Name _____ Date _____ Class _____

Additional Practice

Investigation 3

Thinking With Mathematical Models

1. Suppose you are designing a rectangular garden with an area of 350 square feet.

a. What perimeters can you make the garden using whole numbers? For each perimeter, give the length and the width.

b. Suppose you know the length L of a rectangle with an area of 350 square feet. Write an equation that would help you to determine the width W.

c. Suppose you know the width W of a rectangle with an area of 350 square feet. Write an equation that would help you to determine the length L.

d. Make a graph using the equation you wrote in part (b). Explain what your graph is showing.

2. Use only the first quadrant of the coordinate grid for this problem. If you are using a graphing calculator, set your window to show x and y values from 0 to 10 with a scale of 1. Show each graph on the same set of axes.

a. Graph the equation $y = \frac{10}{x}$ for x values from 1 to 10.
For which value of x (from 1 to 10) is y the greatest?
For which value of x is y the least?

b. Graph the equation $y = 10x$ for x values from 1 to 10.
For which value of x (from 1 to 10) is y the greatest?
For which value of x is y the least?

c. Compare the greatest and least values for y that you found in parts (a) and (b).

d. At what point do the two graphs intersect?

Additional Practice *(continued)*

3. Carl wants to save $1,000 for a trip.

a. Suppose he saves $10 per week. How many weeks will it take? How many weeks at $20 per week? How many weeks at $30 per week?

b. Complete this table and then draw a graph to show the data.

Carl's Savings

Amount Saved per Week	10	20	30	40	50	60	70
Number of Weeks							

c. Write an equation showing the relationship between the amount a saved per week and the number of weeks n.

d. What are the changes in the number of weeks needed to reach $1,000 when the amount saved per week changes from:

i. $10 to $20

ii. $20 to $30

iii. $30 to $40

e. How do the answers to part (d) show that the relationship between *amount saved per week* and *number of weeks* is not linear?

4. Tamika is organizing a walkathon for her class. The goal is for students to walk a total of 500 miles. Each student who participates will walk 1 mile per day.

a. How many days will it take to reach the goal if Tamika is the only student who participates?

Additional Practice *(continued)*

b. How many days will it take to reach the goal if 5 students participate? How many days if 10 students participate? How many days if 25 students participate?

c. Make a table of data.

500-Mile Walkathon

Number of Students	1	2	3	4	5	6	7	8	9	10	11	12	13
Number of Days													

Number of Students	14	15	16	17	18	19	20	21	22	23	24	25
Number of Days												

d. Make a graph of the data.

e. Should the points be connected? Explain your reasoning.

f. What pattern do you notice for the number of days when there are 1, 2, 4, 8, and 16 students participating?

g. How do the data in the table show that the relationship between *number of students participating* and *number of day* is not linear?

h. Write an equation showing the relationship between the number of students s participating and the number of days n required to reach the goal.

Additional Practice *(continued)*

5. How are the length and width of rectangles related if the area is fixed at 60 cm^2?

a. Make a table of lengths and widths. Draw a graph of these data.

b. Should the points be connected? Explain your reasoning.

c. Write an equation showing the relationship between length ℓ and width w.

d. Is the relationship between *length* and *width* linear when the area is constant? How does the graph show this?

6. How are the length and width of rectangles related if the perimeter is fixed at 60 cm?

a. Make a table of lengths and widths. Draw a graph of these data.

b. Should the points be connected? Why?

c. Write an equation showing the relationship between length ℓ and width w.

d. Is the relationship between *length* and *width* linear when the perimeter is constant? How does the graph show this?