

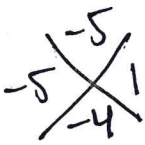
**Graphing a Parabola**       $y = x^2 - 4x - 5$

**Finding the Roots (x-intercepts)**

Factor and use zero product property

$$0 = x^2 - 4x - 5$$

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



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

$$\boxed{x=5} \quad \boxed{x=-1}$$

**Finding the y-intercept**

Substitute  $x = 0$

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

$$\boxed{y = -5}$$

**Finding the vertex**

The line of symmetry goes through the  $x$  value halfway between the  $x$ -intercepts

a.) Range b/w  $x$ -intercepts

$$5 + 1 = 6 \text{ spaces}$$

$$\frac{6}{2} = 3 \text{ spaces}$$

$$5 - 3 = \boxed{2} \quad -1 + 3 = \boxed{2}$$

$\boxed{x=2}$  line of symmetry

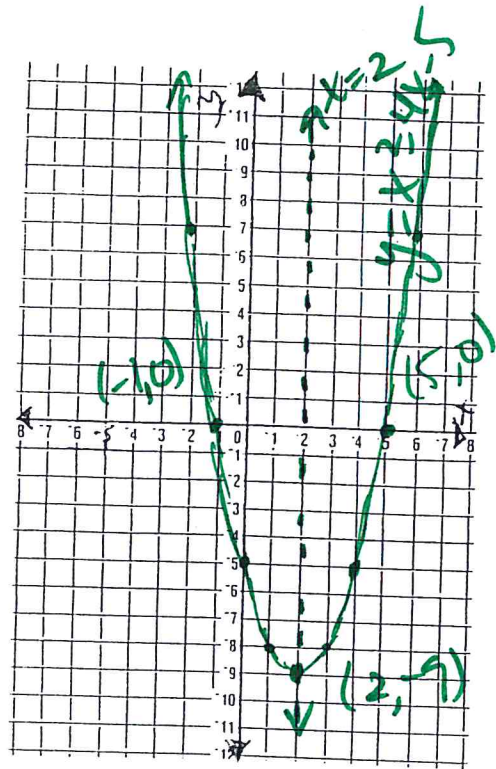
b.) Substitute the  $x$ -value of the vertex into the original equation + solve for the  $y$ -value.

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

$$y = 4 - 8 - 5$$

$$\boxed{y = -9}$$

Vertex is @  $(2, -9)$



**Find other required points**

Calculate additional points

Use symmetry to fill in points.

**Calculate      Use Symmetry**

$$y = (1)^2 - 4(1) - 5 \quad (3, -8)$$

$$y = 1 - 4 - 5$$

$$y = -8$$

$$(1, -8)$$

$$y = (-2)^2 - 4(-2) - 5 \quad (6, 7)$$

$$y = 4 + 8 - 5$$

$$y = 7$$

$$(-2, 7)$$