

# Graphing Quadratic Equations

## Station 1

Directions: Find the following

- Graph:
- x-intercept(s):
- y-intercept:
- vertex
- axis of symmetry

1.  $f(x) = (x+2)(x+4)$       2.  $f(x) = 3(x+2)^2 - 4$       3.  $f(x) = -x^2 + 5x - 6$

② vertex  $(-2, -4)$

AOS  $x = -2$

y-intercept  $x=0$   $(0, 8)$

$y = 3(0+2)^2 - 4$

$y = 3(4) - 4$

$y = 12 - 4$

$y = 8$

X-intercepts

$0 = 3(x+2)^2 - 4$

$+4 \quad +4$

$4 = 3(x+2)^2$

$\frac{4}{3} = \frac{3(x+2)^2}{3}$

$\sqrt{(x+2)^2} = \sqrt{\frac{4}{3}}$

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

$-2 \quad -2$

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

③ X-intercept

$0 = -1(x^2 - 5x + 6)$

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

$x-3=0 \quad x-2=0$

$x=3 \quad x=2$

$(3, 0) \quad (2, 0)$

AOS  $x = 2.5$

Vertex

$x \rightarrow \frac{3+2}{2}$

$x = 2.5$

$y = -(2.5-3)(2.5-2)$

$y = -(-0.5)(0.5)$

$y = .25$

$(2.5, .25)$

y-intercept

$y = -1(0-3)(0-2)$

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

$y = -6$

$(0, -6)$

① X-intercepts

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

$x+4=0 \quad x=-4$

$(-2, 0) \quad (-4, 0)$

y-intercept

$x=0$

$y = (0+2)(0+4)$

$y = (2)(4)$

$y = 8$

$(0, 8)$

AOS  $x = -3$

Vertex  $(-3, 7)$

$x \rightarrow \frac{-2+(-4)}{2}$

$x = -3$

$y = (-3+2)(-3+4)$

$y = (-1)(1)$

$y = -1$

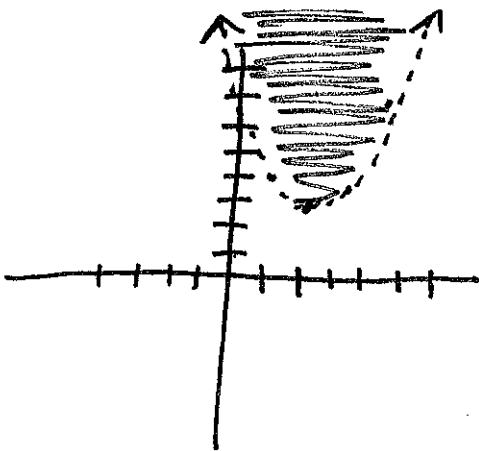
③

# Graphing Quadratic Inequalities

## Station 2

Graph each of the following inequalities, AND give ONE possible solution.

1.  $y > (x - 2)^2 + 3$



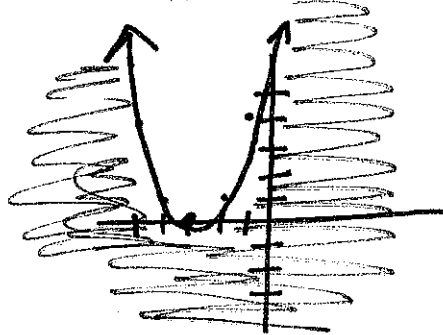
Example of one  
possible solution:  
(2, 5)

\* solutions are  
any points in  
shaded area

2.  $y \leq x^2 + 6x + 9$

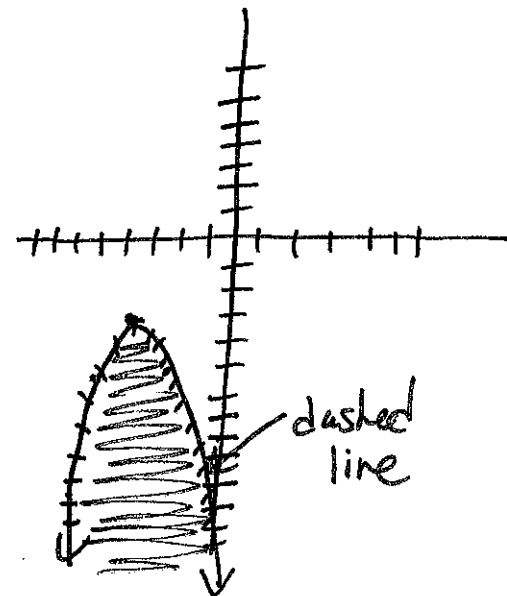
$(x + 3)(x + 3)$

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



Example of one  
solution:  
(-2, -3)

3.  $y < -2(x + 4)^2 - 3$



Example of one  
solution:  
(-3, -6)

# Converting Quadratic Equations

## Station 3

Convert each of the following equations as instructed.

1. Convert to **standard form**

$$y = -2(x + 7)(x - 3)$$

2. Convert to **vertex form**

$$y = 4x^2 - 8x + 15$$

3. Convert to **intercept form**

$$y = 8x^2 + 10x - 12$$

$$\begin{aligned} 1) \quad y &= -2(x+7)(x-3) \\ &= -2(x^2 - 3x + 7x - 21) \\ &= -2(x^2 + 4x - 21) \\ &= -2x^2 - 8x + 42 \end{aligned}$$

$$\begin{aligned} 2) \quad y &= (4x^2 - 8x + \underline{\quad}) + 15 - \underline{\quad} \\ y &= 4(x^2 - 2x + \frac{1}{4}) + 15 - 1 \\ \left(\frac{b}{2}\right)^2 &= \left(\frac{-2}{2}\right)^2 = 1 \\ y &= 4(x-1)^2 + 15 - 4 \\ &= 4(x-1)^2 + 11 \end{aligned}$$

$$\begin{aligned} 3) \quad y &= 8x^2 + 10x - 12 \\ y &= 2(4x^2 + 5x - 6) \\ &= 2(x^2 + \frac{5}{4}x - \frac{6}{4}) \\ &= 2(x^2 + \frac{5}{4}x - \frac{6}{4}) \\ &= 2(x+2)(x-\frac{3}{4}) \\ &= 2(x+2)(4x-3) \end{aligned}$$

# Solving Quadratic Equations

## Station 4

1. If the area of a rectangle is  $24 \text{ ft}^2$ , the length is  $(x+2)$  and the width is  $(5x-4)$ . Solve for  $x$ . What value would NOT make sense as a solution? What is the length and width?

2.  $f(x) = x^2 + 8x + 12$

3.  $f(x) = \frac{2}{3}x^2 - 4$

4.  $f(x) = 2(x-1)^2 - 10$

5.  $10x^2 - 100x = 0$

$$\begin{array}{r} 3) \quad 0 = \frac{2}{3}x^2 - 4 \\ \phantom{3) \quad} +4 \phantom{0 = \frac{2}{3}x^2 - 4} \\ \phantom{3) \quad} \phantom{+4} \phantom{0 = \frac{2}{3}x^2 - 4} \end{array}$$

$$\frac{3}{2} \cdot 4 = \frac{2}{3}x^2$$

$$\sqrt{6} = \sqrt{x^2}$$

$$x = \pm \sqrt{6}$$

1)  $24 = (x+2)(5x-4)$

$$24 = 5x^2 - 4x + 10x - 8$$

$$\begin{array}{r} 24 = 5x^2 + 6x - 8 \\ -24 \phantom{= 5x^2 + 6x - 8} \\ \phantom{-24} \phantom{= 5x^2 + 6x - 8} \end{array}$$

$$0 = 5x^2 + 6x - 32$$

$$x^2 + 6x - 160$$

$$(x+16)(x-10)$$

$$0 = (5x+16)(x-2)$$

$$5x+16=0 \quad x-2=0$$

$$\boxed{x = -\frac{16}{5}} \quad \boxed{x = 2}$$

$$L = (2+2)$$

$$= 4$$

$$W = (5 \cdot 2 - 4)$$

$$= 6$$

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

$$\begin{array}{cc} x+6=0 & x+2=0 \\ \boxed{x=-6} & \boxed{x=-2} \end{array}$$

4)  $0 = 2(x-1)^2 - 10$

$$\begin{array}{r} +10 \phantom{0 = 2(x-1)^2 - 10} \\ \phantom{+10} \phantom{0 = 2(x-1)^2 - 10} \end{array}$$

$$\frac{10}{2} = \frac{2(x-1)^2}{2}$$

$$\sqrt{5} = \sqrt{(x-1)^2}$$

$$x-1 = \pm \sqrt{5}$$

$$\begin{array}{r} +1 \phantom{x-1 = \pm \sqrt{5}} \\ \phantom{+1} \phantom{x-1 = \pm \sqrt{5}} \end{array}$$

$$\boxed{x = 1 \pm \sqrt{5}}$$

5)  $10x^2 - 100x = 0$

$$10x(x-10) = 0$$

$$10x = 0 \quad x-10 = 0$$

$$\boxed{x=0} \quad \boxed{x=10}$$

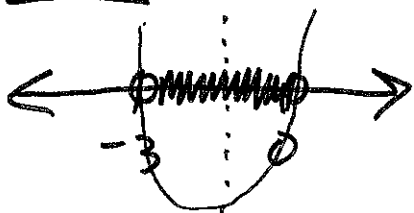
# Station 5

1)  $x^2 + 3x < 0$

$x(x+3) < 0$

$x = 0$     $x+3 = 0$   
                   -3   -3

$\boxed{< y}$     $x = -3$



2)  $2x^2 + 3x \leq 5$

$-5 \quad -5$

$2x^2 + 3x - 5 \leq 0$

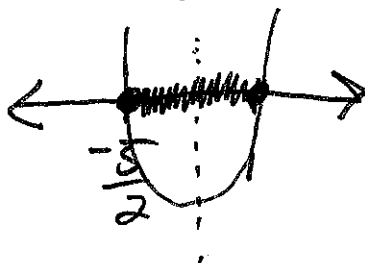
$x^2 + 3x - 10$

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

$(2x+5)(x-1) \leq y$

$2x+5 = 0$     $x-1 = 0$

$x = -\frac{5}{2}$     $x = 1$



3)  $0 > -x^2 + 2x + 8$

$0 > -1(x^2 - 2x - 8)$

$0 > -1(x-4)(x+2)$

$\boxed{y >}$     $x = 4$     $x = -2$

