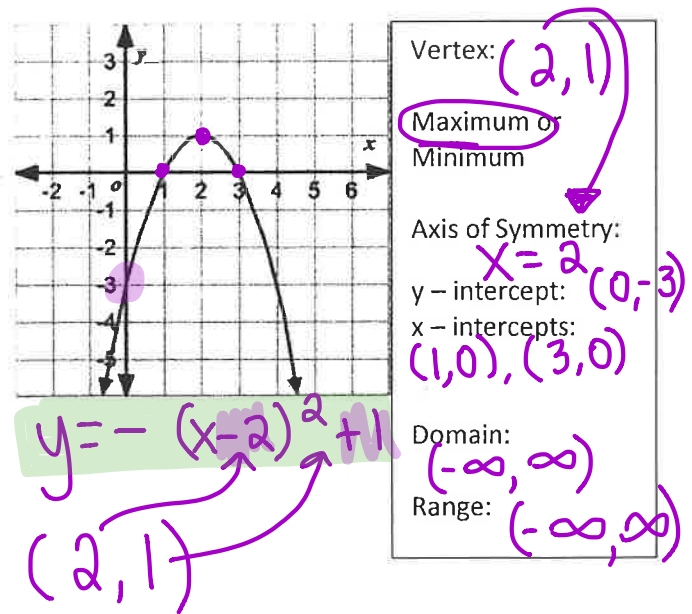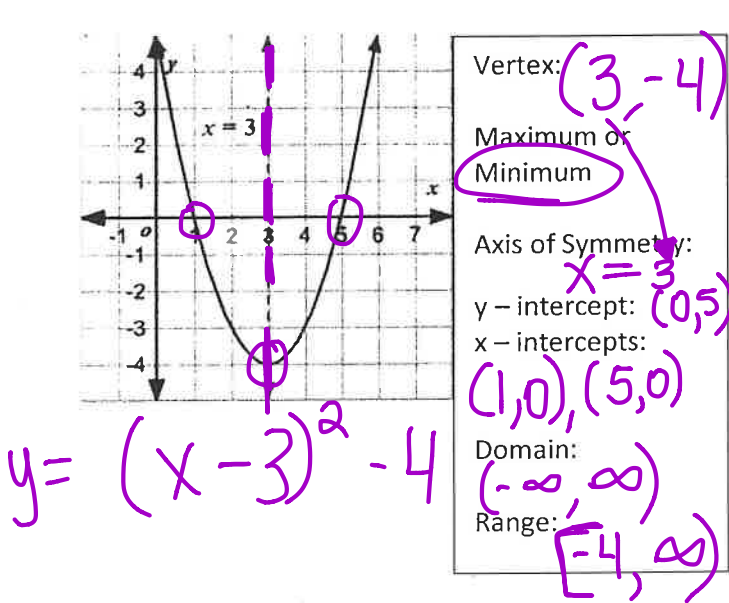Math 2
Unit 2 – Quadratic Functions
Lesson 3 – Graphs of Quadratic Functions

Name_____
Date_____ Pd_____

I. 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 **Symmetry** is a line of reflection that runs vertically through
    the vertex and divides the parabola into two equal parts. It is always written as $\boxed{x =}$.

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 **solutions/roots** or **zeros** of the quadratic function.

$y = (x-3)^2 - 4$

Vertex: $(3, -4)$
Maximum or ⟨Minimum⟩
Axis of Symmetry: $x = 3$
y – intercept: $(0,5)$
x – intercepts: $(1,0), (5,0)$
Domain: $(-\infty, \infty)$
Range: $[-4, \infty)$

$y = -(x-2)^2 + 1$ $(2,1)$

Vertex: $(2, 1)$
⟨Maximum⟩ or Minimum
Axis of Symmetry: $x = 2$
y – intercept: $(0, -3)$
x – intercepts: $(1,0), (3,0)$
Domain: $(-\infty, \infty)$
Range: $(-\infty, \infty)$

II. Ways to write quadratic functions:

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

B) | Vertex Form: | $y = a(x - h)^2 + k$
   - Vertex: (h, k)
   - Translation left or right: h
   - Translation up or down: k
   - Dilation: If $\begin{array}{l} a > 1 \text{ the graph stretches} \\ 0 < a < 1 \text{ the graph compresses} \end{array}$
   - Reflection: a is negative

pg. 14

❖ 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		V3	—	—	$(-\infty,\infty)$	$[3,\infty)$
3. $y = x^2 - 3$	(0,-3)	—	D3	—	—		$[-3,\infty)$
4. $y = 2(x-5)^2$	(5,0) R5		—	S by 2	—		$[0,\infty)$
5. $y = -3x^2 + 1$	(0,1)	—	U1	S by 3 / S by -3	Yes		$(-\infty, 1]$
6. $y = \frac{1}{2}(x+1)^2 - 4$	(-1,-4) L1		D4	C by ½			$[-4,\infty)$

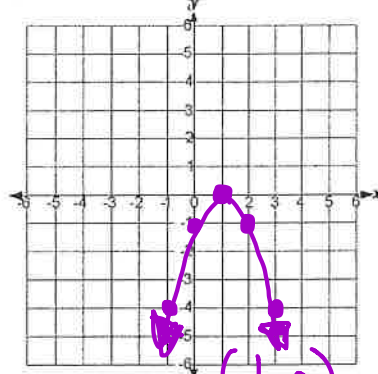III. Graphing quadratic functions using vertex form.

1. $y = x^2$ over 1 up 1 > +2 / over 1 up 3 / over 1 up 5
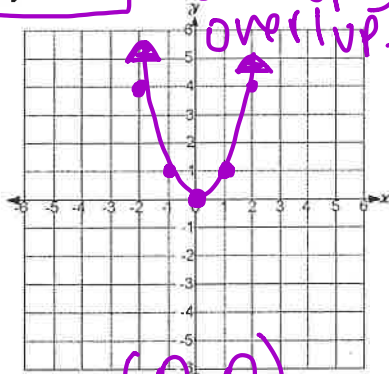
Vertex __(0,0)__

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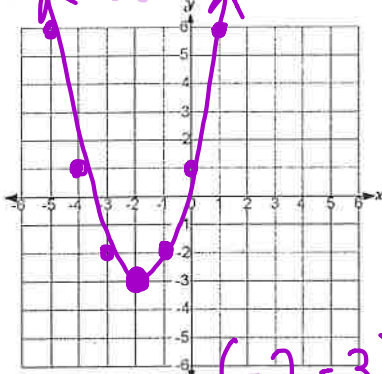
Vertex __(-2,-3)__

3. $y = -(x-1)^2$ V: (1,0)

Vertex __(1,0)__

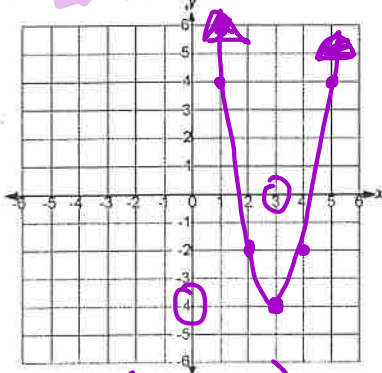4. $y = x^2 - 2$
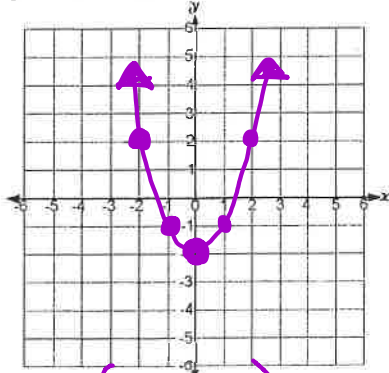
Vertex __(0,-2)__

5. $y = 2(x-3)^2 - 4$ (3,-4)

Vertex __(3,-4)__

6. $y = \frac{1}{2}x^2 + 1$

Vertex __(0,1)__

pg.15