

Exercises for Section 12.1 (1-3)

- * 1. The following situations were written by public elementary school students. For each situation, write a sentence that shows how two quantities in the situation are related. There may be several relationships that you can describe in each situation.

Example: A large block of ice is on the sidewalk in the sun.
It melts 3 centiliters a minute.

The amount of ice decreases as the number of minutes that pass increases.

As time passes, the amount of water on the sidewalk increases.

- a. An airplane is flying miles high over Siberia, hundreds of miles from any help. Suddenly, the tank ruptures and gas starts steadily leaking out.

The amount of gas in tank decreases over time or amount of gas leaked increases over time

- b. A motor home has a water tank that holds a large amount of water. Each shower takes 5 gallons of water.

As showers increase, # of gallons used increases

- c. You have \$5 and you buy candy bars at 50¢ apiece.

A # of candy bars increase \$ spent increases or # of gallons left decreases

- d. A classroom starts off with 16 students. Two students stop coming every week.

As # of weeks increase, # of students in class decreases

2. a. Write your own story like those the students wrote in Exercise 1.

- b. Then write a sentence that shows how two quantities in the situation are related. There may be several quantitative relationships that you can describe.

of students dropped increases

3. Determine whether the pairs of quantities below are related to one another. If so, explain whether the value of the quantity on the right increases or decreases as the value of the quantity on the left increases.

Problem-solving tip: Try some examples and see what happens.

- a. the perimeter of a square and the area of a square

yes - increasing

- b. the base of a triangle and the area of a triangle

NO

- c. the value of the numerator in a fraction (when the denominator stays the same) and the value of the fraction

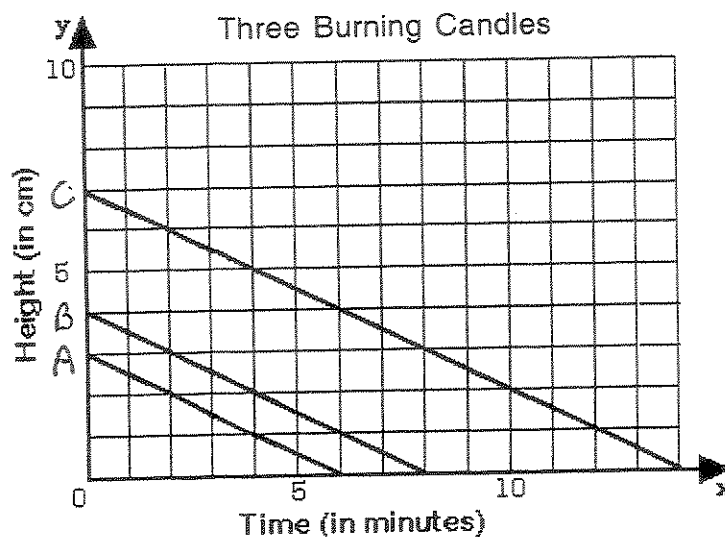
yes - increasing

- d. the value of the denominator in a fraction (when the numerator stays the same) and the value of the fraction

yes - decreasing

variables:
time & gas
variables
showers & water
variables
money & candy bars
variables
time & # of students

4. Burning Candles, Part 2.



a. What was the starting height of each candle?

Candle C - 7 in
 Candle B - 4 in
 Candle A - 3 in

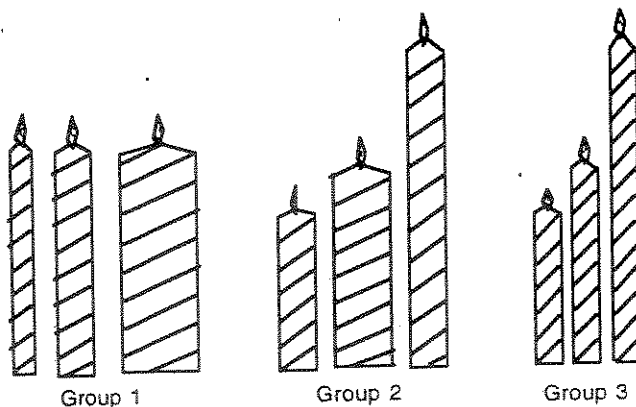
b. At what rate did each candle burn? How do you know?

All burned at same rate
 because slopes are the same
 1 in every 2 minutes

c. What is the slope of each line?

$$\text{slope} = \frac{1}{2}$$

d. Which of the following groups of candles could be represented by the graph and why? Which candle goes with which line?



4 cont.

- e. Write an equation to represent each candle's burning. (Make a table of data for each candle first, if it will help.)

Candle A $H = 3 - \frac{1}{2}T$

Candle B $H = 4 - \frac{1}{2}T$

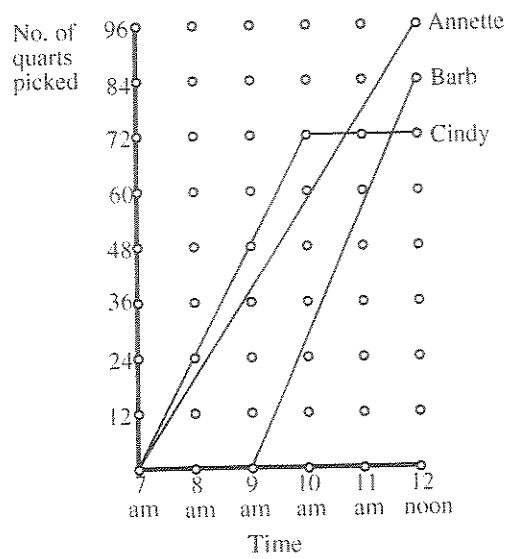
Candle C $H = 7 - \frac{1}{2}T$

- f. How are the three equations alike? How are they different?

Same slopes, different initial heights

- g. Write an equation for a fourth candle, Candle D, whose graph is parallel to the graphs of Candles A, B, and C.
- h. Sketch the graph of your equation for Candle D on the grid with the graphs for Candles A, B, and C.
- i. Describe the candle (Candle D) which you've represented by the graph and equation in parts g and h.

6. The following graphs show the number of quarts of strawberries picked by three people one morning.



- One of the three people was scared by a snake and quit picking. Who was that? How do you know?
- How many quarts does Annette pick per hour?
- At what time did Barb start picking? How many quarts does she pick per hour?
- Which person picks strawberries fastest? How do you know?

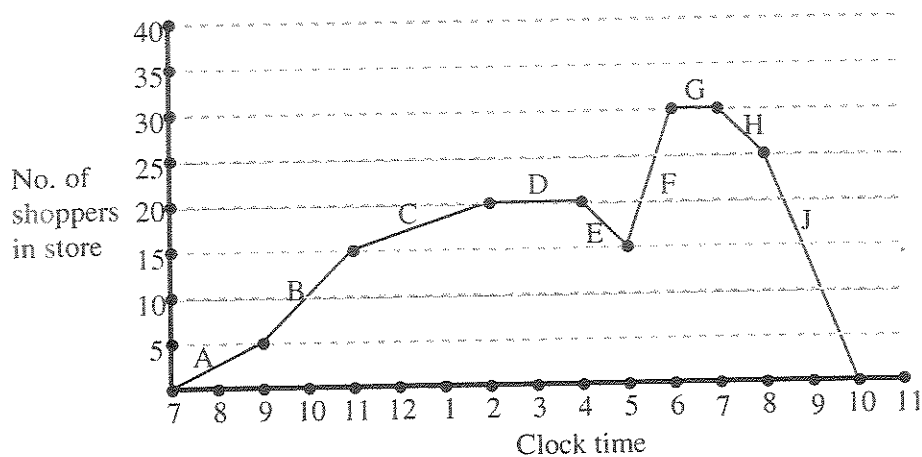
a. Cindy - her amount picked stops at 10 am

b. Annette picked 96 quarts in 5 hours
 $\frac{96}{5} = 19\frac{1}{5}$ quarts per hour

c. Barb started at 9 am - her amount picked is zero before then.
 She picked 84 quarts in 3 hours
 $\frac{84}{3} = 28$ quarts per hour.

d. Barb picked the fastest - her line has steepest slope (also Cindy picked $\frac{72}{3} = 24$ quarts per hour until she quit so Barb picks most per hour)

8. One Monday the manager of a drug store counted the number of shoppers at various times during the day, which are represented by the solid dots on the manager's graph below.



- Why does the graph begin at 7 on the time axis rather than 0?
- What does the manager's graph assume about what happens between the times when the manager counted the shoppers?
- What period saw the greatest increase in customers?
- How could segment D be interpreted?
- How could segment B be interpreted?
- During what hours might the manager need more cashiers?

- That's what time store opened. We are looking at time on clock, not hours since store opened
- That the number of shoppers was increasing or decreasing constantly over that time
- From 5-6 there was an increase of 15 shoppers in one hour
- The number of shoppers remained the same
- The number of shoppers increased at a constant rate from 5 shoppers at 9 am to 15 shoppers at 11 am
- From say 2 pm to 8 pm there are consistently 15 to 20 or more shoppers in the store at any time.

Answers vary