

9 math

Unit 5

Linear Relations

booklet 4

May 26th - June 2nd

Name: _____

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Putting it All Together

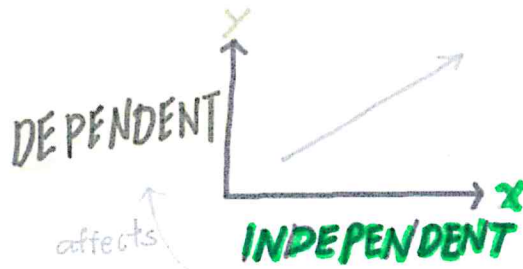
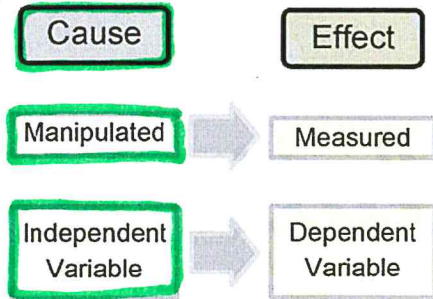
The goal of working with linear relations, is to **understand patterns in the world around us.**

To do so, we need to be able to recognize which variable controls the other.

There are two types of variables:

INDEPENDENT: It does not change, it controls the other variable.

DEPENDENT: It changes based on the other variable.



The **independent** variable will always be graphed on the **x-axis**.

The **dependent** variable will always be graphed on the **y-axis**.

Another essential skill is to be able to match language to mathematical operations. Some key terms within linear relations include:

PER - "\$5 per day" → MULTIPLY 5 by # of days.

EACH - "10 candies each" → MULTIPLY 10 by # of people

FOR EVERY - "24 hours for every day" → MULTIPLY 24 by # of days.

PLUS - "\$4 plus \$1" → ADD 4 to 1

LOOK for these words in the word problems!

Name: Key

U5L3

Independent vs. Dependent Variables

Read each statement below. Determine the two variables (in words) in each situation and identify each as independent or dependent variable.

1. How fast the grass grows depends on how much rain we get.

independent: rain
dependent: fast

2. The number of problems missed on a test determines your grade on the test.

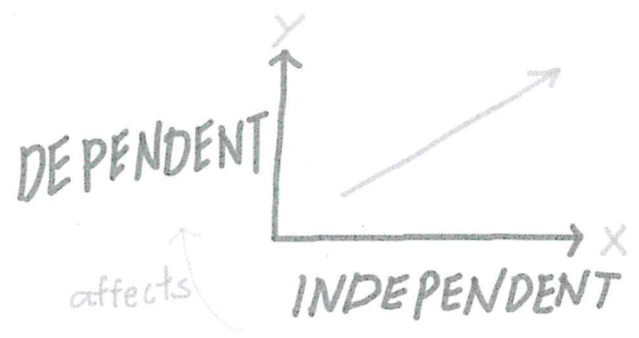
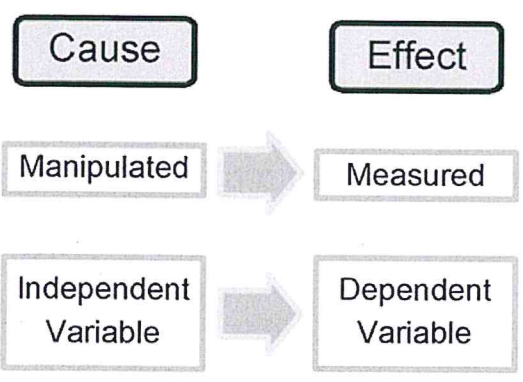
independent: problems missed
dependent: grade

3. How long I talk on my cell phone depends on the number of minutes on my calling plan.

independent: # minutes
dependent: long talk

4. The amount of money I make is a function of the number of hours I work.

independent: hours
dependent: \$



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5. You are given the following data on the relationship between John's test score and the number of hours he studies.

x # of Hours John Studies	y John's Test Score
0	55
1	65
2	75
3	85
4	95

Handwritten annotations: Blue arrows point from the labels x and y to the respective columns. Blue brackets on the right indicate a constant increase of +10 in the test score for each additional hour of study.

- a) What are the independent and dependent variables?
- b) How are the independent and dependent variables related?
Choose variables and write an equation to represent this table.

$$y = 10x + 55$$

6. You are given the following data on the relationship between the number of dinner guests at Mary's house and the amount of time she will need to prepare dinner.

x Number of Guests	y Meal Preparation Time (min)
3	25
4	33
5	41
6	49
7	57

Handwritten annotations: Blue arrows point from the labels x and y to the respective columns. Blue brackets on the right indicate a constant increase of +8 in the meal preparation time for each additional guest.

- a) What are the independent and dependent variables?
- b) How are the independent and dependent variables related?
Choose variables and write an equation to represent this table.

$$y = 8x + 1$$

7. WORD PROBLEM!

A phone company charges a fixed cost of \$10 per month, plus \$0.25 per minute for long distance calling.

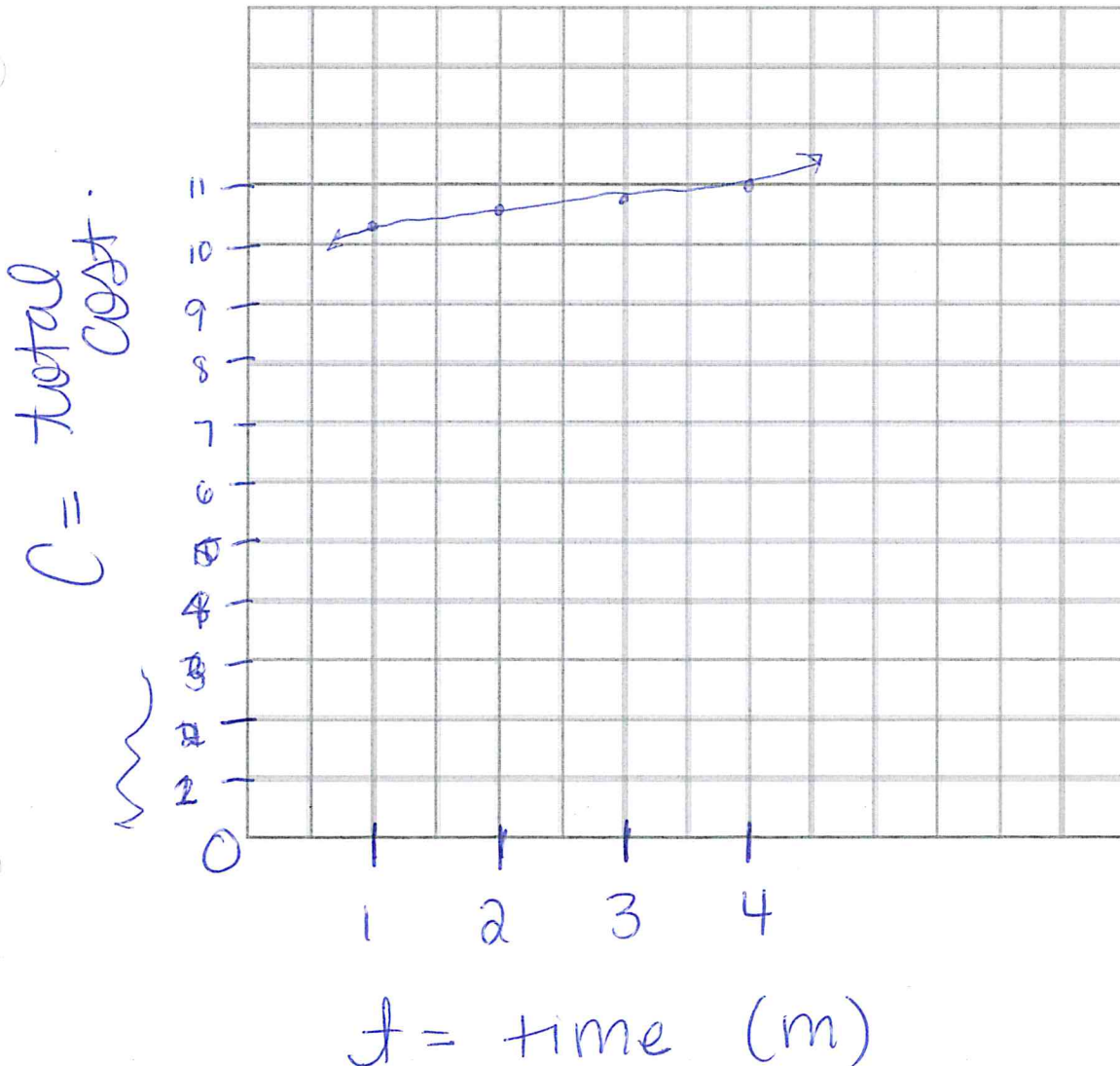
Create a table of values:

$t = x$	1	2	3	4
$C = y$	10 ²⁵	10 ⁵⁰	10 ⁷⁵	11

Write an equation that relates the monthly cost, C dollars, to t , the time in minutes:

$$C = 0.25t + 10$$

Graph the linear relation:



Name: _____

Key

$$y = mx + b$$

1. Suppose that the water level of a river is 34 feet and that it is receding at a rate of 0.5 foot per day. Write an equation for the water level, L , after d days. In how many days will the water level be 26 feet?

$$\begin{array}{r} L = 34 - 0.5d \\ 26 = 34 - 0.5d \\ -34 \quad -34 \\ \hline -8 = -0.5d \end{array}$$
$$\frac{-8}{-0.5} = \frac{-0.5d}{-0.5}$$
$$16 = d$$

2. Seth's father is thinking of buying his son a six-month movie pass for \$40. With the pass, matinees cost \$1.00. If matinees are normally \$3.50 each, how many times must Seth attend in order for it to benefit his father to buy the pass?

$$\begin{array}{r} 40 + 1m = 3.5m \\ -1m = -1m \\ \hline 40 = 2.5m \\ \frac{40}{2.5} = \frac{2.5m}{2.5} \end{array}$$

$m = \text{matinee (movie @ lunch/morning)}$

$$16 = m$$

3. For babysitting, Nicole charges a flat fee of \$3, plus \$5 per hour. Write an equation for the cost, C , after h hours of babysitting. How much money will she make if she baby-sits 5 hours?

$$3 + 5h = C$$

$$3 + 5(5) = C$$

$$3 + 25 = C$$

$$28 = C$$

4. A plumber charges \$25 for a service call plus \$50 per hour of service. Write an equation in slope-intercept form for the cost, C , after h hours of service. What will be the total cost for 8 hours of work? 10 hours of work?

$$25 + 50h = C$$

$$8 \Rightarrow 25 + 50(8) = C$$

$$25 + 400 = C$$

$$425 = C$$

$$10 \Rightarrow 25 + 50(10) = C$$

$$25 + 500 = C$$

$$525 = C$$

5. Rufus collected 100 pounds of aluminum cans to recycle. He plans to collect an additional 25 pounds each week. Write an equation for pounds, P , of aluminum cans after w weeks. How long will it take Rufus to collect 400 pounds of cans?

$$100 + 25w = P$$

$$100 + 25w = 400$$

$$\begin{array}{r} 100 + 25w = 400 \\ -100 \\ \hline 25w = 300 \end{array}$$

$$25w = 300$$

$$\frac{25w}{25} = \frac{300}{25}$$

$$w = 12$$

6. A canoe rental service charges a \$20 transportation fee and \$30 dollars an hour to rent a canoe. Write an equation representing the cost, y , of renting a canoe for x hours. What is the cost of renting the canoe for 6 hours?

$$20 + 30x = y$$

$$20 + 30(6) = y$$

$$20 + 180 = y$$

$$200 = y$$

7. A caterer charges \$120 to cater a party for 15 people and \$200 for 25 people. Assume that the cost, y , is a linear function of the number of x people. Write an equation for this function. How much would a party for 40 people cost?

$$120 = 15x$$

$$8 = x$$

$$200 = 25x$$

$$8 = x$$

\$8 per person

$$y = 8x$$

$$y = 8(40)$$

$$y = 320$$

\$320 for
40 people