Graph the following equations. **FIND AND LABEL** all key features of the equation.

$y = ax^2 + bx + c$

$a = -1$ $c = 16$

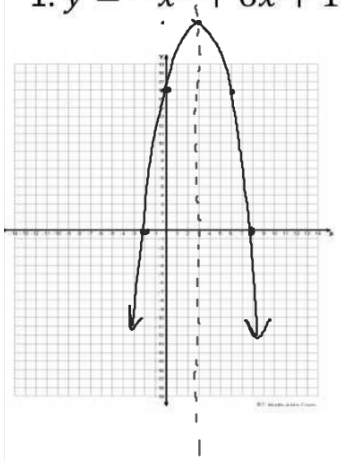
$b = 6$

1. $y = -x^2 + 6x + 16$

$x = \frac{-b}{2a}$

$= \frac{-6}{2(-1)} = \frac{-6}{-2}$

$= 3$



Vertex $(3, 25)$ A.O.S $x = 3$

Maximum or Minimum?

y-intercepts $(0, 16)$ x-intercepts $x = 8, -2$

Domain $(-\infty, \infty)$ Range $(-\infty, 25]$

Interval of Increasing $(-\infty, 3)$

Interval of Decreasing $(3, \infty)$

$-(3)^2 + 6(3) + 16$

$-9 + 18 + 16$

25

$0 = -x^2 + 6x + 16$

$0 = x^2 - 6x - 16$

$(x-8)(x+2)$

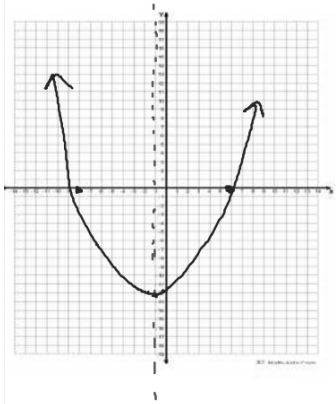
$x - 8 = 0$ $x + 2 = 0$

$x = 8$ $x = -2$

Graph the following equations. **FIND AND LABEL** all key features of the equation.

$y = a(x-p)(x-q)$

1. $y = \frac{1}{4}(x+8)(x-6)$



$\frac{-8+6}{2} = -1$

$\frac{1}{4}(-1+8)(-1-6)$

$\frac{1}{4}(7)(-7)$

$\frac{1}{4}(-49) = -\frac{49}{4}$

Vertex $(-1, -12.25)$ A.O.S $x = -1$

Maximum or Minimum?

y-intercepts $(0, -12)$ x-intercepts $(-8, 0)$ $(6, 0)$

Domain $(-\infty, \infty)$ Range $[-12.25, \infty)$ $[-\frac{49}{4}, \infty)$

Interval of Increasing $(-1, \infty)$

Interval of Decreasing $(-\infty, -1)$

$x+8=0$ $x-6=0$

$x=-8$ $x=6$

$\frac{1}{4}(0+8)(0-6)$

$\frac{1}{4}(8)(-6)$

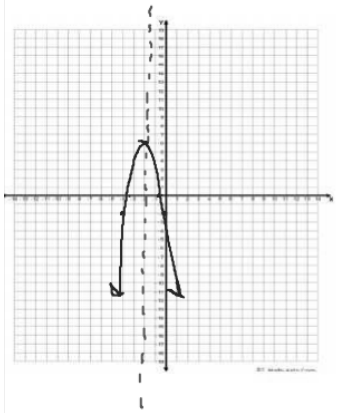
-12

Graph the following equations. **FIND AND LABEL** all key features of the equation.

$y = a(x-h)^2 + k$

$V(h, k)$

1. $y = -2(x+2)^2 + 6$



Vertex $(-2, 6)$ A.O.S $x = -2$

Maximum or Minimum?

y-intercepts $(0, -2)$

Domain $(-\infty, \infty)$ Range $(-\infty, 6]$

Interval of Increasing $(-\infty, -2)$

Interval of Decreasing $(-2, \infty)$

$-2(0+2)^2 + 6$

$-2(4) + 6$

$-8 + 6$

-2

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

$-6 \qquad -6$

$\frac{-6}{-2} = \frac{-2(x+2)^2}{-2}$

$\pm\sqrt{3} = \sqrt{(x+2)^2}$

$\pm\sqrt{3} = x + 2$

$-2 \pm \sqrt{3} = x$

$x = -.27, -3.73$

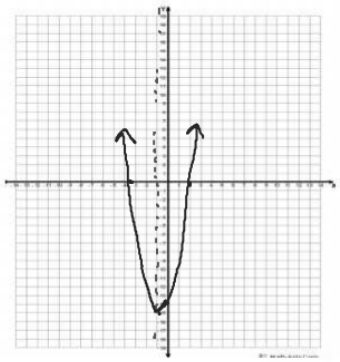
Graph the following equations. **FIND AND LABEL** all key features of the equation.

1. $y = 2x^2 + 3x - 14$

$x = \frac{-b}{2a}$

$= \frac{-3}{2(2)}$

$= -\frac{3}{4}$



Vertex $\left(-\frac{3}{4}, -\frac{121}{8}\right)$ A.O.S $x = -\frac{3}{4}$

Maximum or Minimum?

y-intercepts $(0, -14)$ x-intercepts $x = -3.5$, $x = 2$

Domain _____ Range $[-15.125, \infty)$

Interval of Increasing _____

Interval of Decreasing _____

$\frac{-28}{-4 \cdot 7}$

$0 = 2x^2 + 3x - 14$

$(2x^2 - 4x) + (7x - 14)$

$2x(x-2) + 7(x-2)$

$(2x+7)(x-2)$

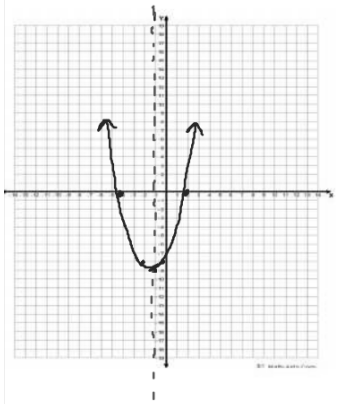
$2x + 7 = 0$ $x - 2 = 0$

$x = \frac{-7}{2}$ $x = 2$

-3.5

Graph the following equations. **FIND AND LABEL** all key features of the equation.

1. $y = (x+4)(x-2)$



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

$(-1+4)(-1-2)$

$(3)(-3)$

-9

Vertex $(-1-9)$ A.O.S $x=-1$

Maximum or Minimum?

y-intercepts $(0,-8)$ x-intercepts $(-4,0)$ $(2,0)$

Domain _____ Range $[-9,\infty)$

Interval of Increasing $(-1,\infty)$

Interval of Decreasing $(-\infty,-1)$

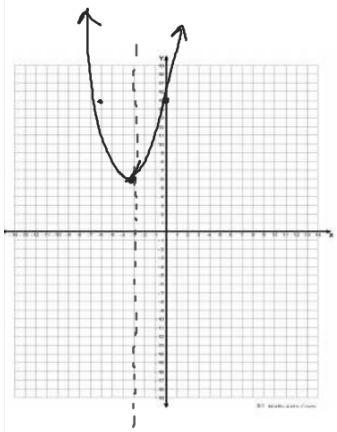
$(0+4)(0-2)$

$(4)(-2)$

-8

Write the equation in vertex form by completing the square.

$y = x^2 + 6x + 15$



Vertex Form $y = (x+3)^2 + 6$

Vertex $(-3, 6)$ AOS $x = -3$ No x-intercepts

min

y-intercept $(0, 15)$

Domain _____ Range $[6, \infty)$

Interval of Increasing _____

Interval of Decreasing _____

$y = (0+3)^2 + 6$

$3^2 + 6$

$9 + 6 = 15$

$$y = x^2 + 8x + 9$$

$$y - 9 = x^2 + 8x + 16$$

$$+16$$

$$y + 7 = (x+4)^2$$

$$y = (x+4)^2 - 7$$

$$V(-4, -7)$$

$$y = x^2 - 3x - 7$$

$$y + 7 = x^2 - 3x^2 + \frac{9}{4}$$

$$+\frac{9}{4}$$

$$y + \frac{37}{4} = \left(x - \frac{3}{2}\right)^2$$

$$y = \left(x - \frac{3}{2}\right)^2 - \frac{37}{4}$$

$$V\left(\frac{3}{2}, -\frac{37}{4}\right)$$