

Lesson 8.12- SWBAT write equations of a circle by completing the square

Kick off-

1) Complete the square: $x^2 + 8x + 15 = 0$

$$x^2 + 8x = -15$$

$$(x+4)^2 = -15 + 16$$

$$(x+4)^2 = 1$$

$$x+4 = \pm 1$$

$$x = -3 \pm \sqrt{1}$$

2) Complete the square: $x^2 - 6x - 10 = 0$

$$x^2 - 6x = 10$$

$$(x-3)^2 = 10 + 9$$

$$(x-3)^2 = 19$$

$$x-3 = \pm \sqrt{19}$$

3) Write the equation of a circle given the center (3, -3) and the point (3, 2). The graph it.

plug in center do opposite

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

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

$$r = 5$$

Circles

Standard Form of the Equation of a Circle:

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

(x, y) - point on the circle

(h, k) - center of the circle *opposite signs

r - radius (the distance from the center to the edge)

↑ count by!

Writing an Equation by Completing the square.

- 1) Move the c to the other side (the number by itself)
- 2) Rewrite so the x's are together and the y's are together
- 3) Complete the square for the x's
- 4) Complete the square for the y's

1) Write the equation of the circle in standard form. $x^2 + 8x + y^2 - 2y - 64 = 0$

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

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

Center $\Rightarrow (-4, 1)$

$$r = \sqrt{81} = 9$$

general form

$\frac{1}{2}(8)$
 $\frac{1}{2}(-2)$

2) Write the equation of the circle in standard form. $x^2 + 24x + y^2 + 6y + 137 = 0$

$$x^2 + 24x + y^2 + 6y = -137$$

$$(x+12)^2 + (y+3)^2 = 16$$

Center $(-12, -3)$

$$r = \sqrt{16} = 4$$

$\frac{1}{2}(24)$
 $\frac{1}{2}(6)$

3) Write the equation of the circle in standard form. $x^2 + y^2 + 12x - 12y + 4 = 0$

$$x^2 + y^2 + 12x - 12y = -4$$

$$x^2 + 12x + y^2 - 12y = -4$$

$$(x+6)^2 + (y-6)^2 = 68$$

Center $\Rightarrow (-6, 6)$

$$r = \sqrt{68}$$

$\frac{1}{2}(12)$
 $\frac{1}{2}(-12)$

4) Write the equation of the circle in standard form. $x^2 + y^2 + 2x - 24y = -120$

5) Write the equation of the circle in standard form. $x^2 + 2x + y^2 - 10y = 55$

6) Write the equation of the circle in standard form. $x^2 + y^2 + 8x + 32y + 263 = 0$