Practice

Form K

5-1
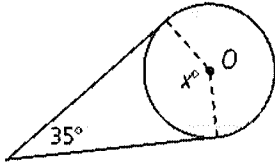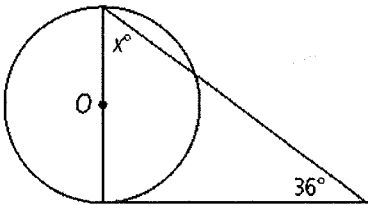
Tangent Lines

Lines that appear to be tangent are tangent. O is the center of each circle. What is the value of x?
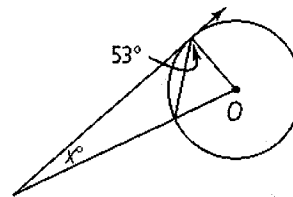
1.

To start, identify the type of geometric figure formed by the tangent lines and radii.
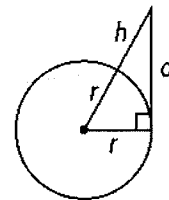The figure formed is a __?__ .

2.

3.

The circle at the right represents Earth. The radius of Earth is about 6400 km. Find the distance d to the horizon that a person can see on a clear day from each of the following heights h above Earth. Round your answer to the nearest tenth of a kilometer.
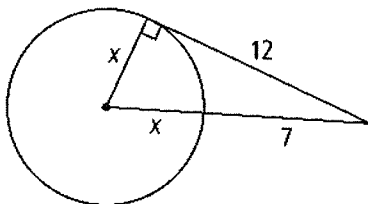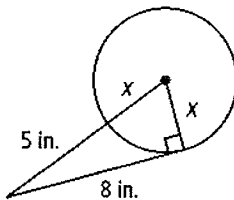

4. 7 km

5. 400 km

6. 2000 m

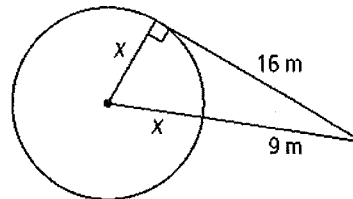**Algebra In each circle, what is the value of x to the nearest tenth?**

7.

To start, use the Pythagorean Theorem.
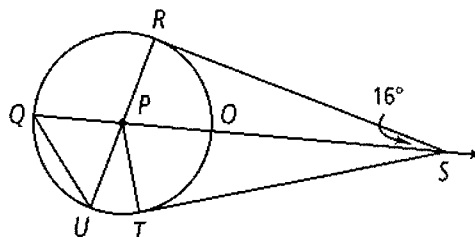$x^2 + 12^2 = (\underline{\ ?\ })^2$

8.

9.

10. $\overline{QO}$ and $\overline{UR}$ are diameters of $\odot P$.
$\overline{RS}$ and $\overline{TS}$ are tangents of $\odot P$.
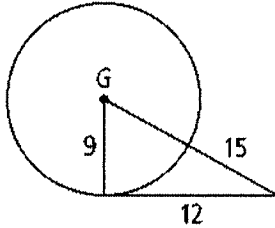Find $m\angle UPT$ and $m\angle UQP$.

5-1 Practice (continued)   Form K
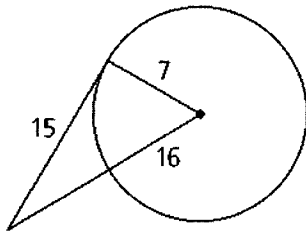
Tangent Lines

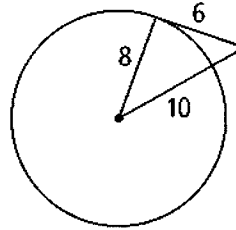**Determine whether a tangent is shown in each diagram. Explain.**

11.

To start, use the Converse of the Pythagorean Theorem to relate the side lengths of the triangle.

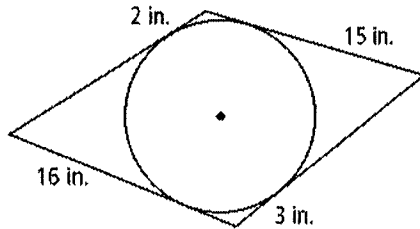$9^2 + 12^2 \ \underline{?} \ \underline{?}^2$

12.

13.

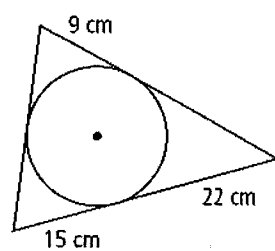**Each polygon circumscribes a circle. What is the perimeter of each polygon?**

14. 2 in. 15 in. 16 in. 3 in.

To start, find the length of each unknown segment.

$P = 2 + \boxed{} + 15 + \boxed{}$
$ + 3 + \boxed{} + 16 + \boxed{}$

15. 9 cm 22 cm 15 cm

16. 12 ft 39 ft 19 ft
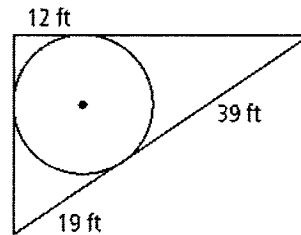
17. ⊙B is inscribed in a triangle, which has a perimeter of 76 in. What is the value of x?

5 in. 25 in. B • x
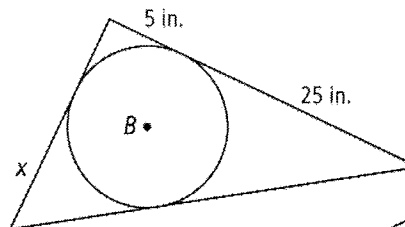
18. Reasoning GHI is a triangle. How can you prove that $\overline{HI}$ is tangent to ⊙G?

H 29° I 61° G
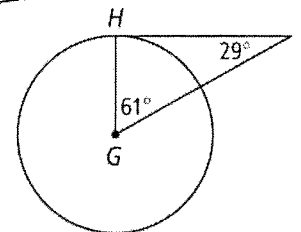
5-2 Practice
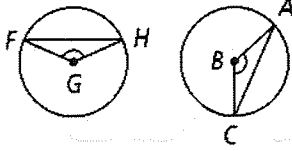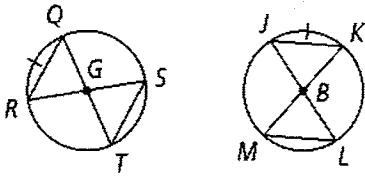
Form K

Chords and Arcs

In Exercises 1 and 2, the circles are congruent. What can you conclude?

1.

To start, look at the chords. If they are equidistant from the center of the circle, what can be concluded?
The chords must be __?__ .

2.

$\overline{QR} \cong \overline{TS} \cong$ __?__ $\cong$ __?__

$\angle QGR \cong$ __?__ $\cong$ __?__ $\cong$ __?__

$\overset{\frown}{QR} \cong$ __?__ $\cong$ __?__ $\cong$ __?__

$\angle QGS \cong$ __?__ $\cong$ __?__ $\cong$ __?__

$\overset{\frown}{QS} \cong$ __?__ $\cong$ __?__ $\cong$ __?__

Find the value of x.

3.
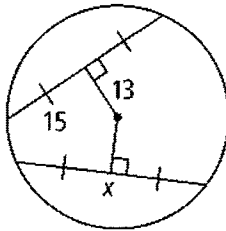
4.
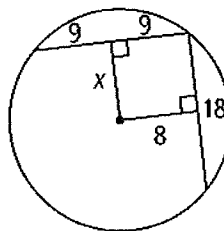
5.
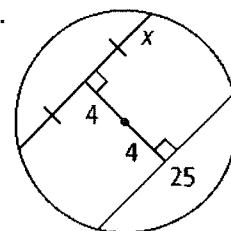
6. Reasoning $\angle QRS$ and $\angle TRV$ are vertical angles inscribed in $\odot R$. What must be true of $\overset{\frown}{QS}$ and $\overset{\frown}{TV}$? Explain.

Draw a Diagram Tell whether the statement is *always, sometimes,* or *never* true.

7. $\overset{\frown}{XY}$ and $\overset{\frown}{RS}$ are in congruent circles. Central $\angle XZY$ and central $\angle RTS$ are congruent.

8. $\odot I \cong \odot K$. The length of chord $\overline{GH}$ in $\odot I$ is 3 in. and the length of chord $\overline{LM}$ in $\odot K$ is 3 in. $\angle GIH \cong \angle LKM$.

9. $\angle STU$ and $\angle RMO$ are central angles in congruent circles. $m\angle STU = 50$ and $m\angle RMO = 55$. $\overset{\frown}{SU} \cong \overset{\frown}{RO}$.
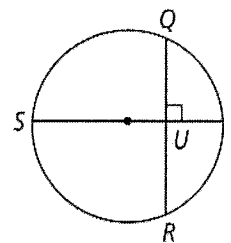
5-2

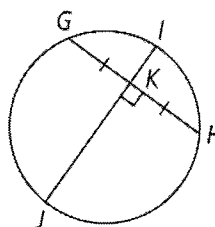**Practice** (continued)   *Form K*

Chords and Arcs

10. In the diagram at the right, $\overline{ST}$ is a diameter of the circle and $\overline{ST} \perp \overline{QR}$. What conclusions can you make?
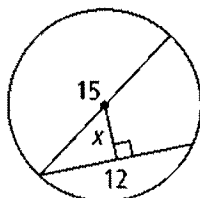
11. In the diagram at the right, $\overline{IJ}$ is a perpendicular bisector of chord $\overline{GH}$. What can you conclude?

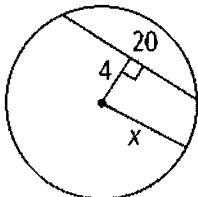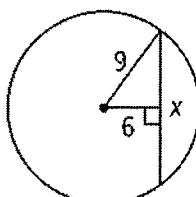**Find the value of *x* to the nearest tenth.**

12.

To start, since the radius is perpendicular to the chord, the chord is bisected.
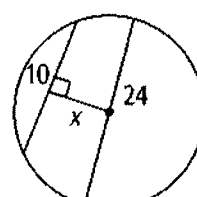
The longer leg of the triangle is $12 \div 2 = \boxed{}$.

13.

14.

15.

$\odot D$ and $\odot E$ are congruent. $\overline{GH}$ is a chord of both circles. Round all answers to the nearest tenth.

16. If $DE = 10$ in. and $GH = 4$ in., how long is a radius?

17. If $DE = 22$ cm and radius $= 14$ cm, how long is $\overline{GH}$?

18. If the radius $= 18$ ft and $GH = 32$ ft, how long is $\overline{DE}$?
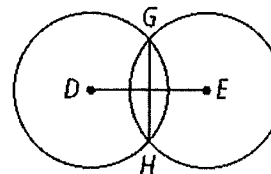
19. In the figure at the right, Sphere Z with radius 9 in. is intersected by a plane 4 in. from center Z. To the nearest tenth, find the radius of the cross section $\odot X$.

5-3

Practice

Form K

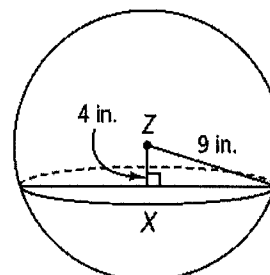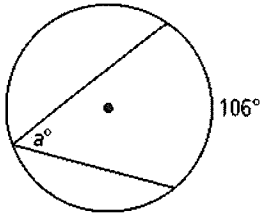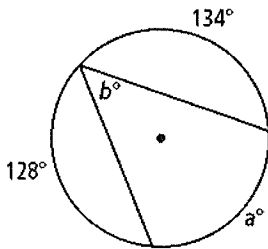### Inscribed Angles

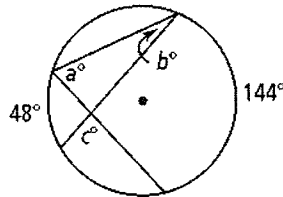**Find the value of each variable. For each circle, the dot represents the center.**

1.

To start, describe the relationship between the inscribed angle and the intercepted arc.
The measure of the inscribed angle is __?__ the measure of the intercepted arc.

106°
a°
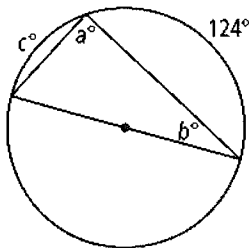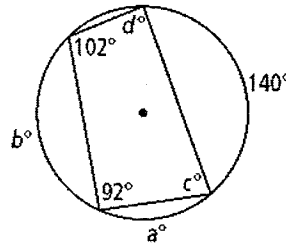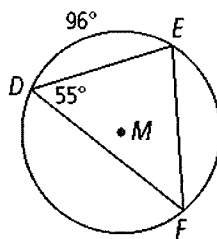
2.

134°
b°
128°
a°

3.

a°
b°
48°
c°
144°

4.

c°
a°
124°
b°

5.

d°
102°
140°
b°
92°
c°
a°

Find each indicated measure for ⊙M.

6. a. $m\widehat{EF}$

b. $m\angle E$

c. $m\angle F$

d. $m\widehat{DF}$

96°
E
D
55°
•M
F

7. a. $m\angle S$

b. $m\widehat{TS}$

c. $m\widehat{QU}$

d. $m\angle TMS$

Q
R
U
M
102°
36°
T
O
S
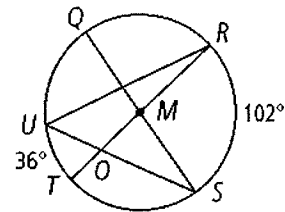
8. Reasoning A quadrilateral that is not a rectangle is inscribed in a circle. What is the least number of arc measures needed to determine the measures of each angle in the quadrilateral? Use drawings to explain.

9. Open-Ended Draw a circle. Inscribe two angles in the circle so that the angles are congruent. Explain which corollary to Theorem 12-11 you can use to prove the angles are congruent without measuring them.

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5-3 **Practice** (continued)   *Form K*

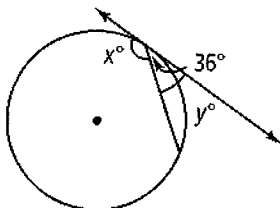Inscribed Angles

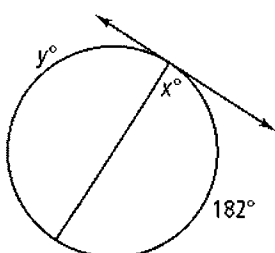**Find the value of each variable. Lines that appear to be tangent are tangent.**

10.

To start, determine the relationship between the inscribed angle formed by a tangent and a chord and the intercepted arc.
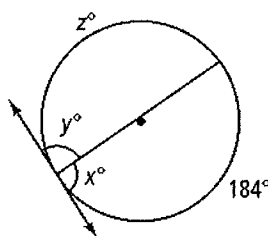
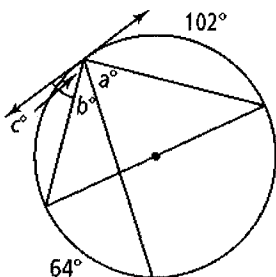The measure of the intercepted arc is y.

$$36 = \frac{1}{2} \cdot \boxed{}$$
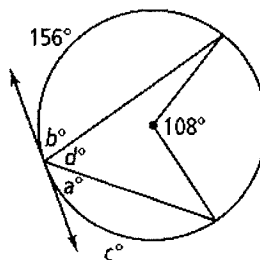
11.

182°

12.

184°

Find the value of each variable. For each circle, the dot represents the center.

13.

102°

64°

14.

156°

108°

15. Reasoning $\angle ABC$ is formed by diameter $\overline{AB}$ and a tangent to $\odot D$ containing point C. What is the measure of $\angle ABC$? Explain.

16. Draw a Diagram $\overline{GH}$ is a chord of $\odot Y$. $\overline{GH}$ forms angles with tangents at points G and H. What is the relationship between the angles formed? Use a drawing in your explanation.

17. Writing Explain why the angle formed by a tangent and a chord has the same measure as an inscribed angle that intercepts the same arc.
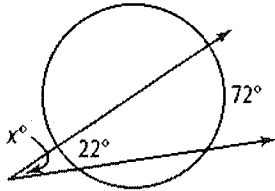
Practice

5-4

Angle Measures and Segment Lengths

Form K

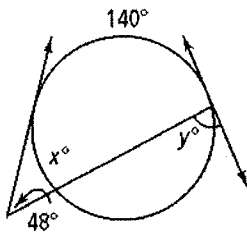**Algebra Find the value of each variable.**

1.

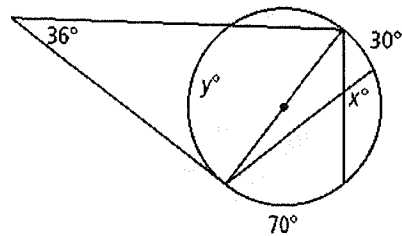To start, identify the type of rays intersecting in the diagram.

Two __?__ rays intersect outside the circle.
Then write an equation using Theorem 12-14.

$$x = \frac{1}{2} \cdot (\boxed{} - \boxed{})$$

2.

3.

Algebra Find the value of each variable using the given chord, secant, and tangent lengths. If your answer is not a whole number, round it to the nearest tenth.

4.

To start, identify the type of segments intersecting in the diagram.

Two __?__ intersect inside the circle.
Then write an equation using Theorem 12-12, Case I.

$$\boxed{} \cdot \boxed{} = x \cdot \boxed{}$$

5.

6.
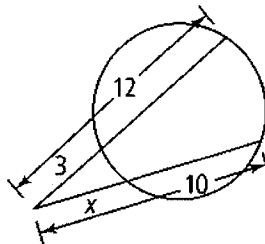
7.

8. Algebra $\overline{FH}$ and $\overline{GI}$ are chords in $\odot T$. Write an expression for $m\angle FJI$ in terms of x and y.

5-4

Practice (continued)　　　　　　　　　　　　　　　*Form K*
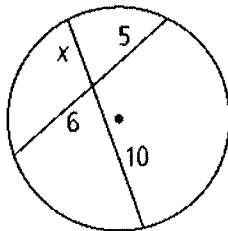_____
Angle Measures and Segment Lengths

Algebra Find the value of each variable using the given chord, secant, and tangent lengths. If your answer is not a whole number, round it to the nearest tenth.
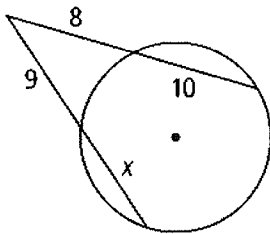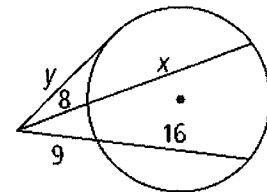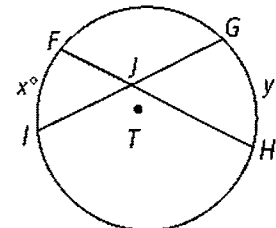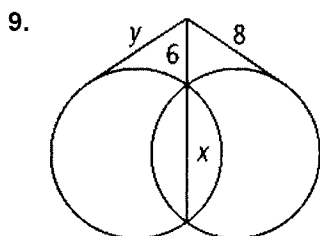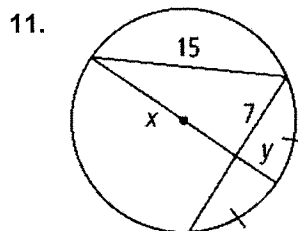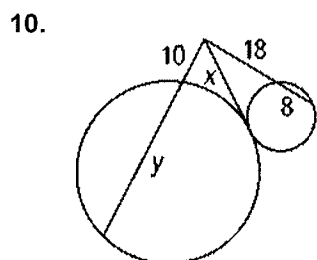
9.

To start, write an equation using
Theorem 12-15, Case III.

$$\boxed{} \ \square \ \boxed{} = (x+6) \ \square \ \boxed{}$$

10.

11.

12. You look through binoculars at the circular dome of the Capitol building in Washington, D.C. Your binoculars are at the vertex of the angle formed by tangents to the dome. You estimate that this vertex angle is 70~. What is the measure of the arc of the circular base of the dome that is visible?

Find the diameter of ⊙O. A line that appears to be tangent is tangent. If your answer is not a whole number, round it to the nearest tenth.

13.

14.

15.
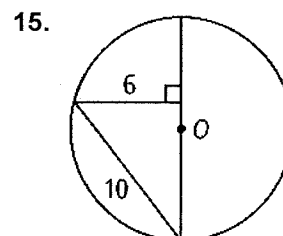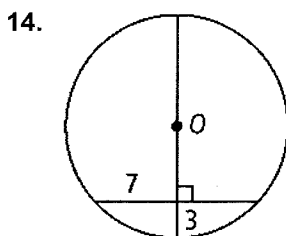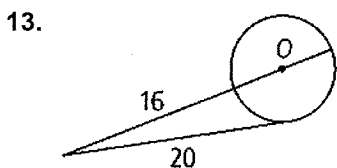
16. A circle is inscribed in a quadrilateral whose four angles have measures 74, 96, 81, 109. Find the measures of the four arcs between consecutive points of tangency.

17. $\triangle CED$ is inscribed in a circle with $m\angle C = 40$, $m\angle E = 55$, and $m\angle D = 85$. What are the measures of $\overset{\frown}{CE}$, $\overset{\frown}{ED}$, and $\overset{\frown}{DC}$? Explain how you can check that your answers are correct.

5-5 Practice

Form K

Circles in the Coordinate Plane

Write the standard equation of each circle.

1. center $(7, \Box 3)$; $r = 9$

To start, write the equation of a circle.

$$(\Box \, \Box \, h)^2 + (\Box \, \Box \, k)^2 = \Box^2$$

Identify the values of h, k, and r.

$h = \Box$ $k = \Box$ $r = \Box$

2. center $(0, 4)$; $r = 3$

3. center $(\Box 2, \Box 8)$; $r = 4$

4. center $(2, 6)$; $r = 12$

5. center $(10, 0)$; $r = 7$

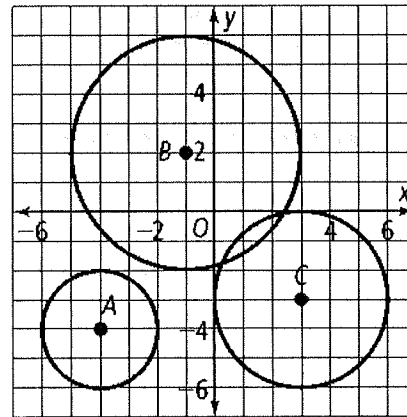**6.** center $(\Box 5, \Box 4)$; $r = \sqrt{3}$

7. center $(\Box 3, 2)$; $r = \sqrt{10}$

Write the standard equation for each circle in the diagram at the right.

8. $\odot A$

9. $\odot B$

10. $\odot C$

Write the standard equation of each circle with the given center that passes through the given point.

11. center $(6, 4)$; point $(9, 12)$

12. center $(\Box 2, 0)$; point $(5, 8)$

13. center $(\Box 4, \Box 1)$; point $(\Box 6, 5)$

14. center $(0, 6)$; point $(5, \Box 2)$

15. center $(3, 0)$; point $(\Box 5, \Box 2)$

16. center $(0, 0)$; point $(\sqrt{5}, \sqrt{8})$
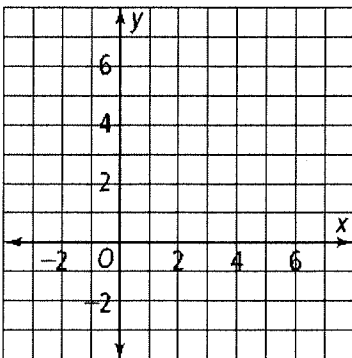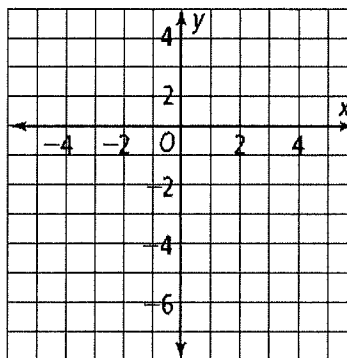
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5-5

Practice (continued)   Form K

Circles in the Coordinate Plane

Find the center and radius of each circle. Then graph the circle.
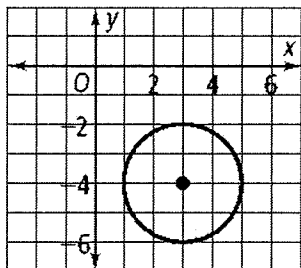
17. $(x \;\square\; 2)^2 + (y \;\square\; 3)^2 = 9$

18. $(x \;\square\; 1)^2 + (y + 5)^2 = 4$
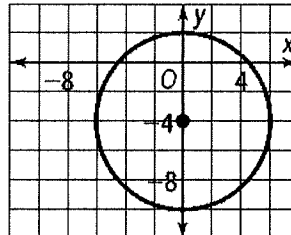
Write the standard equation of each circle.

19.

20.

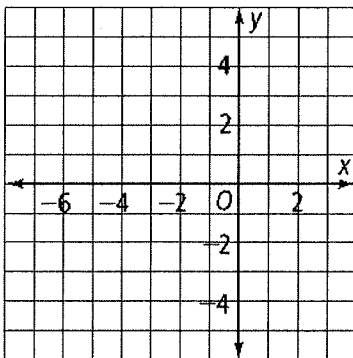**Write an equation of a circle with diameter $\overline{ST}$.**

21. $S(0, 0), T(6, 4)$ **22.** $S(0, 2), T(6, 10)$ **23.** $S(5, 11), T(9, 3)$

Sketch the graphs of each equation. Find all points of intersection of each pair of graphs.

24. $(x + 2)^2 + y^2 = 9$
   $y = \square x + 1$

25. $(x \;\square\; 1)^2 + (y \;\square\; 1)^2 = 13$
   $y = x + 1$