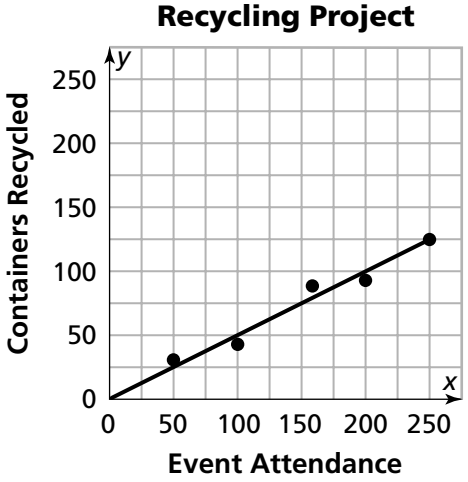
Name _____ Date _____ Class _____

Unit Test

Thinking With Mathematical Models

1. At Metropolis Middle School the student government earns money by recycling cans and bottles after school events.

Some sample (*attendance, containers*) data are shown in the graph below, along with a line modeling the pattern in the data.



a. Use the linear model to estimate answers for the next questions. Explain how each estimate can be found from the graph.

i. About how many containers will be recycled if 125 people attend a chorus concert?

ii. What attendance at a basketball game will produce about 125 containers to be recycled?

b. Use the points (200, 100) and (50, 25) to find an equation in the form $y = mx + b$ for the modeling line. Show your work.

c. Explain what the values of m and b in your equation tell about the relationship between number of containers to be recycled and attendance at the school event.

Unit Test *(continued)*

2. Find equations that relate these conditions.

a. A line with slope 3.5 and y-intercept $(0, -4)$

b. Earnings E of a disk jockey who charges \$25 for travel to an event and \$20 per hour h of time worked

c. A line through $(2, 15)$ and $(6, 7)$

d. Base b and height h of rectangles with area 100 cm^2

3. A group of Metropolis Middle School students volunteered to work all day helping to build a new city playground. A local pizzeria offered to supply eight large pizzas for their lunch. The volunteers share the pizza equally.

a. Complete the following table.

Pizza for Volunteers

Number of Volunteers	1	2	4	8	16	32
Amount of Pizza per Volunteer	8					

b. Is the relationship between the amount of pizza per volunteer and the number of volunteers linear, inverse, or some other pattern? Give an explanation justifying your answer.

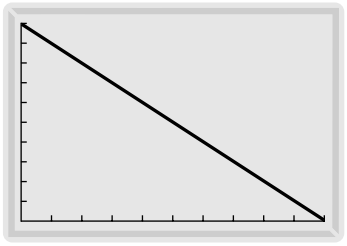
c. Write an equation relating amount of pizza per volunteer P to number of volunteers n.

d. Find the amount of pizza per volunteer if there are 12 volunteers.

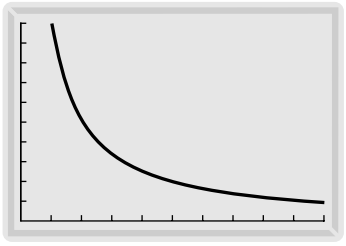
Unit Test *(continued)*

4. Which of the following graph patterns would you expect to see if you were told that variables x and y are related by inverse variation? Explain your reasoning.

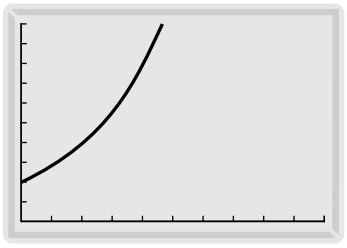
a.



b.



c.



d.