Name: ___________________________ Date: _______________________

Learning Goal 3.2	Given a quadratic function, identify the characteristics of graphs, including domain, range, intercepts, vertex and the axis of symmetry.

Example At the Children's Festival, the organizers are roping off a rectangular area for stroller parking. There is 160 metres of rope available to create the perimeter.

a. Write a quadratic function in standard form to represent the area for the stroller parking.

$$2x + 2y = 160$$
$$2y = 160 - 2x$$
$$y = 80 - x$$

$$A = xy$$
$$= x(80 - x)$$
$$A(x) = 80x - x^2$$

b. What are the coordinates of the vertex? What does the vertex represent in this situation?

$$80x - x^2 = 0 \text{ when } x = 0, 80$$

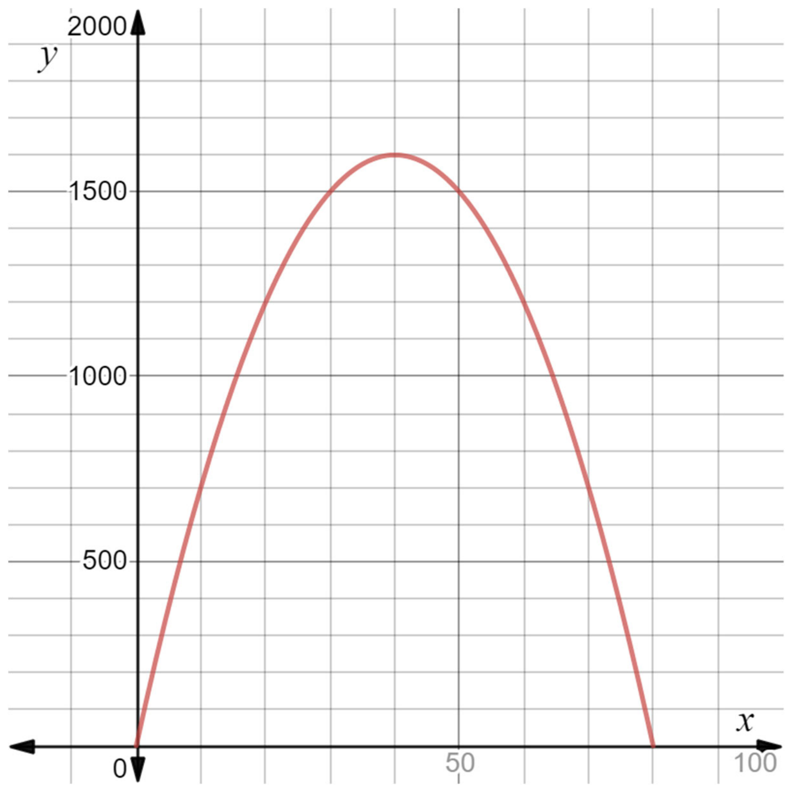
$$x_v = \frac{80 - 0}{2} = 40$$

$$A(40) = 80(40) - (40)^2 = 1600$$

$$\text{vertex } (40, 1600)$$

This represents the maximum area possible ($1600\ \text{m}^2$) with the given amount of rope.

c. Sketch the graph for the function you determined.



d. Determine if there are any x −intercepts that are relevant. What do these intercepts, if they exist, represent in the situation?

$$x(80 - x) = 0 \text{ when } x = 0, 80$$

The area for stroller parking is $0\ \text{m}^2$ when the length of the rectangle is $0\ \text{m}$ or when the length is $80\ \text{m}$.

e. Determine the domain and range for the situation?

Domain $\{x | 0 \le x \le 80, x \in \mathbb{R}\}$

Range $\{y | 0 \le y \le 1600, y \in \mathbb{R}\}$

Assignment p. 175 # 1 – 10, 12, 15, 16, 18, 21 Quiz Next Day!

Example *Amaranth* is a type of vegetable commonly grown in Asia, West Africa, and the Caribbean. When amaranth plants are grown in rows, the height that the plants attain is a quadratic function of the spacing between plants within a row. According to one study, the minimum height of the plants, about 16 cm, occurred when the plants were spaced about 27 cm apart. The study also found that the plants grew to about 20 cm when spaced about 40 cm apart. Write a quadratic model giving the plant height *h* as a function of the spacing *s*.

We are given 2 ordered pairs (s, h):

$(27, 16)$
We are also told that this coordinate is the minimum height of the plants, so this is our vertex.

$(40, 20)$
We will use this point to find the expansion value, a.

$$h(s) = a(s - p)^2 + q$$

$$h(s) = a(s - 27)^2 + 16$$

Now use the other point given to find the a value.

$$20 = a(40 - 27)^2 + 16$$

$$20 = a(13)^2 + 16$$

$$20 = 169a + 16$$

$$4 = 169a$$

$$a = \frac{4}{169}$$

$$h(s) = \frac{4}{169}(s - 27)^2 + 16$$

Assignment p. 175 # 1 – 10, 12, 15, 16, 18, 21 Quiz Next Day!