

Unit 6 Review Guide

A. Use the distance formula to calculate the distance between two points.

a. Find the distance between the given points:
A(-3, 1) & B (-5, -8)

$$d = \sqrt{(-5 - (-3))^2 + (-8 - 1)^2}$$

$$d = \sqrt{4 + 81}$$

$$d = \sqrt{85}$$

b. Find the length of the segment that has the endpoints (0, 0) and (3, 4).

$$d = \sqrt{(3 - 0)^2 + (4 - 0)^2}$$

$$d = \sqrt{9 + 16}$$

$$d = 5$$

B. Use the midpoint formula to calculate the midpoint or an endpoint when given the midpoint.

a. Find the midpoint of the segment that has the endpoints (-6, 9) and (2, 3).

$$\frac{-6 + 2}{2}, \frac{9 + 3}{2}$$

$$(-2, 6)$$

b. Find the coordinates of the other endpoint of a segment with an endpoint of A(-2, 0) and a midpoint M(3, -1).

$$\frac{x - 2}{2} = 3$$

$$\frac{y - 0}{2} = -1$$

$$x - 2 = 6$$

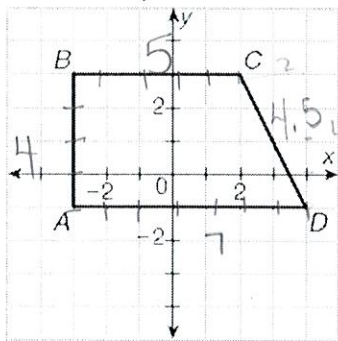
$$y = -2$$

$$x = 8$$

$$(8, -2)$$

C. Find the area and perimeter of a figure in the coordinate plane

a. Find the perimeter of the following figure:



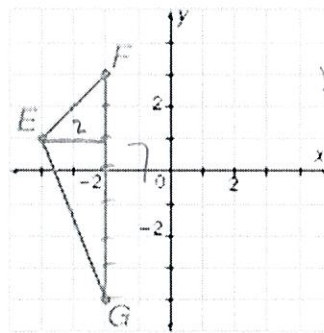
$$\sqrt{(2)^2 + (4)^2}$$

$$CD = \sqrt{4 + 16}$$

$$CD = \sqrt{20}$$

$$P = 20.5$$

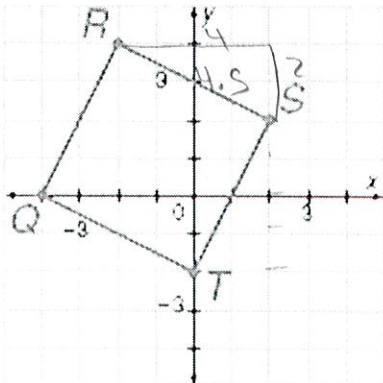
b. Find the area of the following figure:



$$A = \frac{1}{2} (2)(7)$$

$$A = 7$$

c. Find the area and perimeter of the following figure:



$$P = 4.5 + 4.5 + 4.5 + 4.5$$

$$P = 18$$

$$A = (4.5)(4.5)$$

$$A = 20.25$$

N. Convert the equation of a circle from general to standard form

a. $x^2 + y^2 + 8x - 2y - 64 = 0$

$$x^2 + 8x + 16 + y^2 - 2y + 1 = 64 + 16 + 1$$

$$(x+4)^2 + (y-1)^2 = 81$$

Center: $(-4, 1)$ Radius: 9

b. $2x^2 + 2y^2 + 8x - 4y - 72 = 0$

$$x^2 + 4x + 4 + y^2 - 2y + 1 = 36 + 4 + 1$$

$$(x+2)^2 + (y-1)^2 = 41$$

Center: $(-2, 1)$ Radius: $\sqrt{41} \approx 6.4$

O. Determine if a point is on, inside, and outside the circle

a. Circle C has a center of (3, 4) and a radius of 5. Where does the point (0, 9) lie on circle C? Show your evidence (work).

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

$$\begin{matrix} (-3)^2 + (9)^2 \\ 9 + 81 \\ 90 \end{matrix} \quad \text{Outside}$$

b. Circle C has a center of (3, 2) and a radius of 3. Where does the point (5, 4) lie on circle C?

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

$$\begin{matrix} (2)^2 + (4)^2 = 9 \\ 4 + 16 = 20 \\ 20 \neq 9 \end{matrix} \quad \text{Inside}$$

Rules/Formulas I Need to Memorize:

Rules/Formulas that Will Be Given to Me:

Midpoint:

Linear Equation Forms:

General Form of a Circle:

Slope-intercept Form: $y = mx + b$

Point-slope Form: $y - y_1 = m(x - x_1)$

Standard Form: $Ax + By = C$

Slope of Parallel Lines:

Distance:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Slope of Perpendicular Lines:

Partitioning:

$$(x, y) = \left(x_1 + \frac{a}{a+b}(x_2 - x_1), y_1 + \frac{a}{a+b}(y_2 - y_1) \right)$$

Area Formulas:

Triangle $A = \frac{1}{2}bh$

Rectangle $A = bh$

Pythagorean Theorem:

$$a^2 + b^2 = c^2$$

Standard Form of a Circle:

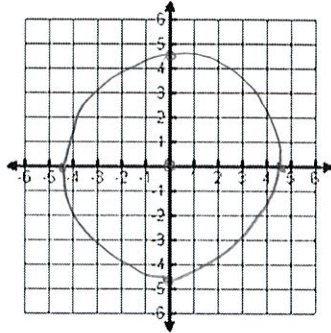
$$(x - h)^2 + (y - k)^2 = r^2$$

Learning Target #3: Equations of Circles

G. Determine the center and radius of a circle from an equation or graph.

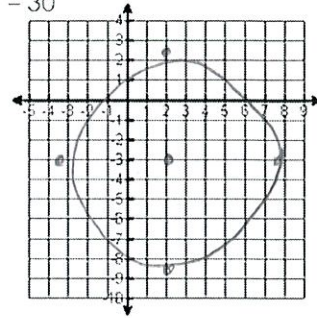
a.
1. $x^2 + y^2 = 24$

Center: $(0, 0)$
Radius: 4.9



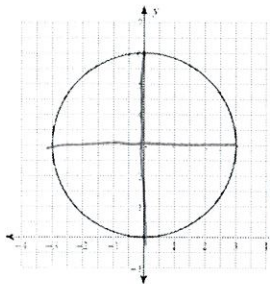
b.
2. $(x-2)^2 + (y+3)^2 = 30$

Center: $(2, -3)$
Radius: 5.5



H. Write the equation of a circle when given the graph, center and radius, or two points on the circle.

a.



Center $(0, 0)$

Radius = 6

$$x^2 + (y-0)^2 = 36$$

b. Write the equation of a circle centered at the origin with a radius of $\sqrt{27}$.

$$x^2 + y^2 = 27$$

c. Write the equation of a circle given a center at $(-6, 1)$ and a radius of 4 .

$$(x+6)^2 + (y-1)^2 = 16$$

d. Write the equation of a circle given a center at $(-2, 1)$ and a point of $(3, 2)$.

$$(x+2)^2 + (y-1)^2 = 26$$

I. Convert the equation of a circle from standard to general form

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

$$x^2 + 8x + 16 + y^2 - 4y + 4 = 9$$

$$x^2 + y^2 + 8x - 4y + 11 = 0$$

b. Center at $(-5, 3)$ and a radius of 3

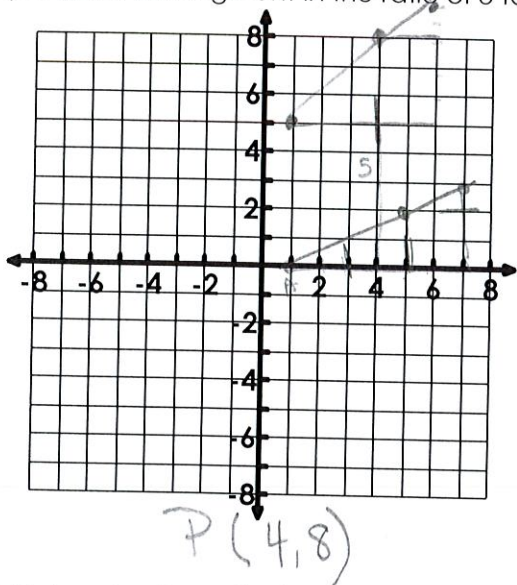
$$(x+5)^2 + (y-3)^2 = 9$$

$$x^2 + 10x + 25 + y^2 - 6y + 9 = 9$$

$$x^2 + y^2 + 10x - 6y + 25 = 0$$

D. Partition a line segment on the coordinate plane

a. Find the coordinate of point P that lies along the directed line segment from A(1, 5) to B(6, 10) and partitions the segment in the ratio of 3 to 2.



b. Find the coordinates of the point P that lies along the directed segment from A(1, 0) to B(7, 3) and partitions the segment in the ratio of 2:1.

(5, 2)

E. Determine if a pair of lines are parallel, perpendicular, or neither. Explain why.

a.
 $y = -2x + 4$

$y = \frac{1}{2}x - 5$

b.
 $2x + 4y = 8$

$3x + 6y = -6$

$y = -\frac{2}{4}x + 2$

$y = -\frac{1}{2}x + 2$

$y = -\frac{3}{6}x - 1$

$y = -\frac{1}{2}x - 1$

Parallel
Same Slopes

Perpendicular
opp. recip. Slopes

F. Given the slope and a point on a line, determine the equation of a line parallel or perpendicular to the original line

a. Write an equation of a line that is parallel to $y = 2x - 8$ and passes through the point (3, 10).

b. Write an equation of a line that is perpendicular to $y = 1/3x - 1$ and passes through the point (6, 3).

$10 = 2(3) + b$

$10 = 6 + b$

$4 = b$

$y = 2x + 4$

$3 = -3(b) + b$

$3 = -18 + b$

$21 = b$

$y = -3x + 21$