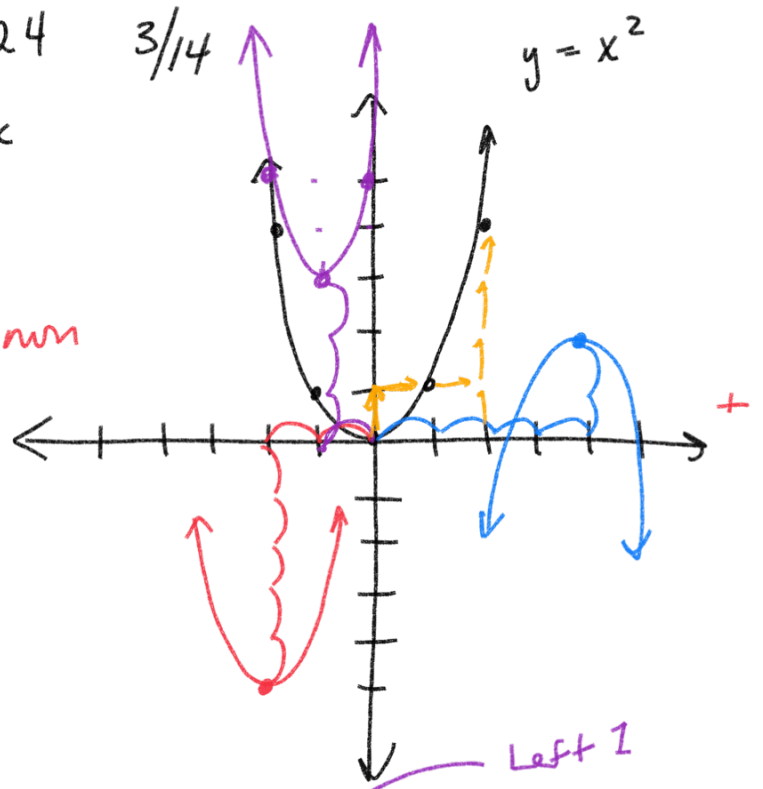


vertex form:  $y = a(x-h)^2 + k$   
 $(h, k) = \text{vertex}$

1.)  $y = (x+2)^2 - 5$   
 -2 -5  
 vertex  $(-2, -5)$   
 2 Left  
 5 down

2.)  $y = -(x-4)^2 + 2$   
 flip  
 4 right  
 vertex  $(4, 2)$   
 2 up

3.)  $y = 2(x+1)^2 + 3$   
 slope  
 vertex:  $(-1, 3)$   
 Left 1  
 up 3



Standard Form

$y = x^2 - 8x - 65$   
 $y = ax^2 + bx + c$

$a = 1$   $b = -8$   $c = -65$

$y = x^2 - 8x - 65$

$y = (4)^2 - 8(4) - 65$   
 $16 - 32 - 65$   
 $-16 - 65 = -81$

vertex:  
 $(4, -81)$

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

$\frac{-(-8)}{2(1)} = \frac{8}{2} = 4$

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

$y = (x-4)^2 - 81$

Standard form  $\rightarrow$  vertex form

vertex  $(\underline{h}, \underline{k})$

$$y = x^2 - 12x - 45$$

$a = 1 \quad b = -12 \quad c = -45$

Standard form  $\rightarrow$  vertex form

$$h = \frac{-b}{2a} = \frac{-(-12)}{2(1)} = \frac{12}{2} = 6$$

vertex:  $(6, -81)$

$$y = x^2 - 12x - 45$$

$\downarrow$

$$6^2 - 12(6) - 45$$

$$36 - 72 - 45$$

$$-36 - 45 = -81$$

vertex form

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

$$y = (x-6)^2 - 81$$

$$y = x^2 + 4x$$

Standard form  $\rightarrow$  vertex form

$a = 1 \quad b = 4 \quad c = 0 \leftarrow$  y-intercept

$$h = \frac{-b}{2a} = \frac{-4}{2(1)} = \frac{-4}{2} = -2$$

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

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

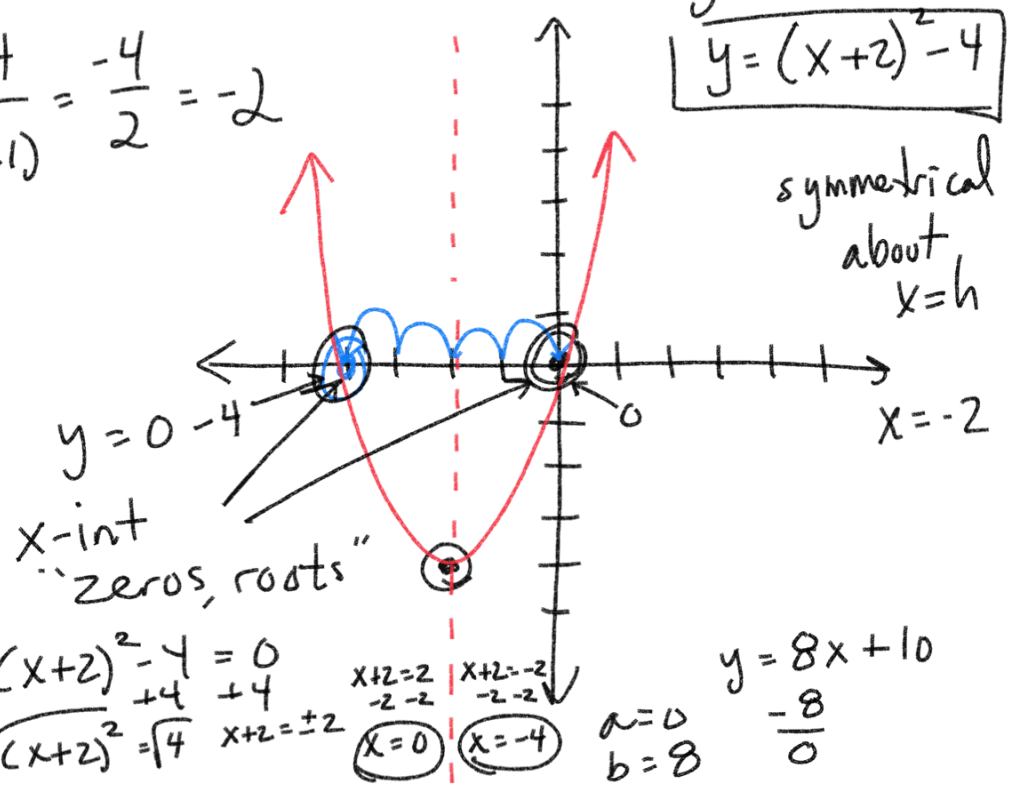
$$y = x^2 + 4x$$

$\downarrow$

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

$$4 - 8 = -4$$

vertex:  $(-2, -4)$



Find the roots/zeros

different signs  
unFOILing

$$y = x^2 + \boxed{1}x - 6$$

$$\underline{3} + \underline{(-2)} = 1$$

$$\underline{3} * \underline{(-2)} = -6$$

$$3 + (-2) = 1$$

$$3 * (-2) = -6$$

$$(x+3)(x-2)$$

$$(x+3)(x-2) = 0$$

$$x+3=0$$

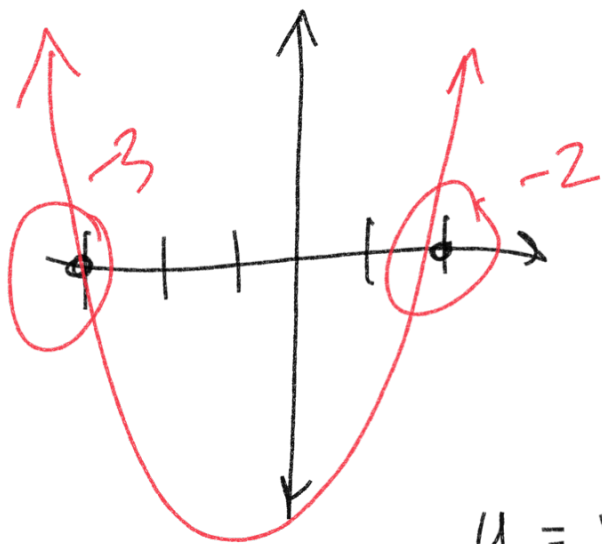
$$\begin{array}{r} -3 \\ -3 \end{array}$$

$$\boxed{x = -3}$$

$$x-2=0$$

$$\begin{array}{r} +2 \\ +2 \end{array}$$

$$\boxed{x = 2}$$



$$y = x^2 - 2x - 24$$

$$\underline{-6} + \underline{4} = -2$$

$$\underline{-6} * \underline{4} = -24$$

$$y = (x-6)(x+4)$$

Roots?

$$\begin{array}{r} x-6=0 \\ +6 \quad +6 \end{array} \quad \begin{array}{r} x+4=0 \\ -4 \quad -4 \end{array}$$

$$x=6 \quad x=-4$$

