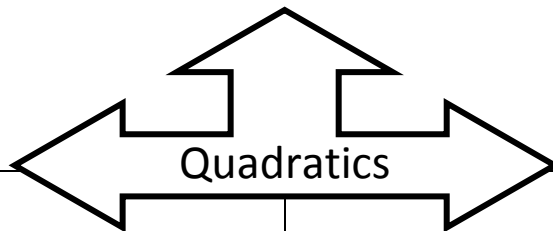


A. Setting the Stage → Think, Puzzle, Explore

What do you **THINK** you know about Quadratics?



What questions or **PUZZLES** do you have?

How can you **EXPLORE** this topic?

A. Investigating Quadratic Relations – Modelling a Business’ Revenue

- a. A hockey arena seats 1600 people. The cost of a ticket is \$10. At this price, every ticket is sold. To increase revenue, the arena management plans to increase ticket prices. They conduct a survey and determine that for a 50 cent increase in price, 50 less people will attend
- i. What is the initial cost of a ticket?
 - ii. What is the initial number of people attending the game?
 - iii. What revenue/income does the hockey arena make?

 - iv. One price increment of \$0.50 is made. What is the new ticket price?
 - v. How many people attend the game now?
 - vi. What revenue/income does the hockey arena make?

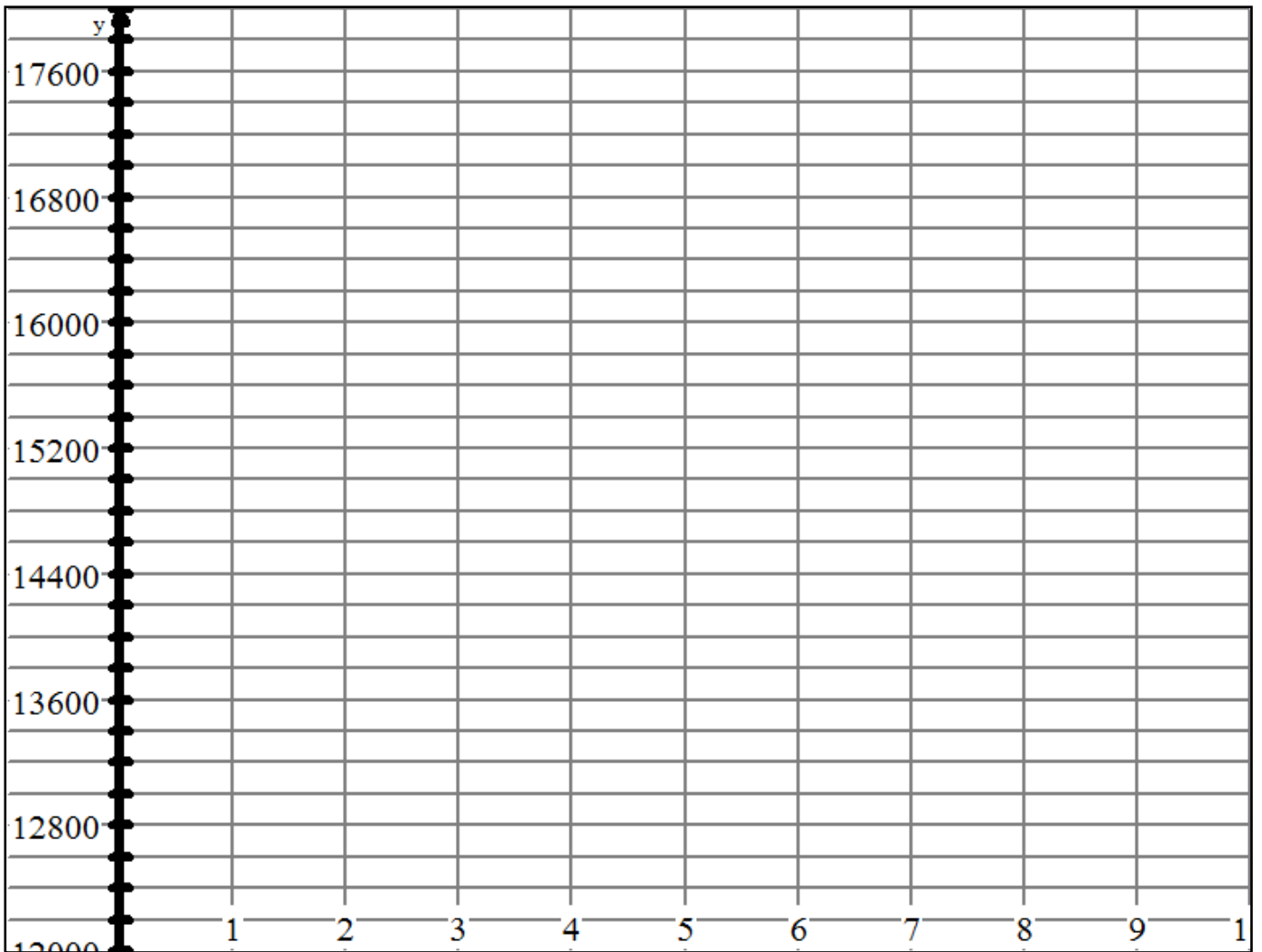
 - vii. Two price increments of \$0.50 are made. What is the new ticket price?
 - viii. How many people attend the game now?
 - ix. What revenue/income does the hockey arena make?

 - x. Three price increments of \$0.50 are made. What is the new ticket price?
 - xi. How many people attend the game now?
 - xii. What revenue/income does the hockey arena make?
- b. Continue this pattern to complete a data table

# of price increments	Ticket price	Number of people attending	Revenue/income
0	10	1,600	16,000
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Exploring Quadratic Relations | Lesson 20

- c. What type of a relation is “ticket price”? Write an equation for determining the ticket price.
- d. What type of a relation is “number of people attending”? Write an equation for determining the number of people attending.
- e. What type of relation is “revenue”? Write an equation for determining the revenue for the arena.
- f. Graph the data on the partial grid provided.



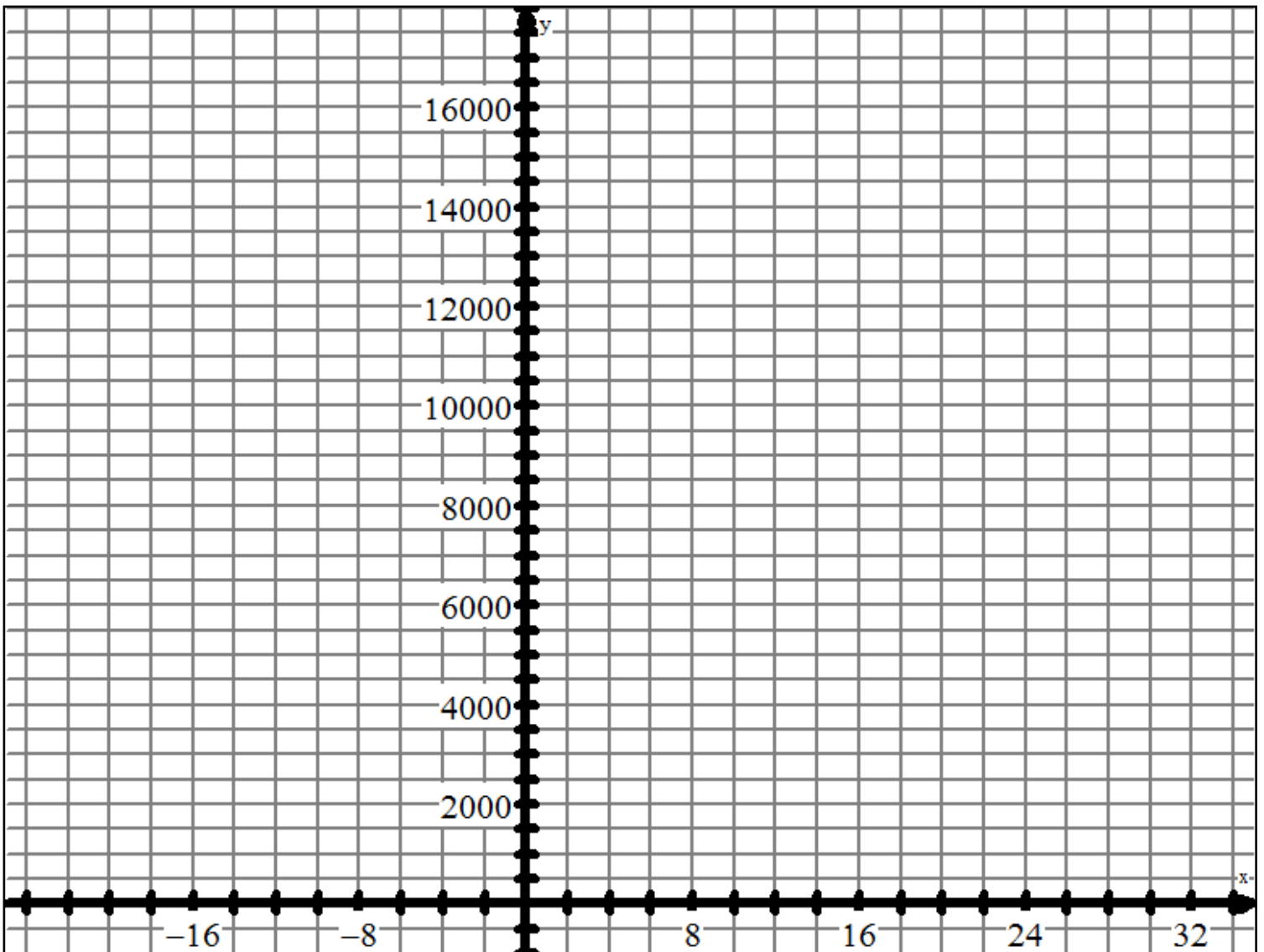
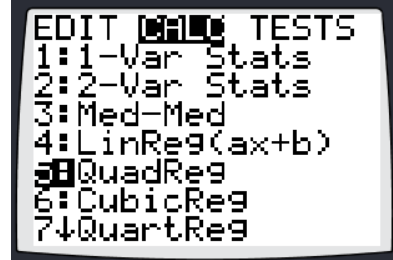
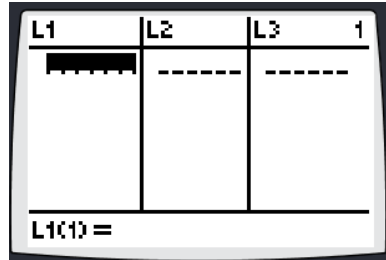
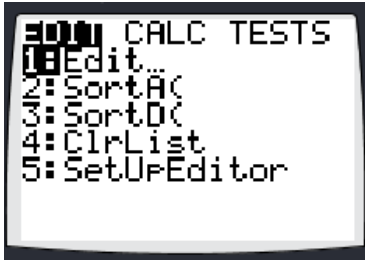
Exploring Quadratic Relations | Lesson 20

- g. Now graph the complete relation from either (a) the equation or (b) from technology
i. **Technology** – Let's look at the two data sets ($x \rightarrow$ # of price increments; $y \rightarrow$ revenue)

Go to STAT – EDIT to enter the data

Enter the x/y data in L1 and L2

STAT - CALC – 5 (QUADREG)



ANALYSIS QUESTIONS:

- h. Evaluate and interpret $R(5)$.

- i. Solve and interpret $R(x) = 16,500$.

- j. Evaluate $R^{-1}(15,300)$ and interpret your answer.

- k. Determine the domain and range of this relation

- l. Determine and interpret the y-intercept of this relation.

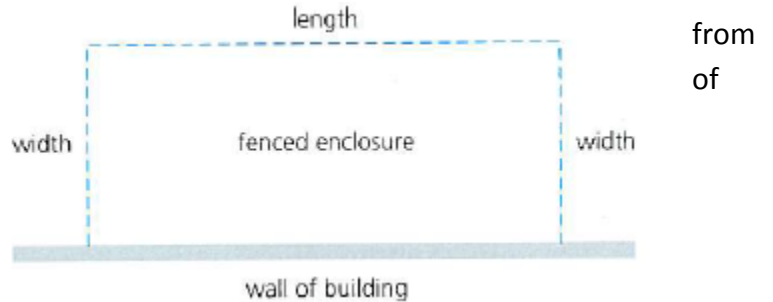
- m. Determine the co-ordinates of the maximum point of this relation and interpret.

- n. Determine the zeroes/x-intercepts of this relation and interpret.

- o. Draw in the axis of symmetry of this relation. What IS an axis of symmetry?

B. Exploration 1

Mr. Brown enjoys vegetable gardening and is digging a garden this weekend. He plans to dig his garden this weekend. He has a total of 12 m of fencing to enclose the rectangular garden to keep his dog eating the vegetables. He is able to use the wall of the garage for one side of the garden.

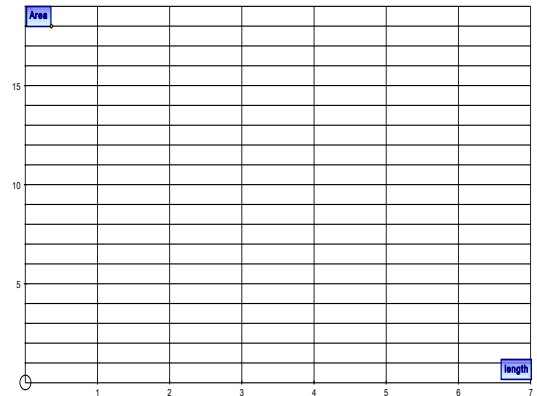


Data

Explore the different lengths, widths and areas he could have for his garden.

Length									
Width									
Area									

Graph



Problem: If Mr. Brown wanted to *maximize* the area of his garden, what would he choose for the dimensions of his garden? Explain your choice.

What does the solution look like on your graph?

Algebra - Could we write an equation for the area A in terms of the length L ?

C. Exploration 2

Mr. Brown decides that he would rather have someone come in and dig the garden for him. When he looks at where the garden is to be, the pool is in the way, and the width of the garden will need to be 1m shorter than the length. He hires a gardener that charges \$8 / square meter to dig the garden. Mr. Brown is worried, and wants to minimize his costs.

Data

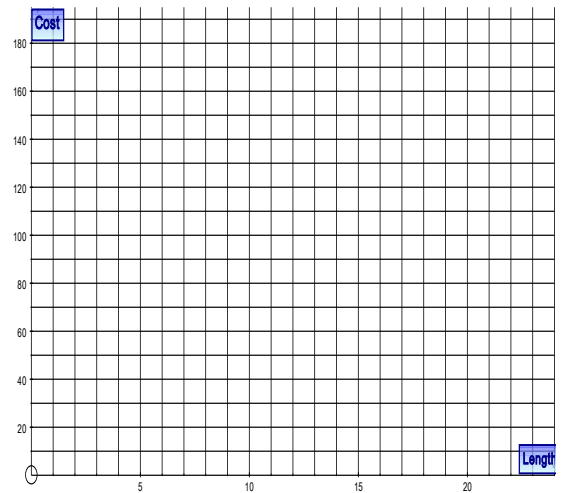
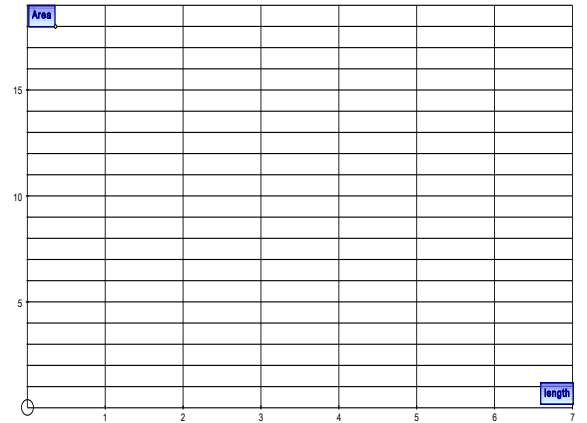
Explore the different lengths, widths and areas he could have for his garden.

Length									
Width									
Area									

Explore the different costs for the garden

Length									
Cost									

Graph



Problem: If Mr. Brown wanted to *minimize* the cost of his garden, what would he choose for the dimensions of his garden? Explain how you made your choice.

What does the solution look like on your graph(s)?

Algebra - Could we write an equation for the Cost C in terms of the length L ?