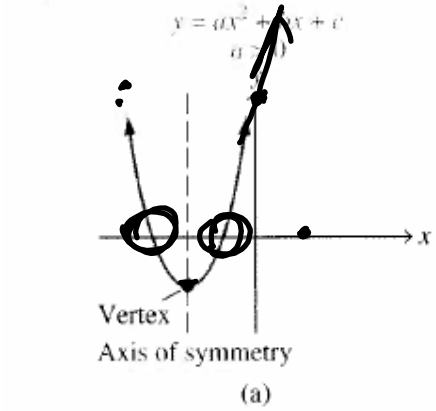
Quadratic Functions. Graph

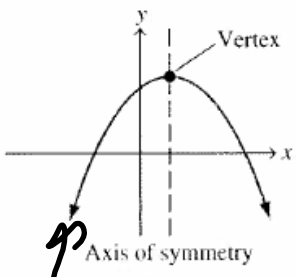
$$f(x) = ax^2 + bx + c$$

$y = ax^2 + bx + c$
$a > 0$



(a)

$y = ax^2 + bx + c$
$a < 0$



1. Axis of symmetry. $x = \frac{-b}{2a}$

x coordinate of the vertex. To find the y coordinate of the vertex substitute the x value of the axis of symmetry into the quadratic equation.

2. Open up or down

a>0 a<0

3. Determine the y intercept by substituting x=0 into the equation.

ax^2+bx+c

y intercept = (0, c)

4. Make a table of values to graph the parabola. Remember that the parabola will be symmetric with respect to the axis of symmetry, so it is advised to put the vertex point in the middle of the table.

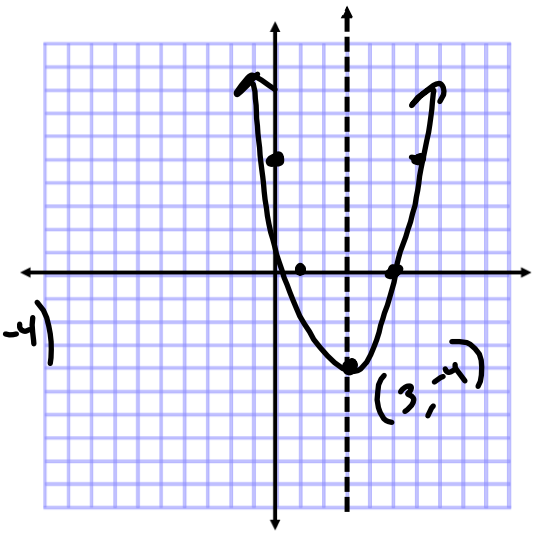
or

5. Determine the x intercepts by substituting y=0 into the equation and then solve/factor.

Graph, then determine the domain and range

$$y = x^2 - 6x + 5$$

1. up $a > 0$
2. $x = -\frac{b}{2a} = \frac{-(-6)}{2(1)} \quad x = 3$
3. vertex $y = 3^2 - 6(3) + 5$
   $y = 9 - 18 + 5 = -4 \quad (3, -4)$
4. y-intercept $(0, c) = (0, 5)$
   $(6, 5)$
5. x intercepts - factor
   $(x - 5)(x - 1) = 0$
   $x - 5 = 0 \quad x - 1 = 0$
   $x = 5 \quad x = 1$



Graph

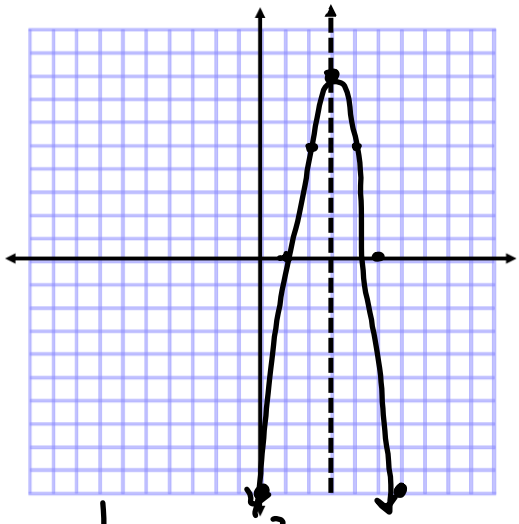
$y = -2x^2 + 12x - 10$

1. down $a = -2$
2. $x = \frac{-b}{2a} = \frac{-12}{2(-2)} = 3$
3. Vertex $y = -2(3)^2 + 12(3) - 10$
   $y = -18 + 36 - 10$
   $y = 8 \quad (3, 8)$
4. y inter. $(0, -10)$
   $(6, -10)$

$y = -2(x^2 - 6x + 5)$

$(x - 5)(x - 1)$

$x = 5 \quad x = 1$



x	$y = -2x^2 + 12x - 10$
2	$= -2(2)^2 + 12(2) - 10$
	$-8 + 24 - 10 = 6$
4	$= 6$