Before we begin, are there any questions from last day's work?

Today's Learning Goal(s):

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

a) graph a quadratic relation written in vertex form: $y = a(x-h)^2 + k$
b) determine the equation of a quadratic relation in vertex form
c) understand "step patterns" when graphing quadratics.

Today's plan:

Correct yesterday's graphs from worksheets **(10 minutes)**
Use slides at the end of file

Lesson 4.4 Day2 Finding an Equation **(20 minutes)**

pp. 185-187 #3 to 6, 7ab, 9, 11, 12, 14

***Enrichment*:** pp. 186-188 #8, 10, 13, 15, 20

MPM 2DI 4.4 Graph $y = a(x-h)^2 + k$ (if $a \neq \pm 1$) (Day2) Date: Nov. 1/16

The vertex form of a quadratic relation is $y = a(x-h)^2 + k$. The vertex is (h , k).
As we have learned, the "a" value determines the direction of opening,
and represents the stretch or compression factor.
The "a" value also determines the **step pattern**, which is very helpful in graphing.

Ex. 1

On the same grid, graph $y = x^2$, $y = 2x^2$, and $y = \frac{1}{2}x^2$.

$y = x^2$

V(0,0)

over	up
1	1
2	4
3	9
4	16
5	25
6	36

$y = 2x^2$

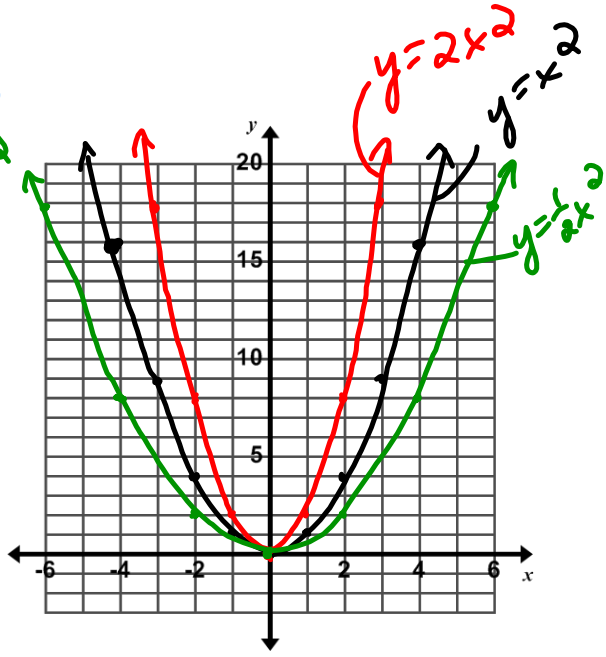
V(0,0)

over	up	MG
1	2	2
2	8	8
3	18	18
4	32	
5	50	
6	72	

$y = \frac{1}{2}x^2$

V(0,0)

over	up	MG
1	$\frac{1}{2}$	$\frac{1}{2}$
2	2	2
3	$\frac{9}{2}$	8
4	8	
5	$\frac{25}{2}$	
6	18	18

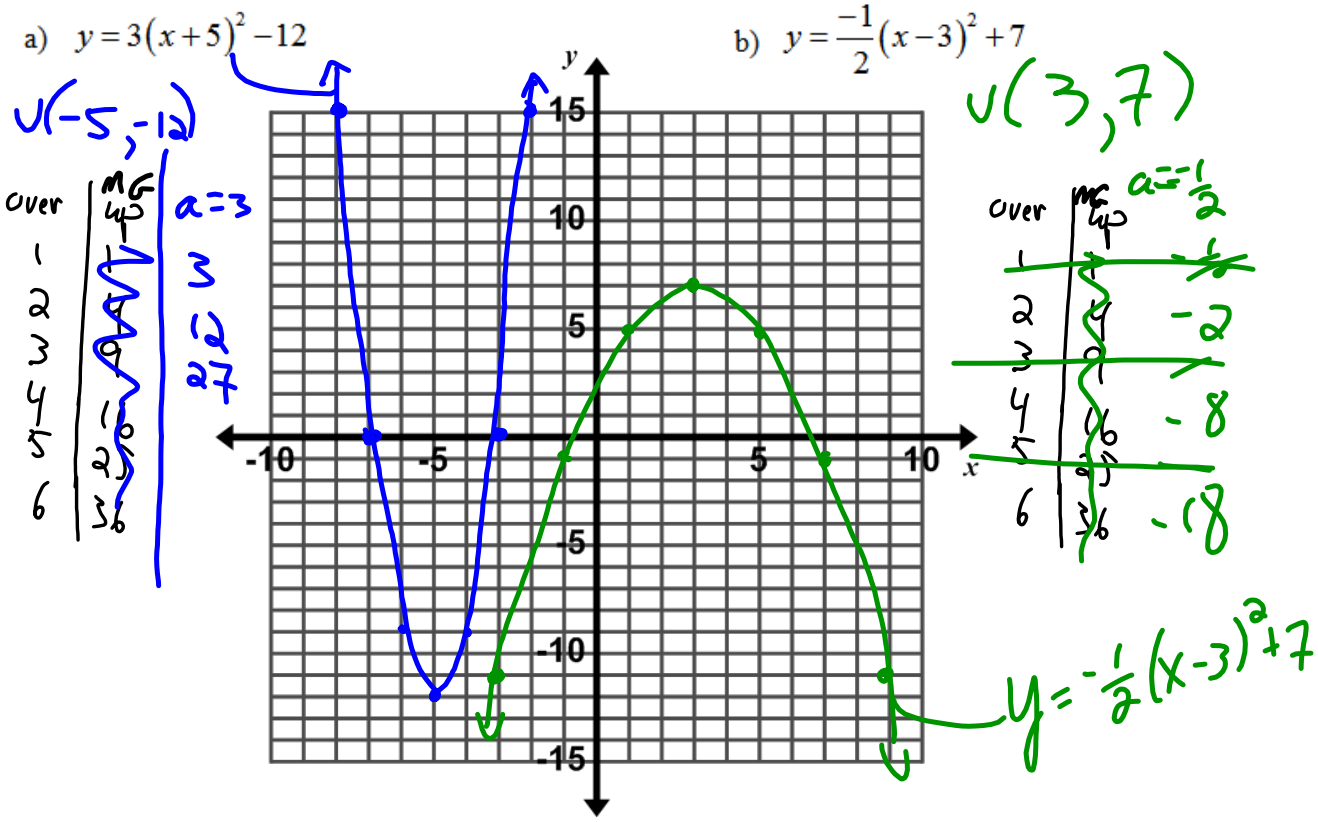


Ex. 2

State the coordinates of the vertex, then graph.

a) $y = 3(x+5)^2 - 12$

b) $y = \frac{-1}{2}(x-3)^2 + 7$



V(-5, -12)

over | MG | up
1 | 3 | 3
2 | 9 | 27
3 | 27 | 243
4 | 81 | 2187
5 | 243 | 19683
6 | 729 | 177147

a = 3

V(3, 7)

a = -1/2

over | MG | up
1 | -1/2 | -1/2
2 | 1 | -2
3 | -2 | 4
4 | 4 | -8
5 | -8 | 16
6 | 16 | -32

$y = -\frac{1}{2}(x-3)^2 + 7$

Finding an Equation of a Parabola

Ex. 3 $y = a(x-h)^2 + k$

Find an equation for the parabola with vertex at (4, 3) that passes through the point (3, 0).

① **Begin with finding the vertex.**
② **Write the "starter" equation. (We don't know "a" yet.)**
③ **Find another point on the graph other than the vertex.**
④ **Substitute the new point's coordinates in the equation.**
⑤ **Write the conclusion...this is the final equation.** ← Solve for "a"

(x, y)

② $y = a(x-4)^2 + 3$

③④ $(0) = a((3)-4)^2 + 3$

$0 = a(-1)^2 + 3$

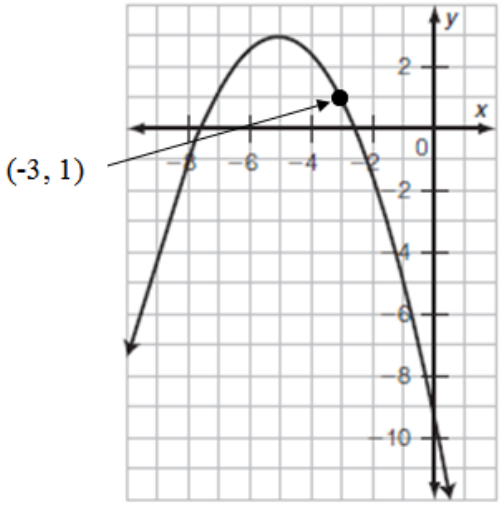
$0 = a(1) + 3$

$-3 = 1a$

⑤ $\therefore y = -3(x-4)^2 + 3$ is the equation

Ex. 4

Find an equation for the parabola shown with vertex at (-5, 3).



$y = a(x+5)^2 + 3$

$(1) = a((-3)+5)^2 + 3$

$1 = a(2)^2 + 3$

$1 = a(4) + 3$

$1 = 4a + 3$

$1 - 3 = 4a$

$-2 = 4a$

$\frac{-2}{4} = a$

$\frac{-1}{2} = a$

$\therefore y = \frac{-1}{2}(x+5)^2 + 3$ is the equation.

Ex. 5

Find an equation for the parabola with vertex at (-2, -3) that passes through the point (2, 3).

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

$(3) = a(2+2)^2 - 3$

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

$3 = a(16) - 3$

$3 + 3 = 16a$

$6 = 16a$

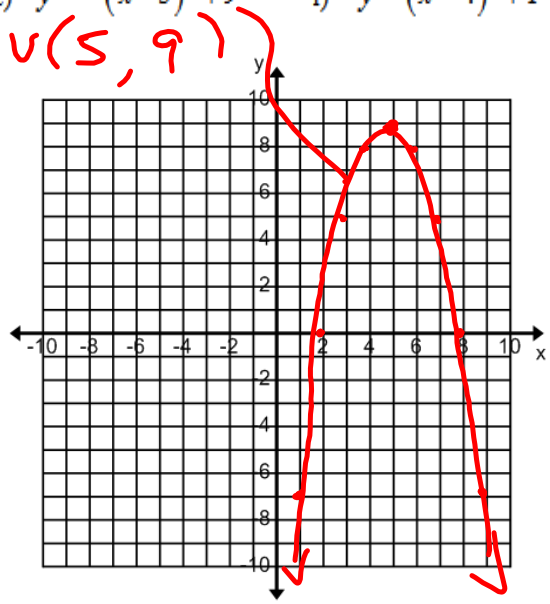
$\frac{6}{16} = a$

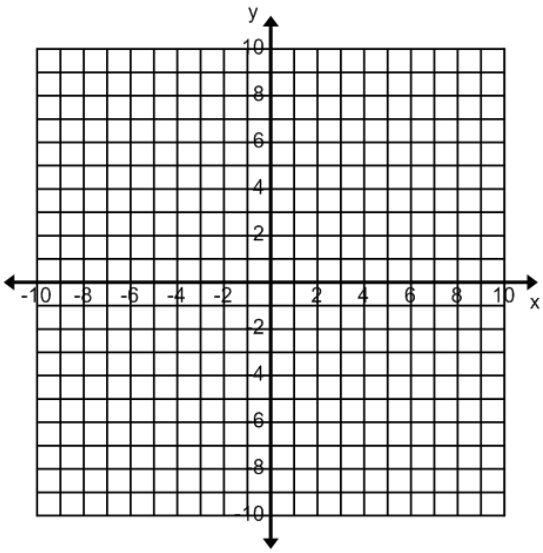
$\frac{3}{8} = a$

$\therefore y = \frac{3}{8}(x+2)^2 - 3$

Practice

e) $y=-(x-5)^2+9$ i) $y=(x-4)^2+1$ ii) $y=(x+6)^2-3$ iii) $y=-(x+2)^2+7$





Today's entertainment: Copy out bottom of p. 181

READ p.184 "Key Concepts"

p. 185 #1*, 2 *use the chart I gave you

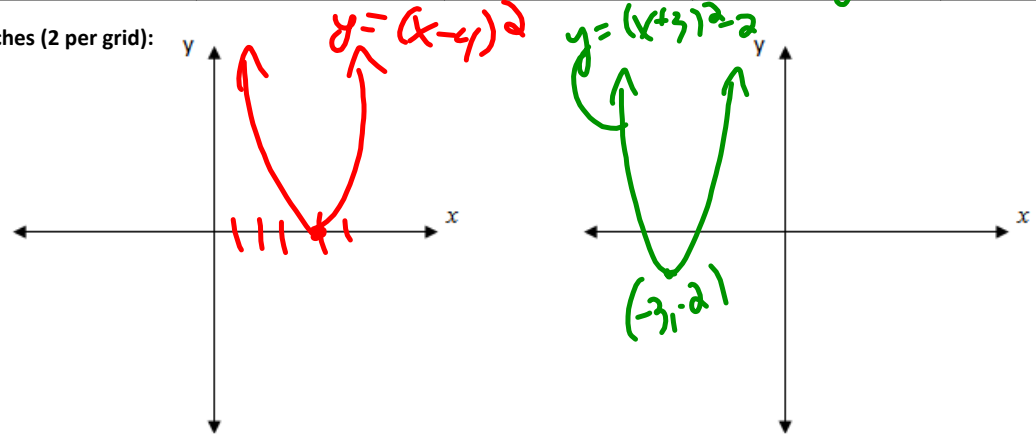
Practice i-iii above

***Enrichment*:** pp.185-186 #6, 7

For yesterday's homework: $y = a(x-h)^2 + k$

Relation: →	a) $y = (x-4)^2$	b) $y=(x-2)^2-4$	c) $y=(x+3)^2-2$	d) $y=\frac{1}{2}(x+1)^2+5$
Property: ↓				
Vertex	(4, 0)		$V(-3,-2)$	
(Equation of the) Axis of Symmetry	$x = 4$		$x=-3$	
Stretch or compression factor relative to $y=x^2$	Neither a stretch nor a compression since the factor is a=1		$a=1$ (no stretch)	
Direction of opening	Up		up	
Values x may take (called Domain)	*Anything* $\{x \in R\}$		$\{x \in R\}$	
Values y may take (called Range)	$y \geq 0$ $\{y \in R / y \geq 0\}$		$\{y \in R / y \geq -2\}$	

Sketches (2 per grid):



Relation: →	e) $y=(x-7)^2-3$	f) $y=-(x-1)^2+7$	g) $y=2(x-4)^2-5$	h) $y=-3(x+4)^2-2$
Property: ↓				
Vertex		$V(1,7)$		$V(-4,-2)$
(Equation of the) Axis of Symmetry		$x=1$		$x=-4$
Stretch or compression factor relative to $y=x^2$		none $a=-1$		Stretch by a factor of 3
Direction of opening		down		down
Values x may take (called Domain)		$\{x\in\mathbb{R}\}$		$\{x\in\mathbb{R}\}$
Values y may take (called Range)		$\{y\in\mathbb{R} \mid y\leq 7\}$		$\{y\in\mathbb{R} \mid y\leq -2\}$

Sketches (2 per grid):