

# 5.3 \* Graphing Quadratic Functions In Factored Form \*

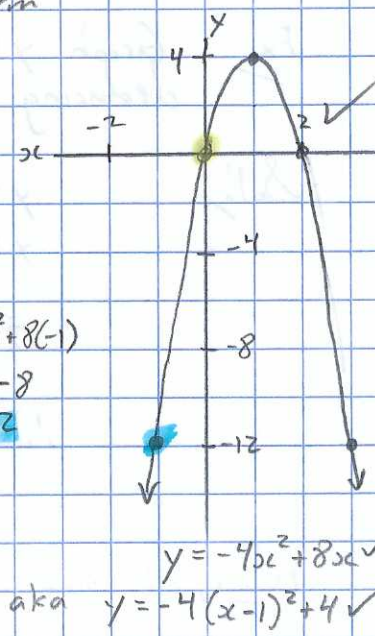
Warmup \* 1. Graph  $y = -4x^2 + 8x$

$y = ax^2 + bx + c,$

Sol'n Maximum when  $x = \frac{-b}{2a}$   
 $= \frac{-(+8)}{2(-4)}$   
 $= 1$

Easy Points \*

x	y
0	0
-1	$-4(-1)^2 + 8(-1)$ $= -4 - 8$ $= -12$



Max value is  $y = -4x^2 + 8x$   
 $= -4(1)^2 + 8(1)$   
 $= 4$

Vertex:  $V(1, 4)$

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

2. For each quadratic function, find I. The x-intercepts  
 II. The axis of symmetry

a)  $y = x^2 - 2x - 8$

b)  $y = x^2 - 9$

Sol'n

x-intercepts  
 Set  $y = 0$  and solve for  $x$

$0 = x^2 - 2x - 8$   
 $0 = (x-4)(x+2)$ , Sum + Product Trinomial factoring  
 $\therefore x = 4$  or  $x = -2$ , Logical to make Equation = 0.

Sol'n

x-intercepts  
 Set  $y = 0$  and solve for  $x$ .

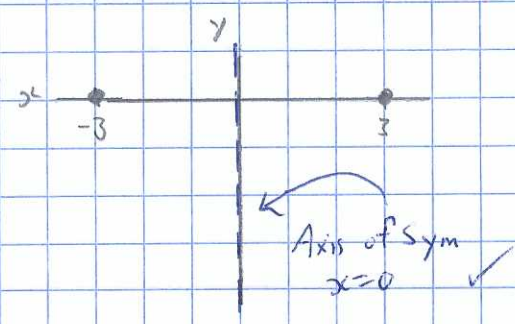
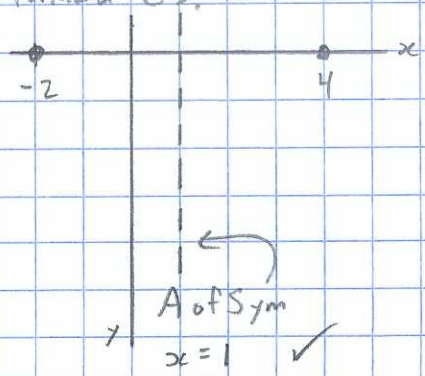
$0 = x^2 - 9$   
 $0 = (x+3)(x-3)$ , Difference of Squares Factor  
 $\therefore x = -3$  or  $x = 3$ , Logic for = 0

I  $\therefore$  x-intercepts are  $(4, 0)$  and  $(-2, 0)$  ✓

I  $\therefore$  x-intercepts are  $(-3, 0)$  and  $(3, 0)$  ✓

To find the Axis of Symmetry, ADD the x-intercepts and DIVIDE by 2. (Like our midpoint formula :))

Axis of Symmetry \*



III

II.

e)

Ex. Graph  $y = x^2 - 4x - 5$  by factoring to find the  $x$ -intercepts, and then deducing the vertex.

Sol'n

$$y = x^2 - 4x - 5$$

$$y = (x-5)(x+1), \text{ Sum and product trinomial factoring. } \left. \begin{array}{l} \rightarrow \text{Sum} = -4 \\ \rightarrow \text{Product} = -5 \end{array} \right\} -5, +1$$

$$0 = (x-5)(x+1), \text{ For } x\text{-intercepts } \star \text{ Set } y = 0.$$

$\therefore x = 5$  or  $x = -1$ , "Reach inside and take out the opposite number"  
Logic.

Note: To find the vertex follow these 2 steps:

STEP 1: Axis of Symmetry is  $x = \frac{(5) + (-1)}{2}$ , "add  $x$ -intercepts and divide by 2."

$$x = 2$$

STEP 2: Sub in Axis of Symmetry number to find  $y$  coordinate of vertex.

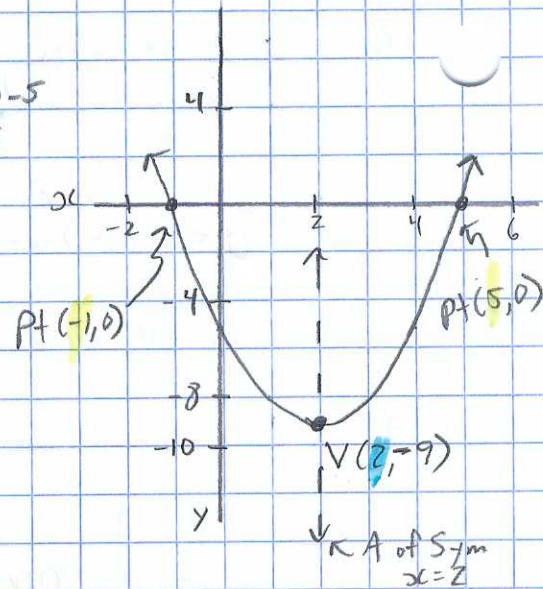
$$y = x^2 - 4x - 5$$

$$y = (2)^2 - 4(2) - 5$$

$$y = 4 - 8 - 5$$

$$y = -9$$

So Vertex =  $(2, -9)$



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