Solving Quadratic Equations by Factoring
Graphing Intercepts

Quadratic Equations properties

- Standard Form: $f(x) = ax^2 + bx + c$
- c is always the __Y-intercept__ of the graph.
- The x-intercepts of the graph are the __Solutions__ to the equation.
- The graph of a quadratic equation is a __parabola__.

Directions: Solve the quadratic equations by factoring. Then, graph the equation by plotting the intercepts.

1.) $f(x) = x^2 + 6x + 5$

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

$\begin{array}{cc} 5 \\ 5 \diagup\!\!\!\diagup 1 \\ 6 \end{array}$

$X+5=0 \qquad X+1=0$
$\quad -5 \; -5 \qquad \quad -1 \; -1$
$\boxed{X=-5} \quad \boxed{X=-1}$ x-intercepts
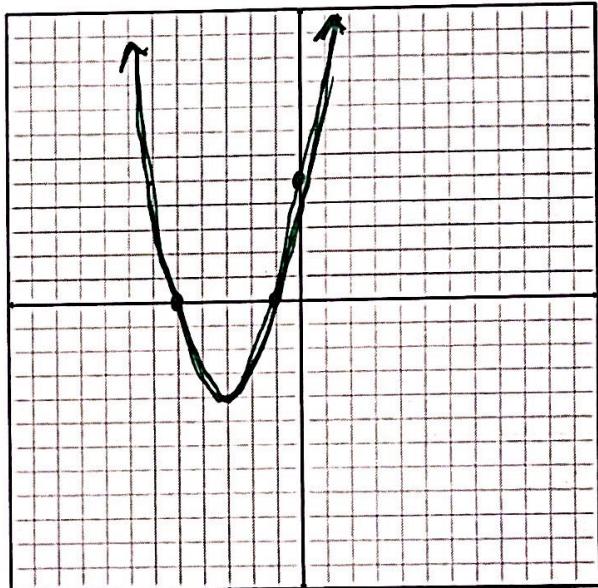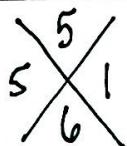
$y\text{-intercept} = 5 \;\;(\text{always } c)$

2.) $f(x) = -x^2 + x + 6$

$(-x^2 + 3x)(-2x + 6) = 0$

$\begin{array}{cc} -6 \\ 3 \diagup\!\!\!\diagup -2 \\ 1 \end{array}$

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

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

$-x-2=0 \qquad X-3=0$
$\quad +2 \; +2 \qquad \quad +3 \; +3$
$\dfrac{-x}{-1} = \dfrac{2}{-1} \qquad \boxed{X=3}$
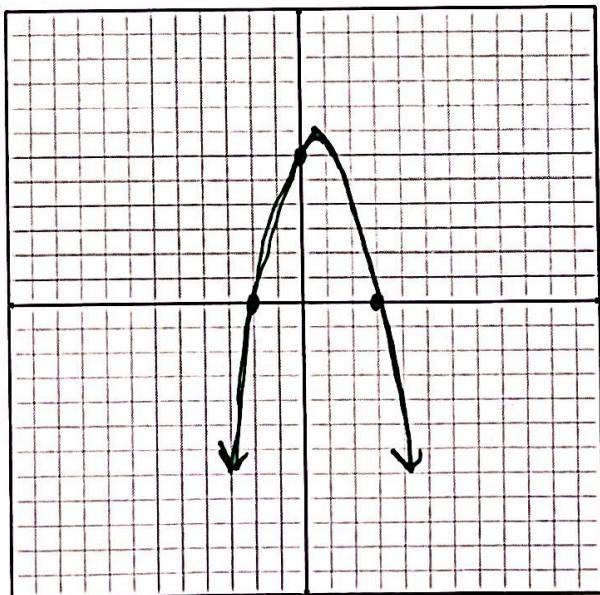
$\boxed{X=-2} \qquad y\text{-intercept}: 6$

3.) $f(x) = 3x^2 - 7x - 6$

$(3x^2 - 9x) + (2x - 6) = 0$

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

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

$3x + 2 = 0 \qquad x - 3 = 0$
$\quad -2 \; -2 \qquad \quad +3 \; +3$

$\dfrac{3x}{3} = \dfrac{-2}{3} \qquad \boxed{x = 3}$

$\boxed{x = \dfrac{-2}{3}} \approx -0.67$

$\begin{array}{c} -18 \\ -9 \quad\times\quad 2 \\ -7 \end{array}$
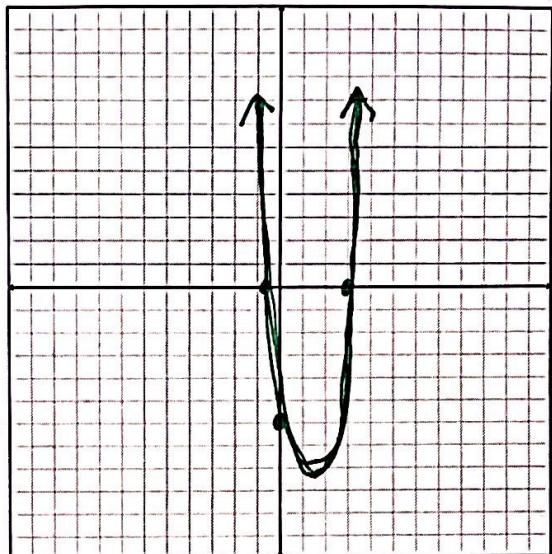
$\boxed{\text{y-intercept: } -6}$

4.) $f(x) = x^2 - 4x + 4$

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

$0 = (x-2)^2$

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

$\boxed{x = 2}$

$\boxed{\text{y-intercept: } 4}$

$\begin{array}{c} 4 \\ -2 \quad\times\quad -2 \\ -4 \end{array}$
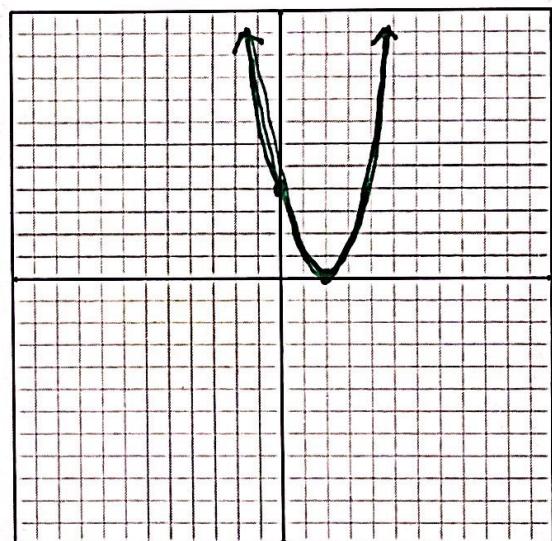
when 1 solution,
the vertex is on the
x-axis & it bounces at that point

5.) $f(x) = -2x^2 + 8x - 8$ Factor GCF

$0 = -2(x^2 - 4x + 4) \rightarrow$ Same as 4.

$0 = -2(x-2)^2$

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

$\boxed{x = 2}$

$\boxed{\text{y-intercept: } -8}$