

Good afternoon: warm up in notebooks

Write the equation of a line that passes through $(-3, 2)$ and is parallel to $4x + 3y = 6$
 xy

$$y = -\frac{4}{3}x + 2$$

$$y - y_1 = m(x - x_1)$$

$$y - 2 = -\frac{4}{3}(x + 3)$$

Reminders:

- first q4 assess 4/6

HW p. 395

12 origin: $(0, 0)$

a $x^2 + y^2 = 36$ b $x^2 + y^2 = 12$

13

a $(x-7)^2 + (y-2)^2 = 25$ b $(x+4)^2 + (y+2)^2 = 81$

14

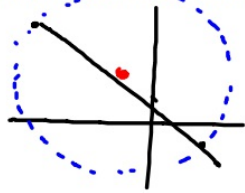
a $(5, 0)$ $r = 15$

b $(-4, 2)$ $r = \sqrt{13}$



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

15. **Model with mathematics.** An engineer draws a cross-sectional area of a pipe on a coordinate plane with the endpoints of the diameter at $(2, -1)$ and $(-8, 7)$. Determine the equation of the circle determined by these endpoints.



① Find the center: averaging the diameter's endpoints.

$$\left(\frac{2 + -8}{2}, \frac{-1 + 7}{2} \right) \Rightarrow \left(\overset{h}{-3}, \overset{k}{3} \right)$$

② Place (h, k) into formula and either given point into (x, y) .

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

$$(2 - -3)^2 + (-1 - 3)^2 = r^2$$

$$(2 + 3)^2$$

$$25 + 16 = r^2$$

$$41 = r^2$$

$$\sqrt{41} = r$$

$$\therefore r = \sqrt{41}$$

$$(x - \underline{h})^2 + (y - \underline{k})^2 = \underline{r^2}$$

center (h, k)

r : radius

$$(x - -3)^2 + (y - 3)^2 = 41$$

$(2, -13)$ and $(-12, 11)$ are the endpoints of a diameter. Write the equation of such a circle.

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

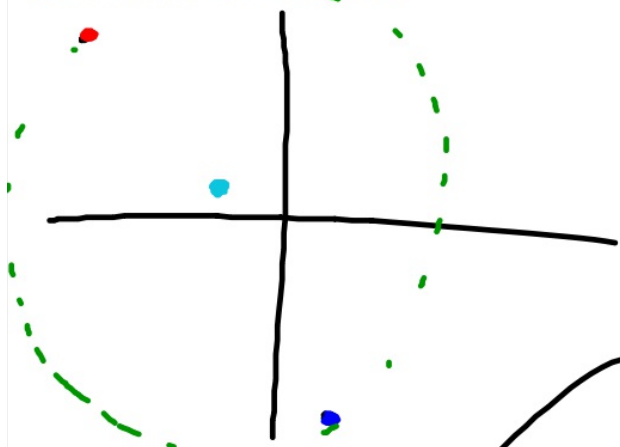
Center: $(-5, -1)$

$$(x - -5)^2 + (y - -1)^2 = r^2$$

$$(-12 + 5)^2 + (11 + 1)^2 = r^2$$

$$49 + 144 = r^2$$

$$\underline{193 = r^2}$$

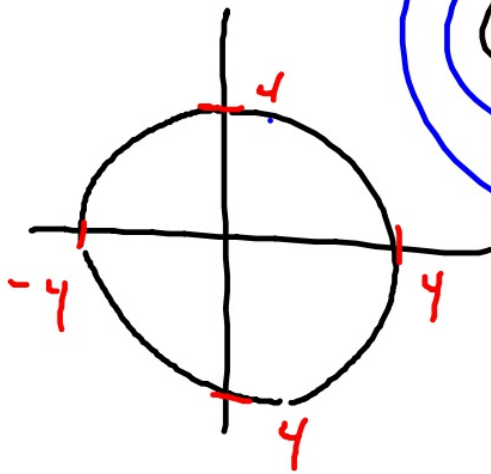


$$(x+5)^2 + (y+1)^2 = 193$$

Using Equations of Circles

A circle with radius 4 is centered at the origin.

Does the point $(1, 3)$ lie on the circle?



$$(x-0)^2 + (y-0)^2 = 4^2$$

$$x^2 + y^2 = 16$$

$$1^2 + 3^2 = 16$$

$$1 + 9$$

$$10 \neq 16 \Rightarrow \text{No}$$

$$\begin{matrix} h & k \\ (0, 0) \end{matrix}$$

NOTES

Hoot



Determine if $(5,-1)$ lies on a circle centered at $(2,-1)$ with radius 3

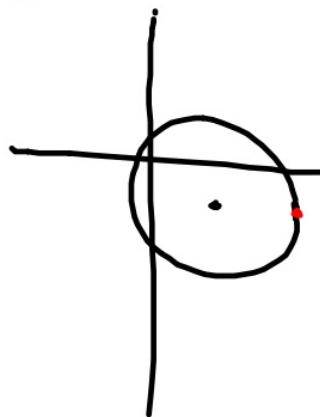
$$(x-2)^2 + (y+1)^2 = 3^2$$

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

$$3^2 + 0^2 = 3^2$$

$$9 = 9$$

yes!



Determine if (40,50) lies on a circle centered at (10,30) with radius $\sqrt{90}$

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

$$(x-10)^2 + (y-30)^2 = \cancel{\sqrt{90}^2} \\ 90$$

$$(40-10)^2 + (50-30)^2$$

$$900 + 400 \neq 90 \quad \text{No}$$

Write the equation of a circle whose center is $(-5, 1)$ and $(3, 4)$ lies on the circle.

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

$(-5, 1)$ (x, y)

$$(\cancel{x} - \cancel{-5})^2 + (y-1)^2 = r^2$$

$$(x+5)^2 + (y-1)^2 = r^2$$

$$(3+5)^2 + (4-1)^2 = r^2$$

$$64 + 9 = r^2$$

$$\underline{\underline{73 = r^2}}$$

$$(x+5)^2 + (y-1)^2 = 73$$



In your notebooks, do a quick-write summarizing how to find if a particular circle passes through a particular point.

Completing the Square

NOTES

Determine the center and radius of this...circle??

$$x^2 - 6x + (y-3)^2 = 25$$

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

① Take half of the x -coefficient

$$-\frac{6}{2} \Rightarrow -3$$

② Square the result.

$$(-3)^2 \Rightarrow +9$$

③ Add the result to both sides.

$$\underline{x^2 - 6x + 9} + (y-3)^2 = 25 + 9$$

④ Factor.

$$(x-3)(x-3) + (y-3)^2 = 34$$

⑤ Simplify.

$$(x-3)^2 + (y-3)^2 = 34$$

Center: $(3, 3)$ radi: $\sqrt{34}$

Center? Radius?

$$(x+5)^2 + y^2 + 18y = -17$$

$$\downarrow$$
$$\left(\frac{18}{2}\right)^2 \rightarrow 9^2 \rightarrow \underline{\underline{81}}$$

$$(x+5)^2 + \underline{y^2 + 18y + 81} = -17 + 81$$

$$(x+5)^2 + (y+9)(y+9) = 64$$

$$(x+5)^2 + (y+9)^2 = 64$$

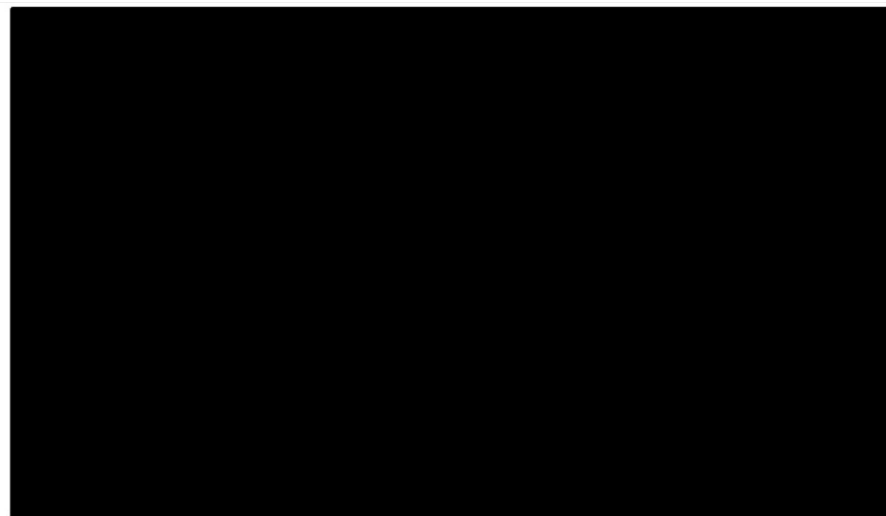
Center: $(-5, -9)$ rad: 8





Center? Radius?

$$x^2 + 136 = -16x + 22y - y^2$$



Center? Radius?

$$-20y = 4x - y^2 - 40 - x^2$$

Homework:

handout #1-10 (due Monday)

1.) center. $(-8, 16)$

Area: 9π

$$(x+8)^2 + (y-16)^2 = 9$$

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

$$\frac{9\pi}{\pi} = \frac{\pi \cdot r^2}{\pi}$$

$$\sqrt{9} = \sqrt{r^2}$$

$$\underline{\underline{3}} = r$$

3.) $(-9, 6)$

Circumf. 16π

$\uparrow 2\pi r$

$$\frac{16\pi}{2\pi} = \frac{2\pi \cdot r}{\pi}$$

$$\underline{\underline{8}} = r$$