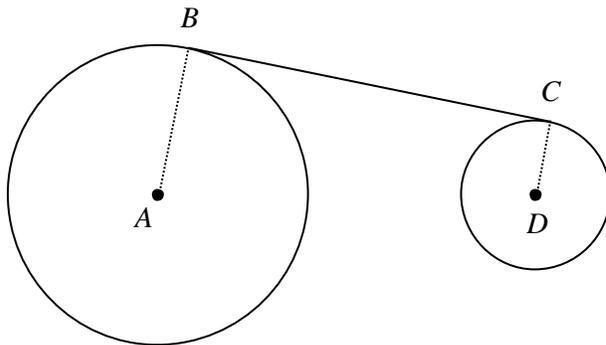

a. Find x.
b. Find y.

43. Given: The circles share the same center, O, $m\angle MON = 120$, and
$m\widehat{AX} = m\widehat{BY} = 106$.

a. Find $m\angle P$. Show your work.
b. Find a and b. Explain your reasoning.

44. $\overline{BC}$ is tangent to circle A at B and to circle D at C (not drawn to scale).
$AB = 10$, $BC = 21$, and $DC = 8$. Find AD to the nearest tenth.

a. 22.5   b. 21.1   c. 23.3   d. 27.7

45. A chain fits tightly around two gears as shown. The distance between the centers of the gears is 20 inches. The radius of the larger gear is 11 inches. Find the radius of the smaller gear. Round your answer to the nearest tenth, if necessary. The diagram is not to scale.
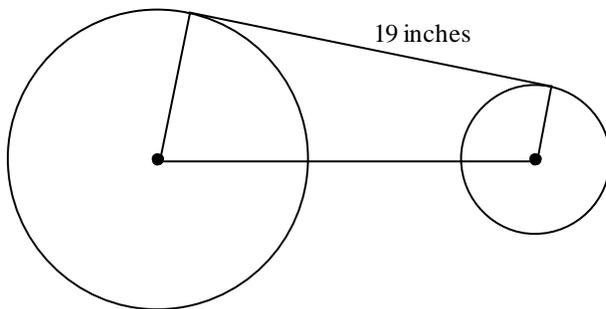

19 inches

a. 17.2 inches   b. 6.2 inches   c. 11 inches   d. 4.8 inches

ANSWER KEY:

[1] $\overline{OA}, \overline{OB}$

[2] [D]

[3] Yes, because $3.6^2 + 1.5^2 = 3.9^2$; $\overline{AB}$ is tangent to $\odot O$ because it is perpendicular to the radius, $\overline{OB}$, at the point of tangency.

[4] [B]

[5] [B]

[6] [A]

[7] 20 cm

[8] 5.4 ft.

[9] [B]

[10] a) $\sqrt{1184}$ b) $\sqrt{928}$ c) 60.9

[11] 238°

[12] [B]

[13] 48

[15] [C]

[16] a) 53   b) 106   c) 74   d) 37

[17] 8

[18] [A]

[19] [C]

[20] [C]

[21] $m\widehat{ABD} = 288°, m\angle C = 36°$

[22] [C]

[23] [C]

[24] 210°

[25] a) 15   b) Scalene; the arc measures are 110°, 90°, and 160°. Because the arcs are not congruent, neither are the chords that intercept them.

[26] [A]

[27] $\frac{1}{2}(36° + x) = 65°, x = 94°$

[28] 121°

[29] [D]

[30] [D]

[31] [A]

[32] 68°

[33] 156.24°

[34] $24\frac{4}{9}$

[35] [A]

[36] $(x - 5)^2 + (y + 2)^2 = 4$

[37] a) $(-3, -2)$ b) $\sqrt{85}$
     c)$(x = 3)^2 + (y + 2)^2 = 85$

[38] $(x - 1)^2 + (y + 1)^2 = 81$

[39] Center: (4,-3); radius = 5
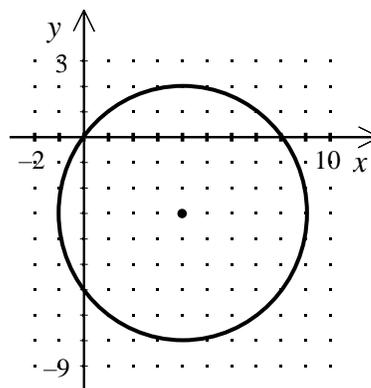
[40] Center: (2, -1); radius = $\sqrt{13}$
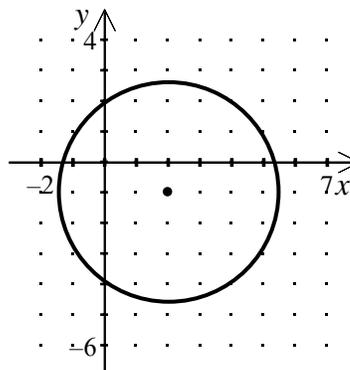
[41] [B]

[42] a) 40   b) 116

[43]

a. 60; $120 + 90 + 90 + m\angle P = 360$

b. $\frac{1}{2}(a - b) = 60; a - b = 120$
    $a + b + 2(106) = 360; a + b = 148$
    $a = 134; b = 14$

[44] [B]

[45] [D]