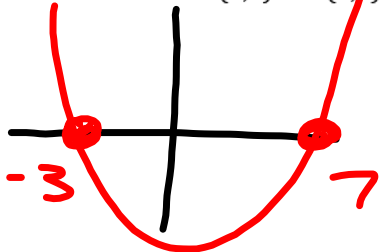


Quadratic Functions

Name \_\_\_\_\_

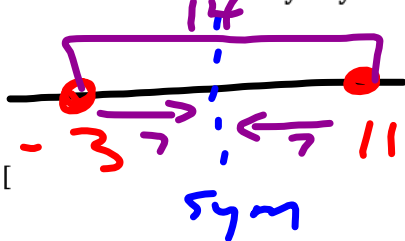
1. Use quadratic function skills to solve:

a) Does the quadratic function  $y = (x - 7)(x + 3)$  have x-intercepts of (7,0) and (-3,0)? Explain or justify why you agree or disagree.



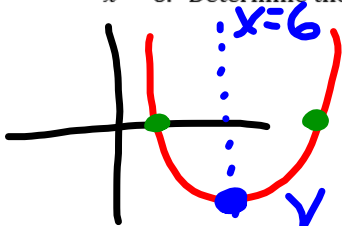
Factor: zero  
 $x - 7 = 0$      $x + 3 = 0$   
 $x = 7$          $x = -3$

b) A quadratic function has x-intercepts of (-3,0) and (11,0). Explain or justify why the equation for the axis of symmetry is  $x = 4$ .



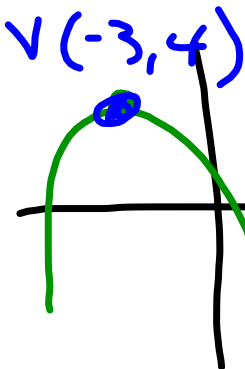
$$\frac{-3 + 11}{2} = \frac{8}{2} = 4$$
  
 $x = 4$

c) The quadratic function  $y = (x - 9)(x - 3)$  has an axis of symmetry  $x = 6$ . Determine the coordinates of the vertex for this function.



$f(6) = (6 - 9)(6 - 3)$   
 $= (-3)(3)$   
 $= -9$   
 Vertex:  $(6, -9)$

d) The quadratic function  $y = -2(x + 3)^2 + 4$  has a vertex of (-3,4) and a range of  $y \geq 4$ . Explain or justify why you agree or disagree.



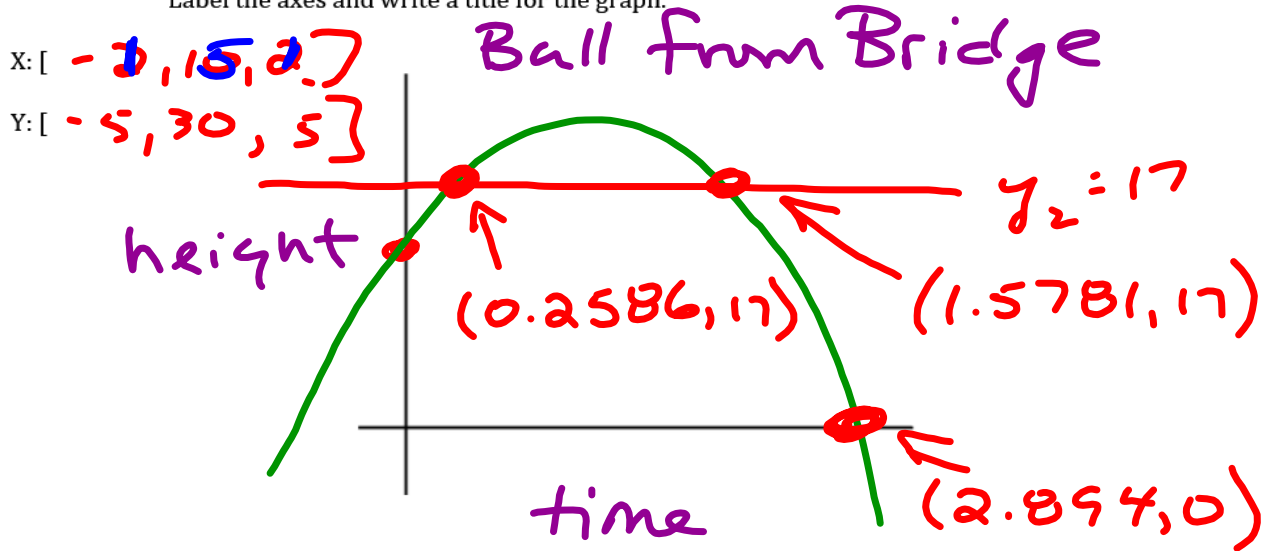
range  
 $y \leq 4$

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

Quad Functions 20.2

2. A ball is thrown into the air from a bridge that is 15 m above a river. The function that models the height,  $h(t)$  in metres, of the ball over time,  $t$  in seconds, is  $h(t) = -4.9t^2 + 9.0t + 15$

- a) Record your window setting and sketch the path of the ball. Label the axes and write a title for the graph.



- b) What TWO times is the ball 17 m above the water? [rounded to one decimal place]

$$\left. \begin{aligned} 17 &= -4.9t^2 + 9.0t + 15 \\ 0 &= -4.9t^2 + 9.0t - 2 \end{aligned} \right\} \begin{array}{l} y_1 = \\ y_2 = 17 \end{array} \text{ intersect}$$

$t = 0.3$  s  
 $t = 1.6$  s

- c) When does the ball hit the water? [rounded to one decimal place]

$$h = 0 = -4.9t^2 + 9.0t - 2 \text{ } \left. \vphantom{h} \right\} \text{ "zero"}$$

$t = 2.9$  s

- d) How high does the ball go?

CALC → MAX

$(0.92, 19.13)$

height

max = 19.1 m

## Quad Functions 20.2

### 3. Revenue Problem:

The promoter of a concert expects 1000 people to attend if ticket prices are \$10.00/person. The promoter ask Math 20 student from LCHS to study past events and recommend a ticket price that will maximize concert ticket revenue. Students surveyed fans and found that for every \$1.00 increase in ticket price 50 fewer people would attend the concert. What ticket price will we recommend to the concert promoter?

- Make a chart
- Find the Revenue Equation
- Graph Function
- Max Point and interpret

PRICE	10.00	11.00	12.00	13.00
NUMBER	1000	950	900	850
REVENUE	10000	10450	10800	11050

L1	L2
PRICE OR NUMB	REV
10	10000
11	10450
12	10800
13	11050

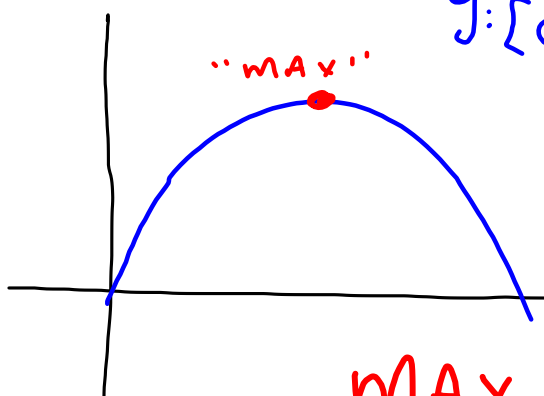
$$a = -50$$

$$b = 1500$$

$$c = 0$$

$$x: [0, 20, 5]$$

$$y: [0, 15000, 5000]$$



MAX

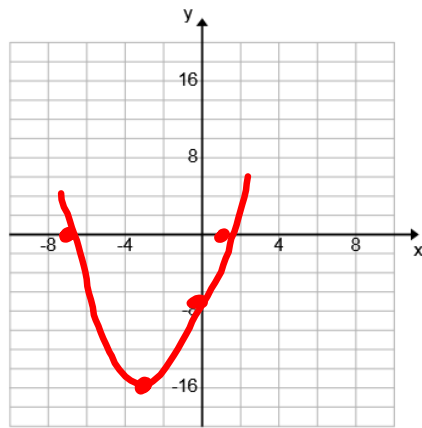
$$x = 15$$

$$y = 11250$$

## Quad Functions 20.2

4. Given the Quad Function:  $y = x^2 + 6x - 7$

- Sketch
- Determine properties: intercepts, vertex, equation of symmetry, domain, range
- Write the equation in two other formats: vertex format, intercept format.



20.2  
 $y = x^2 + 6x - 7$

table

trace

CALC - ZERO

- MAX

x-int

$$0 = x^2 + 6x - 7$$

$$0 = (x+7)(x-1)$$

$$x = -7 \quad x = 1$$

sym

$$x = -3$$

y-int

$$y = (0)^2 + 6(0) - 7$$

$$y = -7$$

vertex

$$y = [x^2 + 6x + 9] - 7 - 9$$

$$y = (x+3)^2 - 16$$

$$V(-3, -16)$$