

Lesson 8.9- SWBAT write an equation of a circle and prove points on the circle.

1) Complete the square
 $x^2 + 2x + 1 = 0$
 $x^2 + 2x = -1$
 $(x+1)^2 = 0$
 $x+1 = 0$
 $x = -1$

2) Show the translation: $f(x) = (x-3)^2 + 1$
 $x^2 - 6x + 10 = 0$
 $x^2 - 6x = -10$
 $(x-3)^2 = -10 + 9$
 $(x-3)^2 = -1$
 $x-3 = \pm i$
 $x = 3 \pm i$

① $x^2 - 4x + 10 = 0$
 $x^2 - 4x = -10$
 $(x-2)^2 = -10 + 4$
 $(x-2)^2 = -6$
 $x-2 = \pm\sqrt{-6}$
 $x = 2 \pm i\sqrt{6}$

② $x^2 + 6x + 8 = 0$
 $x^2 + 6x = -8$
 $(x+3)^2 = -8 + 9$
 $(x+3)^2 = 1$
 $x+3 = \pm 1$
 $x+3 = 1 \Rightarrow x = -2$
 $x+3 = -1 \Rightarrow x = -4$

Circles

* not a function!
 Standard Form of the Equation of a Circle:
 $(x-h)^2 + (y-k)^2 = r^2$
 * Center has opposite signs.

(x, y) - point on the circle
 (h, k) - center of the circle
 r - radius (length from the center to the edge)

1) Write the equation of the circle when the radius is 2 and the center is $(-1, 3)$ to the edge)
 $(x+1)^2 + (y-3)^2 = 2^2 = 4$

2) Write the equation of the circle when the radius is 3 and the center is $(2, -5)$.
 $(x-2)^2 + (y+5)^2 = 9$

3) Write the equation of the circle when the radius is 7 and the center is $(-2, -1)$.
 $(x+2)^2 + (y+1)^2 = 49$

Identify the radius and center of the circle given the equation.

4) $(x-2)^2 + (y+4)^2 = 25$
 center $(2, -4)$
 $r = \sqrt{25} = 5$

5) $(x+3)^2 + (y-1)^2 = 4$
 center $(-3, 1)$
 $r = \sqrt{4} = 2$

6) $(x+1)^2 + (y+8)^2 = 16$
 center $(-1, -8)$
 $r = \sqrt{16} = 4$

7) $(x-5)^2 + (y-2)^2 = 9$
 center $(5, 2)$
 Radius $\sqrt{9} = 3$

Proving Points Lie on the Circle

To show a point (x, y) is on the circle, substitute into the equation.

If a point does not work when substituted in, the point lies on the outside or inside of the circle.

Inside the circle: $<$ Outside the circle: $>$

8) Does the point $(2, 1)$ lie on the circle $(x-2)^2 + (y+5)^2 = 36$?
 Yes! $(2-2)^2 + (1+5)^2 = 36$
 $0 + 36 = 36$

9) Does the point $(-3, 0)$ lie on the circle $(x-3)^2 + (y)^2 = 16$?
 Outside. $(-3-3)^2 + (0)^2 = 16$
 $36 + 0 = 36$
 $36 > 16$

10) Does the point $(0, 2)$ lie on the circle $(x-2)^2 + (y)^2 = 25$?
 Inside. $(0-2)^2 + (2)^2 = 25$
 $4 + 4 = 8$
 $8 < 25$

11) Does the point $(-6, 1)$ lie on the circle $(x+2)^2 + (y-1)^2 = 16$?

12) Does the point $(-9, 8)$ lie on the circle $(x+8)^2 + (y)^2 = 100$?

Exit Ticket

1) Write the equation of the circle whose radius is 8 and the center is $(2, -4)$.

2) Find the center and radius of: $(x-4)^2 + (x+3)^2 = 9$.

3) Determine if the point $(5, -28)$ lie on the circle $(x+2)^2 + (x+4)^2 = 25$?