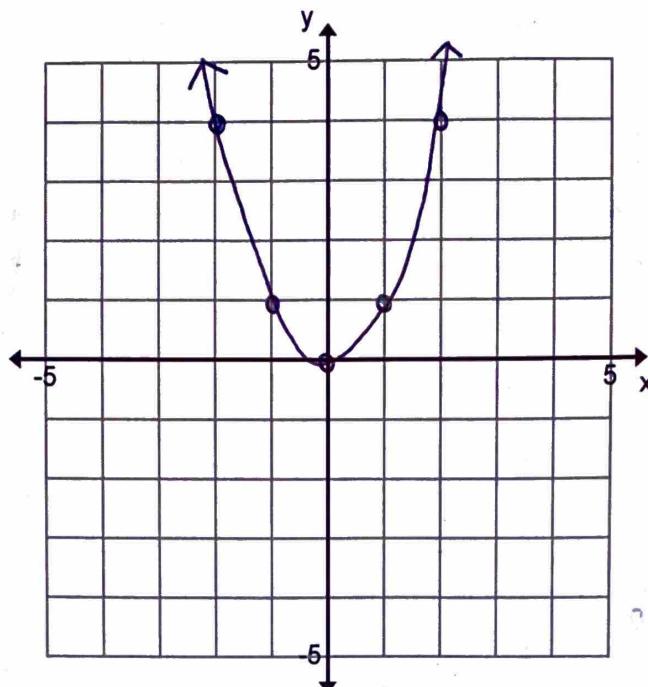


Parabolas Graphing Day 1

Parent Function $y = x^2$



| X | Y |
|----|---|
| -2 | 4 |
| -1 | 1 |
| 0 | 0 |
| 1 | 1 |
| 2 | 4 |

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

a: vertical dilation \rightarrow multiply y's

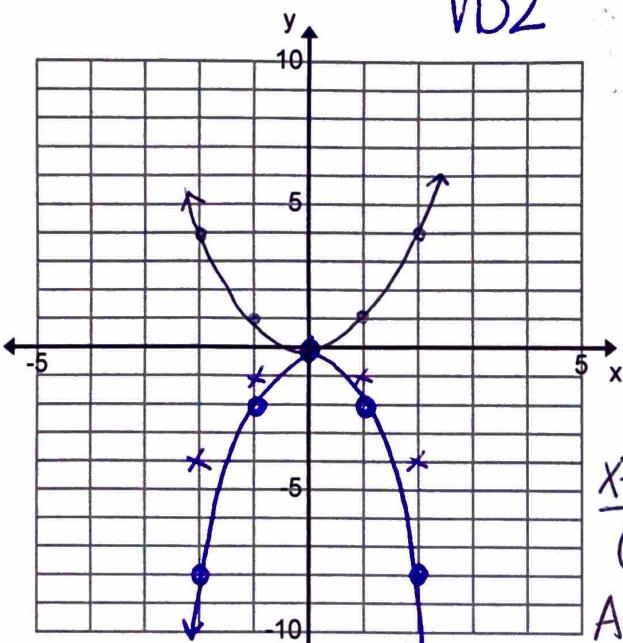
h: left/right movement } (h, k)
 k: up/down movement } vertex

Graphing Examples: sketch a graph, find the x-intercepts, and line of symmetry

1. $y = -2x^2$

Over x-axis

VD2



$$\begin{array}{l} \text{x-int} \\ \hline (0,0) \\ \text{AoS} \\ \hline x=0 \end{array}$$

| X | Y | $2y$ | $-2y$ |
|----|----|------|-------|
| -1 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 1 | -2 | 0 | 0 |
| 2 | -8 | 0 | 0 |

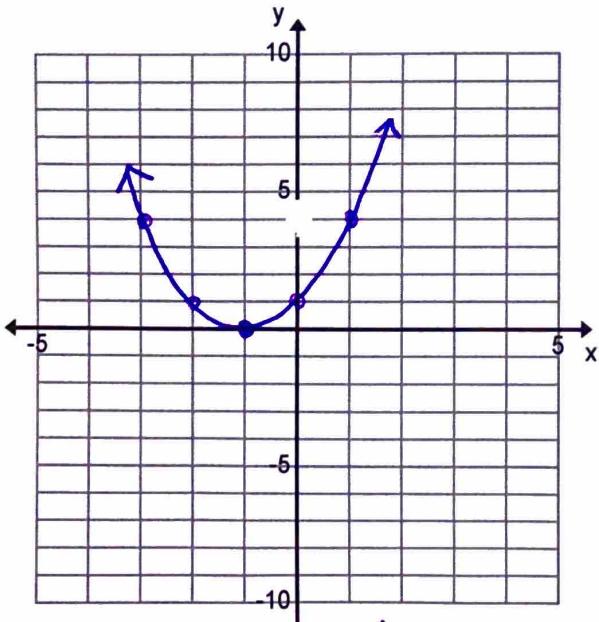
3. $y = x^2 + 2x + 1$

Standard

$$y = (x+1)(x+1)$$

$$y = (x+1)^2 \text{ vertex}$$

L1

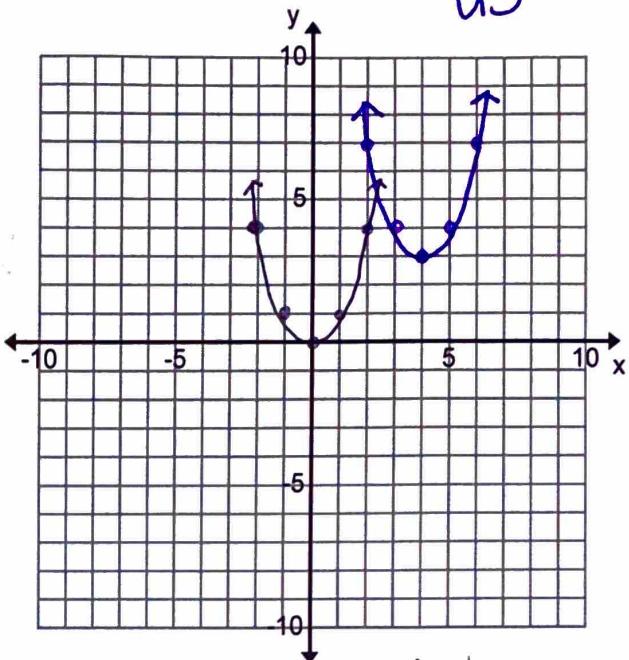


$$\begin{array}{l} \text{AoS : } x = -1 \\ \text{x-int : } (-1, 0) \end{array}$$

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

vertex!

R4
U3



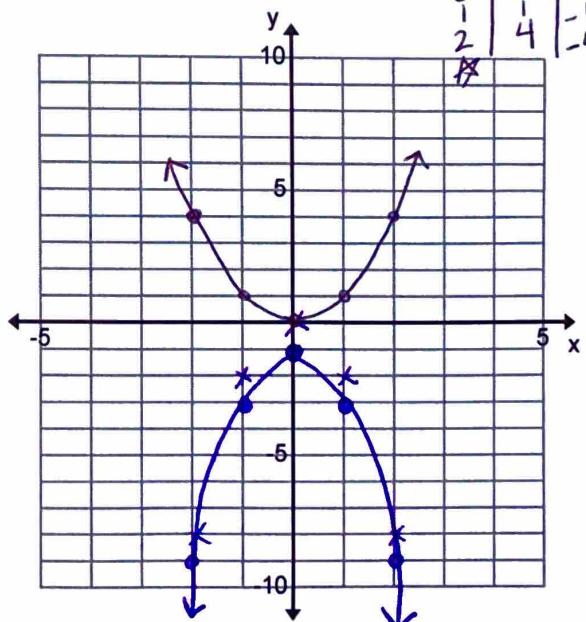
$$\begin{array}{l} \text{x-int} \\ \hline \text{none} \\ \text{AoS} \\ \hline x=4 \end{array}$$

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

Over x-axis

VD2
DI

| X | Y | $-y$ | $2y$ |
|----|----|------|------|
| -2 | 4 | -4 | -8 |
| -1 | 1 | -1 | -2 |
| 0 | 0 | 0 | 0 |
| 1 | -1 | -1 | -2 |
| 2 | -4 | -4 | -8 |



$$\begin{array}{l} \text{x-int: none} \\ \text{AoS : } x=0 \end{array}$$

Parabolas Day 2 Notes

Given the following description write the equation of the graph:

1. A parabola that has gone up 3 and left 7

$$y = (x+7)^2 + 3$$

2. A quadratic that has been vertically dilated by $\frac{1}{2}$ and up 10

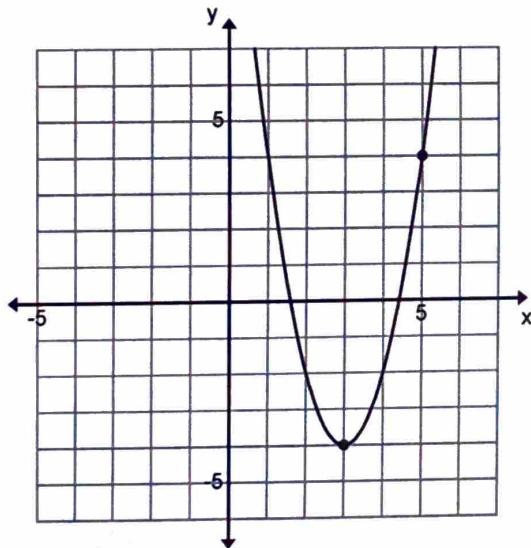
$$y = \frac{1}{2}x^2 + 10$$

3. A parabola that has been moved right 8, down 5 and reflected over the x-axis.

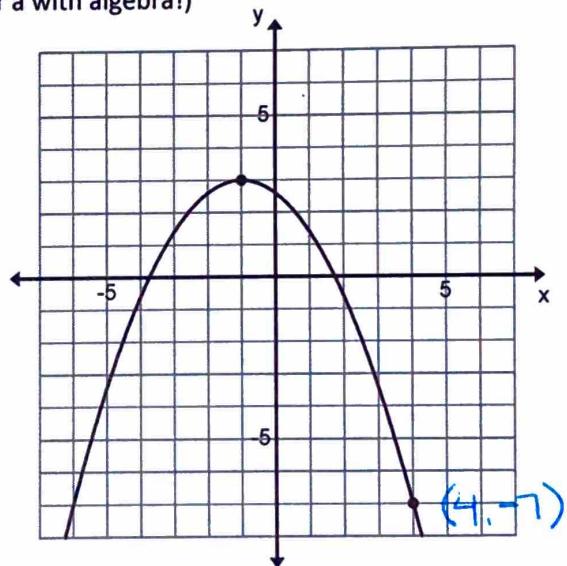
$$y = -(x-8)^2 - 5$$

Given the following graphs find the equations (make sure to solve for a with algebra!)

4.



5.



#1: vertex $(3, -4)$
R3 D4

#2: reflection? no

#3: plug in pt, solve for a
 $(5, 4)$

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

$$4 = a(5-3)^2 - 4$$

$$8 = 4a$$

$$2 = a$$

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

$$y = -a(x+1)^2 + 3$$

$$-7 = -a(4+1)^2 + 3$$

~~$$-10 = -a(25)$$~~

$$\frac{-10}{25} = a$$

$$y = -\frac{2}{5}(x+1)^2 + 3$$

6. Now write the equations from #4 & #5 in standard form $y = ax^2 + bx + c$

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

$$y = 2(x^2 - 6x + 9) - 4$$

$$y = 2x^2 - 12x + 18 - 4$$

$$\boxed{y = 2x^2 - 12x + 14}$$

OR

$$y = 2x^2 - 12x + 22$$



$$y = -\frac{2}{5}(x+1)^2 + 3$$

$$y = -\frac{2}{5}(x^2 + 2x + 1) + 3$$

$$y = -\frac{2}{5}x^2 - \frac{4}{5}x - \frac{2}{5} + \frac{15}{5}$$

$$\boxed{y = -\frac{2}{5}x^2 - \frac{4}{5}x + \frac{13}{5}}$$

7. Nick is starting a bakery and is trying to figure out how to maximize his profit based on selling pecan pies. He found his profit equation was $y = -4x^2 + 152x + 20$.

A. How many pies should he make each day to maximize his profit?



$$x = \frac{-152}{2(-4)} = 19$$

$$\boxed{19 \text{ pies}}$$

B. How much profit can he make each day?

vertex in SF

$$x = \frac{-b}{2a}$$

$y \rightarrow$ plug in x

$$y = -4(19)^2 + 152(19) + 20$$

$$y = \boxed{\$1,404}$$