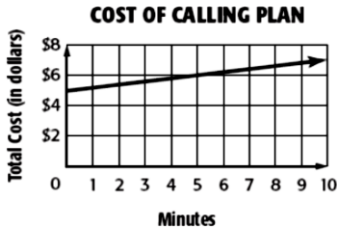


Algebra U7L2 - Transformations on the Linear Parent Function

**Warm Up...**

**A.3C – real world linear funtions:**

The graph below shows the monthly cost of a long-distance calling plan.



What does the slope of the graph represent?

- A. the cost of zero minutes of calls
- B. the cost per additional minutes of long-distance calls
- C. the total cost of long-distance calls
- D. the number of minutes \$1 can buy

**A.2C – write equation from table or graph:**

Write an equation for the situation represented in the table at the bottom of this box

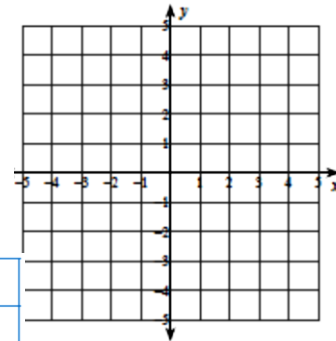
<b>Number of car washes, x</b>	0	8	12
<b>Amount left on card (\$), y</b>	30	18	12

**Recent Review:**

Graph the system of inequalities and shade the solution set (the section that overlaps)

$$y \geq \frac{2}{3}x + 3$$

$$y > -\frac{4}{3}x - 3$$



**Today's Goal:**

- KWBAT determine the effect of transformations on the linear parent function
- WHY? This is Algebra standard A.3E which will be tested on our STAAR End of Course Exam in May. You have already built a lot of the skills to recognize the effect of transformations, but today we will explore it more deeply and put words to what we see. By the end of class, you will be able to name specific transformations and visualize what changes they will make on a line. Let's explore!

**Linear Function**  
**f(x) = x**

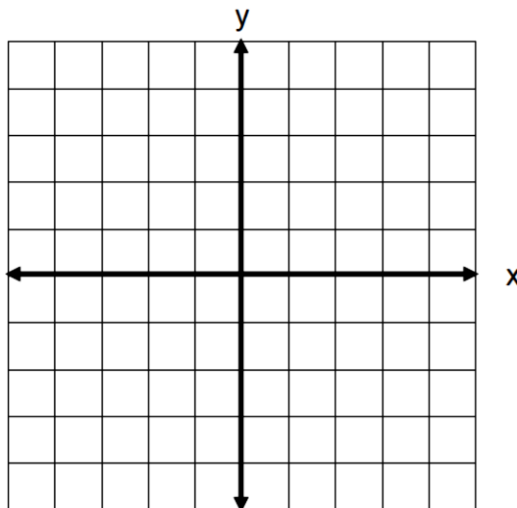
Plot the points and sketch the graph below.

This is the Linear "Parent Function"

$$f(x) = x$$

Complete the table of values.

x	f(x)
-4	
-2	
0	
1	
3	
5	



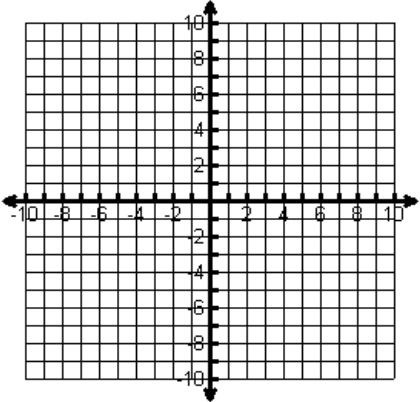
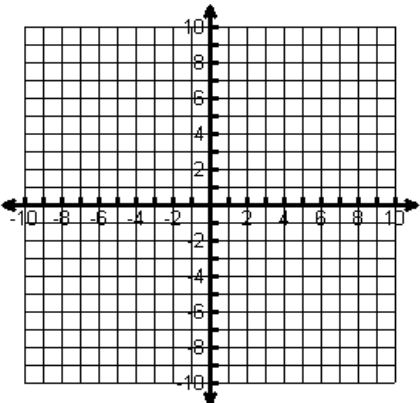
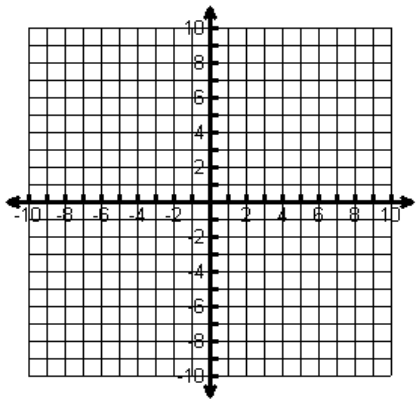
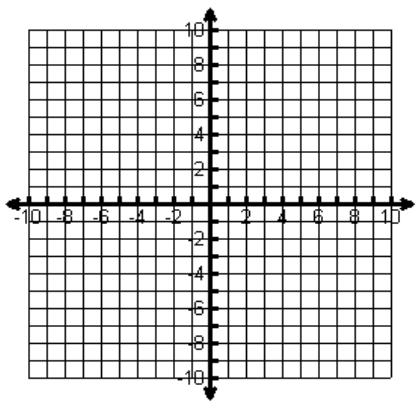
Why is this called a linear function?

What is the x-intercept?

What is the y-intercept?

What is the slope?

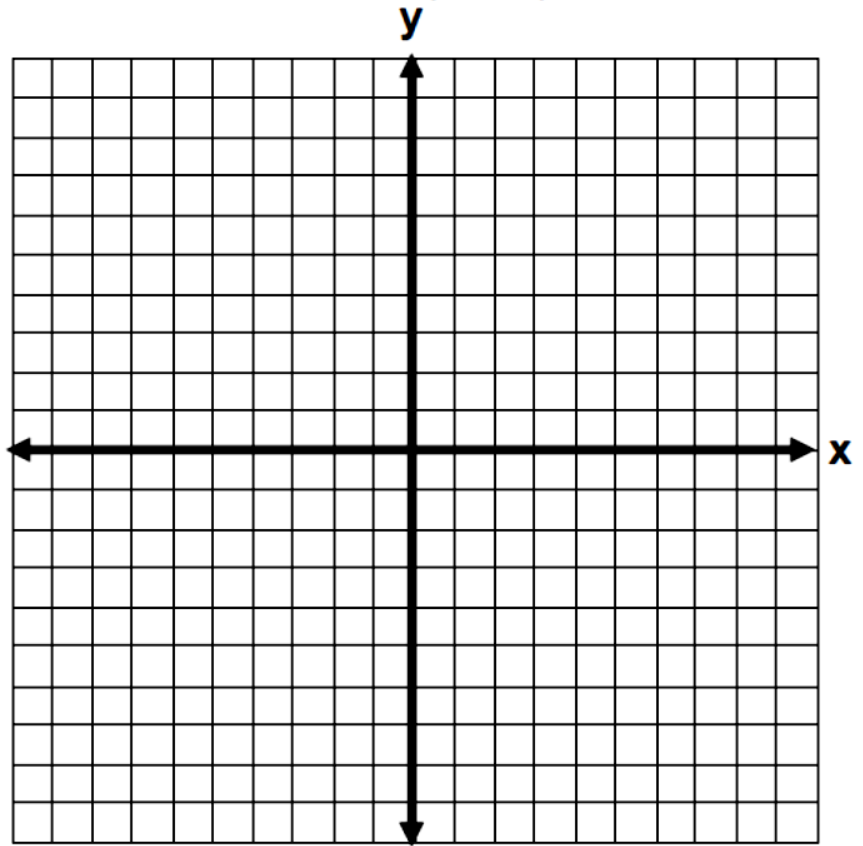
For this activity you will need a pencil and a colored pencil

Function Notation	Table	Graph																		
<p><u>Multiplying the Output</u></p> <p><math>af(x)</math></p>	<p><math>f(x) = x</math></p> <table border="1" data-bbox="609 283 945 596"> <thead> <tr> <th>x</th> <th>f(x)</th> <th>2 * f(x)</th> </tr> </thead> <tbody> <tr><td>-5</td><td></td><td></td></tr> <tr><td>-2</td><td></td><td></td></tr> <tr><td>0</td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td></tr> </tbody> </table>	x	f(x)	2 * f(x)	-5			-2			0			2			5			
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<p><u>Adding to the Output</u></p> <p><math>f(x) + d</math></p>	<p><math>f(x) = x</math></p> <table border="1" data-bbox="609 735 945 1047"> <thead> <tr> <th>x</th> <th>f(x)</th> <th>f(x) + 3</th> </tr> </thead> <tbody> <tr><td>-5</td><td></td><td></td></tr> <tr><td>-2</td><td></td><td></td></tr> <tr><td>0</td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td></tr> </tbody> </table>	x	f(x)	f(x) + 3	-5			-2			0			2			5			
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<p><u>Subtracting from the Input</u></p> <p><math>f(x - c)</math></p>	<p><math>f(x) = x</math></p> <table border="1" data-bbox="609 1184 945 1497"> <thead> <tr> <th>x</th> <th>f(x)</th> <th>f(x - 4)</th> </tr> </thead> <tbody> <tr><td>-5</td><td></td><td></td></tr> <tr><td>-2</td><td></td><td></td></tr> <tr><td>0</td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td></tr> </tbody> </table>	x	f(x)	f(x - 4)	-5			-2			0			2			5			
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# Families of Linear Functions Concept Map

**Families of  
Linear Functions**  
 $f(x) = x + b$

Complete the table on each of the following and draw each in a different color on the graph to the right.



$f(x) = x + 3$	
x	f(x)
-5	
-2	
0	
3	
7	
x-int =	
y-int =	

$f(x) = x - 4$	
x	f(x)
-6	
-3	
0	
2	
5	
x-int =	
y-int =	

How are the lines above alike?

How are they different?

$f(x) = x - 7$	
x	f(x)
-2	
-1	
0	
4	
8	
x-int =	
y-int =	

$f(x) = x + 6$	
x	f(x)
-8	
-6	
-1	
2	
3	
x-int =	
y-int =	

Write the equation of a line in this family with a y-intercept of -2.

\_\_\_\_\_

Write the equation of a line in this family with a y-intercept of +5.

\_\_\_\_\_

Write the equation of a line in this family with a y-intercept of -10.

\_\_\_\_\_

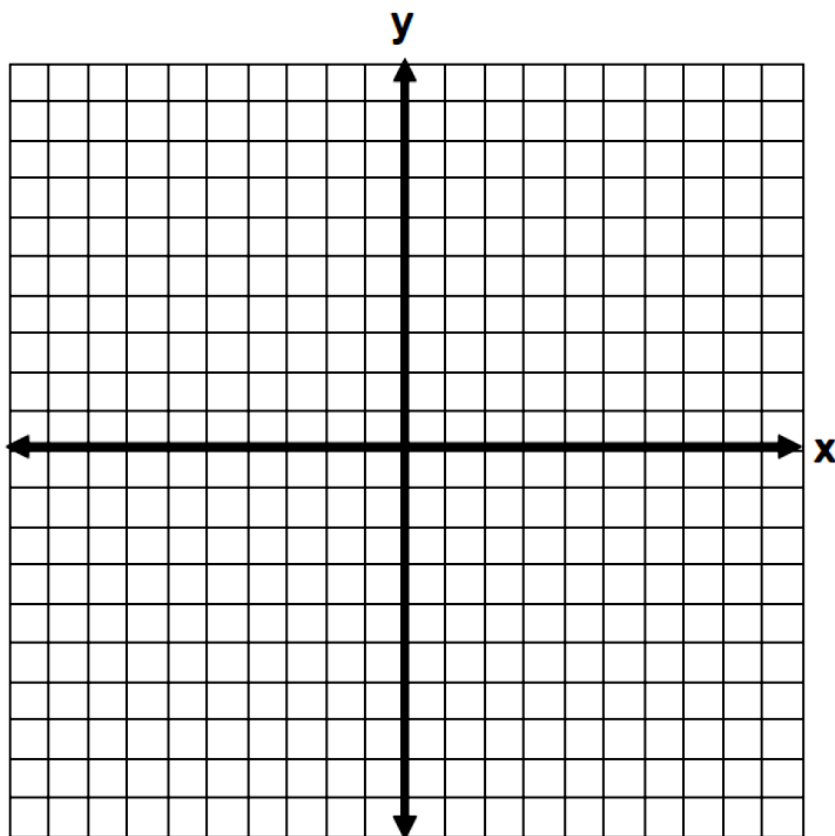
# Linear Functions in the Form of $f(x) = ax$

Graph each of the following functions in different colors on the graph at the right.

$$f(x) = -x$$

$$f(x) = \frac{1}{4}x$$

$$f(x) = 4x$$



How are the graphs alike?

How are the graphs different?

What does the coefficient of  $x$  do to the linear function  $f(x)=x$ ?

How would the graph of  $f(x) = 5x$  compare to the graph of  $f(x)=x$ ?

How would the graph of  $f(x) = -3x$  compare to the graph of  $f(x)=x$ ?

How would the graph of  $f(x) = .2x$  compare to the graph of  $f(x)=x$ ?