1. A tiger in captivity is fed 13.5 pounds of food a day. The graph shows the pounds of food an elephant in captivity eats per day. Compare the functions by comparing their rates of change. (Example 1)

   A tiger is fed 13.5 pounds per day. An elephant is fed 125

   pounds per day. Since 125 > 13.5, the function for the

   elephant has a greater rate of change.

Pounds of Food

(5, 625)
(4, 500)
(3, 375)
(2, 250)
(1, 125)

Time (days)
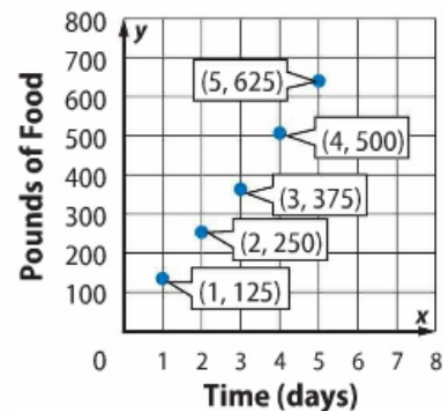
2. Carol's profit at a craft fair is represented by the function $p = 5b - 15$, where p is the profit and b is the number of bracelets she sells. Kate's profit is shown in the table. (Examples 2 and 3)

   a. Compare the y-intercepts and rates of change.

   Carol makes $5 per bracelet, and Kate makes $5 per bracelet.

   At 0 bracelets, Carol's profit is −$15 and Kate's profit is $0.

   b. How much will each girl make if she sells 30 bracelets?

   Carol: $135; Kate: $150

Bracelets Sold	Profit ($)
1	5
2	10
3	15
4	20

Tiger

$$\frac{13.5 \text{ lbs}}{1 \text{ day}}$$

Elephant

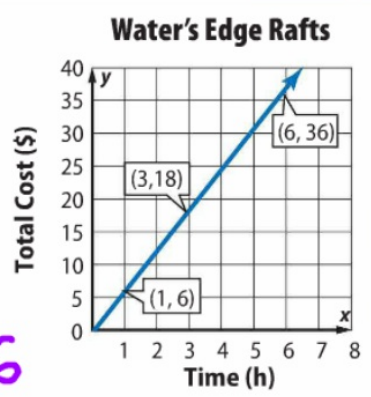| x	y
1	125
2	250

$$\frac{125 \text{ lbs}}{1 \text{ day}}$$

eat more

3. The cost to rent a raft from two different companies is shown. Which company should you use if you rent the raft for 9 hours?

(Example 4) **Ryan's Rafts; The cost to rent from Ryan's Rafts is $33 and the cost to rent from Water Raft Rentals is $54.**

$c = 6h$

$$\frac{12}{2} = 6$$

Water's Edge Rafts

Total Cost ($) vs Time (h); points (1, 6), (3, 18), (6, 36)

Ryan's Rafts

Time (h)	Total Cost ($)
1	15.00
2	17.25
3	19.50
4	21.75
5	24.00

12.75

2.25

$c = 2.25h + 12.75$

4. (e) **Building on the Essential Question** What are the advantages and disadvantages to representing a function

Rate Yourself!

4. (e) **Building on the Essential Question** What are the advantages and disadvantages to representing a function as an equation instead of a graph? **Sample answer: It is easy to see the rate of change for a function shown as an equation. In a graph, to find the rate of change, you have to determine the slope. A function shown as a graph displays the ordered pairs so you can easily see the relationship, but the relationship is not as easily shown in an equation.**

1 For the first leg of the Ramirez family's trip, their speed averages 68 miles per hour. The second leg is shown in the graph. Compare the speeds for each part of their trip. (Example 1)

Show your work.

First part: 68 miles per hour; Second part: 55 miles per hour.

The speed for the first leg is greater by 13 miles per hour.

(6, 330)

(1, 55)

Miles Driven

400
350
300
250
200
150
100
50
0

1 2 3 4 5 6 7 8

Time (h)
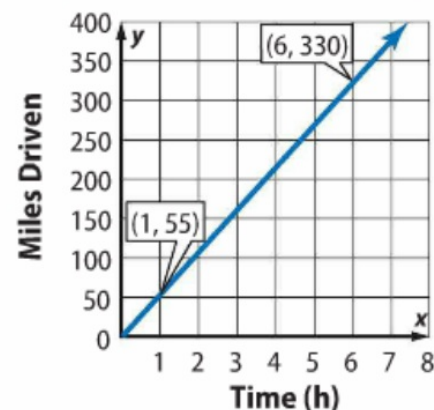
2. The late fees for a school library are represented by the function $c = 0.25d$, where c is the total cost and d is the number of days a book is late. The fees charged by a city library are shown in the table. (Examples 2 and 3)

Days Late	1	2	3
Cost ($)	0.35	0.70	1.05

a. Compare the functions' y-intercepts and rates of change.

Both have the same y-intercept of 0. The rates of change are

different. Rates of change: school library: $0.25 per day; city

library: $0.35 per day

b. Shamar checks out one book at each library and returns both books 3 days late. What are the late fees for each library? **school library:**
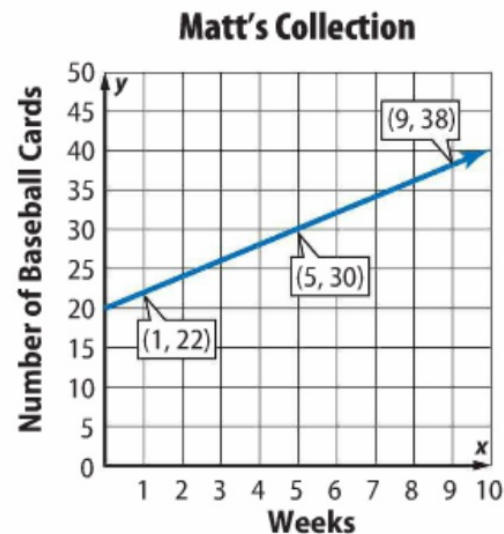
$0.75; city library: $1.05

3 Matt and Seth purchase baseball cards each week. The amount of cards they each have in their collection is shown in the graph and table. Who will have more cards in Week 20? Justify your response. (Example 4)

Seth; Seth will have 4(20) or 80 cards

and Matt will have 2(20) + 20 or 60

cards.

Seth's Collection

Week	Number of Cards
1	4
2	8
3	12

Matt's Collection

4. The Shaw family is building a patio. One person can place the flagstone at a rate of 4.5 per hour. The equation $s = 11h$ represents the number of stones s that two people can place in h hours. How many more flagstones can 2 people place in 3 hours than one person? Explain.

19.5 stones; Sample answer: One person can lay 4.5(3) or 13.5 stones.

Two people can lay 11(3) or 33 stones. 33 − 13.5 = 19.5

5. **CCSS** **Reason Abstractly** Refer to the conversions in the tables below.

Cups	Ounces
1	8
2	16
3	24
4	32

Pints	Ounces
1	16
2	32
3	48
4	64

Quarts	Ounces
1	32
2	64
3	96
4	128

a. Write a function for each table.

$z = 8c; z = 16p; z = 32q$

b. If you graph the points, the graph for which function would have the steepest slope? Justify your response.

the quart equation; Sample answer: The greater the rate of change, the steeper the slope of the graph.

c. Which function has the least rate of change? Explain.

The first function has the least rate of change because 8 is less than 16 and 32.

6. CCSS **Model with Mathematics** Write a real-world problem where you would want to compare rates of change for two different functions.

See students' work.

7. CCSS **Persevere with Problems** Explain why the graph of the function $y = 3x + 40$ will never intersect the graph of the function $y = 3x + 35$.

Sample answer: Both functions have the same rate of change but

because they have different y-intercepts, they are parallel lines and

parallel lines will never intersect.

8. CCSS **Reason Inductively** The exchange rate to convert U.S. dollars to British pounds is represented by the function $p = 0.61d$ where p is the amount in pounds and d is the number of dollars. One U.S. dollar can also be exchanged for 0.69 European euro. If you exchange $250 for pounds and $250 for euros, which of the following is true? **I**

I   You will receive 152.5 pounds and 172.5 euros.

II   You will receive about 410 pounds and about 362 euros.

III   You will receive 250 dollars.

IV   You will receive the same amount of pounds and euros.