

Name Key Block _____ Date _____

Graphing Parabolas

Graph the following parabolas. For each parabola determine: the **vertex**, **line of symmetry**, and **x-intercepts** and **y-intercept**. Find two additional points to graph a complete parabola.

Graph 1

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

$$= (x-5)(x+1)$$

x-ints:

$$0 = (x-5)(x+1)$$

$$\begin{array}{r} x-5=0 \\ +5 \quad +5 \\ \hline x=5 \end{array}$$

$$\begin{array}{r} x+1=0 \\ -1 \quad -1 \\ \hline x=-1 \end{array}$$

$(5,0)$ & $(-1,0)$

LOS: $\frac{5+(-1)}{2} = \frac{4}{2} = 2$

Vertex:

$$\begin{aligned} y &= (x-5)(x+1) \\ &= (2-5)(2+1) \\ &= (-3)(3) \\ &= -9 \end{aligned}$$

$(2, -9)$

Extra Points:

$(4, -5)$ reflect over LOS

$$x = -2$$

$$\begin{aligned} y &= (-2-5)(-2+1) \\ &= (-7)(-1) \\ &= 7 \end{aligned}$$

$(-2, 7) \rightarrow$ reflect over LOS to $(6, 7)$

$$x = 1 \quad y = (1-5)(1+1) = (-4)(2) = -8 \quad (1, -8)$$

Up/Down	Up
y-intercept	$(0, -5)$
x-intercept(s)	$(5, 0)$ $(-1, 0)$
LOS	$x = 2$
Vertex	$(2, -9)$

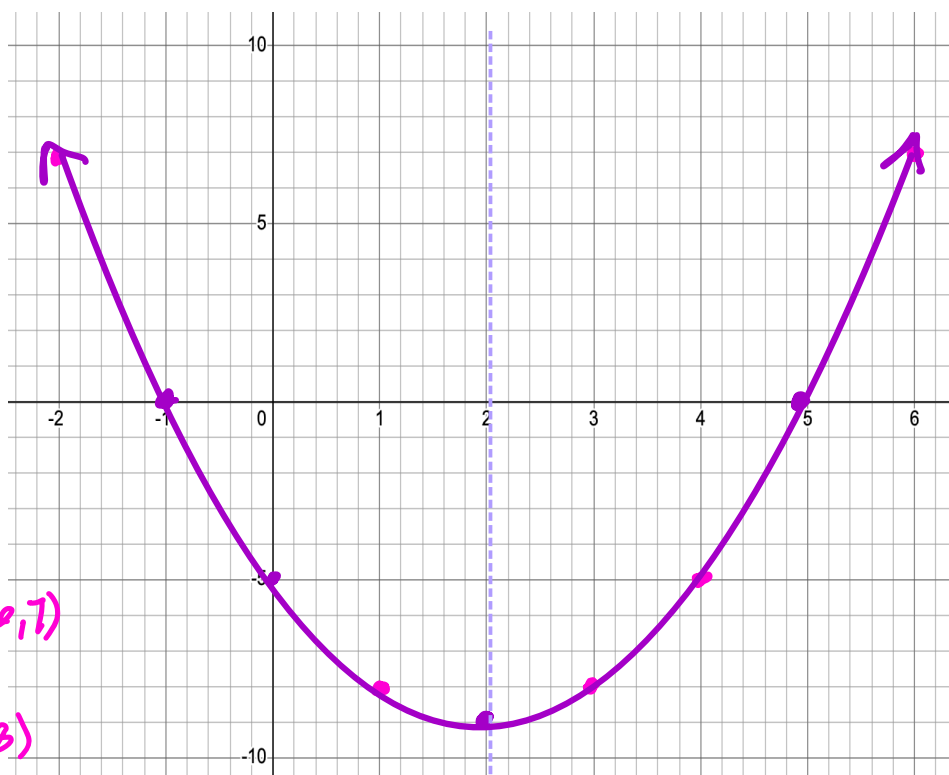
y-int:

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

$$y = 0^2 - 4(0) - 5$$

$$y = -5$$

$(0, -5)$



Graph 2

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

$$= -1(x^2 + 4x - 5)$$

$$= -1(x+5)(x-1)$$

x-ints:

$$0 = -1(x+5)(x-1)$$

$$\begin{array}{r} x+5=0 \\ -5 \quad -5 \\ \hline x=-5 \end{array}$$

$$\begin{array}{r} x-1=0 \\ +1 \quad +1 \\ \hline x=1 \end{array}$$

Vertex:

$$y = -1(x+5)(x-1)$$

$$y = -1(-2+5)(-2-1)$$

$$y = -1(3)(-3)$$

$$y = 9$$

$$\text{Vertex: } (-2, 9)$$

Extra Points:

$$\begin{aligned} x=-1 \quad y &= -1(-1+5)(-1-1) \\ &= -1(4)(-2) \\ &= 8 \end{aligned}$$

$(-1, 8)$ reflect to $(-3, 8)$

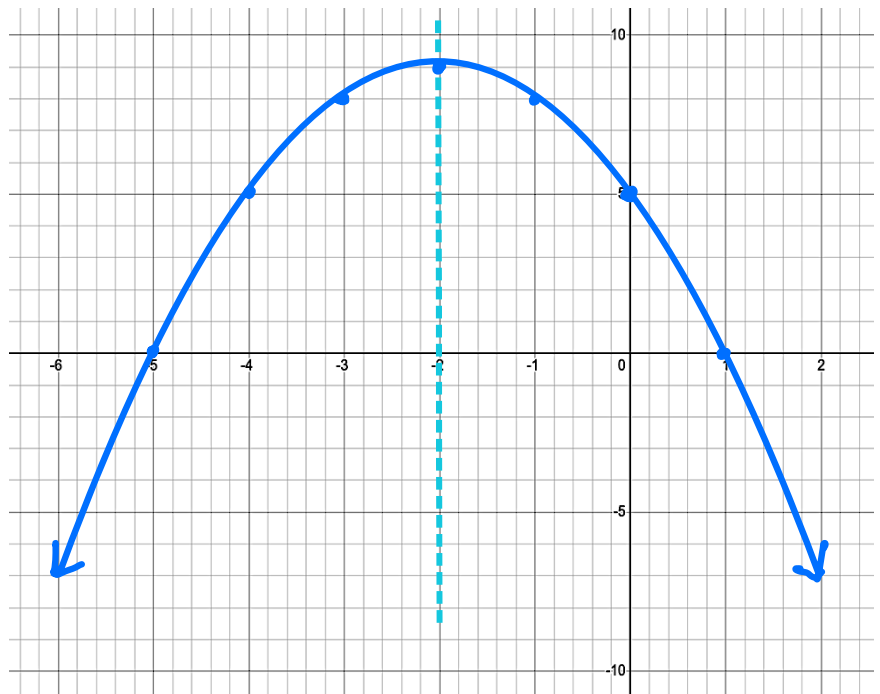
$$\begin{aligned} x=2 \quad y &= -1(2+5)(2-1) \\ &= -1(7)(1) \\ &= -7 \end{aligned}$$

$(2, -7)$ reflect to $(-6, -7)$

Up/Down	Down
y-intercept	$(0, 5)$
x-intercept(s)	$(-5, 0) (1, 0)$
LOS	$x = -2$
Vertex	$(-2, 9)$

LOS

$$x = \frac{-5+1}{2} = \frac{-4}{2} = -2$$



Graph 3

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

$$= 4x^2 - 10x + 2x - 5$$

$$= (2x+1)(2x-5)$$

2x	4x ²	-10x
1	2x	-5
	2x	-5

Up/Down	UP
y-intercept	(0,-5)
x-intercept(s)	(-0.5,0) (2.5,0)
LOS	X = 1
Vertex	(1,-9)

x-ints

$$0 = (2x+1)(2x-5)$$

$$2x+1=0$$

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

$$x = -0.5$$

$$(-0.5, 0)$$

$$2x-5=0$$

$$\frac{+5}{2} = \frac{+5}{2}$$

$$x = 2.5$$

$$(2.5, 0)$$

LOS:

$$x = \frac{-0.5 + 2.5}{2}$$

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

$$x = 1$$

Vertex

$$y = (2x+1)(2x-5)$$

$$= (2(1)+1)(2(1)-5)$$

$$= (3)(-3)$$

$$= -9$$

$$(1, -9)$$

Additional Points

(0,-5) reflects to (2,-5)

$$x = 3$$

$$y = (2(3)+1)(2(3)-5)$$

$$= (7)(1)$$

$$= 7$$

(3,7) reflects to (-1,7)

