

Lesson 8.8- SWBAT translate functions on a graph and equation.

Kick off:

1) Complete the square:  
 $x^2 - 10x + 25 = 0$   
 $x^2 - 10x + 25 = -25 + 25$   
 $(x-5)^2 = 0$   
 $x-5 = 0$   
 $x = 5$

2) Graph the function:  $2y - 4 = -6x$   
 $2y = -6x + 4$   
 $y = -3x + 2$   
 $m = -3$   
 $b = 2$

3) If  $f(x) = x + 2$ ,  $k(x) = 2x - 1$ , and  $g(x) = x^2 - 2x + 1$  find:  
 a)  $(f \circ k)(x)$   
 $f(k(x)) = f(2x - 1) = (2x - 1) + 2 = 2x + 1$   
 b) Subtract  $f(x)$  from  $g(x)$   
 $g(x) - f(x) = (x^2 - 2x + 1) - (x + 2) = x^2 - 2x + 1 - x - 2 = x^2 - 3x - 1$   
 c)  $k(f(2))$   
 $k(f(2)) = k(2 + 2) = k(4) = 2(4) - 1 = 8 - 1 = 7$   
 d)  $k(f(x))$   
 $k(f(x)) = k(x + 2) = 2(x + 2) - 1 = 2x + 4 - 1 = 2x + 3$

Parent Function- Original functions

Linear function  $y = x$

Quadratic Function  $y = x^2$

Translating Functions- Slide the graph

$\uparrow \downarrow \rightarrow \leftarrow$

Graph the parent function and the translated function for each of the following:

1)  $f(x) = x^2 + 2$   
 PF:  $y = x^2$   
 UP 2

2)  $f(x) = x^2 - 4$   
 DOWN 4

3) Graph:  $f(x) = (x - 3)^2$   
 RIGHT 3

4) Graph  $f(x) = (x + 5)^2$   
 LEFT 5

**VERTICAL Translation**  
 $f(x) = x^2 + k$   
 If  $k > 0$ , then the graph will be translated  $k$  units UP.  
 If  $k < 0$ , then the graph will be translated  $|k|$  units DOWN.

**HORIZONTAL Translation**  
 $f(x) = (x - h)^2$   
 If  $h > 0$ , then the graph will be translated  $h$  units to the RIGHT.  
 If  $h < 0$ , then the graph will be translated  $|h|$  units to the LEFT.

\* ( ) are opposites!

State the horizontal and/or vertical translation for each of the following:

1)  $f(x) = (x - 2)^2$   
 right 2

2)  $f(x) = x^2 + 5$   
 up 5

3)  $f(x) = x^2 - 8$   
 down 8

4)  $f(x) = (x + 7)^2$   
 left 7

5)  $f(x) = (x - 5)^2 + 8$   
 right 5 up 8

6)  $f(x) = (x + 8)^2 + 3$   
 left 8 up 3

7)  $f(x) = (x - 2)^2 - 4$

8)  $f(x) = (x - 6)^2$

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

10)  $f(x) = 2x^2 + 5$

11)  $f(x) = 2(x + 1)^2 - 3$

12)  $f(x) = 3(x - 9)^2 - 7$