Graphing Parabolas

Graph the following parabolas. For each parabola determine: the vertex, line of symmetry, x-intercepts and y-intercept. Find two additional points to graph a complete parabola. All the Key Features should be clearly visible on your graphs.

$y = x^2 - 2x - 3$

$y = 2x^2 - 4x - 6$

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

$y = -2x^2 + x + 10$

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

$y = x^2 - 2x - 3$

$(x-3)(x+1)$

$0 = x - 3$ $\quad +3 \quad +3$

$3 = x$

$0 = x + 1$ $\quad -1 \quad -1$

$-1 = x$

$LOS = \frac{3 + -1}{2} = \frac{2}{2} = 1$

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

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

$= (-2)(2)$

$= -4$

Try $x = 0.5$

$y = (0.5-3)(0.5+1)$

$= (-2.5)(1.5)$

$= -3.75$

$(0.5, -3.75)$

Key Features

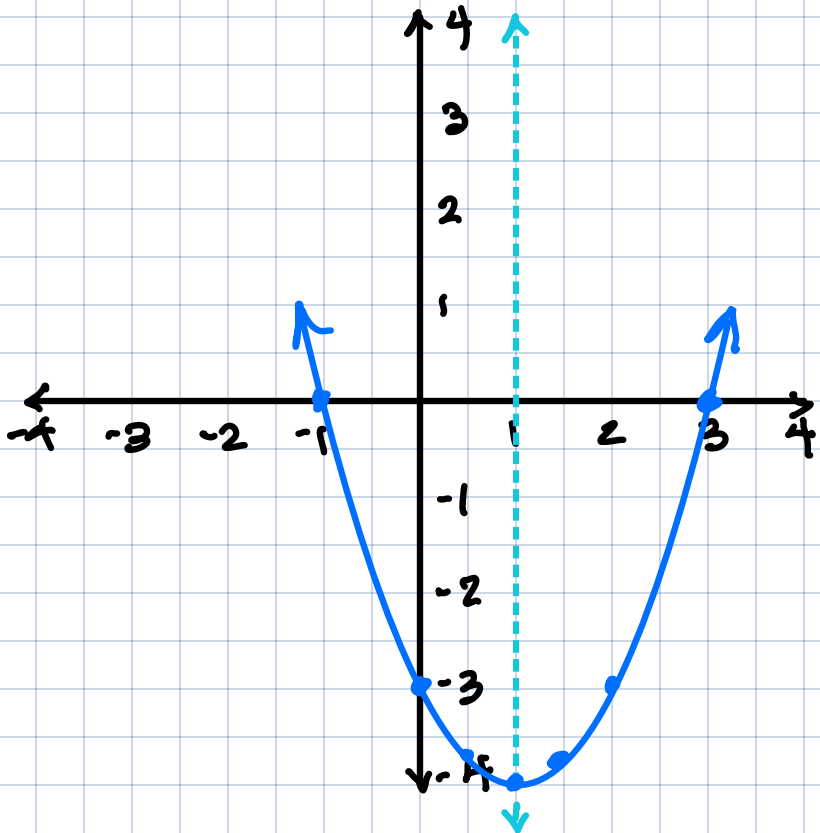
Opens Up

x-ints: $(3,0)$ $(-1,0)$

y-int: $(0,-3)$

LOS: $x = 1$

Vertex: $(1,-4)$



$y = 2x^2 - 4x - 6$

$2(x^2 - 2x - 3)$

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

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

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

$0 = 2(x-3)(x+1)$

$x - 3 = 0$ $\quad$ $x + 1 = 0$

$+3 \quad +3$ $\quad$ $-1 \quad -1$

$x = 3$ $\quad$ $x = -1$

LOS: $x = \frac{3 + -1}{2}$

$= 1$

$x = 1$

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

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

$= 2(-2)(2)$

$= -8$

Vertex: $(1, -8)$

Let $x = 0.5$

$y = 2(0.5-3)(0.5+1)$

$= 2(-2.5)(1.5)$

$= -7.5$

$(0.5, -7.5)$

Key Features

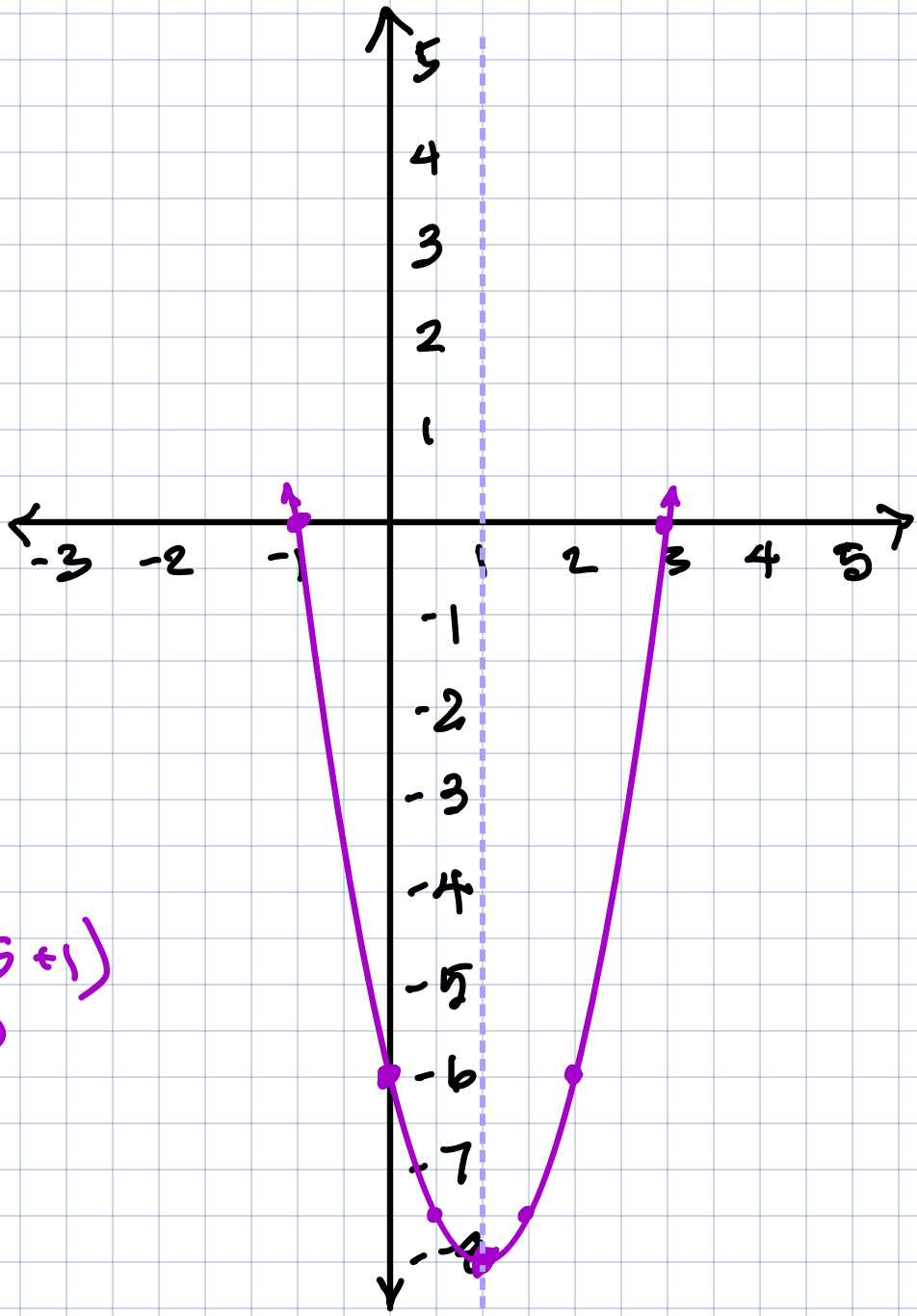
y-int: $(0, -6)$

x-ints: $(3, 0)$ $(-1, 0)$

LOS: $x = 1$

Vertex: $(1, -8)$

Opens Up



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

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

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

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

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

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

$0 = x+5$ $\quad$ $0 = x-1$

$-5 \quad -5$ $\quad$ $+1 \quad +1$

$-5 = x$ $\quad$ $1 = x$

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

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

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

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

$= 9$

Let $x = -1$

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

$= -1(4)(-2)$

$= 8$

$(-1, 8)$

Key Features

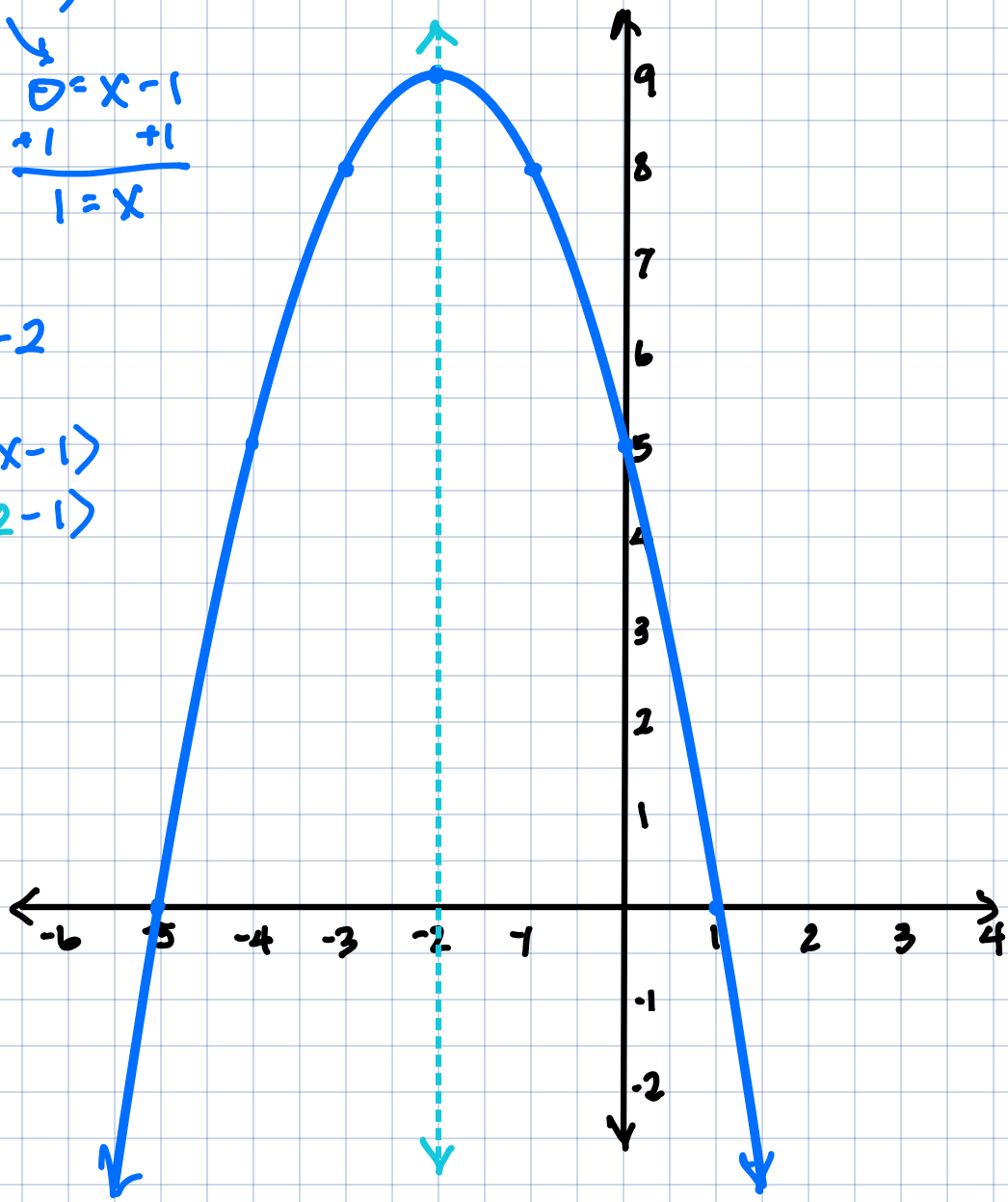
Opens down

y-int: $(0, 5)$

x-ints: $(-5, 0)$ $(1, 0)$

LOS: $x = -2$

Vertex: $(-2, 9)$



$y = -2x^2 + x + 10$

$y = -1(2x^2 - x - 10)$

$= -1(2x^2 - 5x + 4x - 10)$

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

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

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

$0 = 2x - 5$ $\quad$ $0 = x + 2$

$+5 \quad +5$ $\quad$ $-2 \quad -2$

$\frac{5}{2} = \frac{2x}{2}$ $\quad$ $-2 = x$

$2.5 = x$

LOS: $x = -\frac{-2+2.5}{2} = 0.25$

$y = -1(2(0.25) - 5)(0.25 + 2)$

$= -1(-4.5)(2.25)$

$= 10.125$

Let $x = 1$

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

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

$= 9$

$(1, 9)$

Key Features

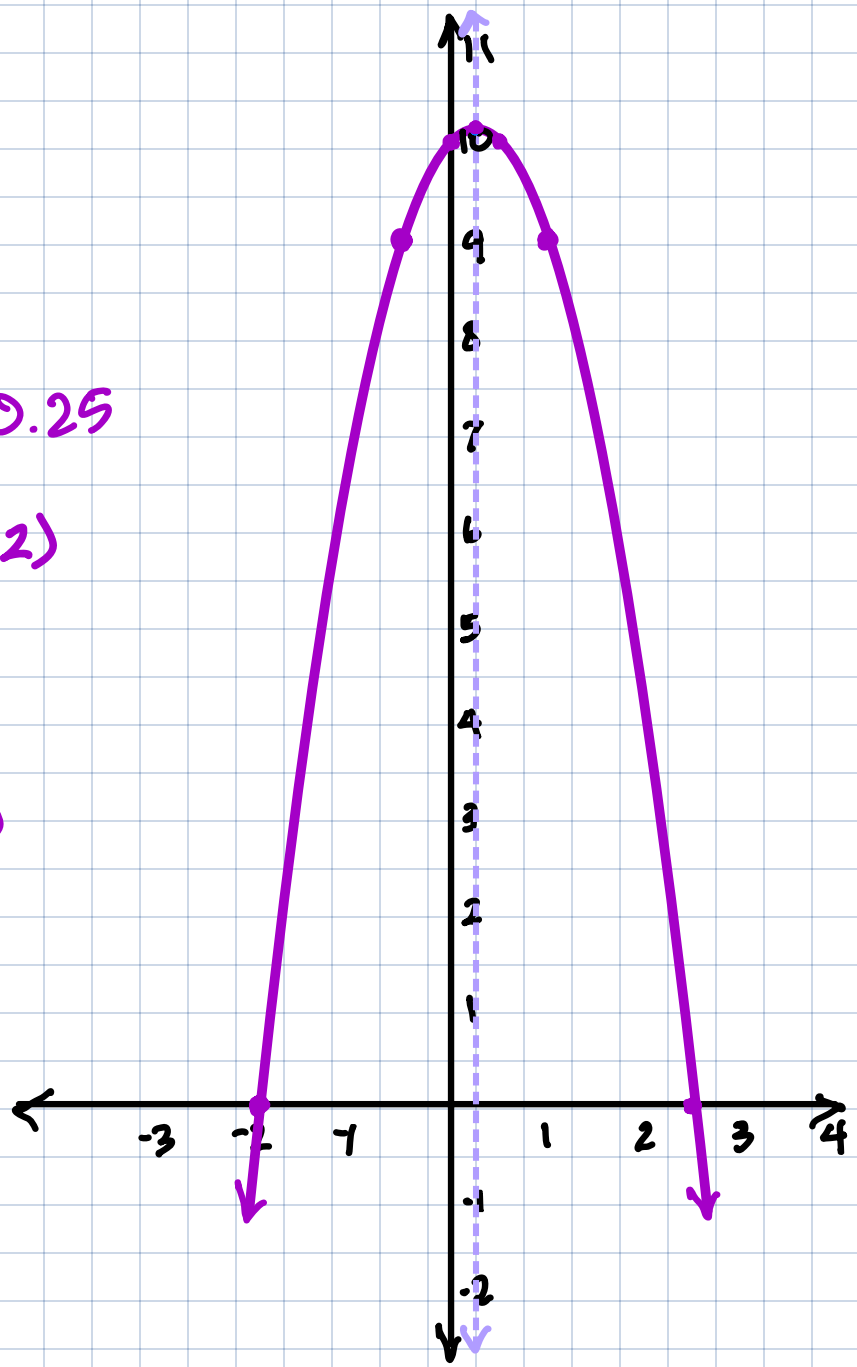
Opens Down

y-int: $(0, 10)$

x-ints: $(-2, 0)$ $(2.5, 0)$

LOS: $x = 0.25$

vertex: $(0.25, 10.125)$



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

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

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

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

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

$0 = 2x+5$

$-5 \quad -5$

$\frac{-5}{2} = \frac{2x}{2}$

$-2.5 = x$

$0 = 2x-1$

$+1 \quad +1$

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

$0.5 = x$

LOS: $x = \frac{-2.5 + 0.5}{2} = -1$

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

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

$y = (3)(-3) = -9$

$(-1, -9)$

Let $x = -.5$

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

$= (4)(-2)$

$= -8$

$(-.5, -8)$

Key Features

Opens Up

y-int: $(0, -5)$

x-ints: $(-2.5, 0)$ $(0.5, 0)$

LOS: $x = -1$

Vertex: $(-1, -9)$