Bellwork: Algebra 1

1. Write down your homework for the night in your planner.

2. Make sure you have your Algebra Nation book and a highlighter.

3. Answer the following question in your FRIDAY bellwork section:

Consider the following table of values.

$f(x+2)$

x	$f(x)$
−5	25
−3	9
0	0
3	9
5	25

x	$m(x)$
−7	25
−5	9
−2	0
1	9
3	25

−7 −5

Write what transformation is happening.

1. Label the following as transformations on the independent variable or the dependent variable and describe the transformation.

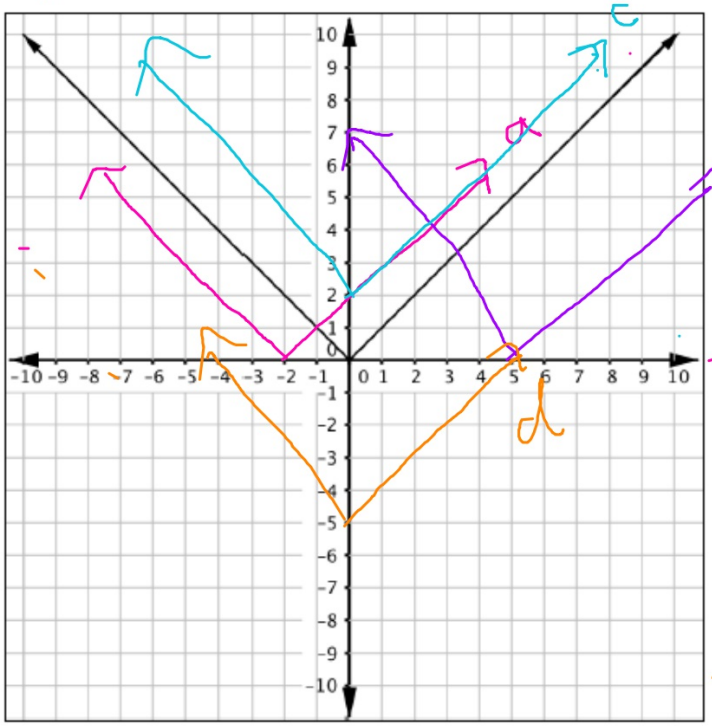
		Description
a. $f(x)+3$	○ Independent Variable ✓ Dependent Variable	up 3 units
b. $f(x)-3$	○ Independent Variable ✓ Dependent Variable	down 3 units
c. $f(x+3)$	✓ Independent Variable ○ Dependent Variable	left 3 units
d. $f(x-3)$	✓ Independent Variable ○ Dependent Variable	right 3 units

2. The following table represents the function $h(x)$. Complete the table for $g(x)$, given $g(x) = \frac{1}{2}h(x)$.

x	$h(x)$
-4	256
-2	16
0	0
3	81
6	1296

x	$g(x)$
-4	128
-2	8
0	0
3	40.5
6	648

3. The following graph represents the function $f(x)$. Sketch and label the following functions on the same coordinate plane.
   a. $f(x+2)$
   b. $f(x-5)$
   c. $f(x)+2$
   d. $f(x)-5$



4. The following table represents the function $h(x)$. Complete the table for $g(x)$, given $g(x) = h\left(\frac{1}{4}x\right)$. The first two have been done for you!

x	$h(x)$
-2	3.25
-1	3.5
0	4
1	5
2	7
3	11
4	19

x	$g(x)$
-8	3.25
-4	3.5
0	4
4	5
8	7
12	11
16	19

$\frac{1}{4}$

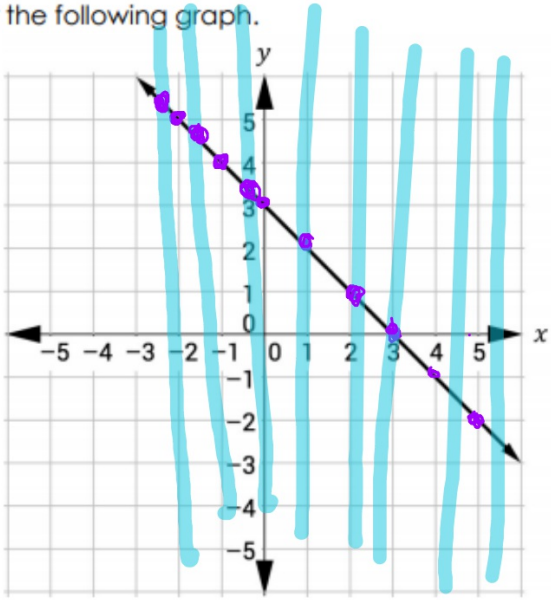
4

Let's review the definition of a function.

Every input value (x) corresponds to only one output value (y).

X	Y
-2	5
-1	4
0	3
1	2
2	1
3	0
4	-1
5	-2

Consider the following graph.



How can a vertical line help us quickly determine if a graph represents a function?

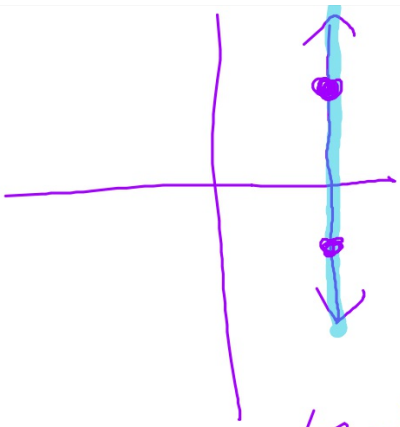
only touch the graph once

We call this the ***vertical line test***. Use the vertical line test to determine if the graph above represents a function.

Important facts:

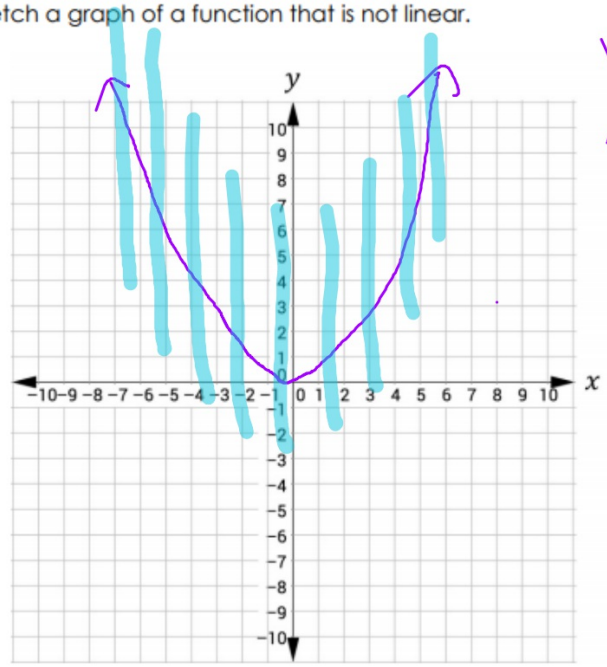
- Graphs of lines are not always functions. Can you describe a graph of a line that is not a function?

vertical line



- Functions are not always linear.

Sketch a graph of a function that is not linear.



x^2

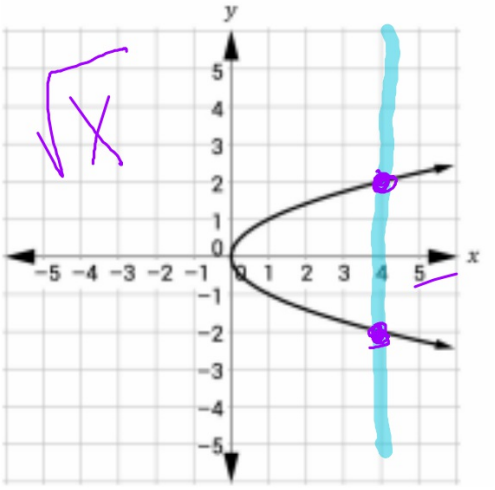
(3, 2)

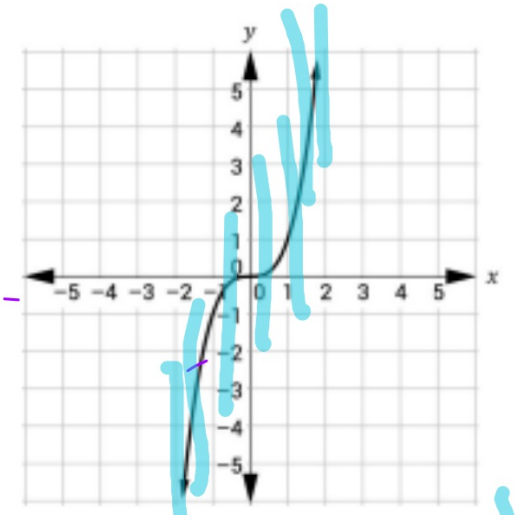
(3, -2)

All parabolas are functions.

Let's Practice!

1. Use the vertical line test to determine if the following graphs are functions.





$\sqrt{x}$

x^3

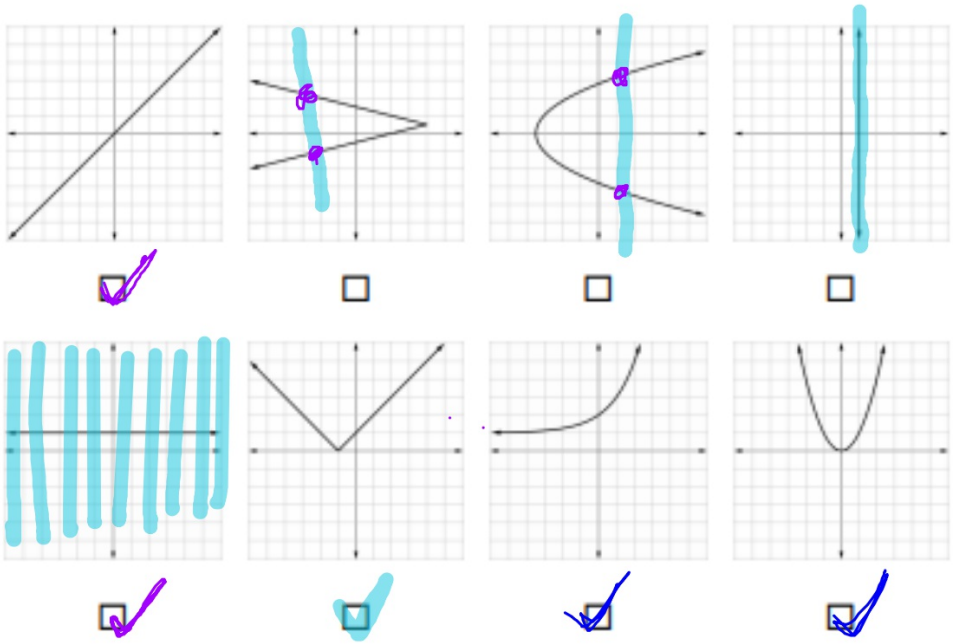
Not a function!

(4,2)
(4,-2)

Function!

Try It!

2. Which of the following graphs represent functions? Select all that apply.



3. Consider the following scenarios. Determine if each one represents a function or not.

   a. An analyst takes a survey of people about their heights (in inches) and their ages. She then relates their heights to their ages (in years).

   No!

   b. A geometry student is dilating a circle and analyzes the area of the circle as it relates to the radius.

   Yes!

   $A = \pi \cdot r^2$

   c. A teacher has a roster of 32 students and relates the students' letter grades to the percent of points earned.

   Yes!

   d. A boy throws a tennis ball in the air and lets it fall to the ground. The boy relates the time passed to the height of the ball.

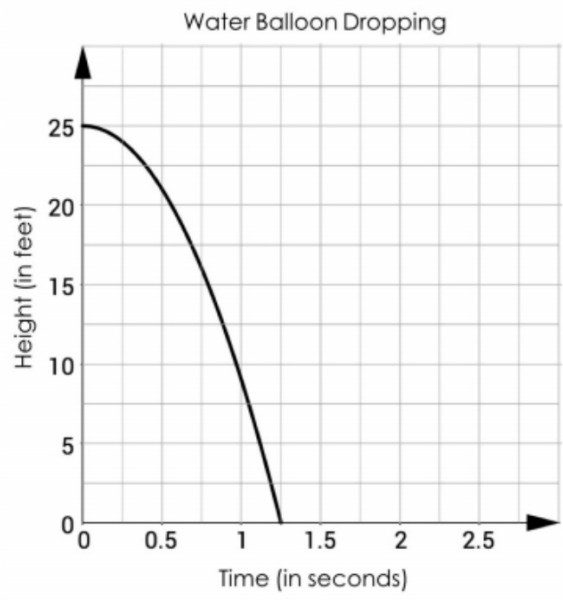
   Yes!

It's important to understand key features of graphs.

- An ***x*-intercept** of a graph is the location where the graph crosses the _____.
- The y-coordinate of the x-intercept is always _____.
- The ***y*-intercept** of a graph is the location where the graph crosses the _____.
- The x-coordinate of the y-intercept is always _____.
- The x-intercept is the _____ to $f(x) = 0$.

All of these features are very helpful in understanding real-world context.

4. Consider the following graph that represents the height, in feet, of a water balloon dropped from a 2nd story window after a given number of seconds.



a. What is the x-intercept?

b. What is the y-intercept?

c. Label the intercepts on the graph.

Try It!

5. Refer to the previous problem for the following questions.

   a. What does the y-intercept represent in this real-world context?

   b. What does the x-intercept represent in this real-world context?

   c. What is the solution to this situation?

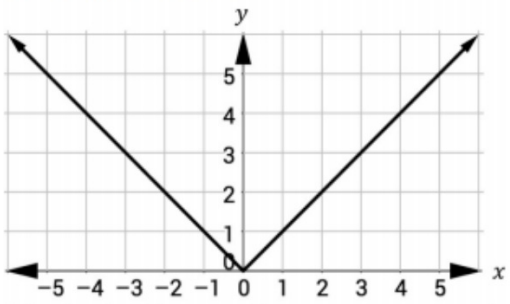
Section 3 – Topic 8
Key Features of Graphs of Functions – Part 2

Let's discuss other key features of graphs of functions.

- ***Domain***: the input or the _____ values.
- ***Range***: the _____ or the y-values.
- ***Increasing intervals***: as the x-values _____, the y-values _____.
- ***Decreasing intervals***: as the x-values _____, the y-values _____.
- ***Relative maximum***: the point on a graph where the interval changes from _____ to _____.
- ***Relative minimum***: the point on a graph where the interval changes from _____ to _____.

Let's Practice!

1. Use the following graph of an ***absolute value function*** to answer the questions below.



   a. Define the domain.

   b. Define the range.

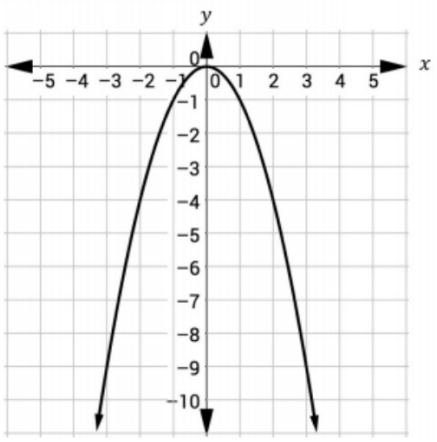
   c. Where is the graph increasing?

   d. Where is the graph decreasing?

   e. Identify any relative maximums.

   f. Identify any relative minimums.

2. Use the graph of the following ***quadratic function*** to answer the questions below.



a. Define the domain.

b. Define the range.

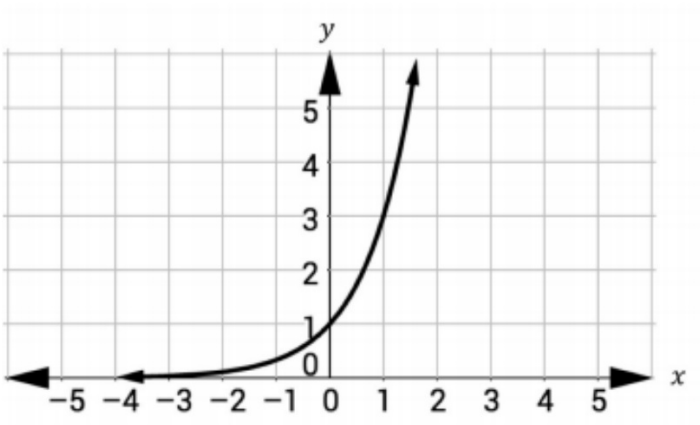
c. Where is the graph increasing?

d. Where is the graph decreasing?

e. Identify any relative maximums.

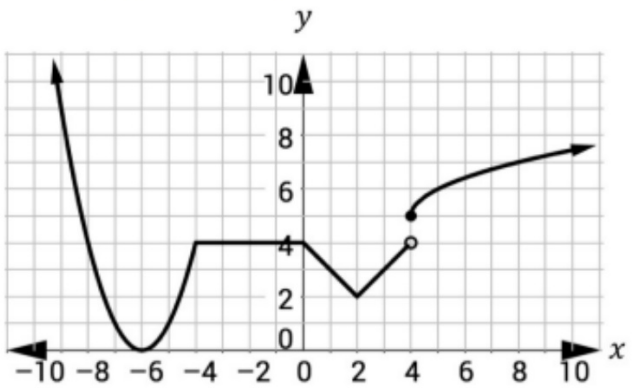
f. Identify any relative minimums.

3. Describe everything you know about the key features of the following graph of an ***exponential function***.



BEAT THE TEST!

1. The following graph is a ***piecewise function***.



Which of the following statements are true about the graph? Select all that apply.

- ☐ The graph is increasing when the domain is $-6 < x < -4$.
- ☐ The graph has exactly one relative minimum.
- ☐ The graph is increasing when $-4 \leq x \leq 0$.
- ☐ The graph is increasing when $x > 4$.
- ☐ The graph is decreasing when the domain is $\{x | x < -6 \cup x > 2\}$.
- ☐ The range is $\{y | 0 \leq y < 4 \cup y \geq 5\}$.
- ☐ There is a relative minimum at $(2, 2)$.