Today's Learning Goal(s):

By the end of the class, I will be able to:

a) sketch a parabola ***without*** a table of values (using the "step" pattern).
b) recognize special cases for the vertex.

Note: Quiz 4.1 is today,
but begin class by completing the graphic organizer (from last class.)

MBF 3CI

The roles of a, h & k in $y = a(x-h)^2 + k$, a≠0

Date: Apr. 12/17

Based on class discussion, complete the following graphic organizer to summarize the roles of a, h and k.

Role of a:

Direction of Opening (Reflection):

- When a is positive, the parabola opens upwards
- When a is negative, the parabola opens downwards

Shape (Vertical Stretch or Compression):

- If $a > 1$ or $a < -1$, then the graph of $y = a(x-h)^2 + k$ is vertically stretched, which means it has a thinner opening than $y = 1(x-h)^2 + k$.
- If a is between -1 and 1, then the graph of $y = a(x-h)^2 + k$ is vertically compressed, which means it has a wider opening than $y = 1(x-h)^2 + k$.

Role of h:

Properties (Horizontal Translation):

- If $h > 0$, then the graph of $y = a(x-h)^2 + k$ is translated **horizontally** h units to the right.
- If $h < 0$, then the graph of $y = a(x-h)^2 + k$ is translated **horizontally** h units to the left.

Relation to the Vertex:

- The value of h is the x - coordinate of the vertex.

∴ for $y = a(x-h)^2 + k$, the vertex is: (h, k).

$$y = a(x-h)^2 + k$$

Role of k:

Properties (Vertical Translation):

- If $k > 0$, then the graph of $y = a(x-h)^2 + k$ is translated **vertically** k units up.
- If $k < 0$, then the graph of $y = a(x-h)^2 + k$ is translated **vertically** k units down.

Relation to the Vertex:

- The value of k is the y - coordinate of the vertex.

Example: $y = -2(x-3)^2 + 5$

State:

- Coordinates of the vertex: (3, 5)

  Direction of opening: downward
- Transformations (NOTE: there are 4):

reflected in the x-axis

vertical stretched by a factor of 2

horizontal translation 3 units right

vertical translation 5 units up

r

s (c)

t

MBF 3CI **4.4 The Quadrac Relaon: Vertex Form** (Day 2) Date: Apr. 12/17

$y = a(x-h)^2 + k$ vertex: $v(h, k)$

$y=(x-0)^2-5$

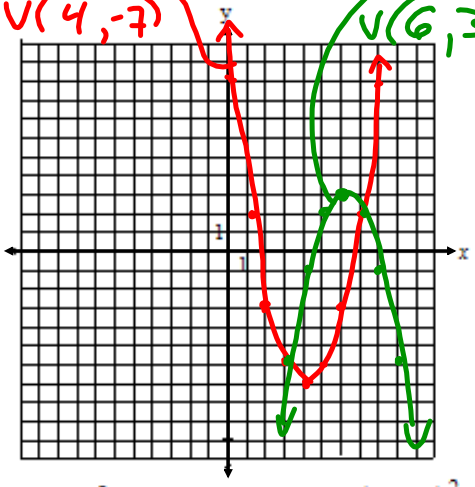
Graph two parabolas per grid:

$y=(x-4)^2-7$ and $y=-(x-6)^2+3$

$v(4,-7)$ $v(6,3)$

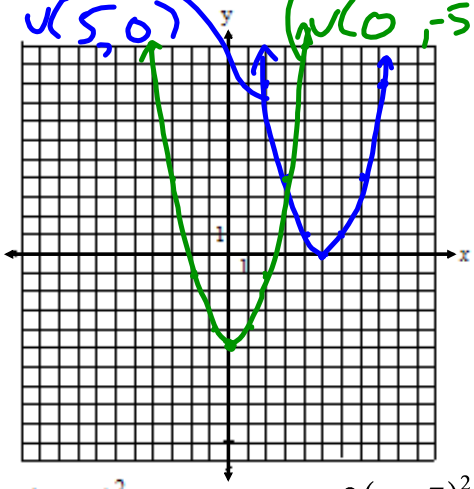
MG

x	y
1	1
2	4
3	9
4	16
~~5~~	~~25~~
~~6~~	~~36~~



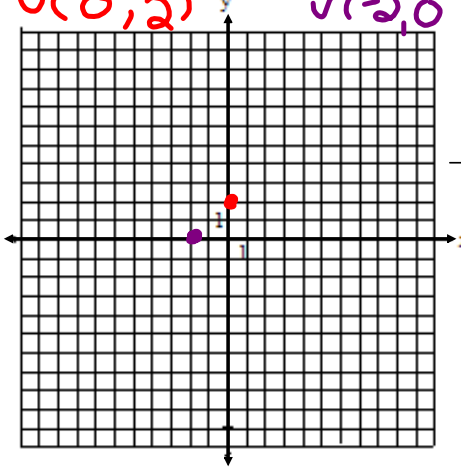
$y=(x-5)^2$ and $y=x^2-5$

$v(5,0)$ $v(0,-5)$



$y=x^2+2$ and $y=(x+2)^2$

$v(0,2)$ $v(-2,0)$



MG

x	y
1	1
2	4
3	9
~~4~~	~~16~~
~~5~~	~~25~~
~~6~~	~~36~~

$y \to 2x$

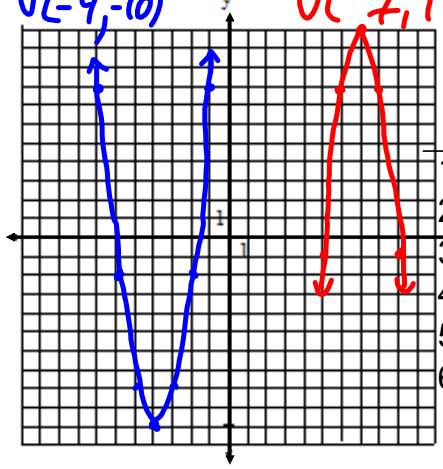
$1 \to 2$

$4 \to 8$

$9 \to 18$

$y=2(x+4)^2-10$ and $y=-3(x-7)^2+11$

$v(-4,-10)$ $v(7,11)$



MG

x	y
1	3
2	12
3	27
4	16
5	25
6	36

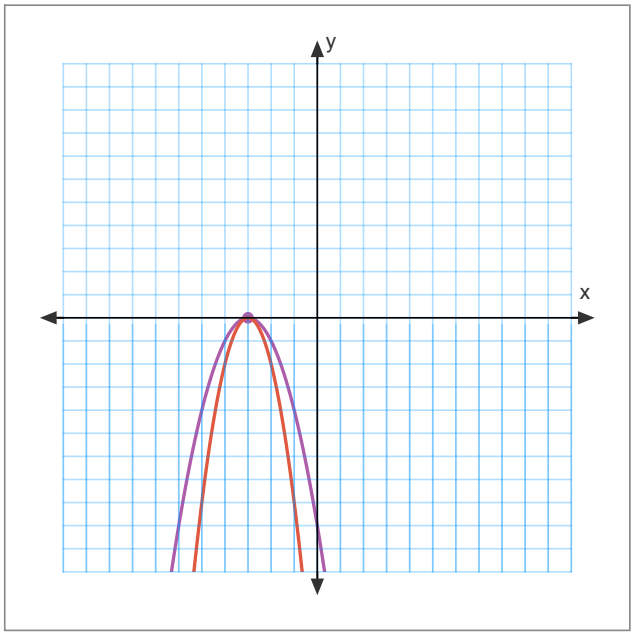
$y = -(x+3)^2$

-3 0

v(,)

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

v(-3,0)



$y = 3x^2 - 4$

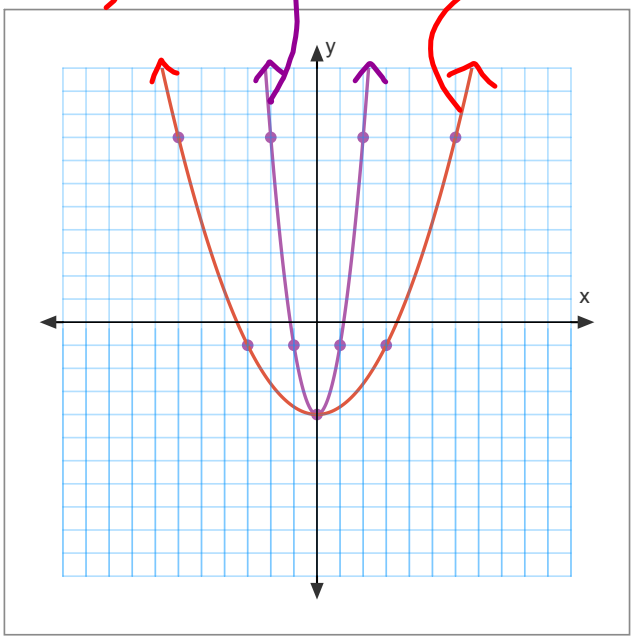
v(0, -4)

$y = \frac{1}{3}x^2 - 4$

v(0, -4)

MG

x	y
1	1 → 3
2	4 → 12
3	9 → 27
4	16
5	25
6	36



MG

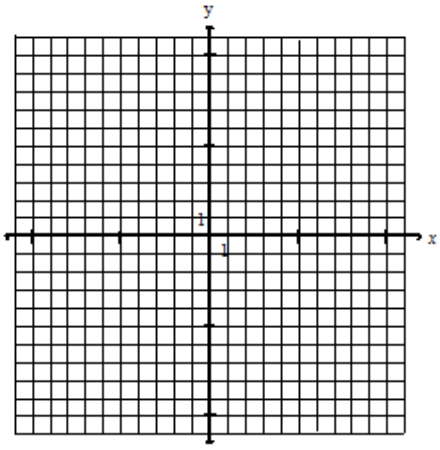
up $\frac{1}{3}$

x	y
1	1 → $\frac{1}{3}$
2	4 → $\frac{4}{3}$
3	9 → 3
4	16
5	25
6	36 → 12

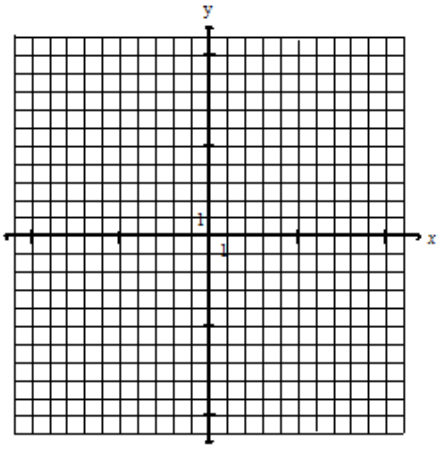
Homework: 6 Graphs (a-f)

Graph:

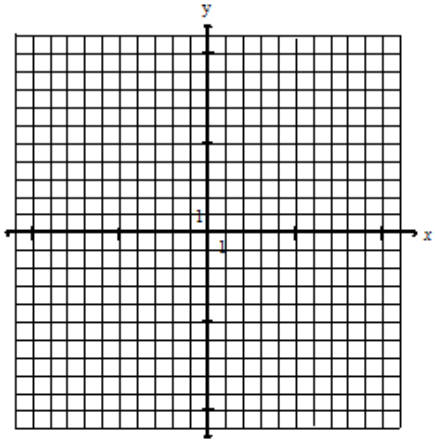
a) $y = 2(x+2)^2 - 6$



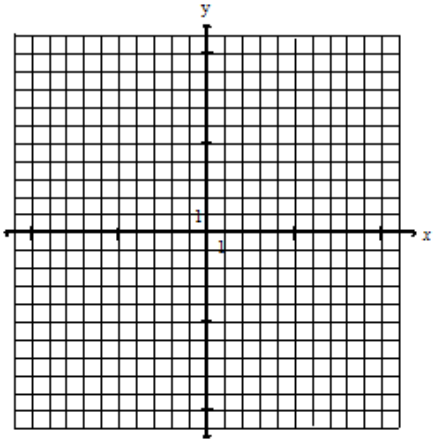
b) $y = -4x^2$



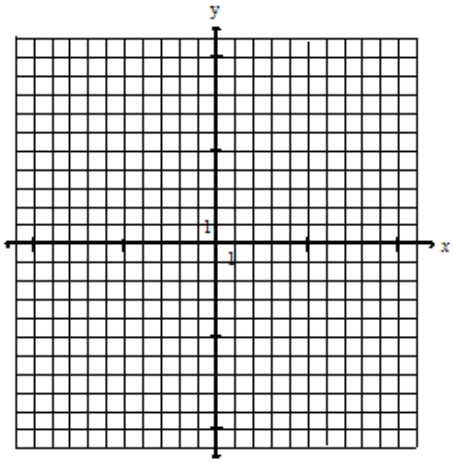
c) $y = -0.5(x-1)^2 - 2$



d) $y = x^2 + 5$



e) $y = -3x^2 + 4$



f) $y = -4 + 2(x-1)^2$