

Quadratic Functions Quiz 2 (2020)

1. A concert sells all 5000 seats to stadium when the price of a ticket is \$30. The concert manager needs to increase the revenue from the sale of tickets, so she commissions a survey to predict ticket sales for different ticket prices. The results are shown in the table below.

Ticket Price (\$)	30.00	35.00	45.00	50.00	70.00
Expected Sales	5000	4500	3500	3000	1000

- a) Find the revenue generated for each ticket price.

Ticket Price	\$ 30.00	\$ 35.00	\$ 45.00	\$ 50.00	\$ 70.00
Revenue	150000	157500	157500	150000	70000

- b) Determine a best-fit Revenue function using **quadratic regression** with the ticket price and revenue data. Round off your values to the nearest hundredth as necessary.

$$y = ax^2 + bx + c$$

$$a = -100$$

$$b = 8000$$

$$c = 0$$

$$y = -100x^2 + 8000x + 0$$

Write the equation:

[5]

- c) What would be a good window to view this on your calculator

X: [min , max , scale] = MAX = 80 or 100, COUNT BY 10

Y: [min , max , scale] =

$$X: [-10, 100, 10]$$

MAX = 100000
OR
200000

COUNT BY 20000 or 50000

$$y: [-50000, 200000, 50000]$$

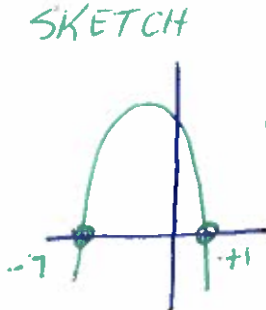
$$y: [-20000, 160000, 20000]$$

2. Use your quadratic function skills to solve or justify with **algebra and/or a sketch**:

- a) The quadratic function $y = -1(x + 7)(x - 1)$ has x-intercepts of (7,0) and (-1,0). Explain or justify why you agree or disagree.

ALG Factors = zero
 $x+7=0$ $x-1=0$
 $x=-7$ $x=1$

Disagree, signs are opposite of factors.



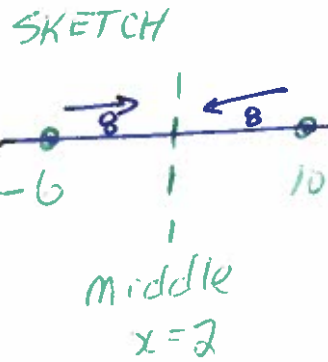
Finds zeros or roots.
 graph shows signs are wrong on the intercepts.

- b) A quadratic function has x-intercepts of (-6,0) and (10,0). Explain or justify why you agree or disagree that the axis of symmetry is $x = 8$.

[6] Algebra = average

$$\frac{-6+10}{2} = \frac{4}{2} = 2$$

symmetry is not $x=8$
 symmetry is $x=2$



- c) The quadratic function $y = 0.5(x + 5)(x - 3)$ has an axis of symmetry $x = -1$.
 i. Determine the coordinates of the vertex for this function.
 ii. Determine the range for this function.

Algebra $x = -1$
 solve $y =$

$$y = 0.5(-1+5)(-1-3)$$

$$y = 0.5(4)(-4)$$

$$y = -8$$

Vertex $(-1, -8)$

opens up so min = -8
 $y \geq -8$

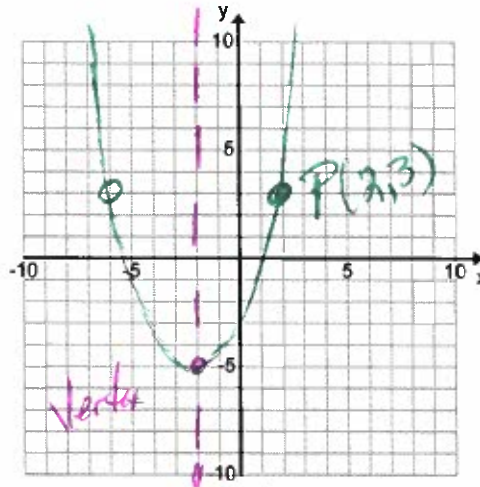
SKETCH



minimum
 $x = -1$ $y = -8$
 Vertex $(-1, -8)$
 $y \geq -8$

3. The quadratic function $y = a(x - h)^2 + k$ has a vertex of $(-2, -5)$ and passes through the point $(2, 3)$.

a) Plot the vertex, plot the point $(2, 3)$ and draw in the line of symmetry. Sketch the function.



symmetry

b) Determine the value of a that satisfies this quadratic function, rounded to the nearest tenth if necessary.

$$y = a(x + 2)^2 - 5 \quad P(2, 3) \quad x = 2 \quad y = 3$$

$$3 = a(2 + 2)^2 - 5$$

$$3 = a(4)^2 - 5$$

$$3 = 16a - 5$$

$$8 = 16a$$

$$a = \frac{8}{16} \text{ OR } a = 0.5$$

4. Complete the diamonds. The top cell contains the product of the numbers in the left and right cells while the bottom cell contains the sum.

[2]

$$\begin{array}{ccc} & 10 & \\ 2 & \times & 5 \\ & 7 & \end{array}$$

$$\begin{array}{ccc} & 36 & \\ 4 & \times & 9 \\ & 13 & \end{array}$$

$$\begin{array}{ccc} & 45 & \\ -15 & \times & -3 \\ & -18 & \end{array}$$

$$\begin{array}{ccc} & -32 & \\ +16 & \times & -2 \\ & 14 & \end{array}$$

5. Solve by factoring.

a) $x^2 - 8x - 20 = 0$

$$\begin{array}{r} -20 \\ -10 \quad +2 \\ -8 \end{array}$$

$$x^2 - 10x + 2x - 20 = 0$$

$$x(x-10) + 2(x-10) = 0$$

$$(x-10)(x+2) = 0$$

$$x-10 = 0 \quad x+2 = 0$$

$$x = 10 \quad x = -2$$

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

$$\begin{array}{r} -12 \\ +4 \quad -3 \\ +1 \end{array}$$

$$2x^2 + 4x - 3x - 6 = 0$$

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

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

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

$$x = -2 \quad x = \frac{3}{2} \text{ OR } 1.5$$

[9]

c) $x^2 - x - 10 = 4x + 14$
 $-4x - 14$

$$x^2 - 5x - 24 = 0$$

$$\begin{array}{r} -24 \\ -8 \quad +3 \\ -5 \end{array}$$

$$x^2 - 8x + 3x - 24 = 0$$

$$x(x-8) + 3(x-8) = 0$$

$$(x-8)(x+3) = 0$$

$$x-8 = 0 \quad x+3 = 0$$

$$x = 8 \quad x = -3$$