The distance formula:

The distance between the two points (x_1,y_1) & (x_2,y_2) is found by using the following formula:

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

Midpoint Formula

The midpoint of a segment whose endpoints are (x_1,y_1) and (x_2,y_2) is found using the following formula:

$$midpoint : \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

The Parent Circle: $x^2 + y^2 = r^2$

Center is (0,0) and Radius = r

Standard Form of an Equation of a Circle

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

center is at the point (h,k): and radius r.

Use this equation of a circle: $(x - 6)^2 + (y - 2)^2 = 9$ $r^2 = 9$ center $(6,2)$ $r = 3$

This circle is translated 8 units left and 2 units up and the radius is tripled. Write the equation of the new circle.

new center $(-2, 4)$

New radius $r = 3 \cdot 3 = 9$

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

Use this equation of a circle: $(x + 21)^2 + (y + 9)^2 = 20$ $\Rightarrow r^2 = 20$ $r = \sqrt{20}$ $r = 2\sqrt{5}$

This circle is translated 4 units right and 10 units up and the radius is doubled. Write the equation of the new circle.

$(x+21-4)^2 + (y+9-10)^2$

$(x+17)^2 + (y-1)^2 = 80$

new radius: $2(2\sqrt{5}) = 4\sqrt{5}$

$r^2 = (4\sqrt{5})^2 = 80$

Given the equation of a circle is $(x - 7)^2 + (y + 3)^2 = 72$
state the coordinates of the center and the exact length of the radius.

Center: $(7, -3)$

Radius = $\sqrt{72} = \sqrt{36 \cdot 2} = 6\sqrt{2}$

Given the equation of a circle is $(x - 8)^2 + y^2 = 196$
State the coordinates of the center of the circle and find the exact length of the diameter.

Center: $(8, 0)$ Diameter = 28

$r^2 = 196$
$r = \sqrt{196}$
$r = 14$

$d = 2 \cdot r = 2(14) = 28$

The equation of a circle is $(x + 10)^2 + (y - 4)^2 = 75$

State the coordinates of the center of the circle and find the exact length of the diameter.

Center: $(-10, 4)$ Diameter = $10\sqrt{3}$

$r^2 = 75$
$r = \sqrt{75}$
$r = 5\sqrt{3}$

$d = 2 \cdot r = 2(5\sqrt{3}) = 10\sqrt{3}$

The center of a circle is (0,-6) and the radius is 11. Write the equation of this circle.

$x^2 + (y+6)^2 = 121$

The center of a circle is (-8, 1) and the radius is $6\sqrt{3}$.
Write the equation of this circle.

$(x+8)^2 + (y-1)^2 = (6\sqrt{3})^2$

$= 36 \cdot 3$

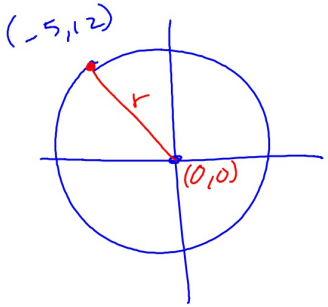
$(x+8)^2 + (y-1)^2 = 108$

The center of a circle is (0,0) and the point (-5,12) is on the circle.
Write the equation of this circle.

$x^2 + y^2 = r^2$

$(13)^2$

$x^2 + y^2 = 169$



the radius is the distance between the center and any point on the circle. Use the Distance Formula between (0,0) & (-5,12).

$r = \sqrt{(-5)^2 + (12)^2}$

$r = \sqrt{25 + 144}$

$r = \sqrt{169} = 13$

The center of a circle is (3, -13) and the point (-5, -7) is on the circle.
Write the equation of the circle.

$(x-3)^2 + (y+13)^2 = r^2$

$(x-3)^2 + (y+13)^2 = 100$

$\sqrt{(-5-3)^2 + (-7+13)^2} = r$

$\sqrt{64 + 36} = r$

$\sqrt{100} = r \longrightarrow r^2 = 100$

the radius is the distance between the center and any point on the circle. Use the Distance Formula.

The center of a circle is (8, -1) and the point (3, 6) is on the circle.
Write the equation of the circle.

$(x-8)^2 + (y+1)^2 = 74$

$r = \sqrt{(8-3)^2 + (6-(-1))^2}$

$r = \sqrt{5^2 + 7^2}$

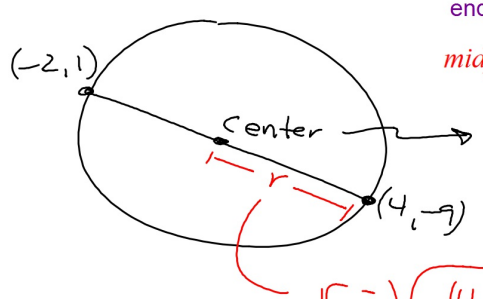
$r = \sqrt{25 + 49}$

$r = \sqrt{74} \longrightarrow r^2 = 74$

The radius is the distance between the center and any point on the circle. Use the distance formula and (8, -1) & (3, 6) to find the radius

The endpoints of a diameter of a circle are (4, -9) and (-2,1).
Write the equation of this circle.

the center is at the midpoint of the endpoints of the diameter.



$$midpoint: \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$$

$$\left(\frac{-2+4}{2}, \frac{1+-9}{2}\right) = (1,-4)$$

The radius is the distance between the center and one of the endpoints of the diameter.

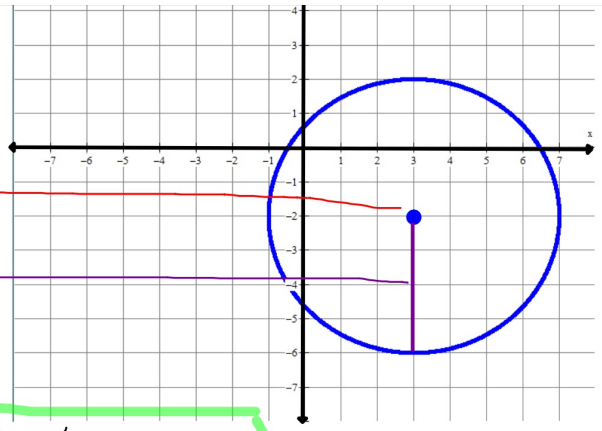
$$r = \sqrt{(4-1)^2 + (-9+4)^2}$$

$$r = \sqrt{9+25}$$

$$r = \sqrt{34} \qquad r^2 = 34$$

EQ: $(x-1)^2 + (y+4)^2 = 34$

Write the equation of this circle.



Center (3, -2)

radius = 4

EQ: $(x-3)^2 + (y+2)^2 = 16$

You can now finish Hwk #22:

Sec 10-3

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Problems 5, 6, 14, 15, 18, 24, 46, 50, 60, 68