Direct and Inverse Variation

Agenda
Warm-Up
HW Check
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Reminders:
Super Saturday
Test Thursday
6.2 Due Friday
Test Corrections due Thursday

Warm-Up: A chili situation

Mr. Gilliland's recipe for chili calls for 2 pounds of beef for every 4 servings.

1. Mr. G wants to make more than 4 servings of chili. Complete the table below to determine how much beef he needs for various servings.

Beef (lb)	**2**	**3**	**4**	**5**
Servings	**4**	**6**	**8**	**10**

+1 +1 +1 +2 +2 +2

2. Write an equation that describes the relationship between x, pounds of beef and y, the servings.

Linear

$y = 2x + 0$

$y = 2x$

Answers:

1. A. Between 8 and 9 years
   B. Between 2021 and 2022
2. A. $38,297
   B. No.
3. A. Approximately 1200 fish
   B. Between 2068 and 2069
4. A. Because this is a growth model, the base, 1.06, represents the original amount plus a 6% increase or 1+0.06 = 1.06
   B. $266,836
5. A. Between 2019 and 2020
   B. 2005

Algebra I – Unit 10: Topic 1 – Applications of Non-Linear, Non-Quadratic Functions

Practice – Applications of Non-Linear, Non-Quadratic Functions

pp 781-788

Name _____ Date _____ Pd. _____

1. In 2009, a large company decides to build a manufacturing plant in the town of Tiny, Texas with 1400 residents. Due to the increase in jobs available with this company, the population of Tiny, Texas increase 9% each year. This growth is represented by the equation $y = 1400 \cdot (1.09)^x$

   A. Approximately when would the population of Tiny, Texas double?

   B. A new fast food restaurant is considering a franchise in Tiny, Texas. Based on market research, it is a better financial investment when the town has a population of at least 4000. If the growth of Tiny, Texas continues, in what year should the fast food restaurant open in this town?

2. The MSRP price of a 2011 Cadillac Escalade is $63,160. The vehicle depreciates in value by 8% each year. This depreciation is represented by the equation $y = 63160 \cdot (0.92)^x$.

   A. What is its value 6 years after it is purchased?

   B. Will the car ever have a value of zero dollars?

3. The population fish in a pond is decreasing at a rate of 1% per year. In 2000, there were 1300 fish in this pond. This decay can be represented by the equation $y = 1300 \cdot (0.99)^x$

   A. What is the population of fish in 2008?

   B. Between which two years will the population of fish be half of what it was in 2000?

4. Annual sales for a small childrens' clothing company are $149,000 and increase at a rate of 6% per year. This growth is represented by the equation $y = 149,000 \cdot (1.06)^x$.

   A. Explain why the base of the exponent 1.06.

   B. When applying for a small business loan, the company must report a 10 year business model. In ten years, what are their projections for annual sales?

5. In 2002, the student enrollment in a local high school was 970 students and increases by 1.2% per year. This growth is represented by the equation $y = 970 \cdot (1.012)^x$.

   A. When student enrollment reaches 1200, the district must consider plans for building a new high school. When will the district begin making these plans?

   B. The 1000th student to enroll will receive a free graphing calculator as a prize. In which year is this projected to occur?

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Direct Variation

$y = kx$

*PROPORTIONAL

As one value increases, the other increases

What is k?

nonzero constant

(just a #)

Inverse Variation

$y = \frac{k}{x}$

As one value increases, the other decreases

1. Julio's wages vary directly as the number of hours that he works. If his wages for 5 hours are $29.75, how much will they be for 30 hours?

$y = kx$ (wages ↑, hours ↑)

$\frac{29.75}{5} = \frac{k(5)}{5}$

$5.95 = k$

$y = 5.95x$

$y = 5.95(30)$

$178.50

wages	29.75	x
hours	5	30

only on DIRECT

2. The number of hours, h, it takes for a block of ice to melt varies inversely as the temperature, t. It takes 2 hours for a square inch of ice to melt at 65°.

A. Find the constant of proportionality, k.

$2 = \frac{k}{65}$ → $130 = k$

B. Write the equation that represents this situation.

$y = \frac{k}{x}$ (hours ↑, temp ↑)

$y = \frac{130}{x}$ OR $h = \frac{130}{t}$

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3. Which of the following equations shows a relationship in which y is inversely proportional to x?

I. $xy = \frac{1}{-3}$ ÷x ↑↓

II. $y = \frac{1}{x+1}$ ↑↓

III. $y = x - 5$ ↑↑ direct

$y = \frac{k}{x}$ Solve for y. ↑↓

A I only
B II and III only
C I, II and III
D II only
E I and II only

4. The time it takes to fly from LA to New York varies inversely as the speed of the plane. If the trip takes 6 hours at 900 km/hr, how long would it take at 800 km/hr?

$y = \frac{k}{x}$ (time ↑, speed ↑)

$900 \cdot 6 = \frac{k}{900} \cdot 900$

$5400 = k$

$y = \frac{5400}{x}$

$y = \frac{5400}{800}$

6.75 hours

5. Do the tables below demonstrate a relationship of inverse variation? Explain why or why not.

$y = \frac{k}{x}$ ↑↓

Table A

x	y
1	30
2	15
3	10

↑↓ inverse

Table B

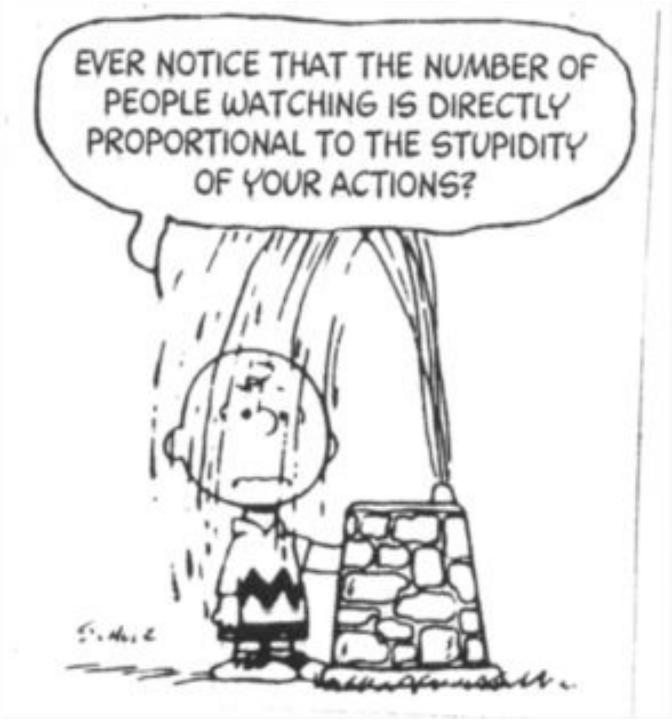
x	y
2	6
3	9
6	18

↑↑ direct

Table C

x	y
1	20
2	10
4	5

↑↓ inverse


EVER NOTICE THAT THE NUMBER OF PEOPLE WATCHING IS DIRECTLY PROPORTIONAL TO THE STUPIDITY OF YOUR ACTIONS?

Algebra I – Unit 10 Lesson 6 – Direct and Inverse Variation

Practice – Direct and Inverse Variation

pp 326-331; 851-854

Name _____ Date _____ Per _____

1. The number of calories in a container of milk is directly proportional to the amount of milk in the container. If there are 160 calories in an 8 ounce glass of milk, find the number of calories in a 15 ounce glass of milk.

2. The cost per person to rent a mountain cabin is inversely proportional to the number of people who share the rent. If the cost is $26 per person when five people share the rent, how much would each person spend if 8 people share the rent?

3. The table below demonstrates a relationship of inverse variation. Complete the table with the appropriate values.

x	y
4.0	1.0
2.0	3.0
	12

What is k for this relationship of inverse variation? Explain your reasoning.

4. A marching band can make various rectangular patterns with differing numbers of rows and columns. The number of columns is inversely proportional to the number of rows for a band of fixed size. Suppose that the RHS band can form a rectangle with 12 rows and 9 columns. How many columns would there need to be if there were six rows?

5. Which of the following equations shows a relationship in which y is inversely proportional to x?

I. $(x+1)y-\frac{1}{2}$

II. $y=0.625x$

III. $y=\frac{x+5}{3}$

A. II only
B. II and III only
C. I only
D. Neither I, II or III
E. I, II and III

6. The number of kilograms of water in a person's body varies directly as the person's mass. A person with a mass of 90 kg contains 60 kg of water. How many kilograms of water are in a person whose mass is 50 kg?

7. The current in an electric circuit varies inversely as the amount of resistance in the circuit. The current is 10 amps when the resistance is 24 ohms. Find the current when the resistance is 30 ohm.

8. The formula for finding electrical current is $I=\frac{V}{R}$

Where V represents voltage and R represents resistance. Fill in the blanks below.

Electrical current, I, varies _____ with voltage, V.

Resistance, R, varies _____ with electrical current, I.