Adapted Notes

SEVENTH GRADE CURRICULUM

PROPORTIONAL RELATIONSHIPS

UNIT TWO: 7.RP.1 7.RP.2

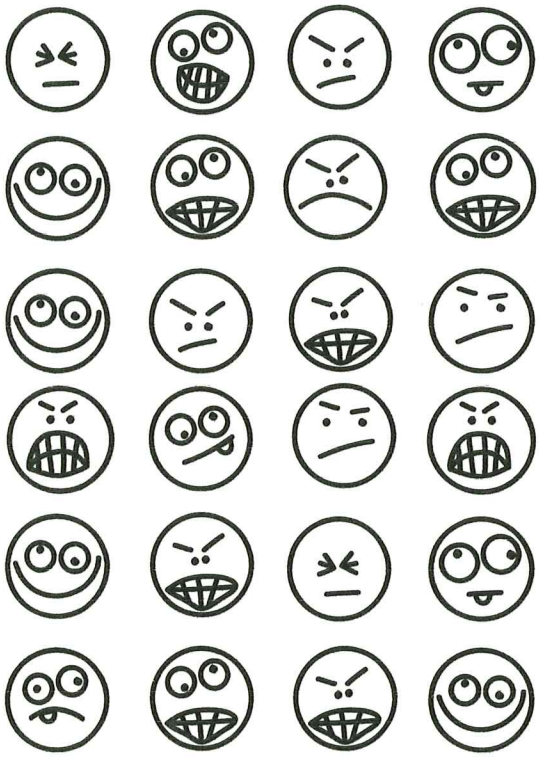
Unit: Proportional Relationships
Student Handout 1

Name _____
Date _____ Pd _____

HOW ARE RATIOS AND RATE RELATED?

A ratio is a comparison of two numbers. It can be written three different ways.
The order in which you write the ratio is important to the meaning.

Use the pictures below to practice writing ratios.



ratios are simplified

TEETH TO NO TEETH	SMILES TO TOTAL
9:15 ÷3 → 3:5	4:24 ÷4 → 1:6
BIG EYES TO TEETH	SMILES TO TONGUE
TONGUE TO TOTAL	ANGRY TO SMILES
SILLY FACE TO ANGRY FACE	TINY EYES TO NO SMILE

A rate is a specific comparison of two quantities.

EXAMPLES OF RATE	miles per hour

Hunter jogs four miles in thirty minutes. Ryan jogs seven miles in forty-eight minutes. What is each person's rate of speed? Who jogs the fastest?

Hunter

$\frac{30 \text{ min.}}{4 \text{ miles}}$

Ryan

$\frac{48 \text{ min.}}{7 \text{ miles}}$

The unit rate can help us determine the better value for our money.

A twelve-pack of Orange Crush is priced at $3.00. A six-pack is priced at $1.75. Which is the better value?

12-pack @ 3.00

6-pack @ 1.75

When two ratios are equal, there is a proportional relationship.

WAYS TO SOLVE PROPORTIONS	

A small university enrolls in-state and out-of-state students. The number of students enrolled in their most recent freshman class was 243. The school reported that it enrolled seven in-state students for every two out-of-state students. How many of each type of student was enrolled in the freshman class?

I KNOW:	I NEED TO KNOW:
total students – in-state – out-of-state –	

PLAN/AND WORK:	MY SOLUTION:

Summarize today's lesson:

Unit: Proportional Relationships
Homework 1

Name _____

Date _____ Pd_____

HOW ARE RATIOS AND RATE RELATED?

Answer the following questions. Be sure to justify your response.

1. At the ice cream shop, there are 14 shakes sold for every 6 malts. What is the ratio of malts to shakes?

6 malts to 14 shakes

both divisible by 2

$6 \div 2 = 3$

$14 \div 2 = 7$

3:7

2. Eight out of ten dentists prefer Crest toothpaste. What is the ratio of dentists who do not prefer Crest to those who do?

3. An animal shelter currently only has 30 dogs and 20 cats. What is the ratio of cats to animals?

4. Folgers Coffee is priced at $12.88 for 80 cups of coffee, and Seattle's Best is priced at $9.00 for 50 cups. Which brand of coffee is the better value for each cup?

5. Anna can type 123 words in 3 minutes. Caroline can type 220 words in 5 minutes. Who can type the fastest?

6. An amusement park sells child (8) and adult (1) tickets at a ratio of 8:1. On Saturday, they sold 147 more child tickets than adult tickets. How many tickets did the amusement park sell on Saturday?

7. Northside High School is having a spaghetti dinner fundraiser. In order to advertise, students place flyers on neighborhood doors. Margie hands out 120 flyers in 2 hours. Jaxon hands out 18 flyers in 15 minutes. Who is able to pass out flyers at a faster rate? Defend your thinking.

8. Stan's Steakhouse has a server (5) to cook (2) ratio of 5 to 2. The total number of servers and cooks is 42. How many servers does Stan's Steakhouse employ?

$\frac{7}{42}$ → 5+2 = one group → total workers

$\frac{5}{x}$ → servers in one group → total servers employed

$\frac{7}{42} \times \frac{5}{x}$ $\quad 7x = 210$ $\quad \frac{7x}{7} = \frac{210}{7}$

$x = 30$

30 servers

Unit: Proportional Relationships
Student Handout 2

Name _____

Date _____ Pd_____

WHAT MAKES A RELATIONSHIP PROPORTIONAL?

Two quantities are proportional if the ratio between the quantities is equal.

Mario travels 180 miles in 2.5 hours. If Mario travels at the same rate, how far can Mario travel in 5 hours?

$\frac{180 \text{ miles}}{2.5 \text{ hours}}$ $\quad \frac{180}{2.5} \overset{\times 2}{\rightarrow} \frac{?}{5}$ $\quad 180 \times 2 = 360$

360 miles in 5 hours

Using the information about Mario's rate, complete the table below.

HOURS	2.5	5	7.5	10	12.5
MILES	180	360			

How many miles does Mario travel in one hour? Explain your solution.

$\frac{360}{5} \overset{\div 5}{\rightarrow} \frac{?}{1}$ $\quad 5\overline{)360}$

What did you to get to the answer?

The constant of proportionality is the value of the ratio of two proportional quantities.

Examine the table below. Describe the patterns that are true.

FEET	INCHES	$\frac{Y}{X}$
1	12	$\frac{12}{1} = 12$
2	24	$\frac{24}{2} = 12$
3	36	$\frac{36}{3} =$
4	48	$\frac{48}{8} =$
5	60	

How do you know that the number of feet is proportional to the number of inches?

Using *x*, the number of feet, how do you find *y*, the number of inches?

The constant of proportionality can be described with the equation [y = kx].

y = represents the	k = constant of	x = represents the

While training for a marathon, Keith's watch reported how many calories he burned at each mile marker. The data is shown below.

x	MILES	1	2	3	4	5
y	CALORIES BURNED	117	234	351	468	585

1. Is the number of calories proportional to the number of miles? Explain your thinking.

2. The next day, Keith ran 7.5 miles. How many calories did he burn?

3. What is the constant of proportionality?

4. Write an equation to explain the relationship between the number of miles and the calories burned.

Determine if the tables below are proportional. If so, write an equation representing the constant of proportionality.

x y

CUPS OF OIL	CUPS OF WATER	Y/X
1.5	6	
4	16	
5.5	22	
7.5	30	

[EQUATION:] _____

x y

HOURS	MILES WALKED	Y/X
2	3	
4	6	
6	9	
8	12	

[EQUATION:] _____

Summarize today's lesson:

Unit: Proportional Relationships
Homework 2

Name _____

Date _____ Pd_____

WHAT MAKES A RELATIONSHIP PROPORTIONAL?

Use the situation below to complete the table and answer the questions.

A gym employee is paid monthly. After working for three months, he had earned $4,500. To determine how much money he will make over a six-month period, he created the table below.

MONTH (x)	TOTAL EARNINGS (y)	$\frac{Y}{X}$
1		
2		
3	4,500	
4		
5		
6		

1. If he continues to earn at the same rate, how much will he have earned after working 5 months?

2. After how many months will the gym employee have made $19,500?

3. Write an equation to represent the constant of proportionality.

A student reads at a constant rate in her chapter book, *Where the Red Fern Grows*. This can be described by the equation $y = \frac{1}{2}x$. Complete the chart below.

→ replace x and solve! OR replace y and solve!

MINUTES (x)	PAGES READ (y)	$\frac{Y}{X}$
1		
2		
3		
4		
5		
6		

4. The teacher recommends that students read for 20 minutes each night. How many pages will the student complete?

5. In a really exciting part of the book, the student read 18 pages in one sitting. How many minutes did he read for?

6. If the book is 245 pages, how many minutes will it take him to finish?

7. Describe any patterns you notice when working with proportional relationships.

Unit: Proportional Relationships
Student Handout 3

Name _____
Date _____ Pd_____

HOW CAN RELATIONSHIPS BE COMPARED?

Relationships are proportional if they have a constant relationship represented by $y = kx$.

Prove that the tables below are proportional. Complete the tables by finding the ratio of the y-value to the x-value.

SEATTLE COFFEE WORKS

CUPS OF COFFEE x	TOTAL COST y	$\frac{Y}{X}$
1		
2		
3	$8.25	
4		
5	$13.75	
6		

HOUNDSTOOTH COFFEE

CUPS OF COFFEE x	TOTAL COST y	$\frac{Y}{X}$
1		
2	$5.60	
3		
4		
5		
6	$16.80	

1. What do you notice that is different about the two tables?

2. What proves that both coffee shops sell their drinks at proportional rates?

3. If you purchased nine cups of coffee at Houndstooth Coffee, how much more would You spend than if you purchased nine cups at Seattle Coffee Works?

4. A third coffee shop is opening up in a busy business district. What do you notice about their pricing structure?

5. What would be the benefit to this structure?

STUMPTOWN COFFEE

CUPS OF COFFEE x	TOTAL COST y	$\frac{Y}{X}$
0	$0.00	
1	$2.90	
2	$5.70	
3	$8.40	
4	$11.00	
5	$13.50	
6	$15.90	

Label the following tables proportional or non-proportional.

proportional

X	Y
2	6.8
5	17
8	27.2
11	37.4

X	Y
1	3
4	9
7	15
10	21

X	Y
3	18
5	30
7	42
9	54

A fraction can also represent k in a proportional relationship.

x	FEET	1	2	3	4	5
y	YARDS	1/3	2/3	1	4/3	5/3

What is the constant of proportionality in the table above?

Each table shows a proportional relationship. Fill in the missing values and determine k.

x	y
1	6
4	24
7	42
10	60
13	78

continue pattern

decrease by 3

$k = 6$

x	y
6	15
18	45
	60
	75

$k =$ _____

x	y
	4
	8
15	12
25	20

$k =$ _____

x	y
7	
	42
	63
28	84
35	

$k =$ _____

Summarize today's lesson:

Unit: Proportional Relationships
Homework 3

Name _____

Date _____ Pd_____

HOW CAN RELATIONSHIPS BE COMPARED?

Savannah, Greg, and Kevin all take part-time jobs for the summer. Their hourly wages are shown in the tables below. Use the information to answer the questions below.

SAVANNAH

HOURS x	$ EARNED y
2	$19.00
4	$38.00
6	$57.00
8	$76.00
10	$95.00
12	$114.00
14	$133.00

GREG

HOURS x	$ EARNED y
3	$27.00
6	$54.00
9	$81.00
12	$108.00
15	$135.00
18	$162.00
21	$189.00

KEVIN

HOURS x	$ EARNED y
2	$16.50
5	$41.25
8	$66.00
11	$90.75
14	$115.50
17	$140.25
20	$165.00

1. Determine the constant of proportionality, k, of Kevin's wage.

2. Which person has the highest hourly wage? How do you know?

3. If all three friends worked 20 hours during the week, how much would each person earn?

4. Savannah earns $247.00. How many hours did she work?

5. How long will it take Greg to earn $500.00?

Unit: Proportional Relationships
Student Handout 4

Name _____

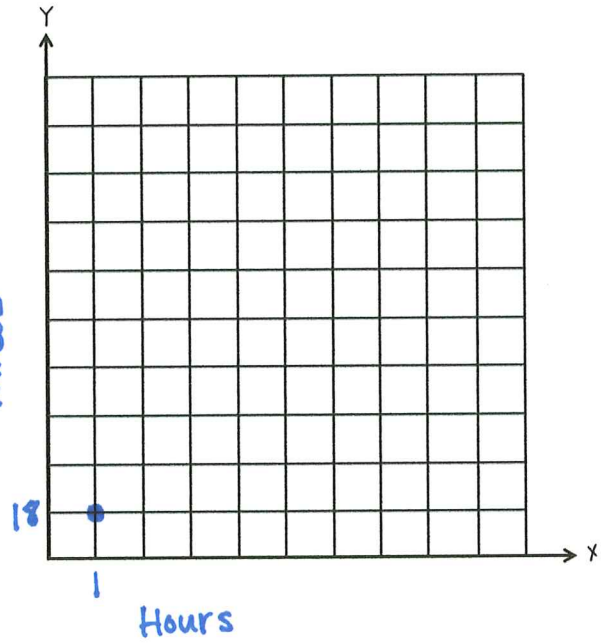
Date _____ Pd_____

HOW CAN PROPORTIONAL RELATIONSHIPS BE GRAPHED?

Use the information below to create a table and determine the constant of proportionality, *k*.

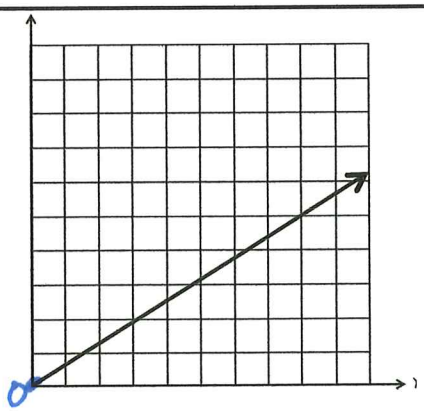
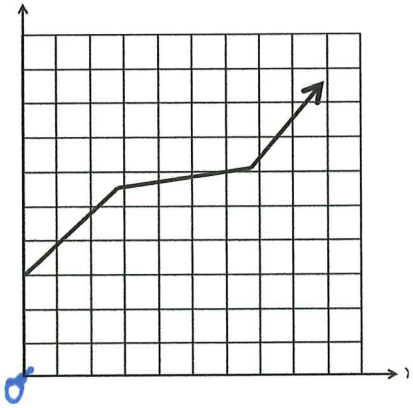
A bike rider cycles 18 miles in 1 hour.

HOURS	TOTAL MILES	[ordered pairs]
1	18	(1, 18)



K = _____ EQUATION: _____

Compare the two graphs below. Jot down your observations in the table below.

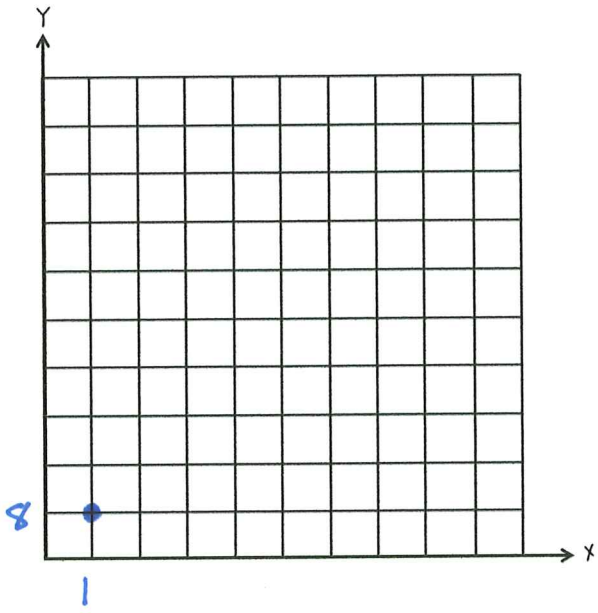
	GRAPH	CHARACTERISTICS
PROPORTIONAL		
NON-PROPORTIONAL		

Proportional relationships are linear (straight line) and pass through the origin.

A Hulu membership is $8.00 per month.

MONTHS	TOTAL COST
1	$8.00

→ [ordered pairs]: (1, 8)

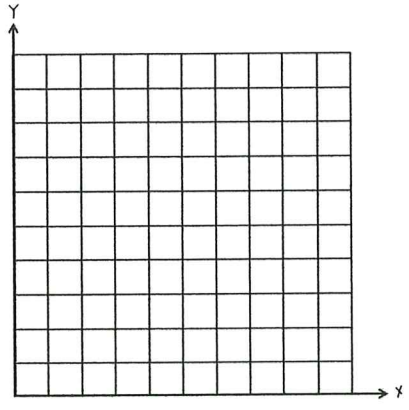


K = _____ EQUATION: _____

Graph the tables below. Explain if they are proportional or not.

EXAMPLE 1

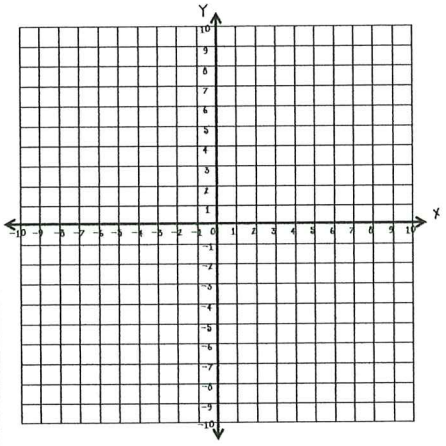
X	1	2	3	4	5
Y	1	3	5	7	9



PROPORTIONAL? yes or no
why?

EXAMPLE 2

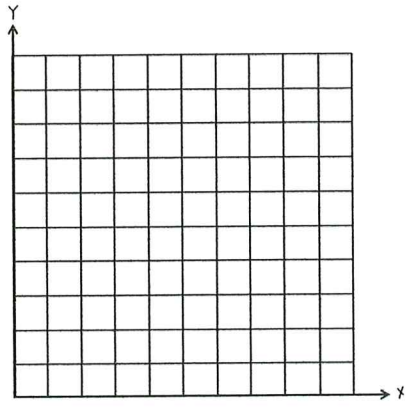
X	-3	-1	1	3	5
Y	-6	-2	2	6	10



PROPORTIONAL? yes or no
why?

EXAMPLE 3

X	2	4	6	8	10
Y	1	2	3	4	5



PROPORTIONAL? yes or no
why?

Unit: Proportional Relationships
Homework 4

Name _____

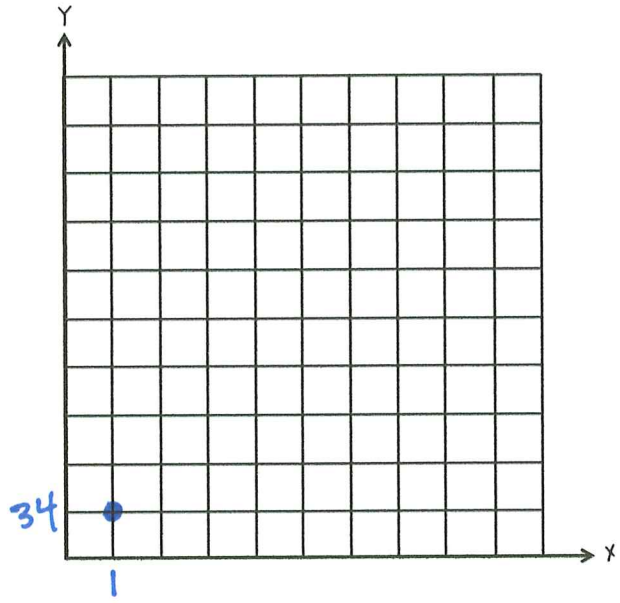
Date _____ Pd_____

HOW CAN PROPORTIONAL RELATIONSHIPS BE GRAPHED?

Read the scenario below. Then, complete the table, graph the ordered pairs, and write an equation. Using the information to answer the questions below.

Concert tickets go on sale for $34.00 each.

TICKETS SOLD	TOTAL REVENUE	→	[ordered pairs]
1	$34.00	→	(1, 34)
		→	
		→	
		→	
		→	
		→	
		→	



K = _____ EQUATION: _____

1. If the venue needs to sell 86 tickets to break even, how much money have they invested in the concert?

2. The venue has a maximum capacity of 200 people. If it sells out, how much revenue will the concert bring in?

3. Describe how you know that this is a proportional relationship.

4. What does the ordered pair (0, 0) represent in this situation?

Unit: Proportional Relationships
Student Handout 5

Name _____

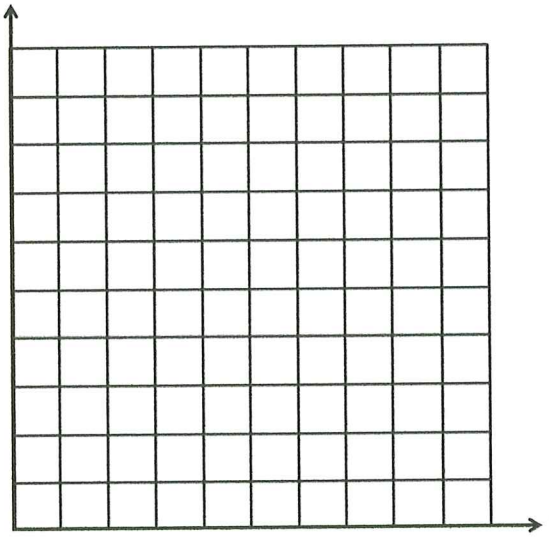
Date _____ Pd_____

HOW ARE PROPORTIONAL RELATIONSHIPS REPRESENTED?

Complete the missing information in the chart below. Then, answer the questions.

The number of miles a white-tailed deer travels is shown in the table below.

[graph]



[table]

HOURS (x)	MILES (y)
0	0
1	
2	
3	84
4	
5	
6	
7	196
8	
9	

[equation]

[verbal description]

A white-tailed deer travels ...

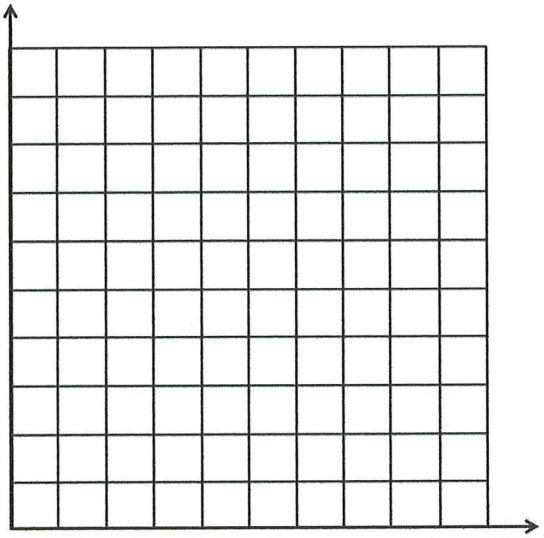
[proportionality explanation]

- constant rate ____ mph

straight line? yes or no

pass through origin? yes or no

[graph]



[table]

X # of shirts	Y total $ donated
5	
10	
15	
20	
25	
30	
35	
40	
45	

[equation]

[verbal description]

The student council is selling t-shirts to raise awareness for the local animal shelter. For each t-shirt they sell, they will donate $7.00.

1 t-shirt to $7 donated
1 : 7

[proportionality explanation]

straight line? yes or no
pass through origin? yes or no
ratio of y/x is ____

Label each scenario as proportional or non-proportional.

SCENARIO 1	SCENARIO 2	SCENARIO 3	SCENARIO 4
A restaurant charges $10.00 for a medium pizza and $1.00 for each topping.	A restaurant has an all you can eat buffet. They charge $8.75 per person.	A restaurant charges $3.00 for a refillable cup. The refills are complimentary. (tricky)	A restaurant has a build-your-own salad option. It is $3.80 per pound of salad.
PROPORTIONAL?	PROPORTIONAL?	PROPORTIONAL?	PROPORTIONAL?

Summarize today's lesson:

Unit: Proportional Relationships
Homework 5

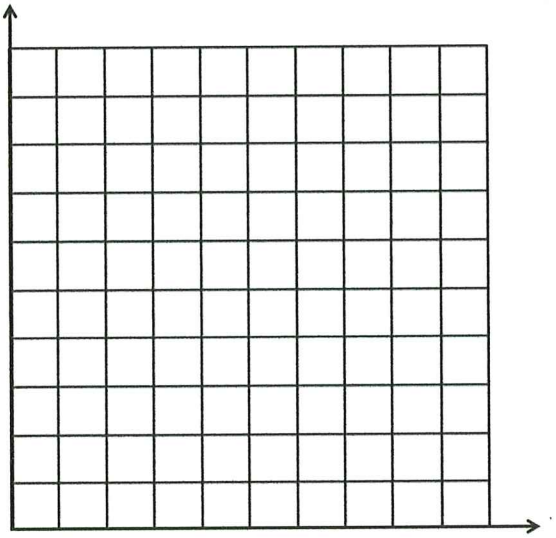
Name _____

Date _____ Pd_____

HOW ARE PROPORTIONAL RELATIONSHIPS REPRESENTED?

Complete the missing information in the chart below. Then, answer the questions.

[graph]



[table]

x HOURS RENTED	y TOTAL COST
0	$0.00
1	
2	$24.00
3	
4	
5	
6	
7	$84.00
8	
q	

[equation]

[verbal description]

[proportionality explanation]

1. The bike rental company has determined that they will charge based on the nearest half hour. If Michael rented the bike for 5.5 hours, how much would that cost?

2. What does the point (7, 84) represent in this situation?

3. If a customer has $50.00 to spend, how many hours can they rent the bicycle for?

Unit: Proportional Relationships
Quiz 1

Name _____

Date _____ Pd _____

Answers	
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

PROPORTIONAL RELATIONSHIPS QUIZ

Use the table below to answer questions 1-4.

X	MINUTES	0	3	6	9	12
y	WORDS TYPED	0	120	? #2	360	480

1. Kenny is practicing for a typing test to obtain a job as a paralegal. The number of words he can type is proportional to the number of minutes. If the test is 18 minutes long, how many words will Kenny be able to type?

2. What number is missing in the table above? ? in table

3. Which number represents k, the constant of proportionality?

A. 120
B. 60
C. 40
~~D. 12~~

4. Kenny types 280 words. How long did he type for?

~~A. 4~~
B. 5
C. 6
D. 7

Answer the following questions. Be sure to show your thinking.

5. During the fall, a pumpkin patch advertises four pumpkins for $11.00. Which equation below represents this proportional relationship?

A. $y = \frac{4}{11}x$
B. $y = 2.75x$
C. $y = 0.36x$
~~D. $11y = 4x$~~

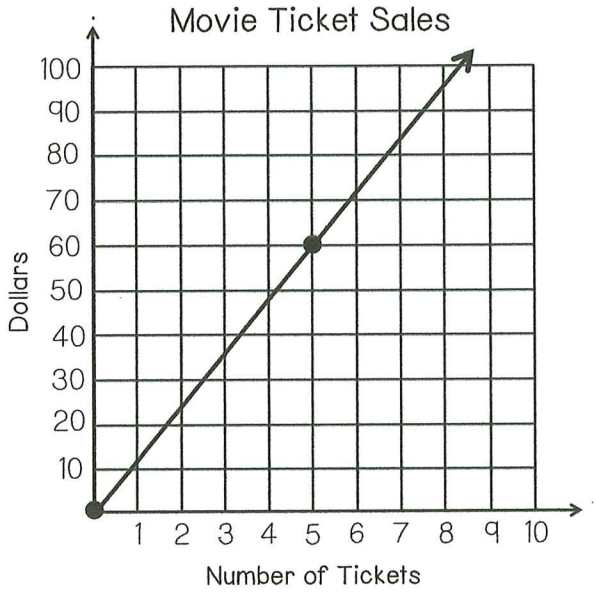
6. Determine if the following situation is proportional or non-proportional:

The state fair charges $5.00 for admission and then $0.50 per ride ticket.

A. proportional
B. non-proportional

Use the graph below to answer questions 7-9. Be sure to show your thinking.

A movie theater has increased their ticket prices. They are shown below.



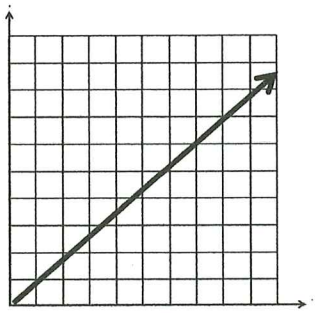
7. The graph shows the proportional relationship of the cost of movie tickets. Using the graph determine the constant of proportionality, k.

8. If the movie theater seats 328 people, what is the maximum amount of money the theater can bring in during a showing?

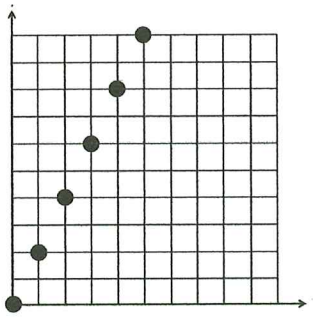
9. What does the ordered pair (1, 12) represent in this situation?

10. Which of the following graphs does NOT represent a proportional relationship?

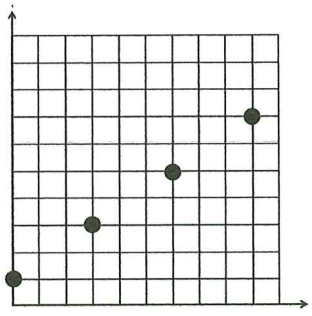
A.



B.



C.



Unit: Proportional Relationships
Student Handout 6

Name _____
Date _____ Pd_____

WHAT IS A UNIT RATE?

A rate is a specific comparison of two quantities.

It is the same value as the constant of proportionality.

Practice finding the unit rates of the following problems.

NICK'S FITNESS TEST	UNIT RATE
78 sit-ups in 2 minutes	
42 push-ups in 3 minutes	
40 jumping jacks in 1 minute	

What do you notice about the unit rate?

Unit rate can also be represented with fractions.

Let's review!

Whole #s become fraction over 1
Ex. $6 \rightarrow \frac{6}{1}$

MULTIPLYING FRACTIONS		DIVIDING FRACTIONS	
$1\frac{1}{2} \cdot 6$	$2\frac{2}{3} \cdot \frac{1}{4}$	$2\frac{1}{2} \div 6$	$1\frac{3}{4} \div \frac{2}{3}$

Unit: Proportional Relationships
Homework 6

Name _____

Date _____ Pd_____

WHAT IS A UNIT RATE?

1. A recipe for banana bread requires 3 cups of bananas for every $1\frac{1}{2}$ cups of sugar used. At this rate, how many cups of sugar should be used if 2 cups of bananas are used?

2. Emma pays $108 every six weeks for tennis lessons. What is the price per year for tennis lessons?

3. If $\frac{3}{4}$ gallon of paint covers $\frac{1}{3}$ of the wall, then how much paint is needed for the entire wall?

$\frac{\frac{3}{4}}{\frac{1}{3}} \rightarrow \frac{3}{4} \times \frac{3}{1} = \frac{9}{4} = 2\frac{1}{4}$ gallons (reciprocal)

$4\overline{)9}$ R 1

4. Jeremy can row $\frac{1}{3}$ of a mile in $\frac{1}{4}$ of an hour. What is the unit rate?

$\frac{\frac{1}{3}}{\frac{1}{4}} = \frac{1}{3} \times \frac{4}{1} = \frac{4}{3} = 1\frac{1}{3}$ miles/hour (reciprocal)

$3\overline{)4}$ R 1

5. Four bottles of Powerade cost $3.88. Find the unit price of each bottle.

6. Art mows $\frac{1}{8}$ acre in $\frac{1}{4}$ hour. How many acres does Art mow per hour?

Unit: Proportional Relationships
Student Handout 7

Name _____
Date _____ Pd_____

HOW CAN TWO UNIT RATES BE COMPARED?

Unit rates are helpful when comparing quantities, as long as the units are alike.

The price of 1 a gallon of organic chocolate milk is $6.40. The price of 6 six cartons of organic chocolate milk is $2.88.

1 gallon = 128 ounces

GALLON OF ORGANIC CHOCOLATE MILK		
NUMBER OF OUNCES x	COST y	Y/X
128	$6.40	$\frac{6.40}{128} = \$0.05$

SIX CARTONS OF ORGANIC CHOCOLATE MILK		
NUMBER OF CARTONS	COST	Y/X
6	$2.88	$\frac{2.88}{6} = \$0.48$

1. What does the unit rate of the gallon of organic chocolate milk represent?

2. What does the unit rate of organic chocolate milk cartons represents?

3. What is the cost per ounce of the gallon variety?

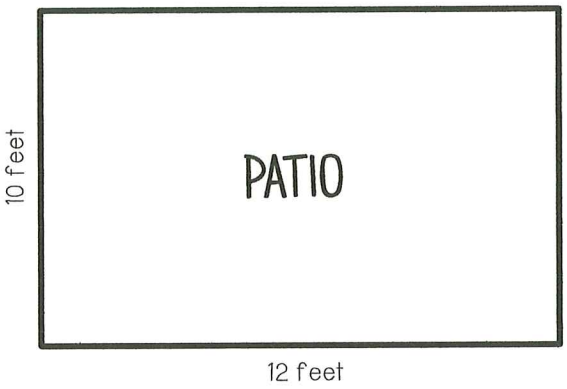
4. What is the cost per carton in each six-pack?

5. What is the cost per ounce of the carton variety, if each carton contains eight ounces?

6. If the gallon variety was poured into cartons, how many cartons would it fill? How much would each carton cost?

Use the following information to answer the questions below.

The Moore family is adding a brick patio to their back yard. Mr. Moore is determining how many square bricks he needs for his rectangular patio, as well as the cost. His sketch is shown below and not drawn to scale.



5. How much does each brick paver cost?

$\frac{15.36}{12}$

6. How many square inches will each paver cover?

7. What is the cost per square inch of the pavers?

8. How many square feet will each paver cover?

9. How many square feet is the patio?

10. How many pavers are needed to cover the patio? How much will that cost?

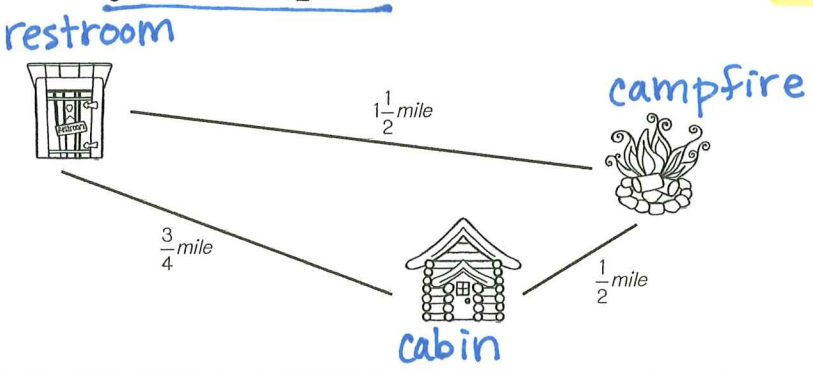
Unit: Proportional Relationships
Homework 7

Name _____
Date _____ Pd_____

HOW CAN TWO UNIT RATES BE COMPARED?

Two girl scout troops are completing a wilderness campout. Use the information to answer the questions.

The Blue Troop hikes $\frac{2}{3}$ mile every $\frac{1}{2}$ hour. The Yellow Troop hikes $\frac{3}{4}$ mile every $\frac{1}{3}$ hour.



	BLUE TROOP	YELLOW TROOP
CABIN TO THE RESTROOMS $\frac{3}{4}$ miles	$\frac{\text{miles}}{\text{hours}} = \frac{\frac{2}{3}}{\frac{1}{2}} \times \frac{\frac{3}{4}}{x}$ $\frac{2}{3}x = \frac{1}{2} \times \frac{3}{4}$ $\frac{\frac{2}{3}x}{\frac{2}{3}} = \frac{\frac{3}{8}}{\frac{2}{3}}$ $x = \frac{3}{8} \div \frac{2}{3} = \frac{3}{8} \times \frac{3}{2} = \frac{9}{16}$ hours	$\frac{\text{miles}}{\text{hours}} = \frac{\frac{3}{4}}{\frac{1}{3}} \times \frac{\frac{3}{4}}{x}$ $\frac{3}{4}x = \frac{1}{1} \times \frac{3}{4}$ $x = \frac{1}{4} \div \frac{3}{4}$ $\frac{\frac{3}{4}x}{\frac{3}{4}} = \frac{\frac{1}{4}}{\frac{3}{4}}$ $x = \frac{1}{1} \times \frac{4}{3}$ $x = \frac{1}{3}$ hour
RESTROOMS TO THE CAMPFIRE $1\frac{1}{2}$ miles		
CAMPFIRE TO THE CABIN $\frac{1}{2}$ mile		