

Unit 2 Lesson 3

Graphs of Quadratic Functions

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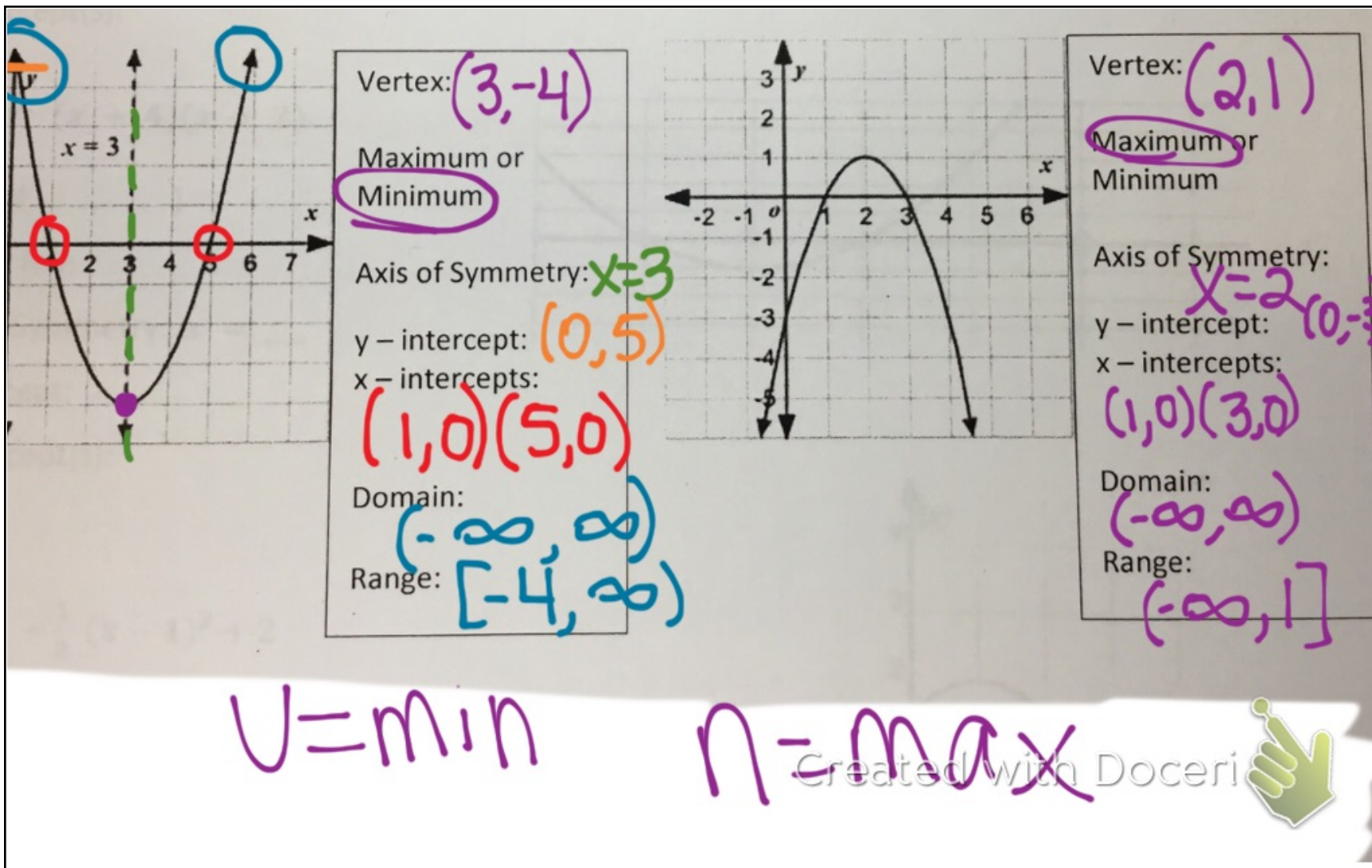


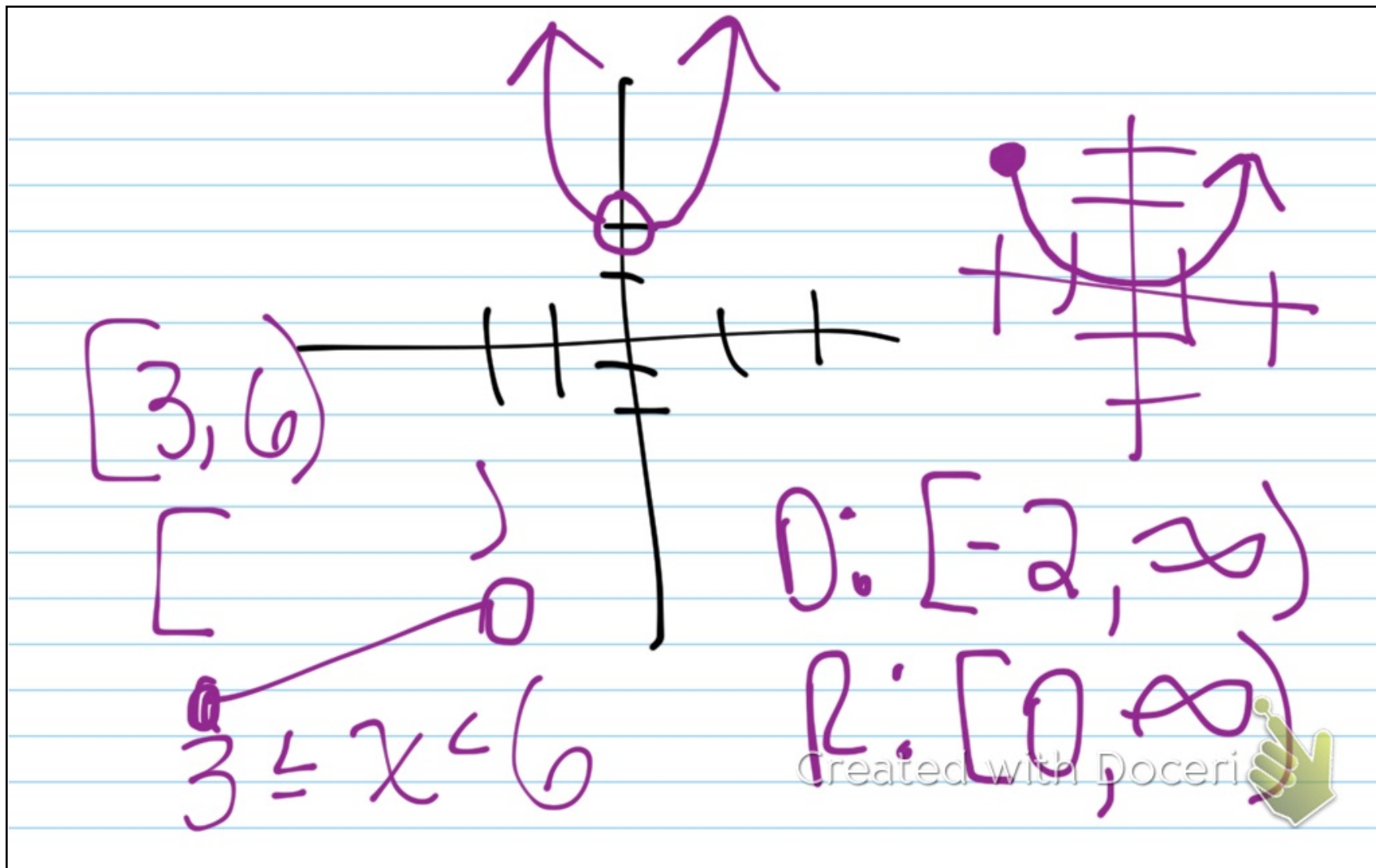
Parts of a Quadratic Graph: $y = x^2$

- A) The graph of a quadratic function is called a Parabola.
- B) All quadratic functions have either a Maximum or a Minimum located at the vertex.
- C) The Axis of Reflection is a line of reflection that runs vertically through the vertex and divides the parabola into two equal parts. It is always written as $x =$.
- D) The y-intercept is where the parabola crosses the y-axis.
- E) The x-intercept is where the parabola crosses the x-axis. These are also referred to as the zeros or roots of the quadratic function.
- F) If the function is equal to 0, then the x-intercepts are also called the Solutions.

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II. Ways to write quadratic functions:

A) **Standard Form:** $y = ax^2 + bx + c$

C) **x – intercept Form:** $y = a(x - \text{intercept } \#)(x - \text{intercept } \#)$

B) **Vertex Form:** $y = a(x - h)^2 + k$

- Vertex: (h, k)
- Translation left or right: h
- Translation up or down: k
- Dilation: If $a > 1$ the graph stretches
If $0 < a < 1$ the graph compresses
- Reflection: a is negative

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Different Forms of a Quadratic Equation:

1. $y = 5x^2$

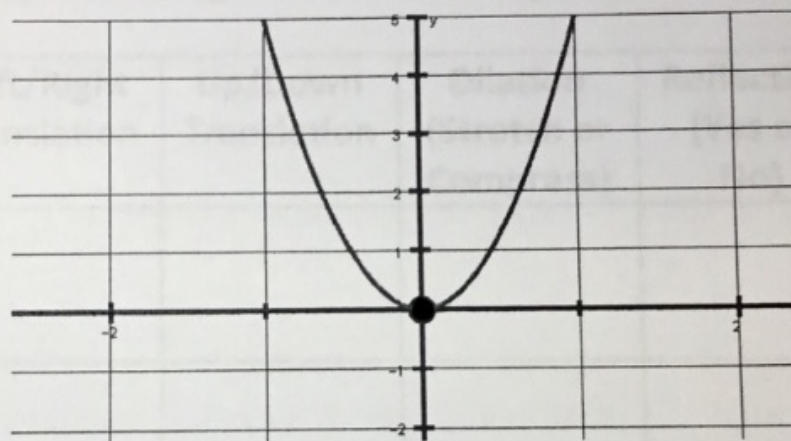
Vertex (0, 0)

Max or Min

Axis of Symmetry: $x = 0$

y-intercept: (0, 0)

x-intercept(s): (0, 0)



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2. $y = x^2 + 3x$

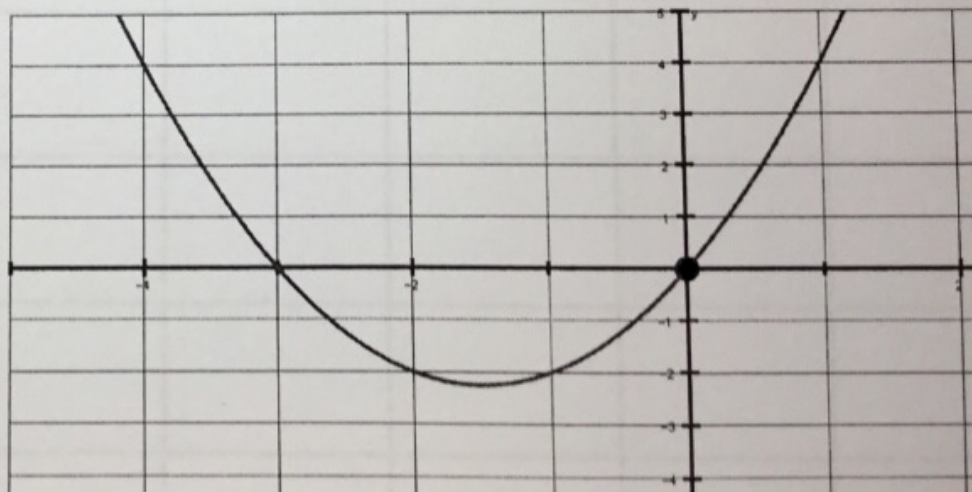
Vertex $(-1.5, -2.25)$

Max or Min

Axis of Symmetry: $x = -1.5$

y-intercept: $(0, 0)$

x-intercept(s): $(0, 0)(-3, 0)$



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3. $y = (x + 4)(x + 2)$

Vertex ($-3, -1$)

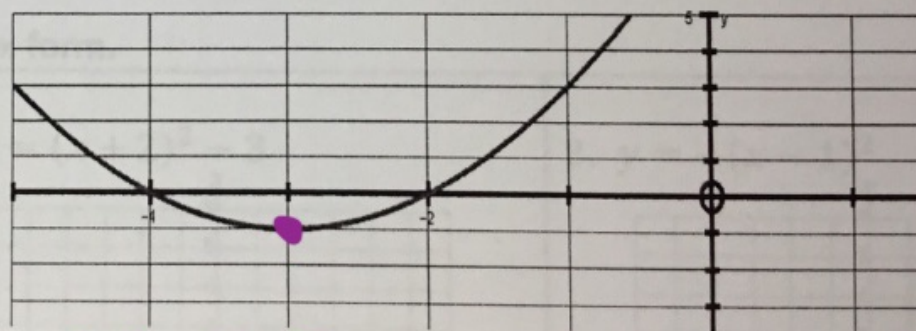
Max or Min

Axis of Symmetry: $x = -3$

y-intercept: $(0, 8)$ 2nd, calc, value, 0

x-intercept(s):

$(-4, 0)$ $(-2, 0)$



$y(x)$

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4. $y = -\frac{1}{2}(x - 1)^2 + 2$

Vertex (1, 2)

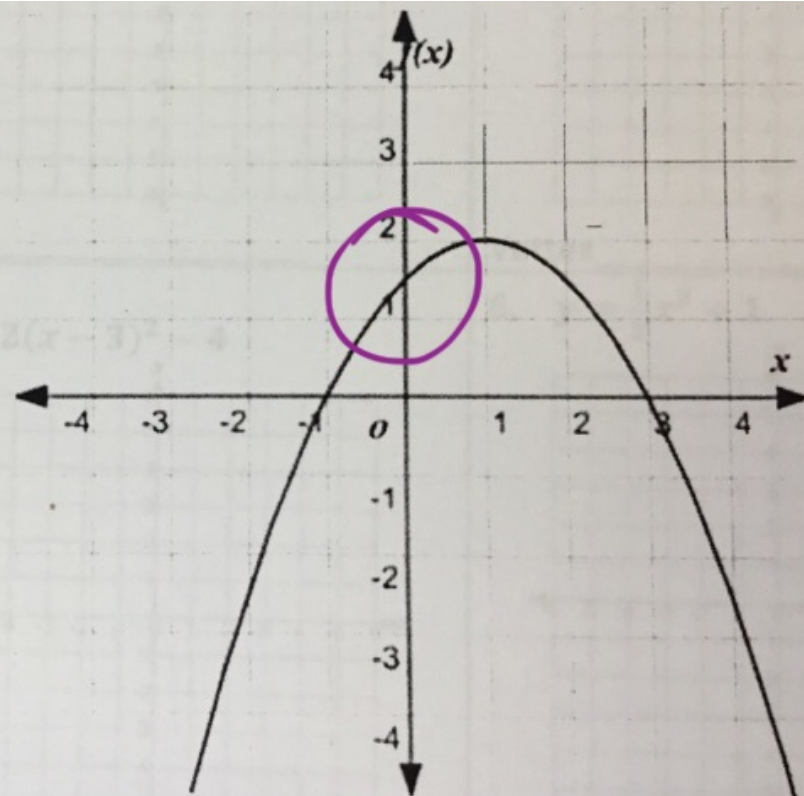
Max or Min

Axis of Symmetry: $x = 1$

y-intercept: 1.5

x-intercept(s):

$(-1, 0)$ $(3, 0)$

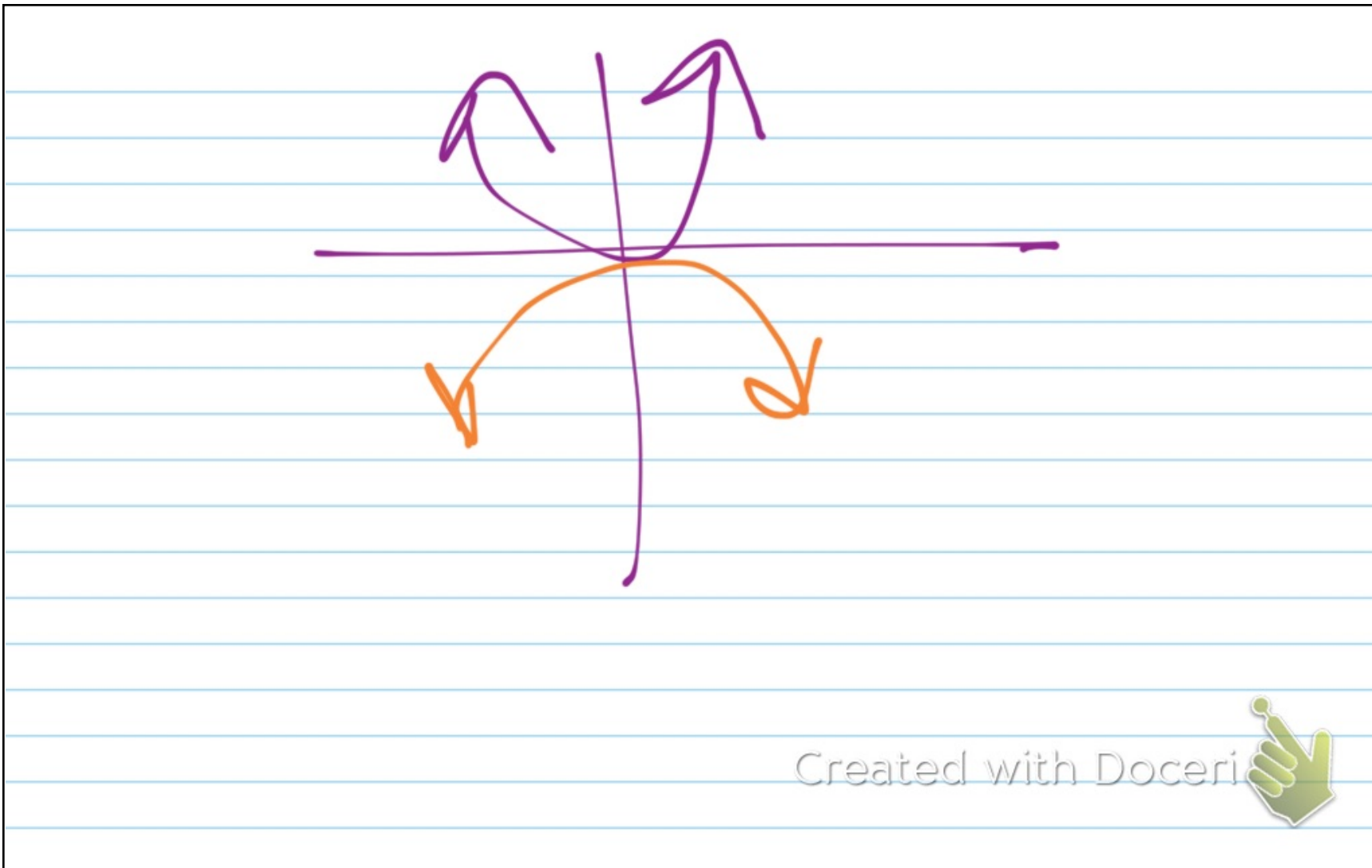


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❖ Example: Complete the following chart using the vertex form, $y = a(x - h)^2 + k$, of a quadratic function.

Function	Vertex	Left/Right Translation	Up/Down Translation	Dilation (Stretch or Compress)	Reflection (Yes or No)	Domain	Range
1. $y = x^2$ (Parent Function)	(0,0)	—	—	—	—	$(-\infty, \infty)$	$[0, \infty)$
2. $y = (x + 2)^2 + 3$	(-2,3)	L2	U3	—	No	\mathbb{R}	$[3, \infty)$
3. $y = x^2 - 3$	(0,-3)	—	D3	—	No		$[-3, \infty)$
4. $y = 2(x - 5)^2$	(5,0)	R5	—	S by $\frac{1}{2}$	No		$[0, \infty)$
5. $y = -3x^2 + 1$ $-3(x-3)^2$	(0,1)	/	U1	S by $\frac{1}{3}$	Yes		$(-\infty, 1]$
6. $y = \frac{1}{2}(x + 1)^2 - 4$	(-1,-4)	L1	D4	C by $\frac{1}{2}$	No		$[-4, \infty)$



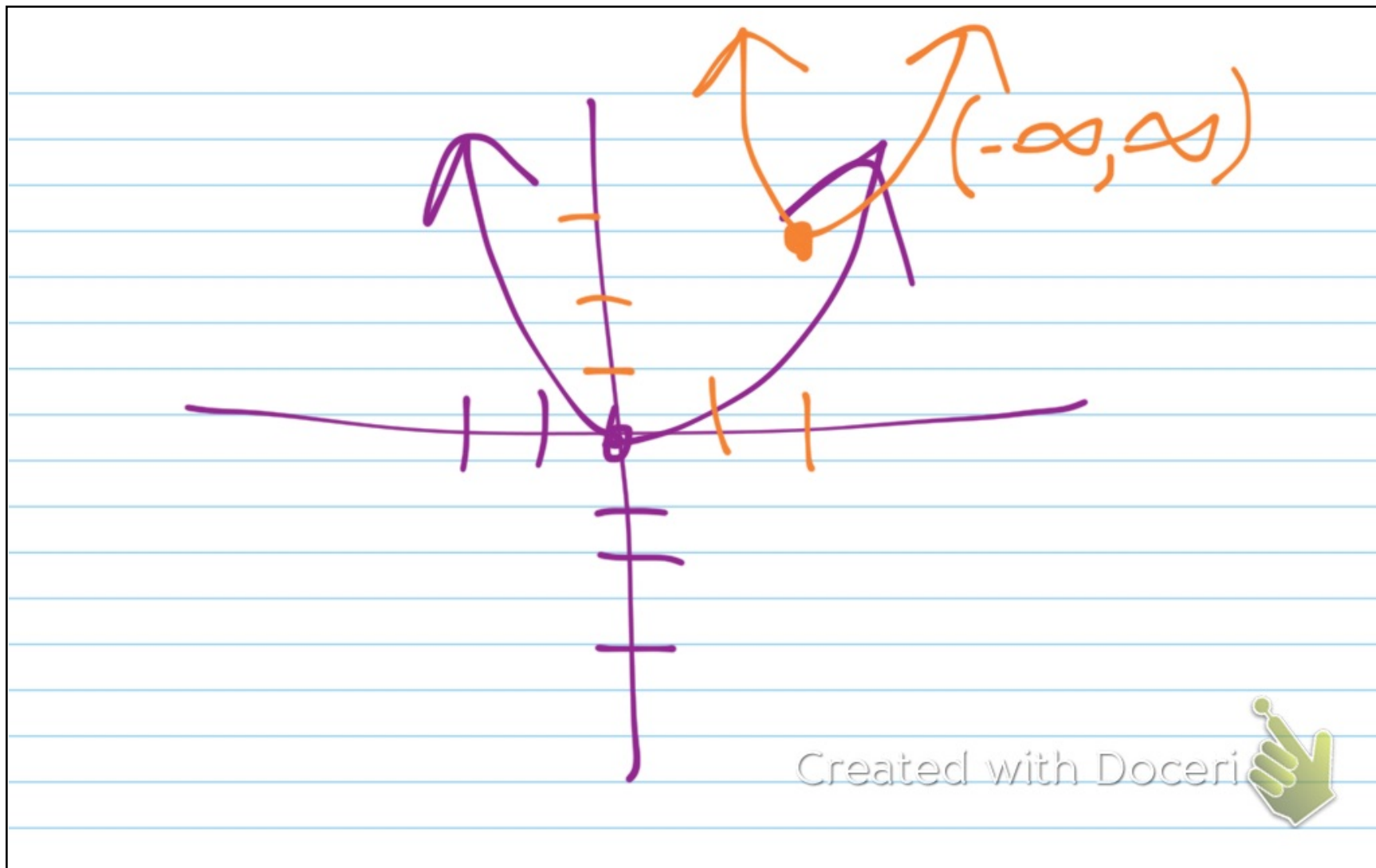
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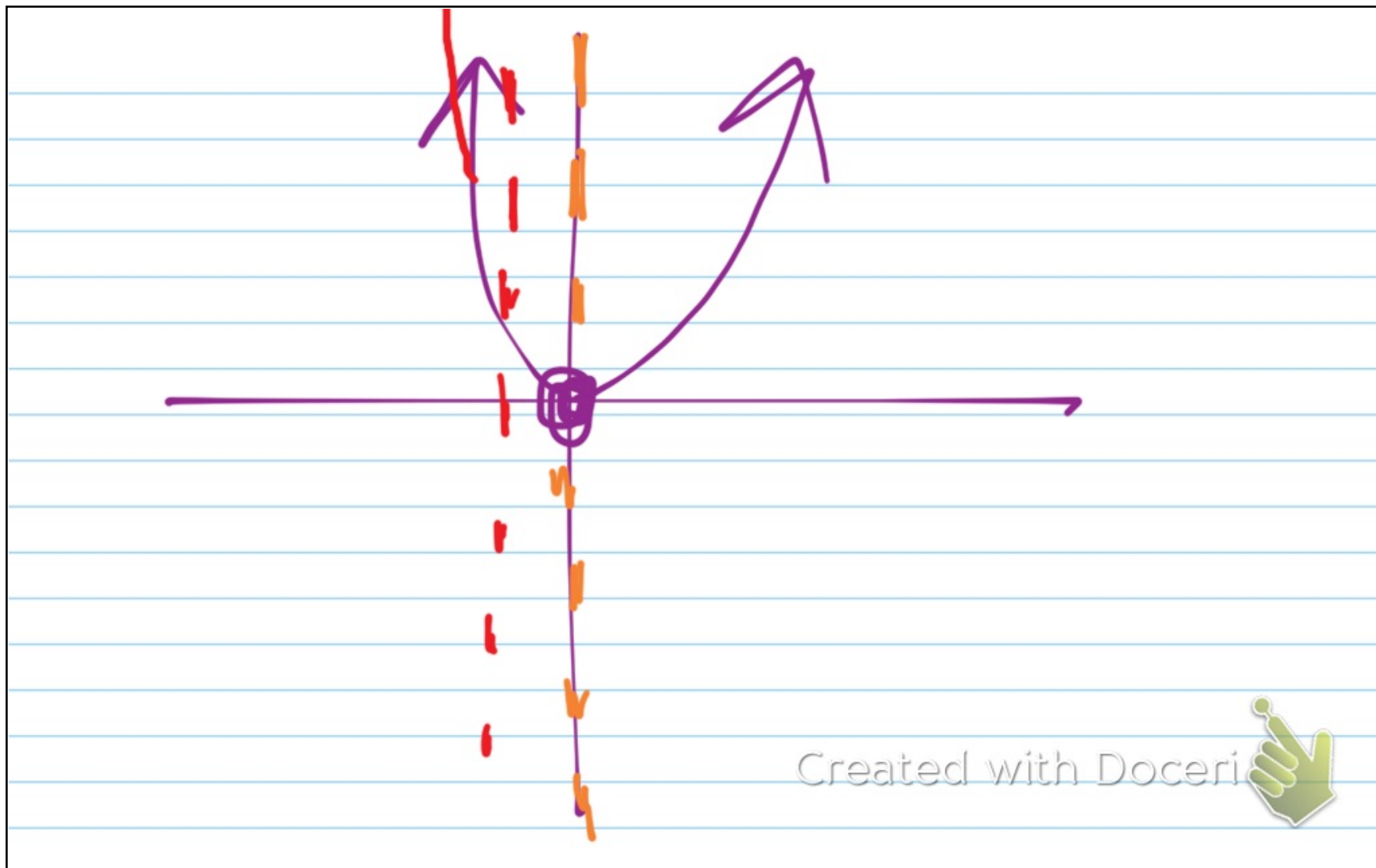


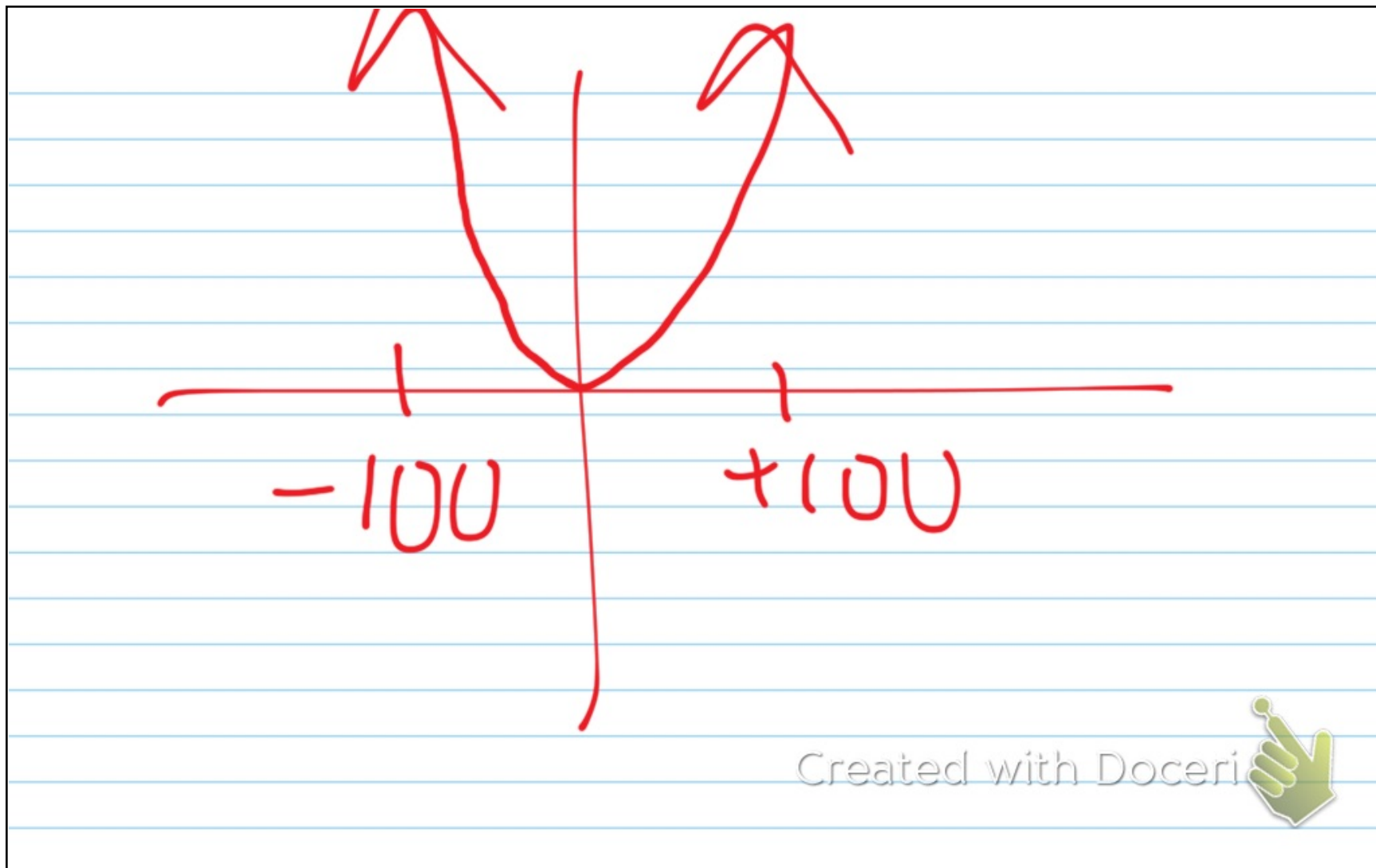
$$y = .3(x - .417)^2 + 15/7$$

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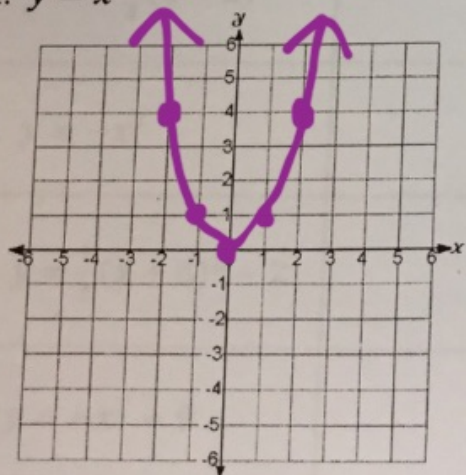


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III. Graphing quadratic functions using vertex form.

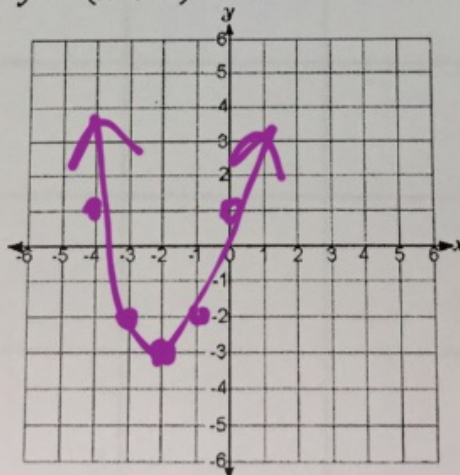
1. $y = x^2$



Vertex _____

$(0,0)$

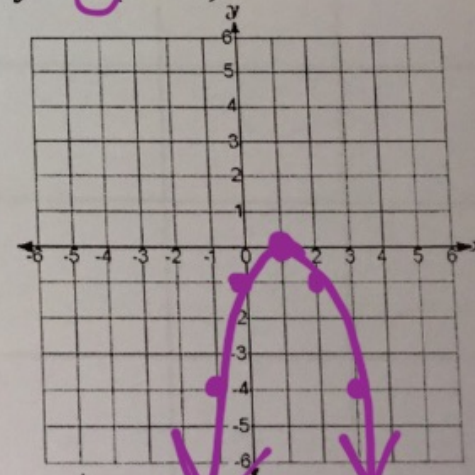
2. $y = (x + 2)^2 - 3$



Vertex _____

$(-2,-3)$

3. $y = -(x - 1)^2$

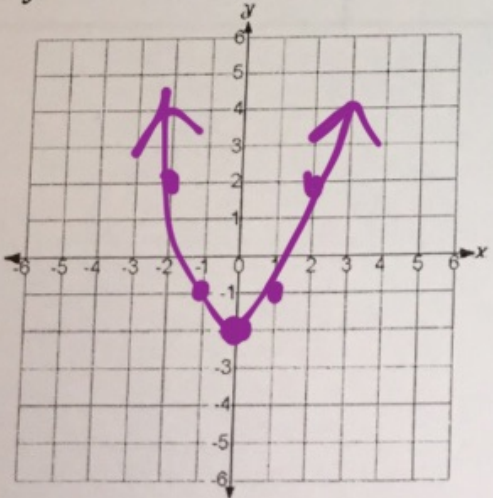
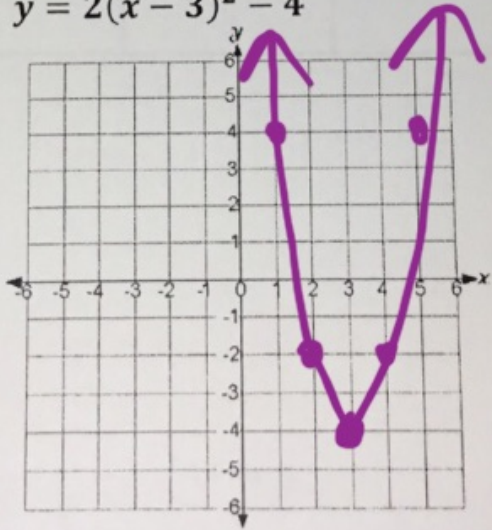
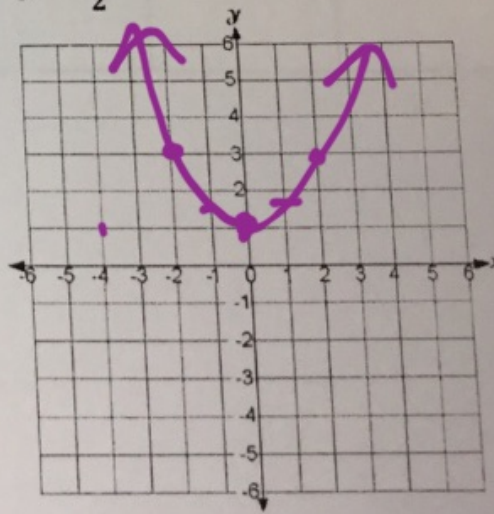



Vertex _____

$(1,0)$

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<p>Vertex _____</p> <p>4. $y = x^2 - 2$</p>  <p>Vertex _____</p>	<p>Vertex _____</p> <p>5. $y = 2(x - 3)^2 - 4$</p>  <p>Vertex _____</p>	<p>Vertex _____</p> <p>6. $y = \frac{1}{2}x^2 + 1$</p>  <p>Vertex _____</p>
<p>$(0, -2)$</p>	<p>$(3, -4)$</p>	<p>$(0, 1)$</p>

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Homework

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