

**Objective:** to review properties of circles.

**Key Terms:**

**Radius:**

a line segment drawn from the center of the circle to a point on the circle



**Diameter:**

a line segment drawn from one side of a circle to another and goes through the center

\*the length of the diameter is equivalent to the sum of two radii\*



**Circumference:**

the distance around the edge of a circle. It is the enclosing boundary of a circle.



**Formula for the Circumference of a Circle:**

$$C = 2\pi r \quad \text{or} \quad C = \pi d$$

**Formula for the Area of a Circle:**

$$A = \pi r^2$$

**Arc:**

a portion of the circumference of a circle



**Chord:**

a line segment drawn from two points on a circle



- The longest chord is the diameter
- A chord can be shorter than the radius of a circle

**Tangent line:**

a line that intersects the circle in only one location



- The point of intersection is called the point of tangency
- The tangent line is perpendicular to the radius at the point of tangency

**Secant:**

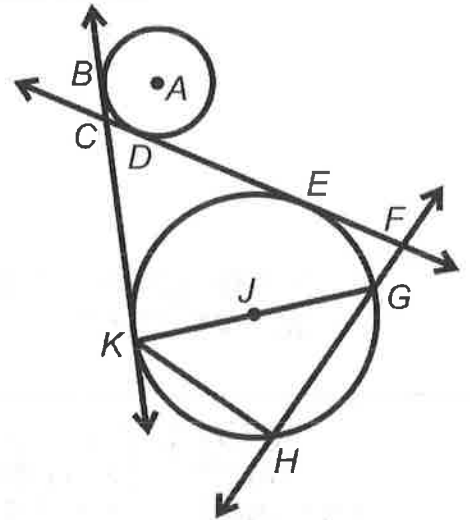
a line that intersects the circle in two locations



**Examples:**

1. Using the correct notation, name each of the following based on the picture below:

- a. Two radii  $\overline{JK}$  and  $\overline{JG}$
- b. A diameter  $\overline{KG}$
- c. A chord that is not a diameter  $\overline{GH}$
- d. A secant line  $\overleftrightarrow{FH}$
- e. A point of tangency  $\cdot B$



**Stretch Questions:** Find the following and include a reason why.

- a.  $m\angle KHG = 90^\circ$  An angle inscribed in a semi-circle is a right angle
- b.  $m\angle JKC = 90^\circ$  Tangent Chord =  $\frac{1}{2}$  Intercepted Arc
- c.  $m\widehat{KHE} + m\angle KE = 360^\circ$

2. Given a circle with a radius of 5 determine the diameter, area, and circumference.

$$d = 2r = 2 \cdot 5 = \boxed{10 \text{ units}}$$

$$C = 2\pi r = 2\pi \cdot 5 = \boxed{10\pi \text{ units}}$$

$$A = \pi r^2 = \pi \cdot 5^2 = \boxed{25 \text{ units}^2}$$

3. If the circumference of a circle is  $24\pi$ , what is the length of the radius and area of the circle?

$$C = 2\pi r$$

$$\frac{24\pi}{2\pi} = \frac{2\pi r}{2\pi}$$

$$A = \pi r^2 = \pi \cdot 12^2 = \boxed{144\pi \text{ units}^2}$$

$$r = \boxed{12 \text{ units}}$$

4. Determine which point(s) lie(s) on the circle:  $x^2 + y^2 = 121$

a. (0,0)

$$0^2 + 0^2 = 121$$

$$0 \neq 121$$

b. (3,2)

$$3^2 + 2^2 = 121$$

$$9 + 4 = 121$$

$$13 \neq 121$$

c. (10,1)

$$10^2 + 1^2 = 121$$

$$100 + 1 = 121$$

$$101 \neq 121$$

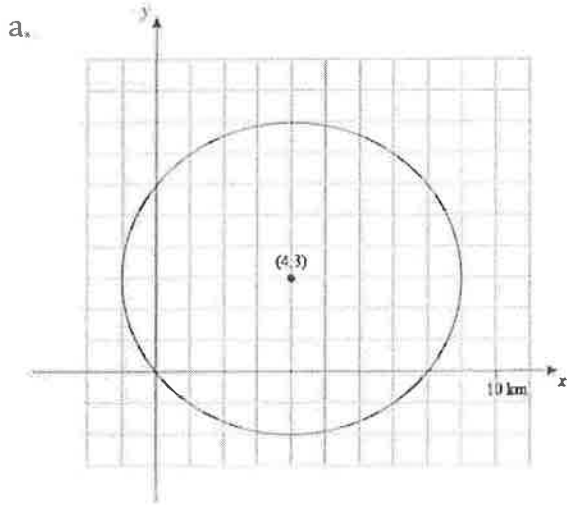
d. (0, -11)

$$0^2 + (-11)^2 = 121$$

$$0 + 121 = 121$$

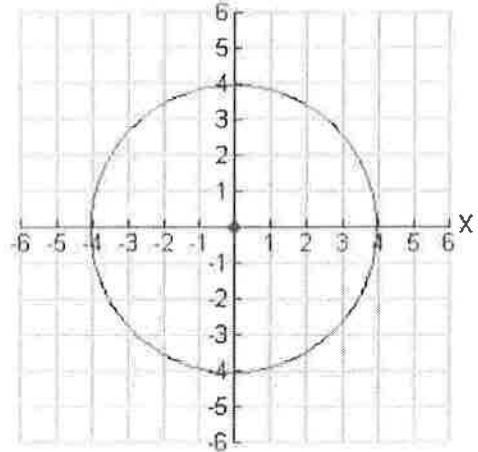
$$121 = 121 \checkmark$$

5. Determine two points that lie on the circle:



$(9, 3)$     $(4, -2)$   
 $(-1, 3)$     $(4, 8)$

b.



$(-4, 0)$     $(0, 4)$   
 $(4, 0)$     $(0, -4)$

6. Find two points that lie on the circle:  $(x - 4)^2 + y^2 = 100$ . How many could you find?

⇒ Infinite

$(4, 10)$     $(10, -8)$   
 $(14, 0)$     $(12, 6)$   
 $(4, -10)$     $(12, -6)$   
 $(10, 8)$

7. Which of the following is an equation for a line that is tangent to the circle  $x^2 + y^2 = 53$  at the point  $(7, 2)$ ? Sketch a picture to support your answer.

center:  $(0, 0)$   
 perpendicular lines ⇒ opposite reciprocal slopes

a.  $y = -\frac{7}{2}x + \frac{45}{2}$    b.  $y = -\frac{7}{2}x + \frac{53}{2}$

c.  $y = \frac{7}{2}x - \frac{45}{2}$    d.  $y = -\frac{7}{2}x - \frac{45}{2}$

$y - 2 = -\frac{7}{2}(x - 7)$

$y - 2 = -\frac{7}{2}x + \frac{49}{2}$

$+2$     $+2$

$y = -\frac{7}{2}x + \frac{53}{2}$

