

## Warm Up (1/29/18) PARCC Practice

Jerome is constructing a table of values that satisfies the definition of a function.

Input	-13	20	0	-4	11	-1	17	
Output	-15	-11	-9	-2	-1	5	5	13

Which number(s) can be placed in the empty cell so that the table of values satisfies the definition of a function?

Select **all** that apply.

A. -5

B. -1

C. 0

D. 2

E. 11

F. 17

Function?

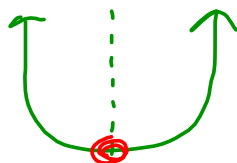
Every input has  
Exactly 1 output

Module 4: Lesson 8

## Exploring the Symmetry of Graphs of Quadratic Functions

Pg. 5.45

- Key features of a quadratic graph
- Average rate of change



## Vocabulary $f(x) = \underline{a}x^2 + \underline{b}x + \underline{c}$

(Blue Text = Found in Module 4, Pg. 45)

Standard Form: the standard form of a quadratic function is  $f(x) = ax^2 + bx + c$

Axis of Symmetry: the vertical line that splits the quadratic graph into two perfectly symmetric pieces. Found by using the formula  $x = -\frac{b}{2a}$

Vertex: the point of intersection between the graph of the quadratic function and the Axis of Symmetry, given as an ordered pair  $(x, y)$

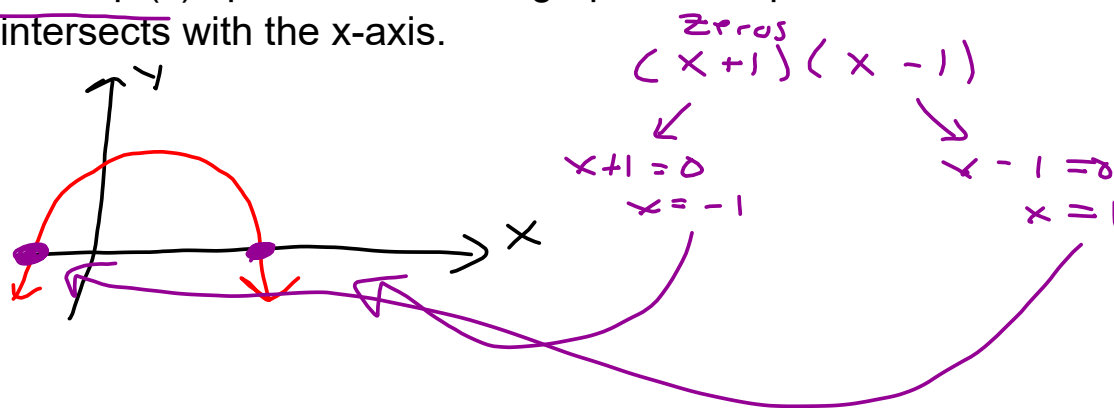
End behavior of a Graph: describes how the graph of the quadratic opens, depending on the leading coefficient.  $f(x) = \underline{a}x^2 + \underline{b}x + \underline{c}$

Two cases

① If  $a > 0$  (+), then graph opens up 

② If  $a < 0$  (-), then graph opens down 

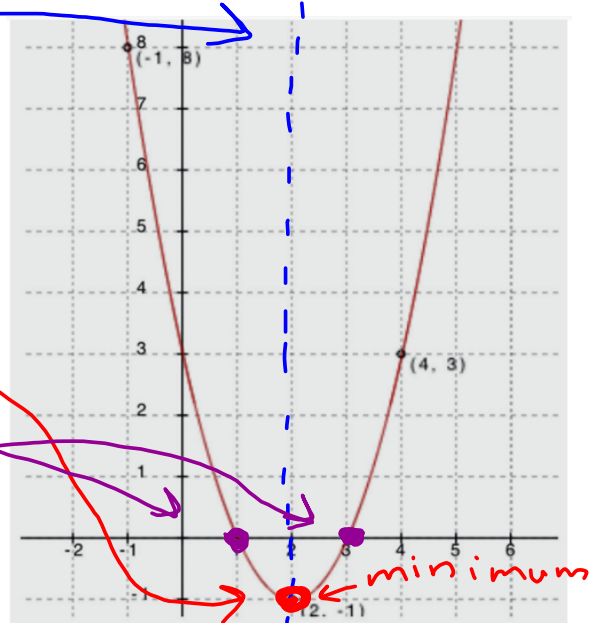
X-intercept(s): points where the graph of the quadratic function touches or intersects with the x-axis.



## Identify the Key Features of the Following Graph

Pg 47

"Graph A"

Axis of Symmetry:  $x = 2$ Vertex:  $(2, -1)$ Open up/Open Down? upSign of the Leading Coefficient: (+)X-intercepts: Positive $(1, 0)$  and  $(3, 0)$  $x = 1$  and  $x = 3$ 

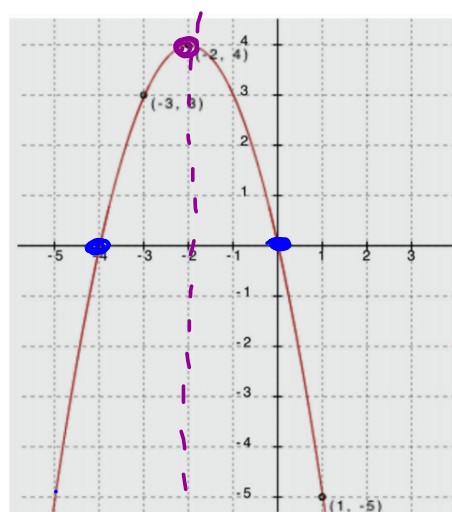
## Identify the Key Features of the Following Graph

"Graph B"

Axis of Symmetry:  $x = -2$ Vertex:  $(-2, 4)$ Open up/Open Down? DownSign of the Leading Coefficient:  $(-)$ X-intercepts:  $(-4, 0)$  and  $(0, 0)$   
Negative

Complete the following table:

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



## Average Rate of Change

Average rate of change is the measure of how much a function changes, on average, over a given interval.

Slope



Average Rate of Change is the Slope between two points!

$$\text{Rate of change} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{Change in } y}{\text{Change in } x}$$

*(x<sub>1</sub>, y<sub>1</sub>) 1<sup>st</sup> ordered pair*  
*(x<sub>2</sub>, y<sub>2</sub>) 2<sup>nd</sup> ordered pair*

### Example 1

Find the average rate of change from x=1 to x=3.

$$x_1 = 1 \quad y_1 = 4$$

$$x_2 = 3 \quad y_2 = 16$$

x	f(x)
0	1
1	4
2	9
3	16

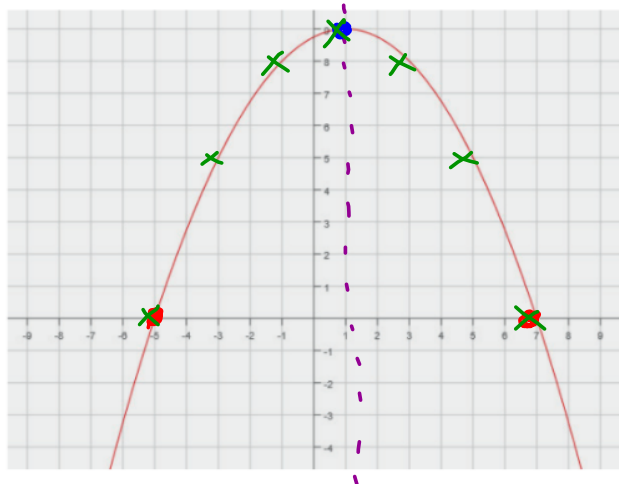
$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{16 - 4}{3 - 1} = \frac{12}{2} = 6$$

### Example 2

Find the average rate of change over the interval [-1, 5].

f(x)	8	3	0	-2	0	3	8
x	-1	0	1	2	3	4	5

## Identify the Key Features of the Following Graph

Axis of Symmetry:  $x=1$ Vertex:  $(1, 9)$ Open up/Open Down? Open downSign of the Leading Coefficient: NegativeX-intercepts:  $(-5, 0)$  AND  $(7, 0)$ Complete the following table and find the average rate of change on the interval  $[-3, 7]$ .

f(x)	0	5	8	9	8	5	0
x	-5	-3	-1	1	3	5	7

From  $x = -3$  to  $x = 7$ 

$$x_1 = -3 \quad y_1 = 5$$

$$x_2 = 7 \quad y_2 = 0$$

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - 5}{7 - (-3)} = \frac{-5}{7+3} = \boxed{\frac{-1}{2}}$$