Name: _____ Date: _____

Graphing Quadratic Equations in Vertex Form

UNIT QUESTION: How are real life scenarios represented by quadratic functions?

Today's Question: How do we graph quadratics in standard form? MCC9-12.F.IF.8

Steps for Graphing in Vertex form

1. Identify vertex: $a(x - h)2 + k$ → Vertex = (h, k)
2. Plot Vertex
3. Construct a table of values for x and y. Two points above and below vertex.
4. Plot the points and connect them with a U-shaped curve & arrows.

Examples:

Graph each using a T-chart. Use a dotted line to graph the axis of symmetry.

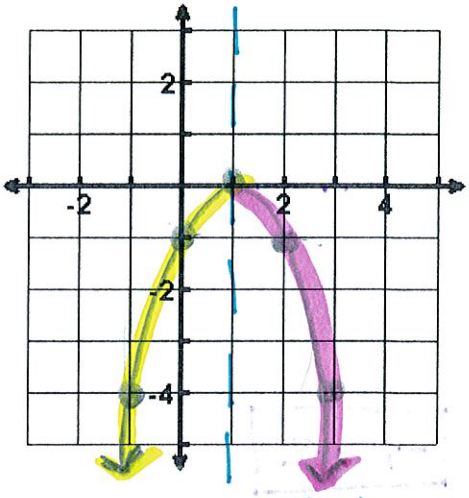
1. $f(x) = -(x - 1)^2$

x	y
-1	-4
0	-1
1	0
2	-1
3	-4

Vertex

$-(-1-1)^2 = -(-2)^2$

$-(0-1)^2 = -(-1)^2$



- Extrema: Max y=0
- Domain: $(-\infty, \infty)$
- X-intercepts: (1, 0)
- Increasing: $(-\infty, 1)$
- Axis of Symmetry: X=1
- Range: $(-\infty, 0)$
- Y-intercept: (0, -1)
- Decreasing: $(1, \infty)$

Rate of Change $0 \le x \le 2$: 0

- x values
- y values

(0, -1)
(2, -1)

$\frac{-1 - -1}{2-0} = \frac{-1+1}{2} = \frac{0}{2}$

Rate of Change $1 \le x \le 3$ -2

(1, 0)
(3, -4)

$\frac{-4-0}{3-1} = \frac{-4}{2}$

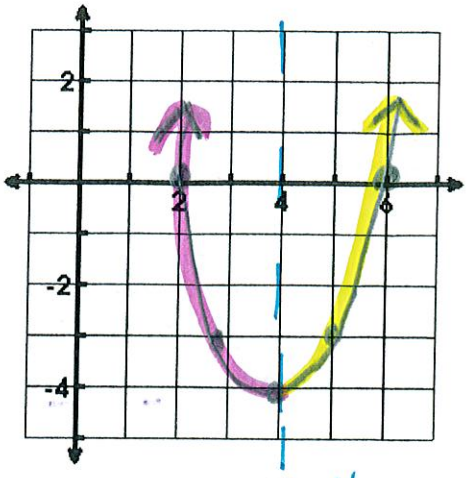
2. $f(x) = (x - 4)^2 - 4$

x	y
2	0
3	-3
4	-4
5	-3
6	0

Vertex

$(2-4)^2 - 4 = (-2)^2 - 4$

$(3-4)^2 - 4 = (-1)^2 - 4$



Extrema: Min $y = -4$

Axis of Symmetry: $x = 4$

Domain: $(-\infty, \infty)$

Range: $(-4, \infty)$

Zeroes: $(2,0)(6,0)$

Y-intercept: $(0,12)$ $(0-4)^2 - 4$

Increasing: $(4, \infty)$

Decreasing: $(-\infty, 4)$

GROC ★ Rate of Change $0 \le x \le 2$: -6

$(0,12)$ $(2,0)$ $\frac{0-12}{2-0} = \frac{-12}{2}$

Rate of Change $4 \le x \le 5$ 1

$(4,-4)$ $(5,-3)$ $\frac{-3--4}{5-4} = \frac{-3+4}{1} = \frac{1}{1}$

3. $f(x) = 2(x + 1)^2 - 2$

x	y
-3	6
-2	0
-1	-2
0	0
1	6

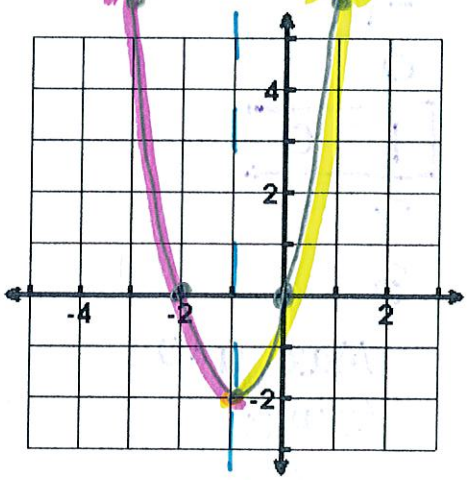
Vertex

$2(-3+1)^2 - 2$

$2(-2)^2 - 2 = 2(4) - 2$

$2(-2+1)^2 - 2$

$2(-1)^2 - 2 = 2 - 2$



Extrema: Min $y = -2$

Axis of Symmetry: $x = -1$

Domain: $(-\infty, \infty)$

Range: $(-2, \infty)$

Roots: $(-2,0)$ $(0,0)$

Y-intercept: $(0,0)$

Increasing: $(-1, \infty)$

Decreasing: $(-\infty, -1)$

Rate of Change $0 \le x \le 2$: 8

$(0,0)$ $(2,16)$ $\frac{16-0}{2-0} = \frac{16}{2}$

Rate of Change $-3 \le x \le 1$ 0

$(-3,6)$ $(1,6)$ $\frac{6-6}{1--3} = \frac{0}{1+3} = \frac{0}{4}$