Name: ____ Date: _________ Class: _____

Discrete v. Continuous and Independent v. Dependent | Ch 3 Lesson A

Answer the following questions:

1. What is your age? (Be as specific as possible.)
2. What is the color of your hair?
3. How many siblings do you have?
4. What is your height?
5. How many pets do you have?
6. What time do you wake up in the morning?

Definition: ____________________

____

____

____

Definition: ____________________

____

____

____

Discuss with you group whether your answers from the short survey above are __________ or ____________.

Label them below:

1. Age = ____________________
2. Color of hair = ____________________
3. Siblings = ____________________
4. Height = ____________________
5. Pets = ____________________
6. Time = ____________________

6.EE.9

Name: ____ Date: _________ Class: _____

Discrete v. Continuous and Independent v. Dependent | Ch 3 Lesson A

Define the following in your own words:

Independent:

____

____

____

Dependent:

____

____

____

We are going to begin working with two variables. Remember, a variable is a representation of a quantity. So we could use *m* to represent money and *l* to represent lawns mowed.

Which variable depends on the other? Circle the correct answer:

The amount of lawns mowed depends on the money earned.

The amount of money earned depends on the lawns mowed.

So *m* is the _________________ variable and *l* is the ________________ variable.

When you are presented with two variables, ask yourself, "Which one can cause a change in the other?"
The one that can cause the change is the independent variable.
The one that will change is the dependent one.

Determine which of the following are the dependent variables:

1. The amount of miles you drive and the number of gallons of gas you need.

2. The height and age of a tree.

3. Time spent studying and a test score.

Determine which of the following are the independent variables:

4. The amount of food you eat and how full you are.

5. The amount of car sales a car dealership has each year.

6. Time spent practicing and level of performance.

Name: ____ Date: ____________ Class: ____

Unit Rates | Ch 3 Lesson C

Rate: A comparison of two quantities, when one is measured against the other.

Unit Rate: A rate with the value of 1 in the denominator.

Ex: Margo types 146 words in two minutes. What is the unit rate?

A. Find the unit rate of the following story situations.

1. Keegan will drive 120 miles in 2 hours.

Current Rate: Unit Rate:

2. There are 64 oranges in four bags.

Current Rate: Unit Rate:

3. I grade an average of 210 tests for 6 classes.

Current Rate: Unit Rate:

4. You need to pay $200 for a season pass of 16 games.

Current Rate: Unit Rate:

Answer the following questions.

5. What do you do to find the unit rate of a story problem?

6. Which of the following cars has better gas mileage?

Car A: 225 miles on 9 gallons of gas

Car B: 315 miles on 14 gallons of gas

Name: ____ Date: ___________ Class: ____

Unit Rates | Ch 3 Lesson C

Unit rate can be applied to not just stories and situations, but tables and graphs. The rate will be comparing the change occurring between *y*-values and the change occurring between *x*-values.

Ex:

x	y
1	3
4	9
7	15
10	21

B. Use your outstanding skills to find the unit rates of the following tables.

1.

x	y
2	4
7	19
12	34
17	49

2.

x	y
1	-3
2	-1
4	3
6	7

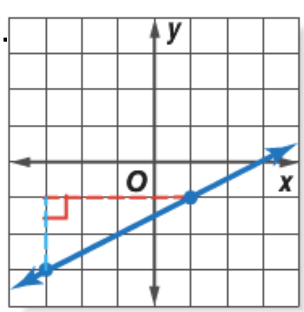
3.

Number of Days (x)	Number of Homework Assignments (y)
0	5
4	25
12	65
22	115

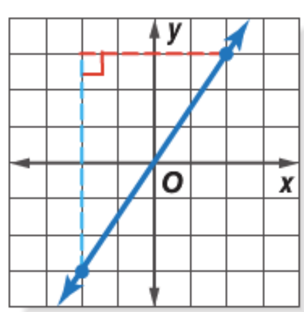
4. We've been talking about finding the rate between the changes in *y*-values and the changes in *x*-values. What is this similar to?

C. Find the unit rate of the following graphs. Make sure to use units if they're given!

1.



2.



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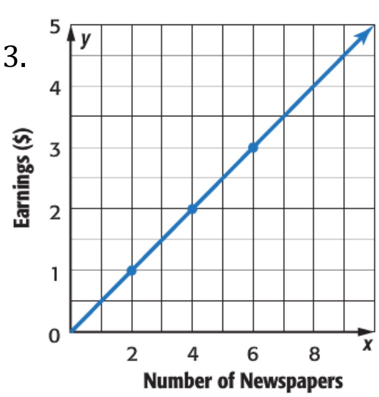


7.RP

Name: ______________________ Date: __________ Class: ____

Constant Rate of Change | Ch 3 Lesson 1

Relationships that have straight-line graphs are called **linear relationships**.
The rate of change between any two points in a linear relationship is the same, or constant. A linear relationship has a **constant rate of change.**

How to find the constant rate of change:
1.

2.

3.

EXAMPLE: The height of a hot air balloon after a few seconds is shown.
Determine whether the relationship between the two quantities is linear.
If so, find the constant rate of change.
If not, explain your reasoning.

Time (s)	Height of Hot Air Balloon (ft)
1	9
2	18
3	27
4	36

A. Determine whether the relationship between the two quantities described in each table is linear. If so, find the constant rate of change. If not, explain your reasoning.

1.

Greeting Cards	
Number of Cards	**Total Cost($)**
1	1.50
2	3.00
3	4.50
4	6.00

2.

Party Table Rental	
Number of Tables	**Cost($)**
1	10
2	18
3	24
4	28

3.

Donuts	
Dozens Bought	**Cost ($)**
2	3.25
4	6.50
6	9.75
8	13.00

4.

Running	
Time (min)	**Distance(mi)**
15	2
30	4
45	5
60	6

5. Have each member of your group choose a different table to graph. On your grid, create axes (*x* and *y*), label the appropriate units, and plot the points. Compare each of your graphs. What do you notice? Does this support our answers for 1-4?

Name: ______________________________ Date: ____________ Class: ______

Constant Rate of Change | Ch 3 Lesson 1

Two quantities have a **proportional relationship** if they have a constant ratio **and** a constant rate of change.

Constant Ratio:

B. Determine whether the relationships below are proportional. Show all work.

EX.

Hours Spent Babysitting	Money Earned ($)
1	10
3	30
5	50
7	70

EX.

Time (min)	Temperature (°F)
9	60
10	64
11	68
12	72

1.

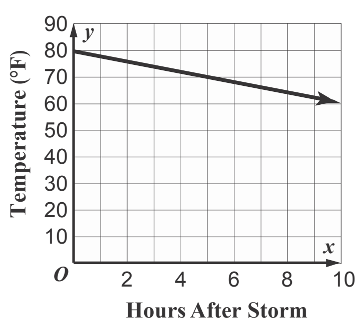
Number of Students	Number of Magazines Sold
10	100
15	110
20	120
25	130

2.

Number of Trees	Number of Apples
5	100
10	200
15	300
20	400

C. Find the constant rate of change for each graph and interpret its meaning in context.

5.



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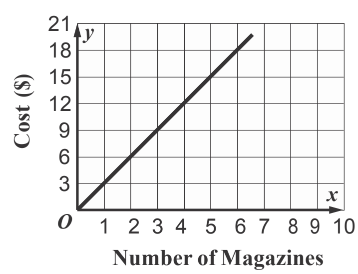


D. Determine whether the graphs above are **proportional** as well as linear. Remember, proportional means it has a constant rate of change and has a constant ratio between values. Show your work and answers below.

5.

6.

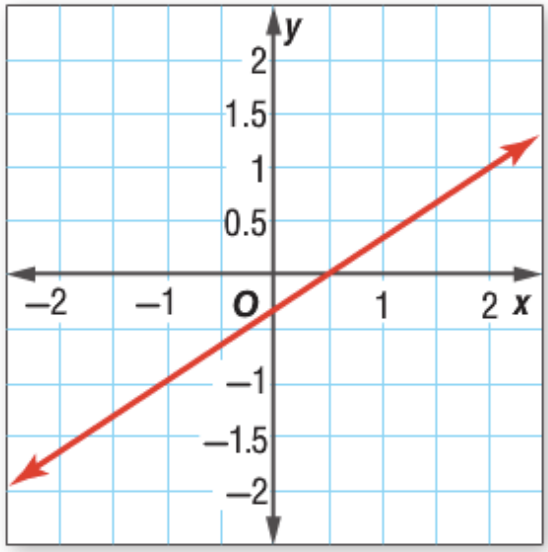
E. At what point does the graph that is proportional begin? (,   )

Please note: ALL proportional graphs will go through the point (,   ).

8.EE.5

Name ____ Date ___________ Class ___________

Slope Triangles | Ch 3 Lesson D



1. Follow the instructions below.
a) Find the slope of the line using the slope triangle between the points (-1, -1) and (0.5, 0).

b) Find the slope of the line using the slope triangle between the points (0.5, 0) and (2, 1).

c) Find the slope of the line using when x changes from -1 to 2 using slope triangles. Write the slope in fraction form.

d) Describe the slope in terms of $\frac{\Delta y}{\Delta x}$.

2. Create a table of values using the points from the graph above.

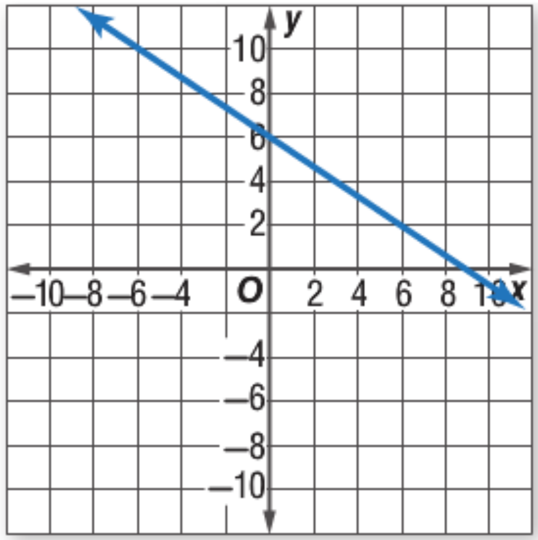
x				
y				

a) Find the constant rate of change.

b) Find the rate of change from the first value to the last value.

c) Find the rate of change from the second value to the last value.

Slope Triangles Continued



3. Follow the instructions below.

a) Find two points. Label them here: (,) and (,). Now find the slope between those two points.

b) Find two more points. Try to be unique. Label them here: (,) and (,). Now find the slope between those two points.

c) Find the slope of the line using when x changes from the first point (the farthest left) you found to the last point (the farthest right) you found.

d) Describe the slope in terms of $\frac{\Delta y}{\Delta x}$.

4. Create a table of values using the points from the graph above.

x				
y				

a) Find the constant rate of change.

b) Find the rate of change from the first value to the last value.

c) Find the rate of change from the first value to the third value.

Slope Triangles Continued

d) What do you notice?

Let's pull this all together.

5. Answer the following questions using our past few problems as examples.
   a) Can you find slope using any points?

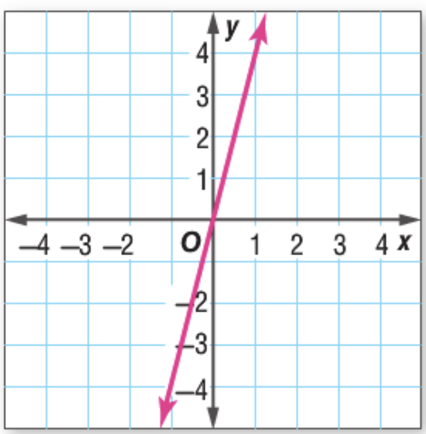
   b) What characteristic about straight lines makes this possible?

   c) What characteristic about tables makes this possible?

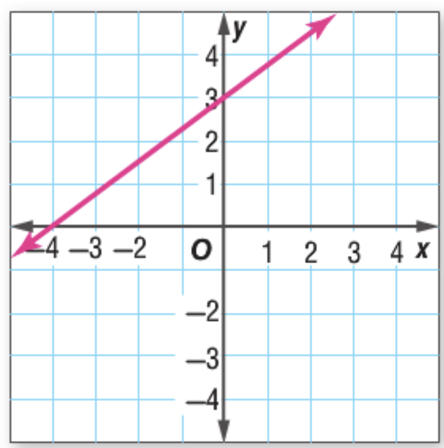
   d) What do we need to do to compare all of the different rates or slopes for one table or graph?

What is the slope of the following graphs? Explain with two different slope triangles.

6.



7.



Extra practice:

8.

9.

10.

Name: ______________________________ Date: __________ Class: ________

Slope Formula | Ch 3 Lesson 2

A. Quick Review

Slope =

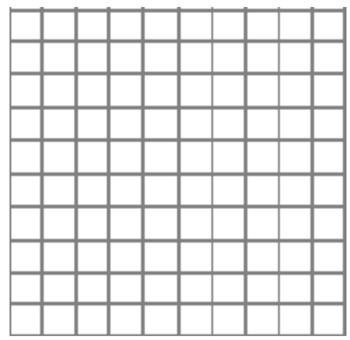
1. What can we do to find the slope of a graph?

2. What can we do to find the slope of a table?

B. With your group, find the slope between each pair of points given using both tables and graphs. Show all work.

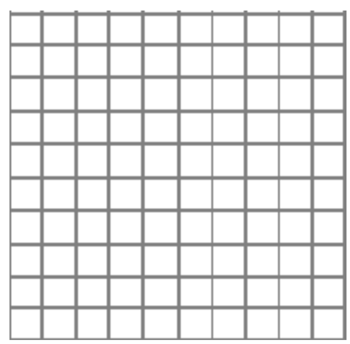
1. $A(-2, -4)$, $B(2, 4)$, slope = __________

x		
y		



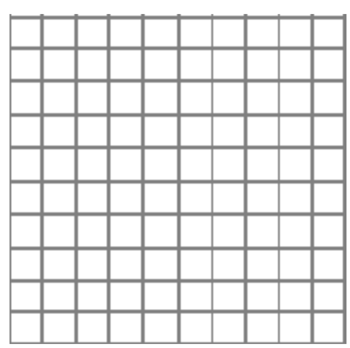
2. $C(0, 2)$, $D(-2, 0)$, slope = __________

x		
y		



3. $E(3, 4)$, $F(4, -2)$, slope = __________

x		
y		



Name: ____ Date: ____________ Class: ________

Slope Formula | Ch 3 Lesson 2

C. Answer the following questions based on the steps that you did on the last page.

1. What do you do to find the following on a table?

  a) the change in *y*

  b) the change in *x*

2.What do you do to find the following on a graph?

  a) the change in *y*

  b) the change in *x*

3. There is a way to find the following changes between two points without making a table or graph. Discuss with your group, and explain the method below.

  a) the change in *y*

  b) the change in *x*

D. Test your method by finding the slope of the following problems.

1. $A(-2, -4)$, $B(2,\ 4)$

2. $C(0,\ 2)$, $D(-2, 0)$

3. $E(3,\ 4)$, $F(4, -2)$

4. Points (*a, b*) and (*x*, *y*) where *a, b, x*, and *y* represent *any* number.

Name: ____ Date: ____________ Class: ________

Slope Formula | Ch 3 Lesson 2

Definition | The slope of a line passing through points (x_1, y_1) and (x_2, y_2) is the ratio of the difference in the y-coordinates to the corresponding difference in the x-coordinates.

This means that, $\Delta y = y_2 - y_1$ and $\Delta x = x_2 - x_1$.
This pattern of subtracting one *y*-value from the other, and one *x*-value from the other, creates what is called the **slope formula.**

$$slope = m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}, \text{ where } x_2 \neq x_1$$

E. Find the slope between the following points. Write the new slope formula $m = \frac{y_2 - y_1}{x_2 - x_1}$

1. *A*(-3, 2) and *B*(2,4)

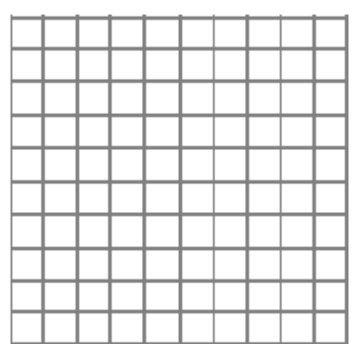
2. *C*(1,2) and *D*(-4,3)

3. *C*(−2, 2), *D*(−4, 2)

4. *S*(0, 4), *T*(1, 0)

5. *O*(1, −3), *P*(2, 5)

6. *Y*(2, 2), *Z*(−5, −4)



F. Recap:
Plot the points from problem six on the grid at right.
Connect the two points with a straight line.
Explain, using the graph and words, why this shows the slope formula.

8.EE.5

Name: ______________________________ Date: __________ Class: ____

Direct Variation| Ch 3 Lesson 3

A. A direct variation is a proportional relationship. This means that the two quantities (for example time and distance) have a constant ratio between them.

1. How do you find a constant ratio between quantities?

This constant ratio is called the *ratio of proportionality* and should always be the same as the slope.

We say this as $m = \frac{y}{x}$

B. Find the slope of the tables below:

1.

People (x)	1	2	3	4
Cupcakes (y)	4	8	12	16

2.

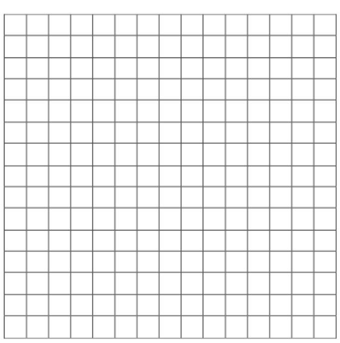
Minutes (x)	6	4	2	0
Temperature (y)	-3	-2	-1	0

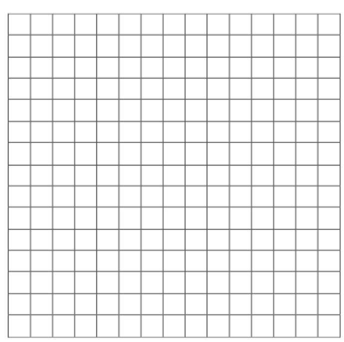
Create ratios of proportionality, $m = \frac{y}{x}$, from the table above.

3.

4.

Now using the grids below, graph both tables:

5. 

6. 

7. What do you notice about the graphs?

8.EE.5, 8.EE.6, 8.F.2, 8.F.4

Name: ____ Date: __________ Class: ____

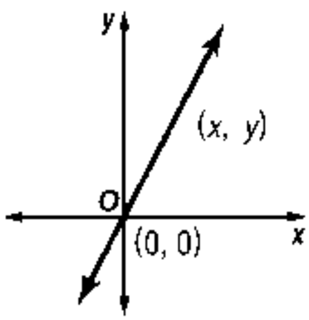
Direct Variation| Ch 3 Lesson 3

C. Direct variation graphs are graphs with proportional relationships. For a graph to be proportional, they need to meet two qualifications:

1.

2.

D. There is an equation that we use for every direct variation graph. We can figure this out by using the graph below, which is a direct variation graph.



1. Use the slope formula to find the slope of the graph at left through the points (0,0) and (x, y).

2. So for all direct variation graphs, the slope is $m =$.
   Is this consistent with what we've been doing in class?

3. Now, the direct variation equation is in the form where y is on its own side. What can we do with the slope equations (shown in #1 and #2) to get y on its own side? Do this.

E. Your result is the direct variation form.

A linear relationship is a direct variation when the ratio of y to x is a constant, m. We say "y varies directly with x." In a direct variation, $y=mx$, m represents the constant ratio (or constant of variation or proportionality), the slope, and the unit rate.

Find the slope of the following direct variations:

1. If y=4 and x=-2

2. If y=12 and x=6

3. If x=-15 and y=-5

4. If y=3 and x=-2

If $\frac{6}{3} = 2$, and $2 \times 3 = 6$, then $m = \frac{y}{x}$ tells us that y=__________. This is the **general form** for a direct variation.

Write the general form equation, *y=mx*, for problems 5-8.

5. Number 5:

6. Number 6:

7. Number 7:

8. Number 8:

8.EE.5, 8.EE.6, 8.F.2, 8.F.4

Name: ____ Date: __________ Class: ____

Direct Variation| Ch 3 Lesson 3

E. Direct variation can be used to find missing values.

Example: If y=12 and x=2, what is y when x=6?

1. What is the value of x when y=5, if x=24 when y=30?

2. If y=18 when x=15, what is the value of y when x=30?

3. What is the value of y when x=7, if y=25 when x=21?

4. If y=35 when x=65, what is the value of x when y=42?

5. Mrs. Jacob's baby is very good at sleeping (but Mrs. Jacob is not). If Mrs. Jacob gets 3 hours of sleep every time her daughter sleeps 5 hours, how much sleep will Mrs. Jacob get if her daughter sleeps 65 hours a week?

6. Mr. Duckworth and his fiancée need flower arrangements for their reception. If the arrangements come with 15 spider mums and 4 fiddle-head ferns, how many spider mums do they have to buy if they order 124 fiddle-head ferns?

8.EE.5, 8.EE.6, 8.F.2, 8.F.4