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

p. 538 #1 - 4*

p. 540 #1ac, 2*, 3bd, 4*cd, 5*ac

Bring/buy Graph Paper for tomorrow's class.

2. Graph each equation, using a table of values where $x \in \{-2, -1, 0, 1, 2\}$.

a) $y = 3x - 1$ **c)** $2x + 3y = 6$

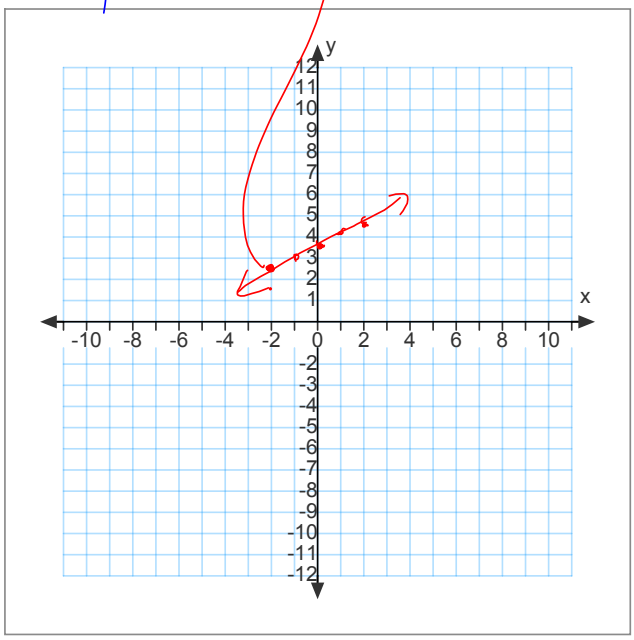
b) $y = \frac{1}{2}x + 4$ **d)** $y = 4$

x	$y = \frac{1}{2}x + 4$
-2	3
-1	3.5
0	4
1	4.5
2	5

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

$= -\frac{1}{2} + 4$

$= 3\frac{1}{2}$



3. Determine the x- and y-intercepts of each equation.

a) $x + y = 10$ **c)** $50 - 10x - y = 0$

b) $2x + 4y = 16$ **d)** $\frac{x}{2} + \frac{y}{4} = 1$

x-int, let y=0

$\frac{x}{2} + \frac{0}{4} = 1$

$2\left(\frac{x}{2}\right) = 2(1)$

$x = 2$

y-int, let x=0

$\frac{0}{2} + \frac{y}{4} = 1$

$0 + \frac{y}{4} = 1$

$4\left(\frac{y}{4}\right) = 4(1)$

$y = 4$

Today's Learning Goal(s):

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

a) sketch a quadratic relation, recalling key features.
b) "complete the square" to find the vertex .

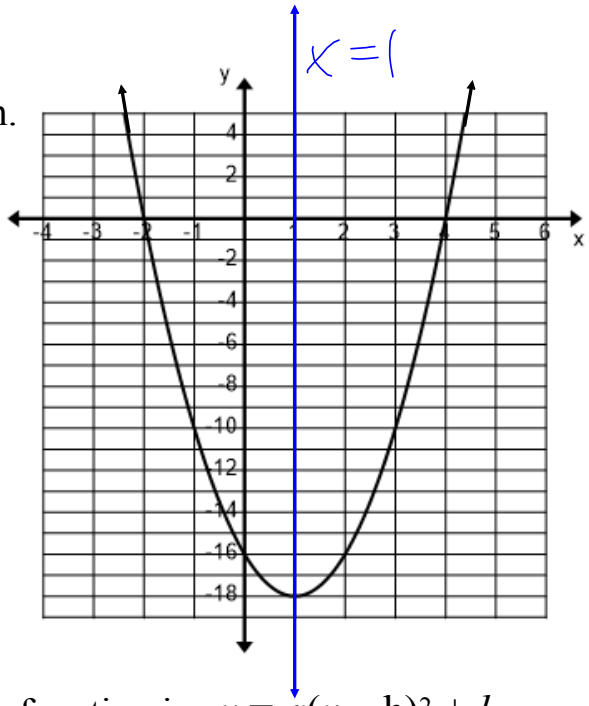
MCF 3MI

Graphing Quadratic Relations

Date: Sept. 10/19
(Every lesson)

The graph of a quadratic relation is called a **parabola**. All parabolas have a vertex (the lowest or highest point of the curve), an axis of symmetry (the vertical line through the vertex), and a *y*-intercept. However, a parabola may have 0, 1, or 2 *x*-intercepts, or **zeros**. ← - - - - (Discuss)

Ex. 1: Label the key points on the graph.



i) the vertex of the parabola (1, -18)

ii) the (equation of the) axis of symmetry x=1

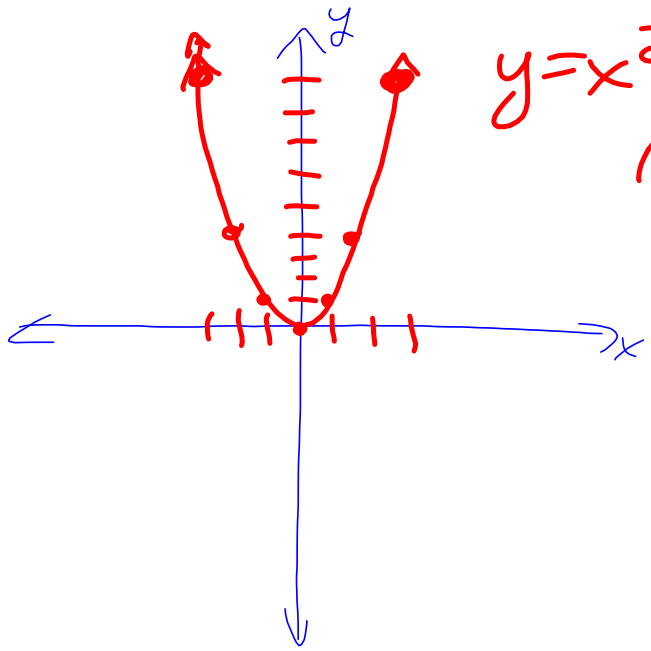
iii) the *y*-intercept -16

iv) the *x*-intercept(s), if any -2 and 4

Recall: The vertex form of a quadratic function is: $y = a(x - h)^2 + k$

The standard form of a quadratic function is: $y = ax^2 + bx + c$

Recall: When we know the vertex and the "*a*" value,
we can sketch using step patterns from the "mother graph".



$y = x^2$

MG = Mother Graph

from vertex

over	up/down
1	1
2	4
3	9
4	16
5	25

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

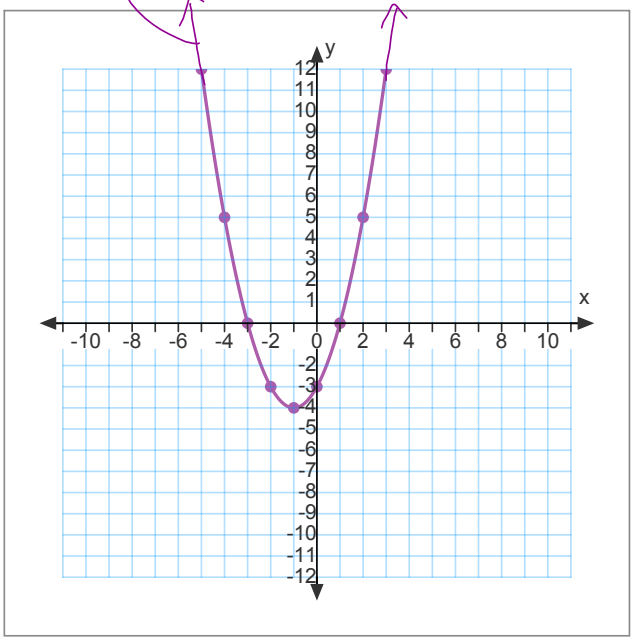
vertex (h, k)

Ex. 2: Sketch each quadratic relation. Use your graph to complete the chart below.

a) $y = (x + 1)^2 - 4$ $V(-1, -4)$

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

MG	
1	1
2	4
3	9



i) the vertex of the parabola $(-1, -4)$

ii) the (equation of the) axis of symmetry $x = -1$

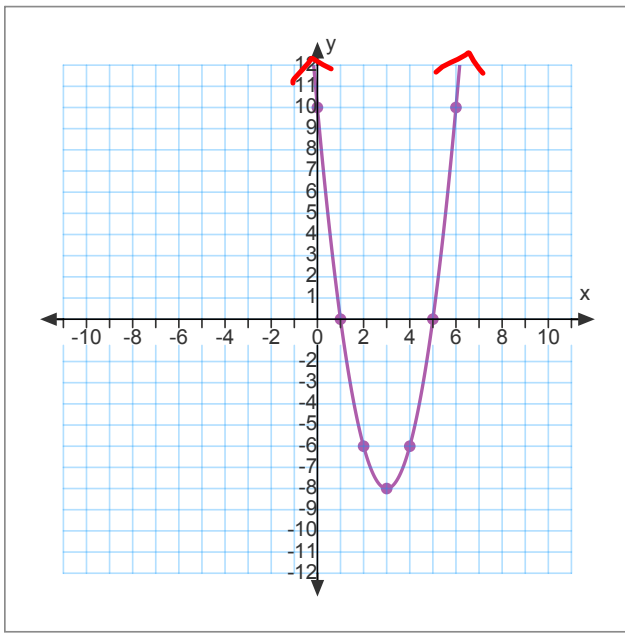
iii) the y-intercept -3

iv) the x-intercept(s), if any 1 & -3

b) $y = 2(x - 3)^2 - 8$ $V(3, -8)$

$y = 2(x-3)^2 - 8$

MG: 1 → 2, 2 → 8, 3 → 18 ($a = 2$)



i) the vertex of the parabola $(3, -8)$

ii) the (equation of the) axis of symmetry $x = 3$

iii) the y-intercept 10

iv) the x-intercept(s), if any 1 & 5

Recall: If a quadratic equation is given in standard form, we can "complete the square" to change it to vertex form.

Ex. 3: Write each function in vertex form by **completing the square**. State the vertex, then sketch on the grid below.

a) $y = x^2 + 10x + 27$

$\left[\frac{1}{2}(10)\right]^2$ $\therefore \frac{1}{2}(10)^2 = 5^2$

$= x^2 + 10x + 5^2 - 5^2 + 27$

$= x^2 + 10x + 25 - 25 + 27$

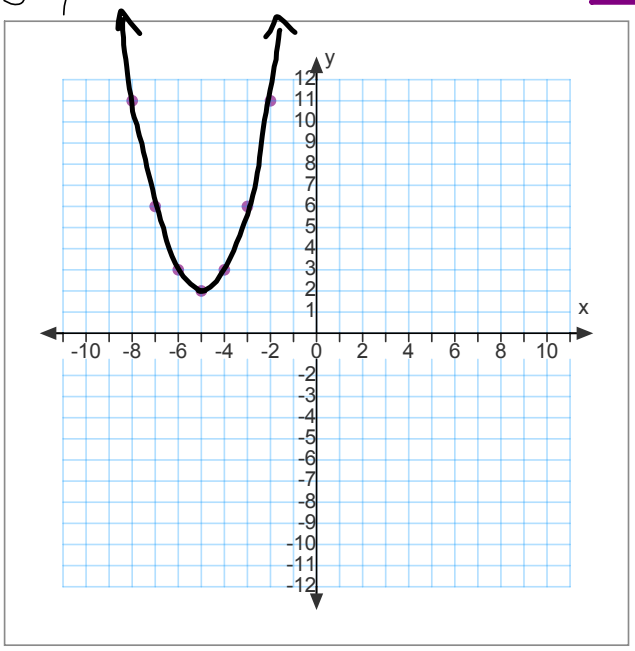
$= (x+5)^2 + 2$

$a = 1$

MG
1 1
2 4
3 9

$\therefore V(-5, 2)$

(-5, 2)



b) $y = -2x^2 + 4x + 6$

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

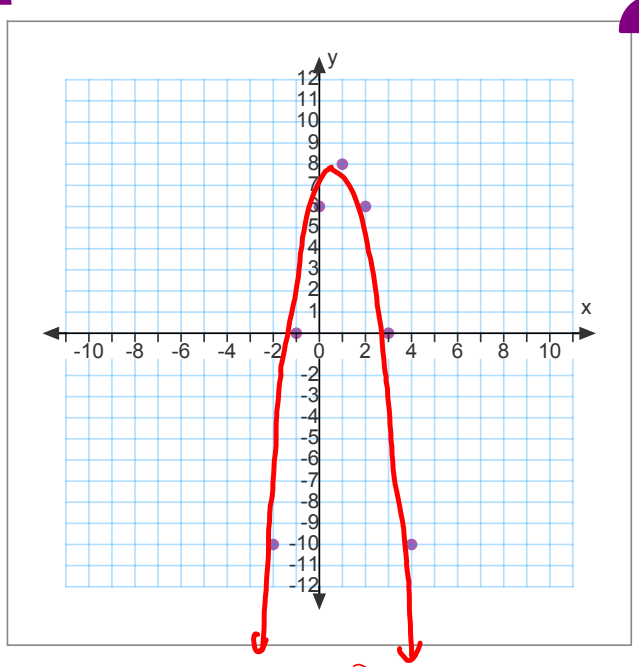
$= -2(x^2 - 2x + 1 - 1) + 6$

$= -2(x-1)^2 - 2(-1) + 6$

$= -2(x-1)^2 + 2 + 6$

$= -2(x-1)^2 + 8$ $\therefore V(1, 8)$

(1, 8)



$y = -2(x-1)^2 + 8$ $V(1, 8)$

MG $a = -2$

1 1 → -2
2 4 → -8
3 9 → -18

Today's Assigned Practice:

p. 542 #1acfh, 2 **you will need graph paper!!

Be ready for the "Unit 0 Summative" on Thursday

Extra Practice Question:

Write the function in vertex form by **completing the square**.

$y = x^2 + 8x + 5$

$= x^2 + 8x + 4^2 - 4^2 + 5$

$= x^2 + 8x + 16 - 16 + 5$

$= (x + 4)^2 - 11$

$\therefore$ vertex $(-4, -11)$

(-4, -11)