Unit: Linear Relationships
Student Handout 1

Name _____
Date _____Pd_____

CONSTANT OF PROPORTIONALITY

Liam is making breakfast for dinner using a pancake mix.

a. How many cups of mix will he use for 12 pancakes? _____
b. How many cups of mix will he use for 24 pancakes? _____
c. What is the ratio of cups of mix to servings?

CUPS OF MIX	# OF PANCAKES
1	12
2	24

PROPORTIONAL RELATIONSHIPS

- A relationship is proportional when the ratio of y over x is _____.

CONSTANT OF PROPORTIONALITY

- The _____ of the ratio of two proportional quantities.
- It is represented by the equation _____, where:
  - y represents: _____
  - x represents: _____
- Use the equation _____ to represent proportional relationships.

For 1-3, find the ratio of $\frac{y}{x}$ to determine if each table represents a proportional relationship.

1.

x	y	$\frac{y}{x}$
1	6	
2	12	
3	18	
4	24	

k = _____

2.

x	y	$\frac{y}{x}$
2	10	
3	15	
4	20	
5	25	

k = _____

3.

x	y	$\frac{y}{x}$
8	4	
10	5	
12	6	
14	7	

k = _____

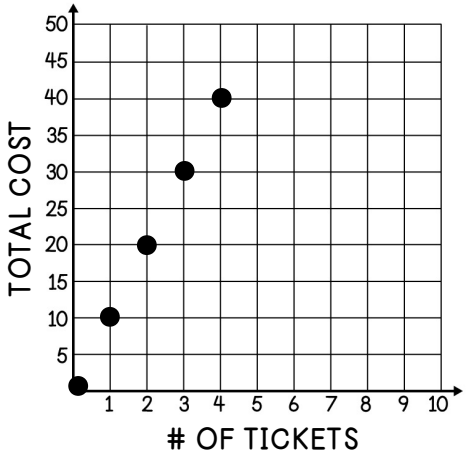
4. The cost of 6 pounds of almonds is $23.28. What is the constant of proportionality that relates y, the cost in dollars, to x, the number of pounds?

k = _____

5. A car travels 220 miles in 4 hours. What is the constant of proportionality that relates y, the total number of miles, to x, the number of hours?

k = _____

6. Use the graph below to complete the table and answer the following questions.

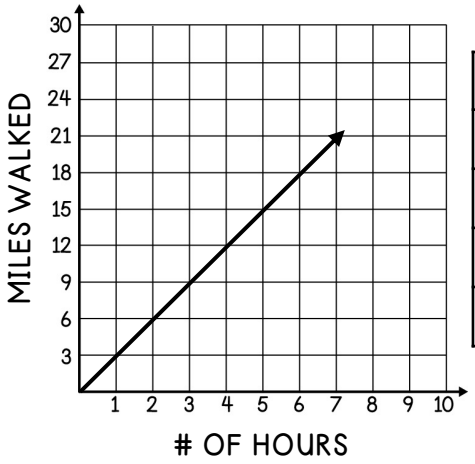


x	y

a. k = _____

b. What does the point (1, 10) represent in the relationship?

7. Use the graph below to complete the table and answer the following questions.



x	y

a. k = _____

b. What does the point (1, 3) represent in the relationship?

Use your understanding of the constant of proportionality to answer the questions below.

8. While training for a marathon, Keith's watch reported the number of calories he had burned at each mile marker. The data is shown below.

# OF MILES	1	2	3	4	5
# OF CALORIES BURNED	117	234	351	468	585

a. Is the number of calories proportional to the number of miles? Justify your thinking.

b. What is the constant of proportionality that relates y, the number of calories burned, to x, the number of miles?

c. Write an equation to represent the relationship between the number of miles and the calories burned.

d. The next day, Keith ran 7 miles. How many calories did he burn?

e. If Keith's watch reported that he burned 1,170 calories, how many miles did Keith run that day?

Summarize today's lesson:

Unit: Linear Relationships
Homework 1

Name _____

Date _____ Pd_____

CONSTANT OF PROPORTIONALITY

Determine the constant of proportionality from each representation below.

1.

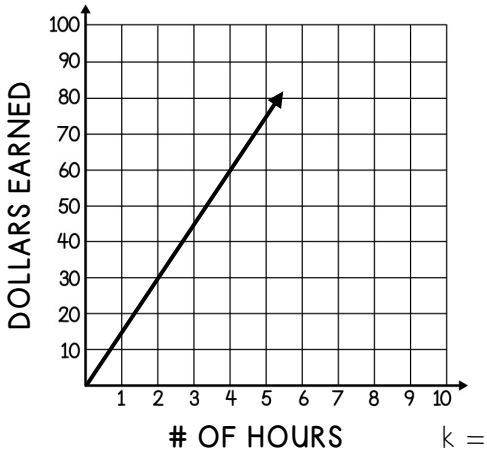
x	8	12	16	20	24
y	2	3	4	5	6

k = _____

2. There are 108 feet in 36 yards. What is the constant of proportionality that relates y, the number of yards to x, the number of feet?

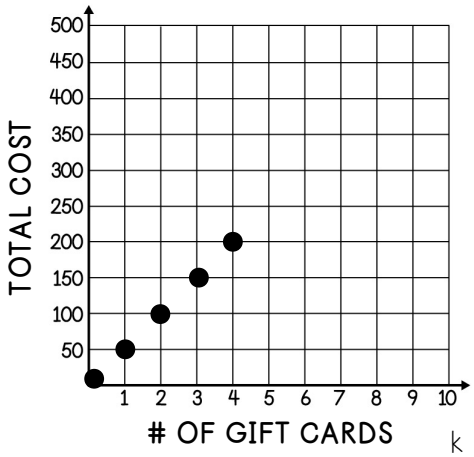
k = _____

3.



k = _____

4.



k = _____

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

A gym employee earns the same amount each month. After working for three months, he earned $4,500. Complete the table to determine how much money he will make over a five-month period.

MONTH	TOTAL EARNINGS	$\frac{y}{x}$
1		
2		
3	$4,500	
4		
5		

5. Is the relationship proportional? Explain your thinking.

6. What is the constant of proportionality?

7. Write an equation to represent the situation.

8. If his pay rate remains the same, how much will he earn after working 7 months?

9. After how many months will the gym employee earn $15,000?

Unit: Linear Relationships
Student Handout 2

Name _____

Date _____Pd_____

PROPORTIONAL RELATIONSHIPS: TABLES

A coffee shop displays their prices on a chalkboard menu. The prices are proportional, but some of the information got erased.

CUPS OF COFFEE	TOTAL COST
1	
2	$5.50
3	
4	$11.00

a. What is the constant of proportionality?

b. How can you use the value of k to find the missing prices on the menu? Use this method to complete the table.

c. How does the total cost change as the cups of coffee increase by 1?

RATE OF CHANGE

- The rate of change describes how one quantity _____ in relation to the other quantity.
- In a proportional relationship, the rate of change is equal to the _____ of proportionality, k.

In 1-2, a representation of a proportional relationship is given. Use the information to create a table to represent the relationship. Then, find the rate of change.

1. $y = 9.5x$

x	y
0	
1	
2	
3	

Rate of change: _____

2. As the x-values increase by 2, the y-values increase by 60.

x	y
1	
2	
3	
4	

Rate of change: _____

Use your knowledge of proportional relationships to answer each question.

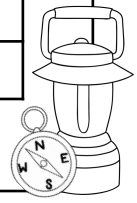
3. Camping Craze hires a graphic designer to create a new logo and marketing materials. The graphic designer charges Camping Craze $45.00 per hour. Complete the table and then answer questions a-c.

# OF HOURS	TOTAL CHARGE

a. Find the rate of change.

b. What does the rate of change represent in the context of the situation?

c. Write an equation to show the relationship between x, the number of hours and y, the total charge of the graphic designer.



4. Ronny earns $27.50 for each driveway he shovels. Create a table to show the sum of the amount Ronny will earn shoveling 4 driveways.

5. Gasoline is priced at $3.39 per gallon. Write an equation to represent the total cost, y, of purchasing x number of gallons.

6. Mrs. Dunn asked her students to represent y = 5x in a table. Which student(s) correctly completed the task? Explain your reasoning.

SASHA

x	0	1	2	3	4
y	5	10	15	20	25

RONALD

x	0	1	2	3	4
y	0	5	10	15	20

7. Michelle reads a book for the school Read-A-Thon. The table shows the proportional relationship between x, the number of minutes and y, the total number of pages read.

# OF MINUTES	TOTAL PAGES READ
30	15
60	30
90	45
120	60

a. Determine the rate of change and explain its meaning in the context of this situation.

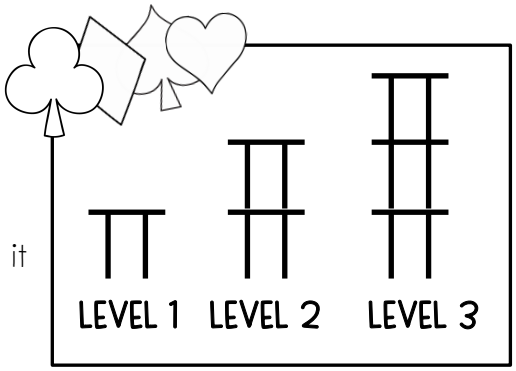
b. Write an equation to represent the total number of pages as it relates to the number of minutes read.

8. Crystal creates a tower of playing cards. The number of cards at each level is shown below.

a. Complete the table below to represent the rate of change.

LEVEL	1	2	3	4	5
# OF CARDS					

b. Write an equation to represent the number of cards, y, as it relates to the level of the tower, x.



9. Sue traveled by car at a constant rate. After 4 hours, she had traveled 272 miles. Circle any of the following that represent the relationship between the distance traveled and the hours of driving.

A.

HOURS	5	6	7
MILES	340	408	476

B. d = 272t, where d is the distance in miles and t is the time in hours.

C. Sue is traveling 68 miles per hour.

Unit: Linear Relationships
Homework 2

Name _____

Date _____Pd_____

PROPORTIONAL RELATIONSHIPS: TABLES

Use your understanding of rate of change to answer the questions below.

1. Three pounds of bananas cost $1.95. Which of the following is not true?

a. One pound of bananas is $0.75.
b. The equation y = 0.65x could be used to determine the cost of x pounds of bananas.
c. Seven pounds of bananas is $4.55.

2. As the x-values increase by 1, the y-values increase by 15. Which equation shows this?

a. $y = 15 + x$
b. $y = 15 - x$
c. $y = 15x$

For each table below, determine the rate of change and write an equation.

3.

x	y
1	4
2	8
3	12
4	16

rate of change: _____

equation: _____

4.

x	y
2	7
4	14
6	21
8	28

rate of change: _____

equation: _____

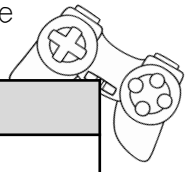
5.

x	y
4	3
5	3.75
6	4.5
7	5.25

rate of change: _____

equation: _____

6. James is saving $15 per week in order to purchase a gaming console. Create a table to represent the relationship between x, the number of weeks and y, the total amount James has saved.



a. Write an equation to represent the situation.

b. James has a goal to save $360 in 22 weeks. Will he meet his goal? Explain.

7. Mr. Brown asked his students create a representation with a rate of change of 2.5. Circle the students who correctly completed the task.

ELIJAH	ZANE	MARCO
y = 2.5 + x	Four boxes of tissue cost $10.	y = 2.5x

Unit: Linear Relationships
Student Handout 3

Name _____

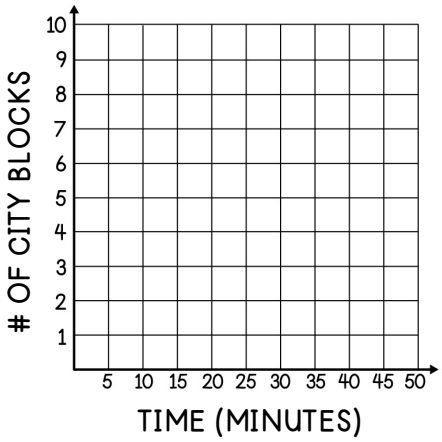
Date _____ Pd_____

PROPORTIONAL RELATIONSHIPS: GRAPHS

Isabelle walks to work each morning. It takes her 5 minutes to travel one city block. Use this information to complete a-b.

a. Sketch a graph to show the number of blocks Isabelle can travel in a specific amount of time.

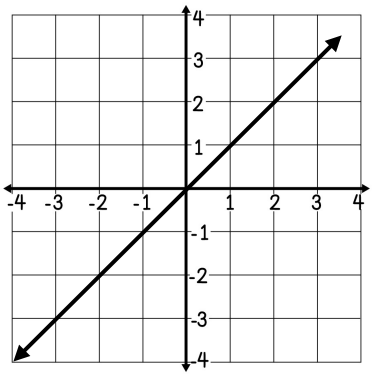
b. What features of the graph help you to determine if the relationship is proportional?



PROPORTIONAL GRAPHS

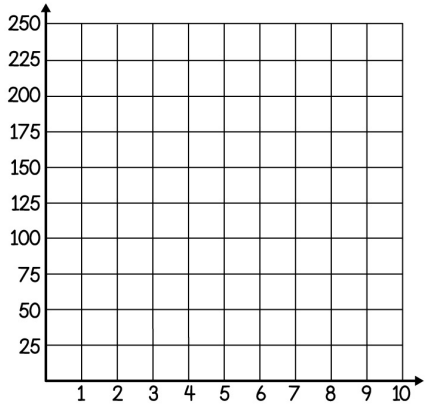
- The line always passes through the origin, _____.
- The rate of change will be equal to the _____ of proportionality, k.
- The equation of the line will be _____.

Ex. Use the formula $k = \frac{y}{x}$ to determine the rate of change.



For 1-2, complete the graph, find the rate of change, and write the equation for each situation.

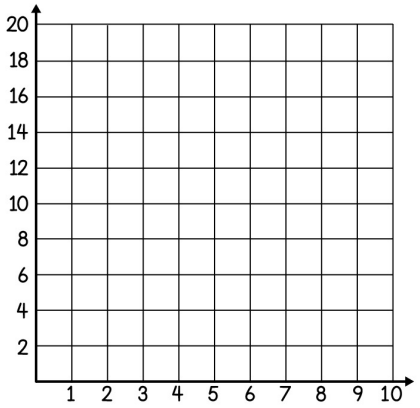
1. An ATV travels 25 miles each hour, where x is the number of hours and y is the total miles.



rate of change: _____

equation: _____

2. The number of cars, x, is proportional to the number of wheels, y.



rate of change: _____

equation: _____

3. Sandra plots the points (0, 0) and (5, 10) on a graph to represent a proportional relationship.

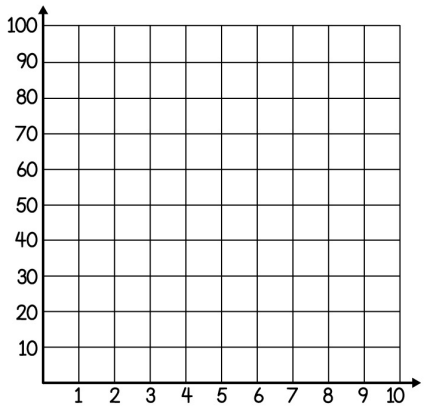
a. Find the rate of change.

b. Write an equation to represent the relationship.

In 4-7, use your knowledge of proportional relationships to answer each question.

4. Use the information in the table to complete the graph and answer the questions.

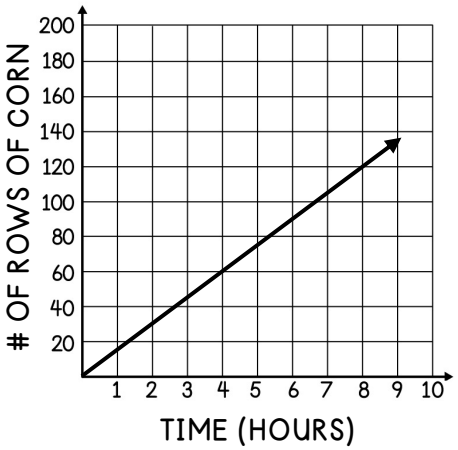
# OF BOXES	2	3	5	7
# OF BANDAGES	24	36	60	84



rate of change: _____

equation: _____

5. A farmer is plowing his cornfields. The relationship between x, the hours driving the plow, and y, the number of rows of corn plowed, is shown in the graph at the right.

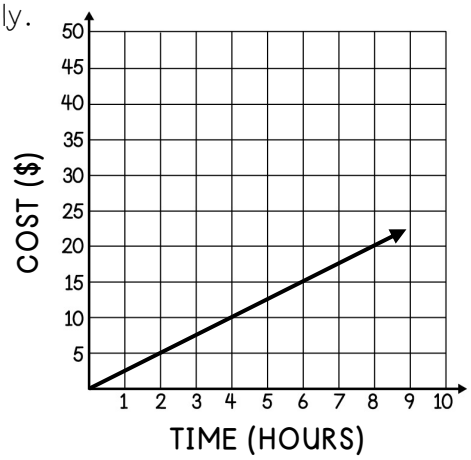


a. What does the point (0, 0) represent?

b. Choose an ordered pair to find the constant of proportionality.

c. Write an equation to represent the situation.

6. Patricia is asked to determine if the statements below represent the graph. Check all that apply.



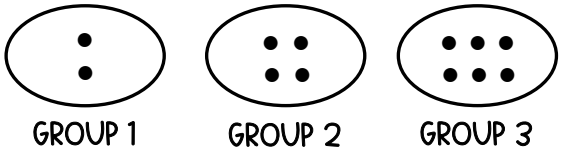
The equation y = 2.5x represents the situation.

The cost for 10 hours of parking is $4.

The cost of parking for 8 hours is $20.

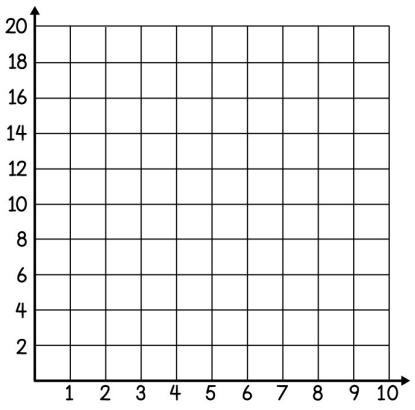
The graph will contain the coordinate (12, 30).

7. A representation of a proportional relationship is shown below.



a. Sketch a graph to represent the relationship between the group number, x, and the number of counters, y.

b. Write an equation to represent the relationship between the group number, x, and the number of counters, y.

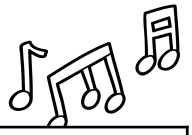


Unit: Linear Relationships
Homework 3

Name _____

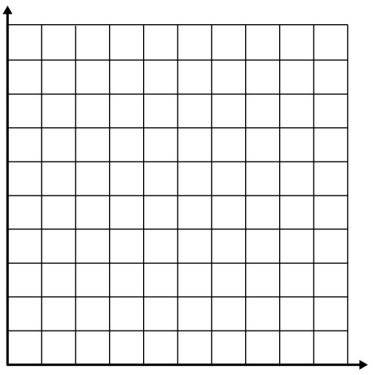
Date _____ Pd_____

PROPORTIONAL RELATIONSHIPS: GRAPHS



Use your understanding of proportional relationships to answer the questions below.

DeMarcus is organizing a group of friends to attend a concert. The ticket pricing is shown in the table below. Use the information to create a graph and answer the questions.

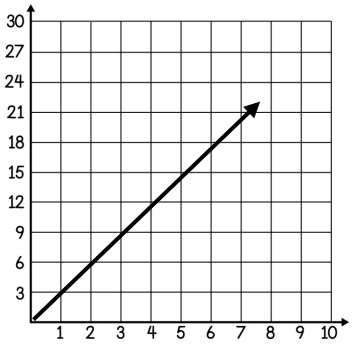


# OF TICKETS	2	3	5	7
TOTAL COST ($)	32	48	80	112

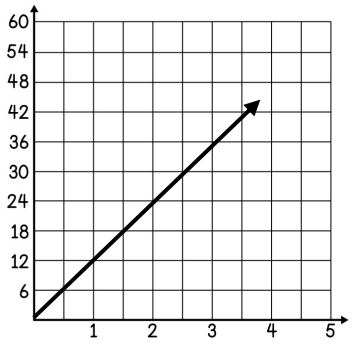
1. Rate of Change: _____ Equation: _____
2. What does the ordered pair (1, 16) represent in this situation?
3. Describe how you know that this is a proportional relationship:

4. The number of feet in a yard can be represented by a graph. Circle the graph(s) that could be used to represent the number of feet, y, in x yards.

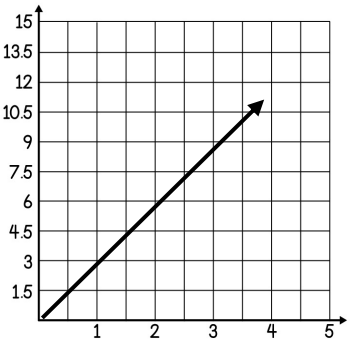
GRAPH A



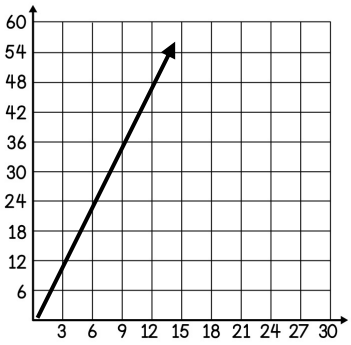
GRAPH B



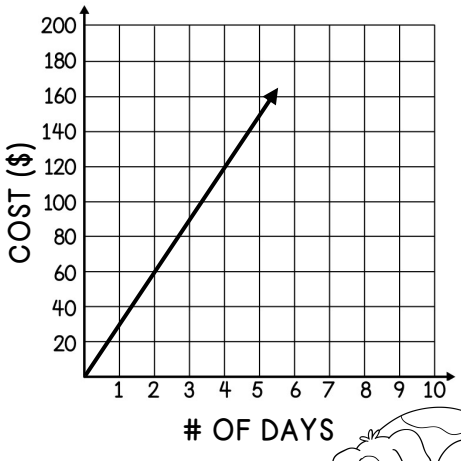
GRAPH C



GRAPH D



A dog kennel charges a daily boarding rate as shown on the graph. Use the information to mark 5-8 as true or false. If false, rewrite the statement correctly.



_____ 5. The dog kennel charges $60 per day.

_____ 6. The equation y = 30x can represent the graph.

_____ 7. It costs $200 to board a dog for 7 days.

_____ 8. The graph will contain the coordinate (9, 270).

Unit: Linear Relationships
Student Handout 4

Name _____

Date _____Pd_____

REPRESENTING PROPORTIONAL RELATIONSHIPS

Practice representing proportional relationships in multiple ways with the following examples. Use the representation given to help you fill in the others.

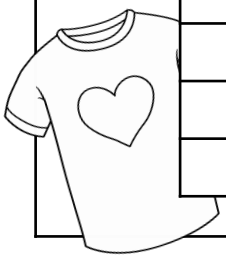
[VERBAL DESCRIPTION]

The student council is selling t-shirts to raise awareness for the local animal shelter. For each t-shirt they sell, they will donate $5.00.

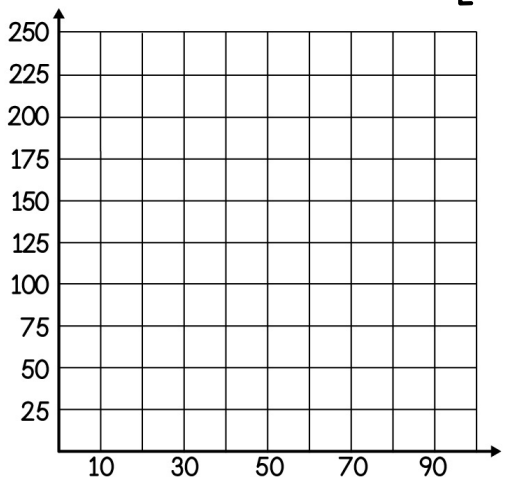
[EQUATION]

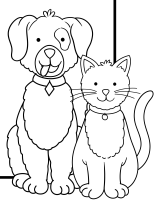
[TABLE]

# OF SHIRTS SOLD	DOLLARS DONATED
0	
10	
20	
30	
40	
50	
60	



[GRAPH]





Use the representations in the example above to answer 1-5.

1. Describe how you know that the above situation is proportional.	2. Find the constant of proportionality.	3. What does the rate of change represent in this situation?
4. What does the ordered pair (10, 50) represent in the context of the situation?	5. If the student council sells 80 t-shirts, how much will they donate to the animal shelter?	

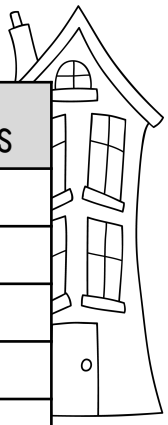
Use the given information for each situation below to fill in the missing representations.

[VERBAL DESCRIPTION]

[EQUATION]

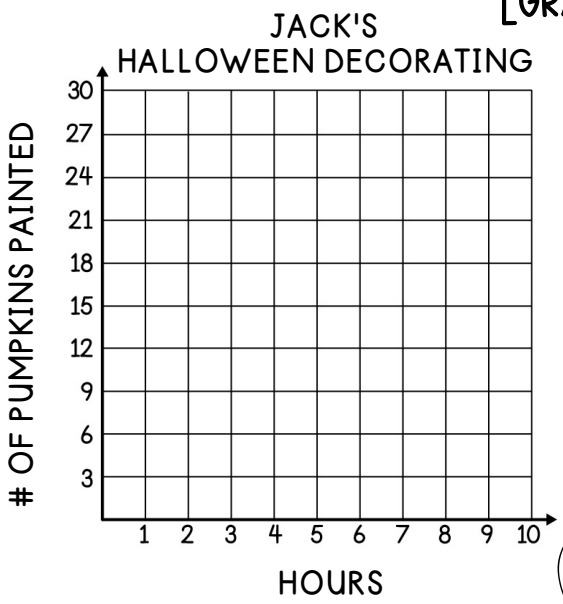
$$y = 3x$$

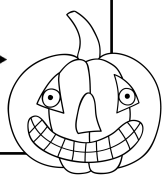
[TABLE]



HOURS	# OF PUMPKINS
1	
2	
3	
4	
5	
6	
7	

[GRAPH]



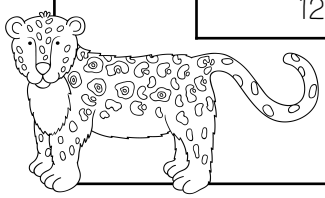


[VERBAL DESCRIPTION]

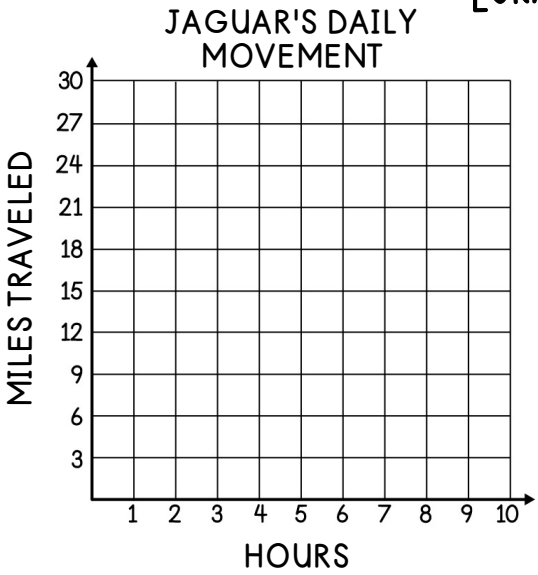
[EQUATION]

[TABLE]

HOURS	MILES
2	
4	
6	9
8	
10	
12	18



[GRAPH]



Summarize today's lesson:

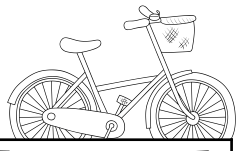
Unit: Linear Relationships
Homework 4

Name _____

Date _____Pd_____

REPRESENTING PROPORTIONAL RELATIONSHIPS

Shoreside Bikes is a bike rental company that charges tourists by the hour as shown in the table. Use the table to fill in the missing representations.

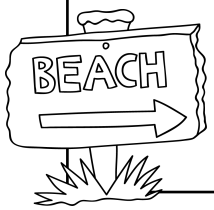


[VERBAL DESCRIPTION]

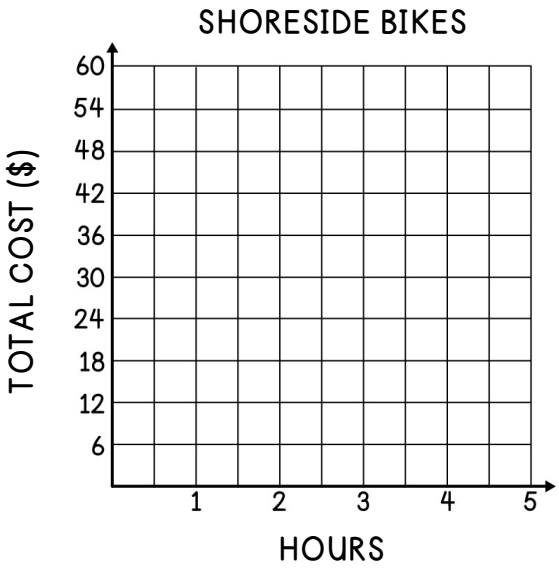
[EQUATION]

[TABLE]

HOURS	COST ($)
1	
2	$24
3	
4	
5	
6	
7	$84



[GRAPH]



1. What is the rate of change and what does it represent in this situation?

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

3. The bike rental company has determined that they will charge based on the nearest half hour. If Mikala rented a bike for 5.5 hours, how much would she be charged?

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

Unit: Linear Relationships
Quiz 1

Name _____

Date _____Pd_____

QUIZ: PROPORTIONAL RELATIONSHIPS

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

Use the table below to answer questions 1-4.

MINUTES	0	3	6	9	12
WORDS TYPED	0	120	?	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 he types. 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?

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 minutes
b. 5 minutes
c. 6 minutes
d. 7 minutes

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

5. Jermaine plots the points (0, 0) and (4, 11) on a graph to represent a proportional relationship. Which of the following equations represents the relationship between the x and y-values?

a. $y = \frac{4}{11}x$ b. $y = 2.75x$

c. $y = 0.36x$ d. $11y = 4x$

6. The table below shows the relationship between the number of miles traveled, y, and the number of gallons of gas used, x.

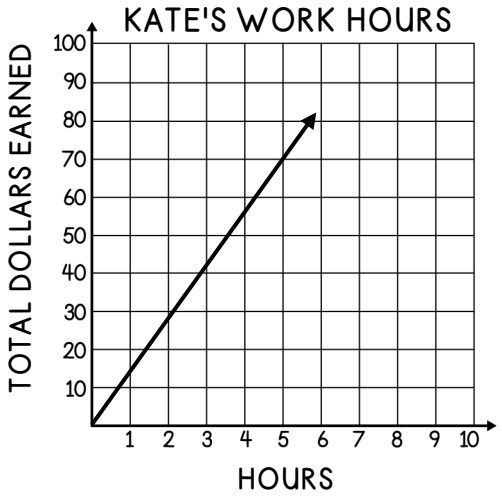
x	3	5	7	11
y	228	380	532	836

Which of the following equations best represents the relationship?

a. $y = 7.6x$ b. $y = 684x$
c. $y = 0.13x$ d. $y = 76x$

Use the graph below to answer questions 7-8. Be sure to show your thinking.

The graph shows the proportional relationship between the number of dollars Kate earned, y, and the hours she worked at the movie theater.



7. Using the graph, determine the constant of proportionality, k.

8. If Kate worked 80 hours last month, how much money did she earn?

9. Which of the following tables represents $y = 24x$?

a.

x	1	2	3	4
y	24	12	0	-12

b.

x	2	4	6	8
y	48	96	144	192

c.

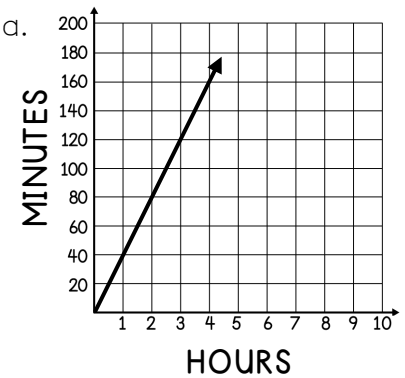
x	0	2	4	6
y	24	48	96	144

d.

x	1	2	3	4
y	24	21	18	15

10. Which of the representations below does NOT represent the number of minutes in an hour?

a.



b.

HOURS	MINUTES
2	120
5	300
6	360
8	480

c. $y = 60x$, where x represents the time in hours and y represents the time in minutes

d. There are 240 minutes in 4 hours.

Unit: Linear Relationships
Student Handout 5

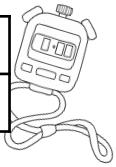
Name _____

Date _____ Pd_____

NON-PROPORTIONAL RELATIONSHIPS

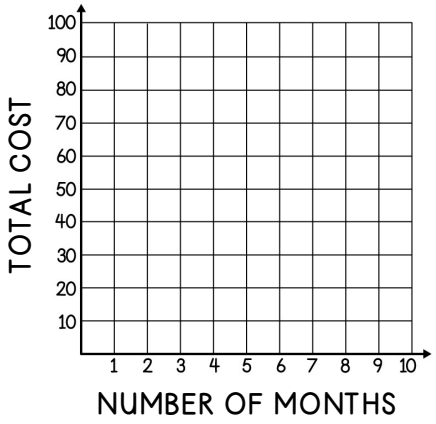
Fit Life Gym charges customers for each month of membership as shown in the table. Use the information to complete a-b.

# OF MONTHS	0	1	2	3
TOTAL COST ($)	10	30	50	70



a. Sketch a graph to show the relationship between the cost of the gym, y, and the number of months, x.

b. Is the relationship between the number of months and the total cost proportional? Explain.



A relationship is non-proportional if the ratio between the two quantities is _____ _____.

NON-PROPORTIONAL RELATIONSHIPS

TABLES:

- The ratio of_____ is not constant.
- Does not contain the point _____ but instead when x is 0, y is a nonzero constant _____ .

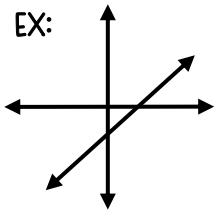
EX:

x	0	1	2	3
y	9	11	13	15

GRAPHS:

- The line will not pass through the _____.
- Instead, the graph will cross the y-axis at a point known as the _____.

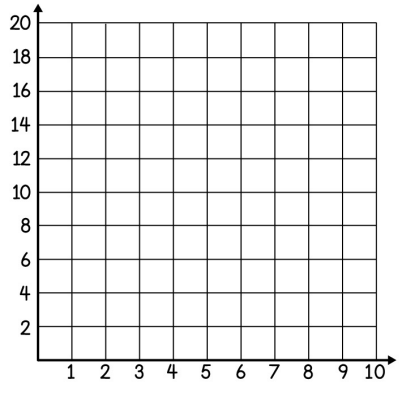
EX:



For 1-2, complete the graph to represent the non-proportional relationship given in the table.

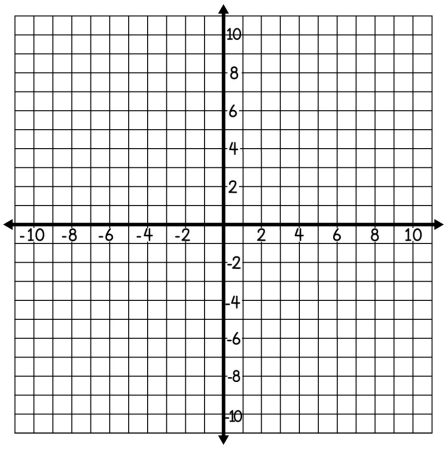
1. The table shows the cost in dollars of jumping at Terrific Trampolines, y, in relation to the hours of jumping, x.

HOURS	COST ($)
0	6
1	8
2	10
3	12



2. The table shows the relationship between x-values and y-values.

x	y
0	1
1	4
2	7
3	10

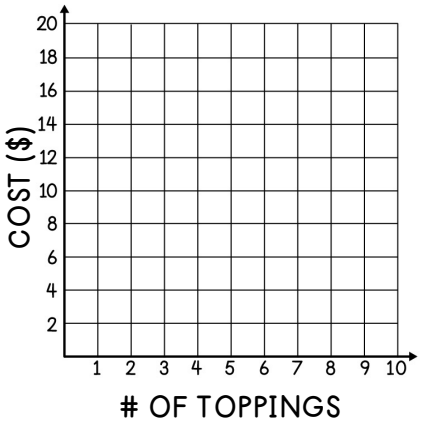


How can you determine the rate of change in questions 1 and 2?

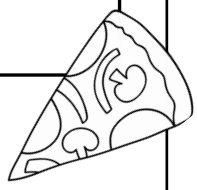
For 3-5, use your understanding of non-proportional relationships to answer each question.

3. At Pizza Palace, Rasheed orders a pizza that costs $8.00 plus $2.00 per topping. Complete each representation to show the relationship between the number of toppings, x, and the cost of the pizza, y. Then answer a-d.

TOPPINGS	PROCESS	COST ($)
0		
1		
2		
3		
4		

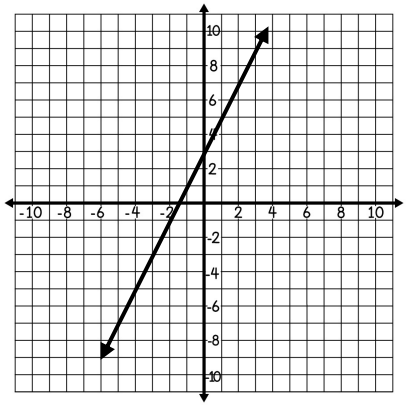


EQUATION:



a. What is the initial value, or the cost of the pizza with 0 toppings?	b. Where do you see the initial value in each representation?	c. What is the rate of change for the situation?	d. Where do you see the rate of change in the equation?

4. Mr. Tien asked his students to write an equation to represent the relationship shown on the graph. Use the graph to complete the table and circle the name of the student whose equation is correct.



x	y
0	
1	
2	
3	

GARRY
$y = 3x + 2$

CEDRICK
$y = 2x$

ELLIE
$y = 2x + 3$

CENA
$y = 2x + 5$

5. Draw a line to match each equation to the table that represents the relationship between the x-values and y-values.

$y = 0.5x + 6$

x	0	1	2	3
y	6	10	14	18

$y = 4x + 6$

x	0	2	4	6
y	3	13	23	33

$y = 5x + 3$

x	0	5	10	15
y	6	8.5	11	13.5

Unit: Linear Relationships
Homework 5

Name _____

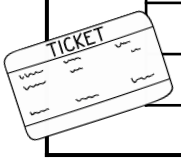
Date _____ Pd_____

NON-PROPORTIONAL RELATIONSHIPS

Three statements were made about each non-proportional relationship shown. Two are true and one is false. Mark each statement as true or false and rewrite the false statement to make it true.

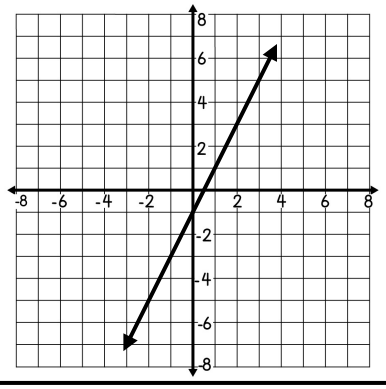
1 A travel agency charges customers to book train tickets as shown.

# OF TICKETS	TOTAL COST
0	$25
2	$125
4	$225
6	$325
8	$425



STATEMENT	T/F?
The travel agency charges at flat booking fee of $25.	
The rate of change is $100 and represents the amount each ticket costs.	
The situation can be represented by the equation y = 50x + 25, where y is the total cost and x is the number of tickets purchased.	
REWRITE THE FALSE STATEMENT TO MAKE IT TRUE:	

2 The graph shows the relationship between x and y-values.



STATEMENT	T/F?
The y-intercept is at -1.	
The rate of change is 2.	
The graph can be represented by the equation y = 2x + 1.	
REWRITE THE FALSE STATEMENT TO MAKE IT TRUE:	

3 A snorkeling company charges tourists $30 for the snorkeling gear and $11 per hour of snorkeling. Let y be the total cost and x be the number of hours spent snorkeling.

STATEMENT	T/F?
The situation can be represented by the equation y = 11x + 30.	
If a tourist snorkels for 4 hours, it will cost $44.	
The rate of change in this situation is 11, and it represents the cost of each hour of snorkeling.	
REWRITE THE FALSE STATEMENT TO MAKE IT TRUE:	

Unit: Linear Relationships
Student Handout 6

Name _____

Date _____Pd_____

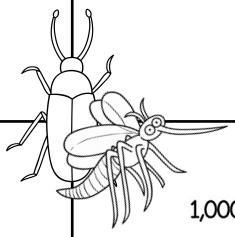
REPRESENTING NON-PROPORTIONAL RELATIONSHIPS

Practice representing non-proportional relationships in multiple ways with the following examples. Use the representation given to help you fill in the others.

[VERBAL DESCRIPTION]

A commercial pest control company charges businesses $2.50 per cubic inch of pesticides used, plus a service fee of $50 for the treatment.

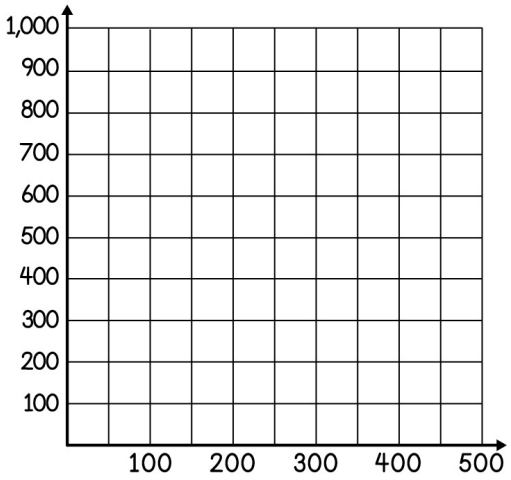
[EQUATION]

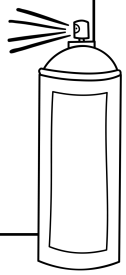


[TABLE]

CUBIC INCHES	PROCESS	TOTAL COST ($)
0		
50		
100		
150		
200		
250		
300		

[GRAPH]





Use the representations in the example above to answer 1-4.

1. Determine if the situation above is proportional or non-proportional. Explain your reasoning.	2. What is the y-intercept and what does it represent in this situation?
3. What is the rate of change and what does it represent in this situation?	4. If the total cost is $1,050, then how many cubic inches of pesticides were used?

Use the given information for each situation below to fill in the missing representations.

[VERBAL DESCRIPTION]

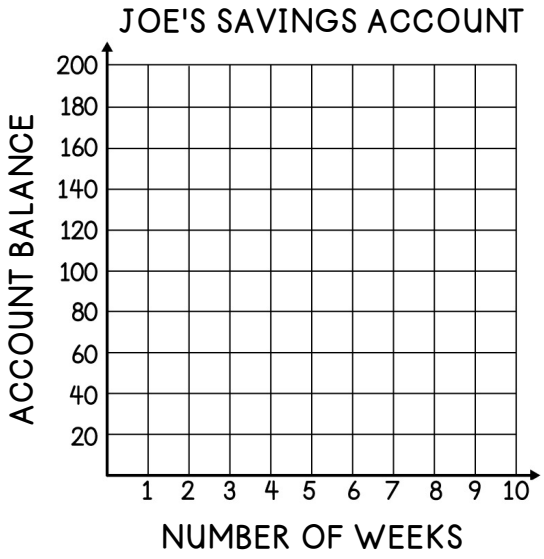
[EQUATION]

$$y = 180 - 10x$$

[TABLE]

NUMBER OF WEEKS	PROCESS	ACCOUNT BALANCE
0		
1		
2		
3		
4		
5		
6		

[GRAPH]



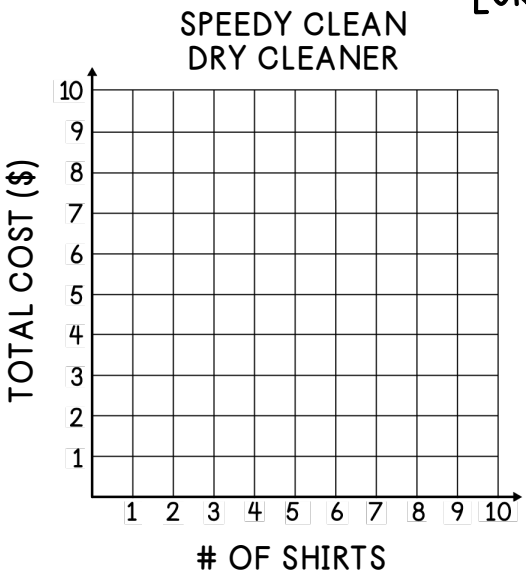
[VERBAL DESCRIPTION]

[EQUATION]

[TABLE]

NUMBER OF SHIRTS	PROCESS	TOTAL COST
0		3
2		4
4		5
6		
8		7
10		
12		

[GRAPH]



Summarize today's lesson:

Unit: Linear Relationships
Homework 6

Name _____

Date _____ Pd_____

REPRESENTING NON-PROPORTIONAL RELATIONSHIPS

Mike, a local auto mechanic, charges a flat fee plus an hourly rate for the time it takes for the repair. Use the graph shown below to fill in the missing representations. Then, answer the questions that follow.

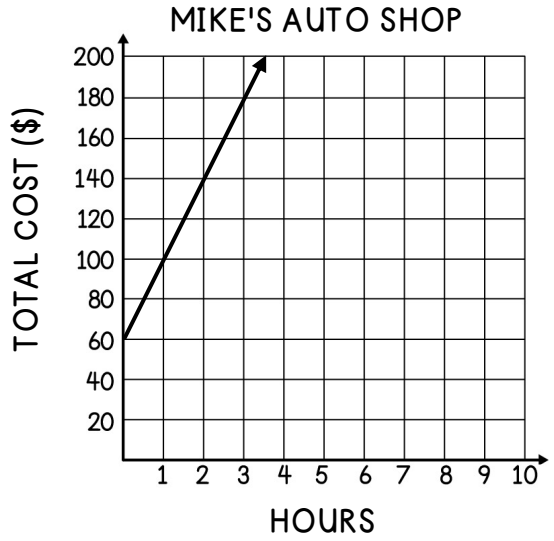
[VERBAL DESCRIPTION]

[EQUATION]

[TABLE]

NUMBER OF HOURS	PROCESS	TOTAL COST
0		
1		
2		
3		
4		
5		
6		

[GRAPH]



1. What is the y-intercept and what does it represent in this situation?

2. What is the rate of change and what does it represent in this situation?

3. What does the coordinate (4, 220) represent in the context of the situation?

4. If a customer's bill was $340, how long did the repair take?

Unit: Linear Relationships Review

Name _____

Date _____ Pd_____

LINEAR RELATIONSHIPS UNIT STUDY GUIDE

Solve each of the problems below. These represent the types of questions on your test. Be sure to ask questions if you need more help with a topic.

I CAN DETERMINE IF A RELATIONSHIP IS PROPORTIONAL. 7.4C

1. Determine if the representations below are proportional (P) or non-proportional (NP).

a. _____

x	2	4	6	8	10
y	5	9	13	17	21

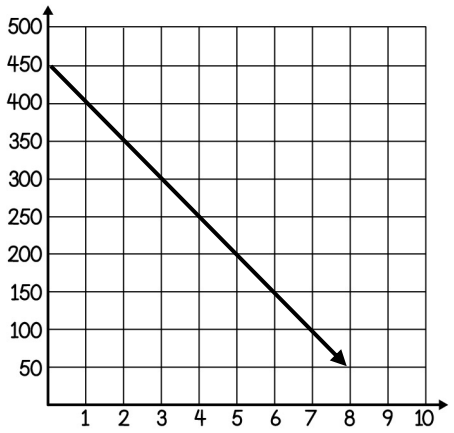
b. _____

x	3	5	7	9	11
y	1.5	2.5	3.5	4.5	5.5

c. _____ $y = 9x + \frac{1}{2}$

d. _____ $y = \frac{3}{4}x$

e. _____



I CAN FIND THE CONSTANT OF PROPORTIONALITY. 7.4C

2. Determine the constant of proportionality in each of the problems below.

a. $y = 8x$

k = _____

b.

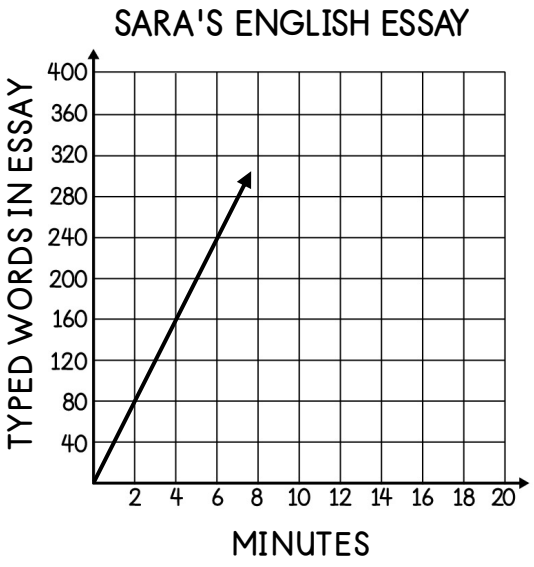
x	2	4	6	8	10
y	190	380	570	760	950

k = _____

c. A restaurant has an all-you-can-eat buffet. They charge $13.95 per person.

k = _____

d.

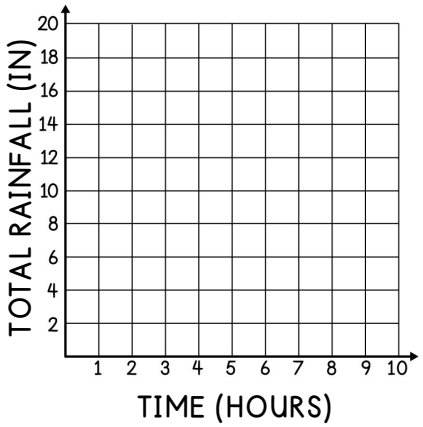


k = _____

I CAN USE TABLES TO REPRESENT PROPORTIONAL RELATIONSHIPS. 7.4A

3. Complete the table and sketch a graph of the relationship between the inches of rainfall, y, and the number of hours, x. Then answer a-c.

HOURS	1	2	3	4	5
TOTAL RAINFALL (IN)			10.5		17.5



a. What is the rate of change? Explain its meaning in the context of the situation.

b. Write an equation to represent the rainfall.

c. If the rainfall continues at this rate, how many inches of rain will fall after 6 hours?

I CAN WRITE EQUATIONS TO REPRESENT PROPORTIONAL RELATIONSHIPS. 7.4A

4. An app developer projects that he will earn $20.00 for every 8 apps downloaded. Write an equation to represent the proportional relationship between the total earnings, y, and the number of apps downloaded, x.

5. As the x-value increases by 3, the y-value increases by 12.

a. Find the rate of change.

b. Write an equation to represent the relationship between the x and y-values.

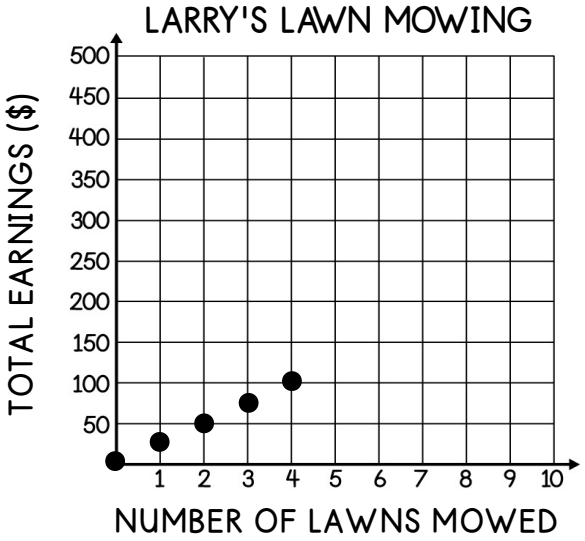
6. The table below shows the relationship between the total sales, y, and the number of textbooks sold, x.

TEXTBOOKS	TOTAL SALES
4	$64.00
7	$112.00
9	$144.00
13	$208.00
20	$320.00

a. What is the rate of change?

b. Write an equation to represent the relationship.

7.



a. What is the rate of change?

b. Write an equation to represent the relationship.

I CAN USE VERBAL DESCRIPTIONS TO REPRESENT PROPORTIONAL RELATIONSHIPS. 7.4A

8. It takes Joe 12 minutes to ride a roller coaster four times. Create a table to represent the relationship between the total time, y, and the number of rides, x.

9. Write a situation to represent the equation $y = 0.5x$.

10. Margie saves $15 of her allowance every two weeks. Circle any of the following that represent the relationship between the total amount saved, y, and the number of weeks, x.

A.

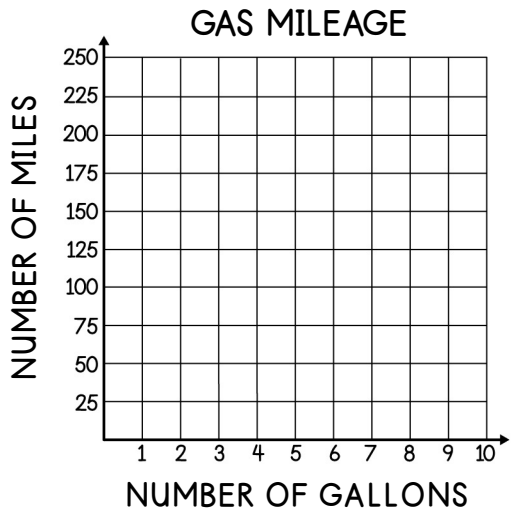
WEEKS	1	2	3
$ SAVED	7.50	15	22.50

B. $y = 7.5x$

C. Maggie will save $50 after 6 weeks.

I CAN USE A GRAPH TO REPRESENT PROPORTIONAL RELATIONSHIPS. 7.4A

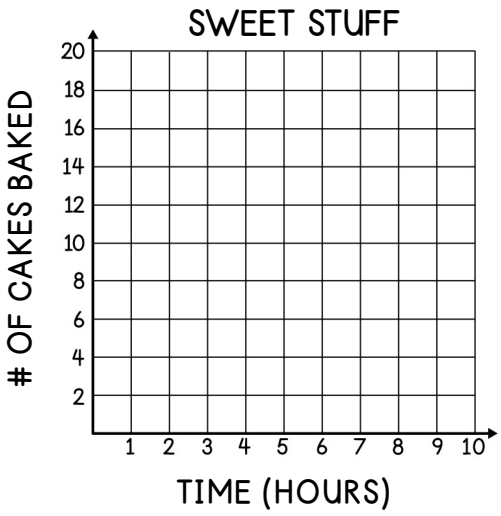
11. Lacey drives 125 miles and uses 5 gallons of gasoline. Create a graph to represent the proportional relationship between the number of miles driven, y, and the amount of gasoline used, x.



a. Write an equation to represent y, the number of miles traveled on x number of gallons of gas.

b. How many gallons of gas are necessary to travel 350 miles?

12. Sweet Stuff is a baking company that bakes specialty cakes. Sweet Stuff can bake 6 cakes in 2 hours. Create a graph to represent the relationship between y, the number of cakes baked, and x, the number of hours.

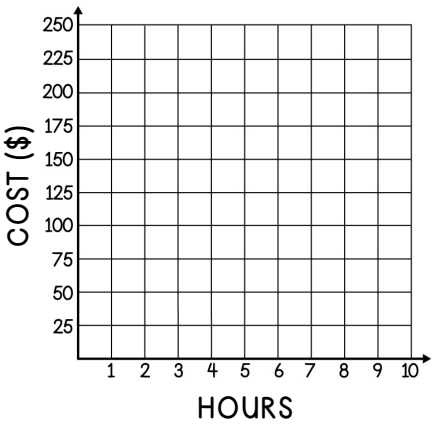


a. Write an equation to represent y, the number of cakes that can be baked in x hours.

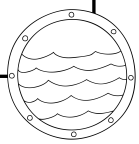
b. In this situation, what does the ordered pair (4, 12) represent?

13. Bob's Deep Sea Fishing charges customers a flat fee of $75 plus $25 per hour spent at sea. Complete each representation to show the relationship between the cost of a fishing trip, y, and the number of hours spent on the boat, x.

HOURS	PROCESS	COST ($)
0		
1		
2		
3		
4		

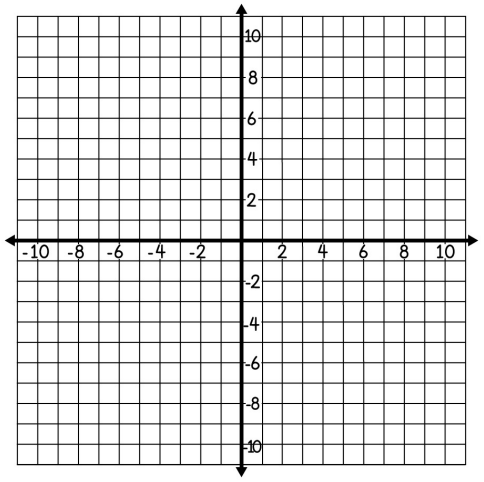


EQUATION:



14. Complete the table below to represent y = 0.25x + 3. Then draw a graph to represent the relationship between the x and y-values.

x	0	2	4	6	8	10
y						

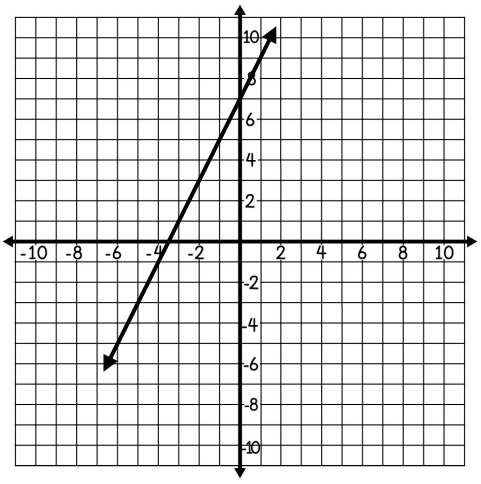


15. Mrs. Eaker asked her students to represent the equation, y = 2x + 7. Which student(s) correctly completed the task? Explain.

BEAU

x	y
0	7
4	15
8	23
12	31

SEAN



I'VE GOT IT!

What concepts can I ace on the test?

HELP!

What concepts do I need to study?

Unit: Linear Relationships Test

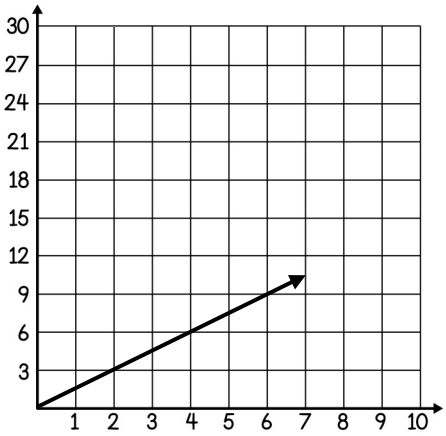
Name _____

Date _____Pd_____

LINEAR RELATIONSHIPS UNIT TEST

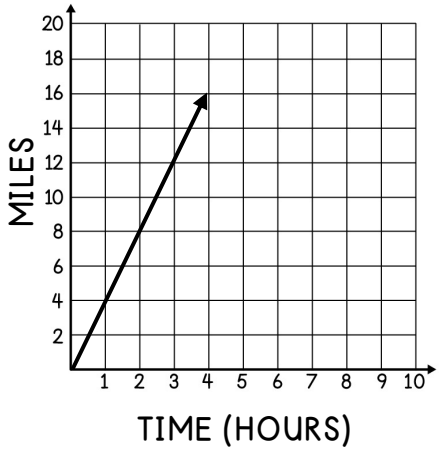
Solve the problems below. Be sure to show your thinking.

1. Which situation is best described by the graph shown?



a. JJ purchases chips for $0.75 per bag.
b. Mark buys a pack of gum for $1.50 each
c. Paula pays $0.50 per ticket at the fair.
d. Franco purchases flowers for $3.00 each.

2. Find the constant of proportionality in the graph below.



a. 9
b. 4
c. 3
d. 1.5

3. A tile backsplash is being installed. The installation fee is $150.00. The tile is priced at $2.75 per square foot, f. Which equation best represents the total cost, c, of the backsplash?

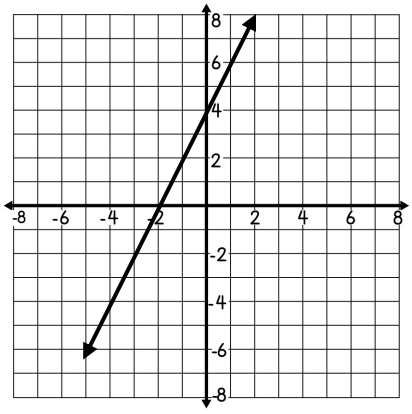
a. $c = 150f + 2.75$

b. $c = 2.75 - 150f$

c. $c = 2.75f + 150$

d. $c = 152.75f$

4. Which of the following equations best represents the relationship between x and y?



a. $y = 2x + 4$

b. $y = 2x - 4$

c. $y = 4x + 2$

d. $y = 4x - 2$

5. An app developer projects that he will earn $230.00 for every 100 apps downloaded. Which of the following equations can be used to represent the proportional relationship between the number of apps, x, and the total earnings, y.

a. $y = 100x + 230$ b. $y = 230x + 100$

c. $x = 2.30y$ d. $y = 2.30x$

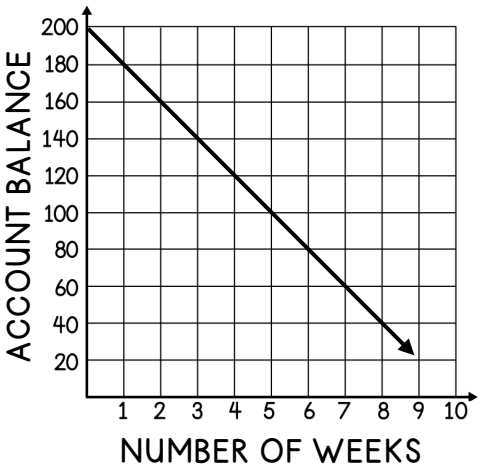
6. Based on the information in the table, which equation can be used to represent the relationship?

x	5	10	15	20	25
y	40	65	90	115	140

a. $y = 8x$ b. $y = 5x + 5$

c. $y = 5x + 15$ d. $y = 5x + 40$

7. The graph below shows the relationship between the amount of money in Sarah's savings account over a period of time. Which of the following statements is NOT true about the relationship?



a. After 5 weeks, Sarah has $100 in her account.
b. If Sarah has a balance of $60, then 7 weeks have passed.
c. The relationship is proportional.
d. The situation can be represented by the equation $y = 200 - 20x$.

8. The table below shows the relationship between the number of miles traveled, x, and the gallons of gas used, y.

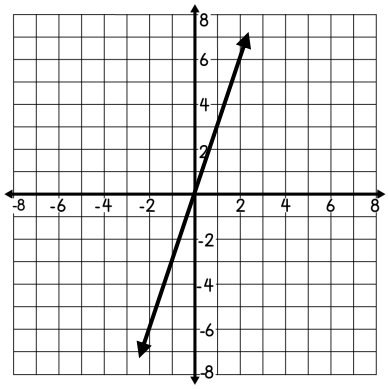
x	35	70	105	140	175
y	1	2	3	4	5

Which of the following equations best represents the relationship?

a. $y = 35x$ b. $y = \frac{1}{35}x$

c. $35 = 1x$ d. $y = 3.5x$

9. Which of the following equations best represents the relationship between x and y?



a. $y = 3x$

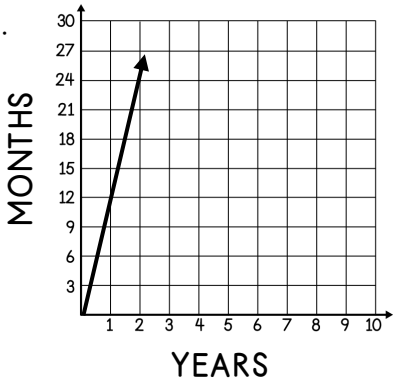
b. $y = 0.5x + 3$

c. $y = 0.5x - 3$

d. $y = 3x - 0.5$

10. Which of the following does NOT represent the number of months in a year?

a.



b.

YEARS	MONTHS
2	24
4	48
6	60
8	72

c. $y = 12x$, where x represents the number of years and y represents the number of months

d. There are 96 months in 8 years.

11. Which situation best represents the equation below?

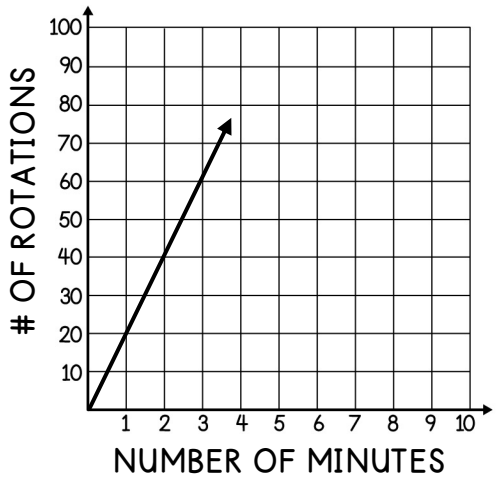
$$y = 2.5x$$

a. John has $2.50 more in his savings than his brother Sam.
b. Two cartons of eggs ring up at the register for $2.50.
c. A bank account is opened with a balance of $5, and $2.50 is deposited each day.
d. Meg pours 2.5 ounces of water onto the plant's soil each day.

12. Which of the following situations represents a proportional relationship?

a. A cheeseburger is $7.95 plus $1.00 for each additional topping.
b. A pool fills at a rate of 90 gallons per hour.
c. A health club charges a $40.00 membership fee plus $25.00 per month.
d. A bank account begins with $350.00 and gains $30.00 per month.

13. The following graph shows the relationship between the number of times a gear can rotate in a period of time. Which of the following statements is true?



a. If the gear rotates 30 times, then it has been rotating for 1.5 minutes.

b. The graph satisfies the equation $y = 10x$.

c. If the machine rotates for 15 minutes, then it will make 350 rotations.

d. The relationship is non-proportional.

14. Which of the following tables best represents the relationship between x and y in the equation $y = 0.5x + 7$?

a.

x	y
0	7
3	8.5
6	10
9	11.5
12	13

b.

x	y
0	0
1	7
2	8
3	8.5
4	9

c.

x	y
0	7
3	7.5
6	8
9	8.5
12	9

d.

x	y
0	7
1	8
2	9
3	10
4	11

Calvin is starting a new job this summer. The table below shows the relationship between Calvin's total earnings and number of hours he has worked. Use the table below to answer questions 15-16.

HOURS WORKED	3	7	15	24	30
TOTAL EARNINGS	$46.50	$108.50	?	$372.00	$465.00

15. _____ Write an equation to represent y, Calvin's total earnings based on x number of hours worked.

16. _____ How much will Calvin earn if he works 15 hours?

Unit: Linear Relationships
Student Handout 1

Name Answer Key
Date _____ Pd_____

CONSTANT OF PROPORTIONALITY

Liam is making breakfast for dinner using a pancake mix.

a. How many cups of mix will he use for 12 pancakes? 1
b. How many cups of mix will he use for 24 pancakes? 2
c. What is the ratio of cups of mix to servings? 1:12

CUPS OF MIX	# OF PANCAKES
1	12
2	24

PROPORTIONAL RELATIONSHIPS

- A relationship is proportional when the ratio of y over x is constant.

CONSTANT OF PROPORTIONALITY

- The value of the ratio of two proportional quantities.
- It is represented by the equation $k = \frac{y}{x}$, where:
  - y represents: the dependent variable in a table or graph
  - x represents: the independent variable in a table or graph
- Use the equation $y = kx$ to represent proportional relationships.

For 1-3, find the ratio of $\frac{y}{x}$ to determine if each table represents a proportional relationship.

1.

x	y	$\frac{y}{x}$
1	6	$\frac{6}{1} = 6$
2	12	$\frac{12}{2} = 6$
3	18	$\frac{18}{3} = 6$
4	24	$\frac{24}{4} = 6$

k = 6

2.

x	y	$\frac{y}{x}$
2	10	$\frac{10}{2} = 5$
3	15	$\frac{15}{3} = 5$
4	20	$\frac{20}{4} = 5$
5	25	$\frac{25}{5} = 5$

k = 5

3.

x	y	$\frac{y}{x}$
8	4	$\frac{4}{8} = \frac{1}{2}$
10	5	$\frac{5}{10} = \frac{1}{2}$
12	6	$\frac{6}{12} = \frac{1}{2}$
14	7	$\frac{7}{14} = \frac{1}{2}$

k = $\frac{1}{2}$ or 0.5

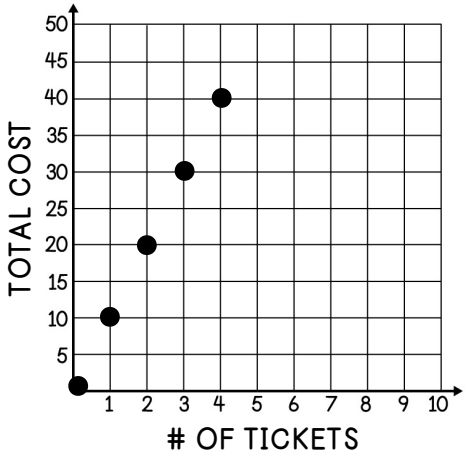
4. The cost of 6 pounds of almonds is $23.28. What is the constant of proportionality that relates y, the cost in dollars, to x, the number of pounds?

k = 3.88

5. A car travels 220 miles in 4 hours. What is the constant of proportionality that relates y, the total number of miles, to x, the number of hours?

k = 55

6. Use the graph below to complete the table and answer the following questions.



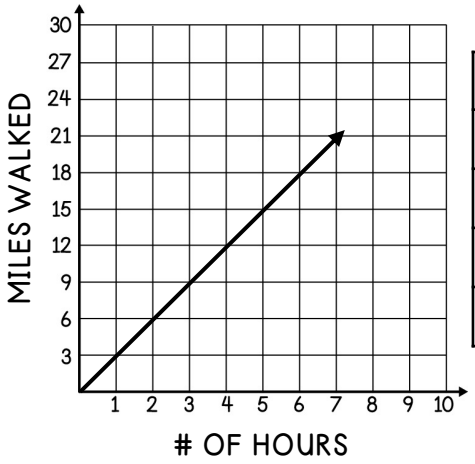
x	y
1	10
2	20
3	30
4	40

a. k = 10

b. What does the point (1, 10) represent in the relationship?

You earn $10 for working 1 hour.

7. Use the graph below to complete the table and answer the following questions.



x	y
1	3
2	6
3	9
4	12

a. k = 3

b. What does the point (1, 3) represent in the relationship?

3 miles are walked in 1 hour.

Use your understanding of the constant of proportionality to answer the questions below.

8. While training for a marathon, Keith's watch reported the number of calories he had burned at each mile marker. The data is shown below.

# OF MILES	1	2	3	4	5
# OF CALORIES BURNED	117	234	351	468	585

a. Is the number of calories proportional to the number of miles? Justify your thinking.

Yes; the ratio of $\frac{y}{x}$ is constant for all values given in the table.

b. What is the constant of proportionality that relates y, the number of calories burned, to x, the number of miles?

117

c. Write an equation to represent the relationship between the number of miles and the calories burned.

$y = 117x$

d. The next day, Keith ran 7 miles. How many calories did he burn?

819 calories

e. If Keith's watch reported that he burned 1,170 calories, how many miles did Keith run that day?

10 miles

Summarize today's lesson:

Unit: Linear Relationships
Homework 1

Name Answer Key

Date _____ Pd_____

CONSTANT OF PROPORTIONALITY

Determine the constant of proportionality from each representation below.

1.

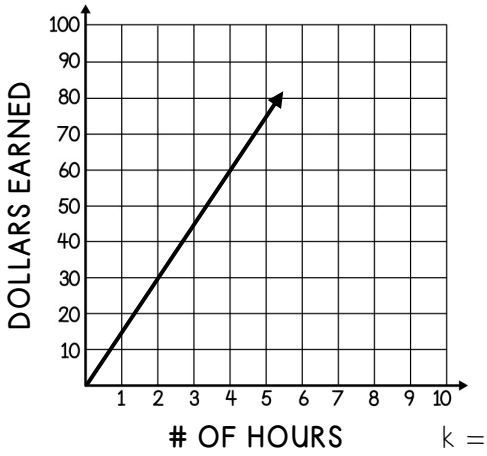
x	8	12	16	20	24
y	2	3	4	5	6

k = $\frac{1}{4}$ or 0.25

2. There are 108 feet in 36 yards. What is the constant of proportionality that relates y, the number of yards to x, the number of feet?

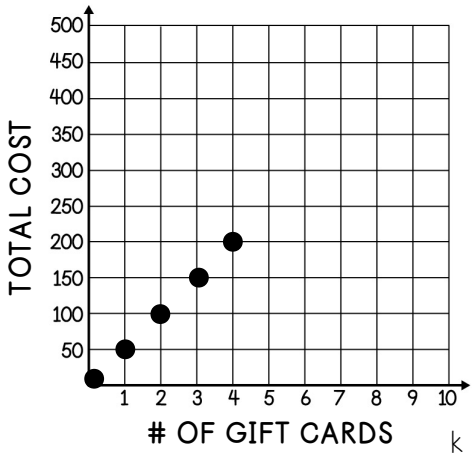
k = $\frac{1}{3}$

3.



k = 15

4.



k = 50

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

A gym employee earns the same amount each month. After working for three months, he earned $4,500. Complete the table to determine how much money he will make over a five-month period.

MONTH	TOTAL EARNINGS	$\frac{y}{x}$
1	1,500	1,500
2	3,000	1,500
3	$4,500	1,500
4	6,000	1,500
5	7,500	1,500

5. Is the relationship proportional? Explain your thinking.

Yes; the ratio of $\frac{y}{x}$ is constant.

6. What is the constant of proportionality?

1,500

7. Write an equation to represent the situation.

y = 1,500x

8. If his pay rate remains the same, how much will he earn after working 7 months?

$10,500

9. After how many months will the gym employee earn $15,000?

10 months

Unit: Linear Relationships
Student Handout 2

Name Answer Key
Date _____ Pd_____

PROPORTIONAL RELATIONSHIPS: TABLES

A coffee shop displays their prices on a chalkboard menu. The prices are proportional, but some of the information got erased.

CUPS OF COFFEE	TOTAL COST
1	$2.75
2	$5.50
3	$8.25
4	$11.00

a. What is the constant of proportionality?
2.75

b. How can you use the value of k to find the missing prices on the menu? Use this method to complete the table.
Multiply the x-values by k.

c. How does the total cost change as the cups of coffee increase by 1?
The total cost increases by $2.75 for each cup of coffee.

RATE OF CHANGE

- The rate of change describes how one quantity ___changes___ in relation to the other quantity.
- In a proportional relationship, the rate of change is equal to the ___constant___ of proportionality, k.

In 1-2, a representation of a proportional relationship is given. Use the information to create a table to represent the relationship. Then, find the rate of change.

1. $y = 9.5x$

x	y
0	0
1	9.5
2	19
3	28.5

Rate of change: 9.5

2. As the x-values increase by 2, the y-values increase by 60.

x	y
1	30
2	60
3	90
4	120

Rate of change: 30

Use your knowledge of proportional relationships to answer each question.

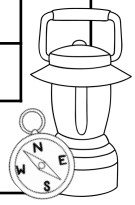
3. Camping Craze hires a graphic designer to create a new logo and marketing materials. The graphic designer charges Camping Craze $45.00 per hour. Complete the table and then answer questions a-c.

# OF HOURS	TOTAL CHARGE
1	45
2	90
3	135
4	180
5	225

a. Find the rate of change.
45

b. What does the rate of change represent in the context of the situation?
The total cost of the graphic designer will increase by $45 each hour.

c. Write an equation to show the relationship between x, the number of hours and y, the total charge of the graphic designer.
$y = 45x$



4. Ronny earns $27.50 for each driveway he shovels. Create a table to show the sum of the amount Ronny will earn shoveling 4 driveways.

# of driveways	1	2	3	4
earnings ($)	27.50	55	82.50	110

5. Gasoline is priced at $3.39 per gallon. Write an equation to represent the total cost, y, of purchasing x number of gallons.

y = 3.39x

6. Mrs. Dunn asked her students to represent y = 5x in a table. Which student(s) correctly completed the task? Explain your reasoning.

SASHA

x	0	1	2	3	4
y	5	10	15	20	25

RONALD

x	0	1	2	3	4
y	0	5	10	15	20

Ronald correctly completed the task because the ratio of $\frac{y}{x}$ is equal to 5 and constant for all values given in the table.

7. Michelle reads a book for the school Read-A-Thon. The table shows the proportional relationship between x, the number of minutes and y, the total number of pages read.

# OF MINUTES	TOTAL PAGES READ
30	15
60	30
90	45
120	60

a. Determine the rate of change and explain its meaning in the context of this situation.

Michelle reads 0.5 pages each minute.

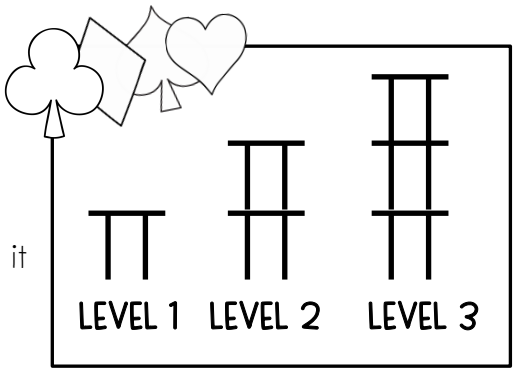
b. Write an equation to represent the total number of pages as it relates to the number of minutes read.

y = 0.5x

8. Crystal creates a tower of playing cards. The number of cards at each level is shown below.

a. Complete the table below to represent the rate of change.

LEVEL	1	2	3	4	5
# OF CARDS	3	6	9	12	15



b. Write an equation to represent the number of cards, y, as it relates to the level of the tower, x.

y = 3x

9. Sue traveled by car at a constant rate. After 4 hours, she had traveled 272 miles. Circle any of the following that represent the relationship between the distance traveled and the hours of driving.

A.

HOURS	5	6	7
MILES	340	408	476

B. d = 272t, where d is the distance in miles and t is the time in hours.

C. Sue is traveling 68 miles per hour.

Unit: Linear Relationships
Homework 2

Name Answer Key

Date _____ Pd_____

PROPORTIONAL RELATIONSHIPS: TABLES

Use your understanding of rate of change to answer the questions below.

1. Three pounds of bananas cost $1.95. Which of the following is not true?

a. One pound of bananas is $0.75.
b. The equation y = 0.65x could be used to determine the cost of x pounds of bananas.
c. Seven pounds of bananas is $4.55.

2. As the x-values increase by 1, the y-values increase by 15. Which equation shows this?

a. y = 15 + x
b. y = 15 – x
c. y = 15x

For each table below, determine the rate of change and write an equation.

3.

x	y
1	4
2	8
3	12
4	16

rate of change: 4

equation: y = 4x

4.

x	y
2	7
4	14
6	21
8	28

rate of change: 3.5

equation: y = 3.5x

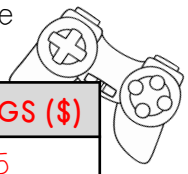
5.

x	y
4	3
5	3.75
6	4.5
7	5.25

rate of change: $\frac{3}{4}$ or 0.75

equation: $y = \frac{3}{4}x$

6. James is saving $15 per week in order to purchase a gaming console. Create a table to represent the relationship between x, the number of weeks and y, the total amount James has saved.



WEEKS	SAVINGS ($)
1	15
2	30
3	45
4	60

a. Write an equation to represent the situation.

y = 15x

b. James has a goal to save $360 in 22 weeks. Will he meet his goal? Explain. No; James will only have saved $330 in 22 weeks.

7. Mr. Brown asked his students create a representation with a rate of change of 2.5. Circle the students who correctly completed the task.

ELIJAH	ZANE	MARCO
y = 2.5 + x	Four boxes of tissue cost $10.	y = 2.5x

Unit: Linear Relationships
Student Handout 3

Name Answer Key
Date _____ Pd_____

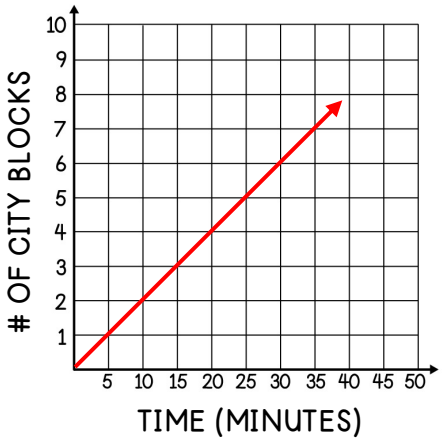
PROPORTIONAL RELATIONSHIPS: GRAPHS

Isabelle walks to work each morning. It takes her 5 minutes to travel one city block. Use this information to complete a-b.

a. Sketch a graph to show the number of blocks Isabelle can travel in a specific amount of time.

b. What features of the graph help you to determine if the relationship is proportional?

Ex: Use the ratio of y/x values to determine if there is a constant of proportionality. When Isabelle has not left the house, she hasn't traveled any city blocks (0, 0).

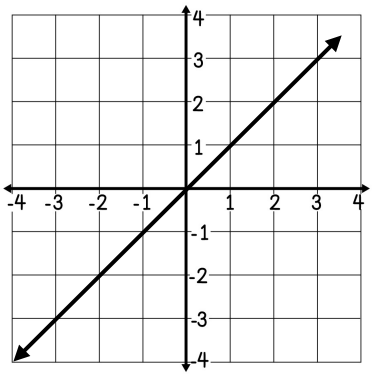


PROPORTIONAL GRAPHS

- The line always passes through the origin, (0, 0).
- The rate of change will be equal to the constant of proportionality, k.
- The equation of the line will be y = kx.

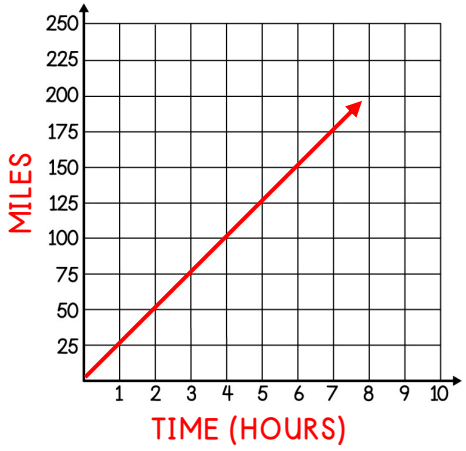
Ex. Use the formula $k = \frac{y}{x}$ to determine the rate of change.

$k = \frac{3}{3} = 1$



For 1-2, complete the graph, find the rate of change, and write the equation for each situation.

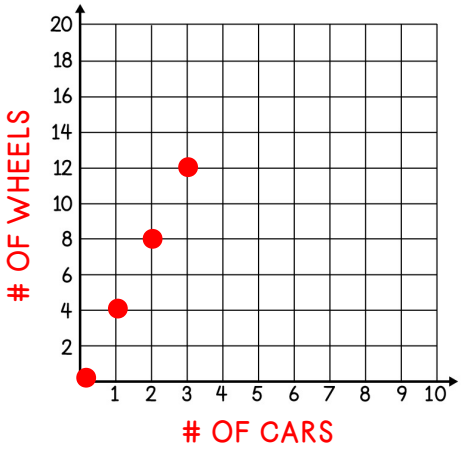
1. An ATV travels 25 miles each hour, where x is the number of hours and y is the total miles.



rate of change: 25

equation: y = 25x

2. The number of cars, x, is proportional to the number of wheels, y.



rate of change: 4

equation: y = 4x

3. Sandra plots the points (0, 0) and (5, 10) on a graph to represent a proportional relationship.

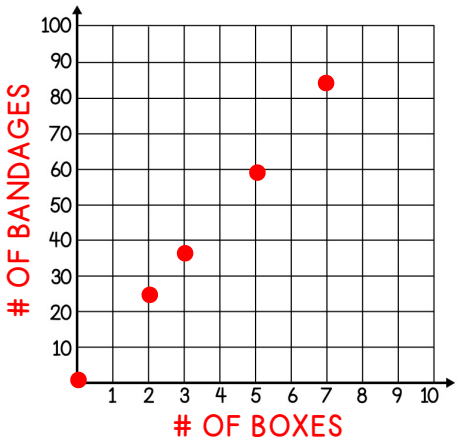
a. Find the rate of change. 2

b. Write an equation to represent the relationship. y = 2x

In 4-7, use your knowledge of proportional relationships to answer each question.

4. Use the information in the table to complete the graph and answer the questions.

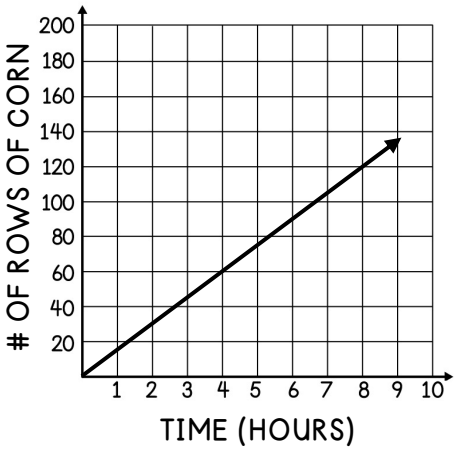
# OF BOXES	2	3	5	7
# OF BANDAGES	24	36	60	84



rate of change: 12

equation: y = 12x

5. A farmer is plowing his cornfields. The relationship between x, the hours driving the plow, and y, the number of rows of corn plowed, is shown in the graph at the right.



a. What does the point (0, 0) represent?

There are 0 rows of corn plowed after 0 hours.

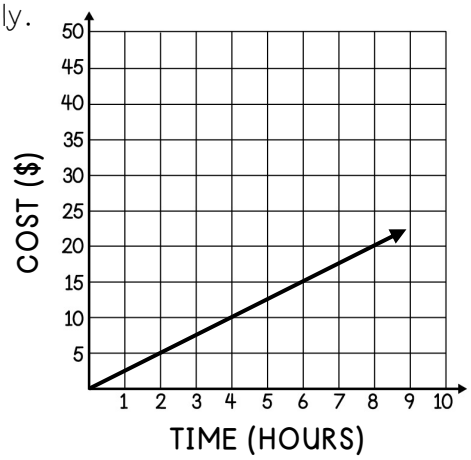
b. Choose an ordered pair to find the constant of proportionality. Use (4, 60) to find the value of k.

k = 15

c. Write an equation to represent the situation.

y = 15x

6. Patricia is asked to determine if the statements below represent the graph. Check all that apply.



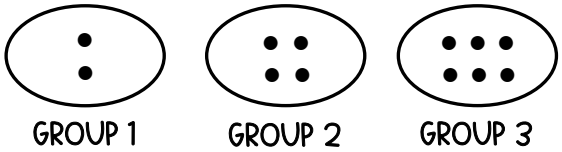
✓ The equation y = 2.5x represents the situation.

The cost for 10 hours of parking is $4.

✓ The cost of parking for 8 hours is $20.

✓ The graph will contain the coordinate (12, 30).

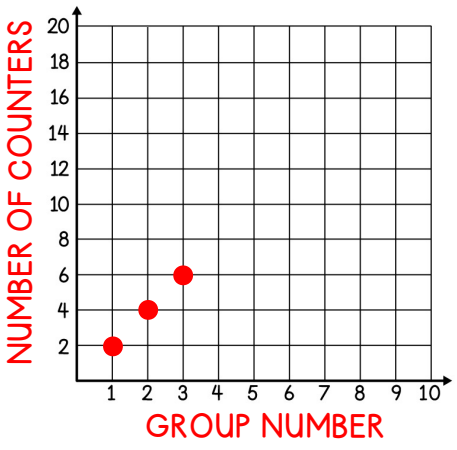
7. A representation of a proportional relationship is shown below.



a. Sketch a graph to represent the relationship between the group number, x, and the number of counters, y.

b. Write an equation to represent the relationship between the group number, x, and the number of counters, y.

y = 2x



Unit: Linear Relationships
Homework 3

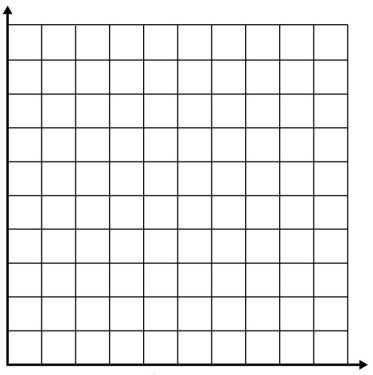
Name Answer Key
Date _____ Pd_____

PROPORTIONAL RELATIONSHIPS: GRAPHS

Use your understanding of proportional relationships to answer the questions below.

DeMarcus is organizing a group of friends to attend a concert. The ticket pricing is shown in the table below. Use the information to create a graph and answer the questions.

# OF TICKETS	2	3	5	7
TOTAL COST ($)	32	48	80	112

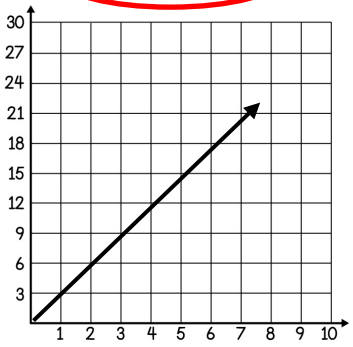


*Students' graphs will vary. Check for a rate of change of 16 based on units selected.

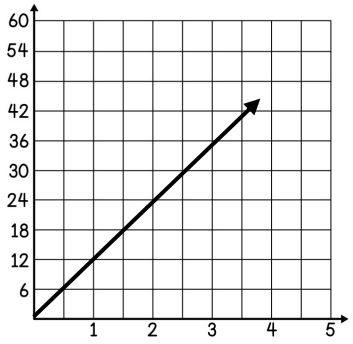
1. Rate of Change: 16 Equation: y = 16x
2. What does the ordered pair (1, 16) represent in this situation?
   1 concert ticket costs $16.
3. Describe how you know that this is a proportional relationship:
   The line goes through (0, 0) and the ratio of $\frac{y}{x}$ is constant.

4. The number of feet in a yard can be represented by a graph. Circle the graph(s) that could be used to represent the number of feet, y, in x yards.

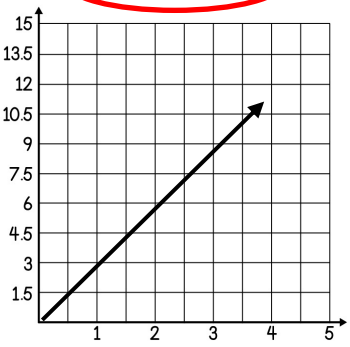
GRAPH A



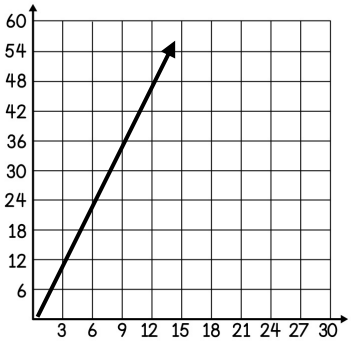
GRAPH B



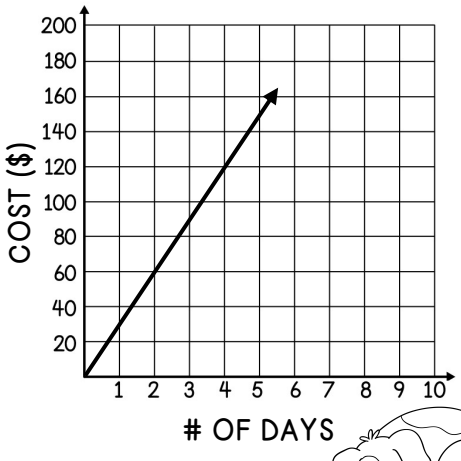
GRAPH C



GRAPH D



A dog kennel charges a daily boarding rate as shown on the graph. Use the information to mark 5-8 as true or false. If false, rewrite the statement correctly.

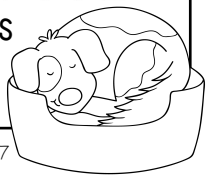


F 5. The dog kennel charges $60 per day.
The dog kennel charges $30 per day.

T 6. The equation y = 30x can represent the graph.

F 7. It costs $200 to board a dog for 7 days.
It costs $210 to board a dog for 7 days.

T 8. The graph will contain the coordinate (9, 270).



Unit: Linear Relationships
Student Handout 4

Name Answer Key
Date _____ Pd_____

REPRESENTING PROPORTIONAL RELATIONSHIPS

Practice representing proportional relationships in multiple ways with the following examples. Use the representation given to help you fill in the others.

[VERBAL DESCRIPTION]

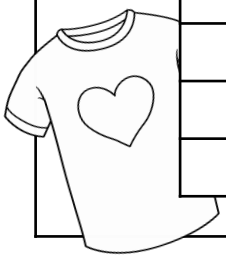
The student council is selling t-shirts to raise awareness for the local animal shelter. For each t-shirt they sell, they will donate $5.00.

[EQUATION]

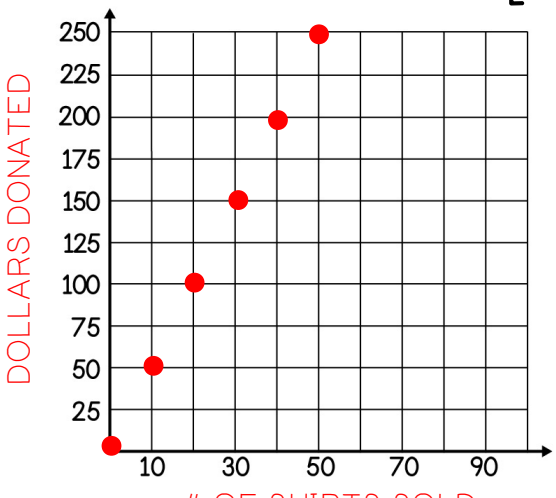
$y = 5x$

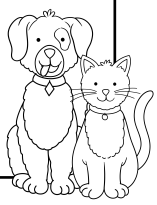
[TABLE]

# OF SHIRTS SOLD	DOLLARS DONATED
0	0
10	50
20	100
30	150
40	200
50	250
60	300



[GRAPH]





Use the representations in the example above to answer 1-5.

1. Describe how you know that the above situation is proportional.

Sample: The graph passes through the origin, and $\frac{y}{x} = 5$

2. Find the constant of proportionality.

The constant of proportionality is 5.

3. What does the rate of change represent in this situation?

The rate of change means that $5 will be donated to the shelter for each shirt sold.

4. What does the ordered pair (10, 50) represent in the context of the situation?

If 10 shirts are sold, $50 will be donated to the shelter.

5. If the student council sells 80 t-shirts, how much will they donate to the animal shelter?

$400

Use the given information for each situation below to fill in the missing representations.

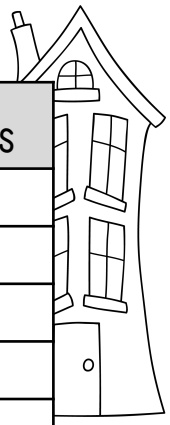
[VERBAL DESCRIPTION]

Sample answer: Jack can paint 3 pumpkins each hour.

[EQUATION]

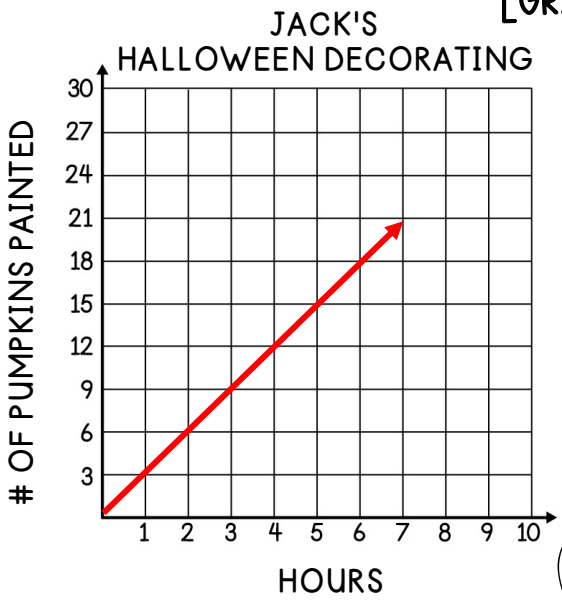
$y = 3x$

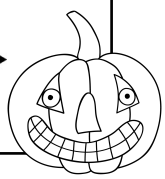
[TABLE]



HOURS	# OF PUMPKINS
1	3
2	6
3	9
4	12
5	15
6	18
7	21

[GRAPH]





[VERBAL DESCRIPTION]

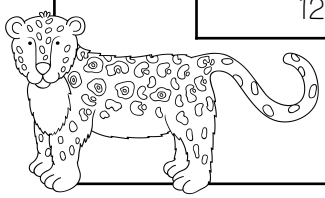
Sample answer: A jaguar travels 1.5 miles each hour.

[EQUATION]

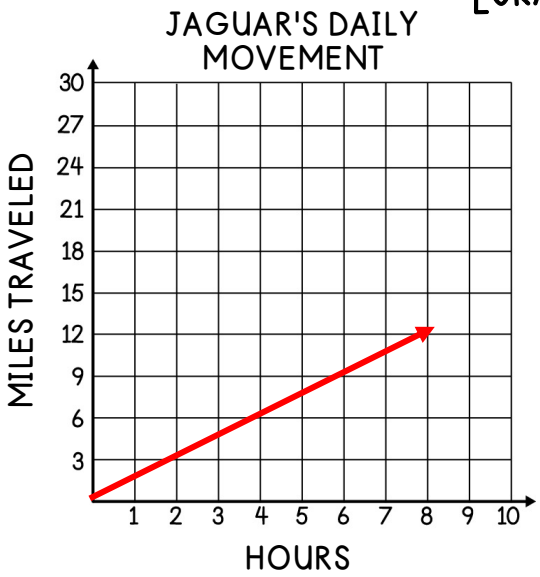
$y = 1.5x$ or
$d = 1.5t$

[TABLE]

HOURS	MILES
2	3
4	6
6	9
8	12
10	15
12	18



[GRAPH]



Summarize today's lesson:

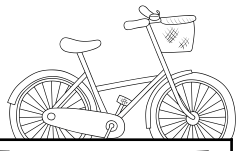
Unit: Linear Relationships
Homework 4

Name Answer Key

Date _____ Pd_____

REPRESENTING PROPORTIONAL RELATIONSHIPS

Shoreside Bikes is a bike rental company that charges tourists by the hour as shown in the table. Use the table to fill in the missing representations.



[VERBAL DESCRIPTION]

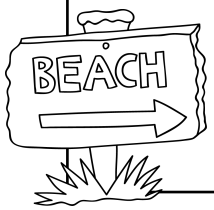
Shoreside Bikes charges tourist $12 per hour to rent a bike.

[EQUATION]

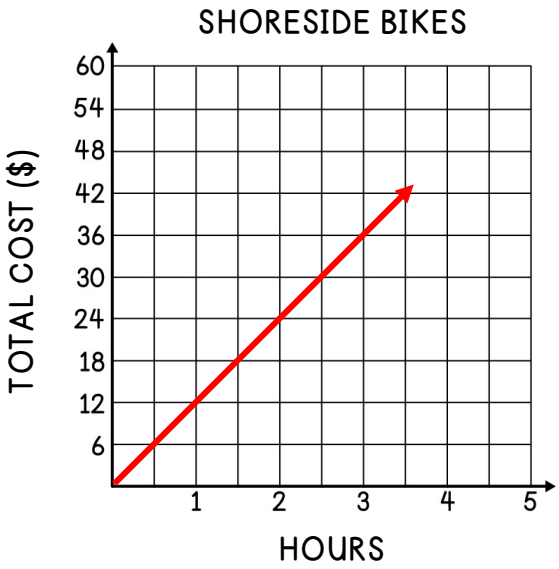
$y = 12x$

[TABLE]

HOURS	COST ($)
1	$12
2	$24
3	$36
4	$48
5	$60
6	$72
7	$84



[GRAPH]



1. What is the rate of change and what does it represent in this situation?

The rate of change is $12. The cost of renting a bike is $12 for every hour.

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

A tourist would pay $84 to rent a bike for 7 hours.

3. The bike rental company has determined that they will charge based on the nearest half hour. If Mikala rented a bike for 5.5 hours, how much would she be charged?

$66

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

4 hours

Unit: Linear Relationships
Quiz 1

Name _____

Date _____ Pd_____

QUIZ: PROPORTIONAL RELATIONSHIPS

Use the table below to answer questions 1-4.

MINUTES	0	3	6	9	12
WORDS TYPED	0	120	?	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 he types. 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?

Answers

1. 720 words
2. 240 words
3. C
4. D
5. B
6. D
7. 14
8. $1,120
9. B
10. A

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 minutes
b. 5 minutes
c. 6 minutes
d. 7 minutes

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

5. Jermaine plots the points (0, 0) and (4, 11) on a graph to represent a proportional relationship. Which of the following equations represents the relationship between the x and y-values?

a. $y = \frac{4}{11}x$ b. $y = 2.75x$

c. $y = 0.36x$ d. $11y = 4x$

6. The table below shows the relationship between the number of miles traveled, y, and the number of gallons of gas used, x.

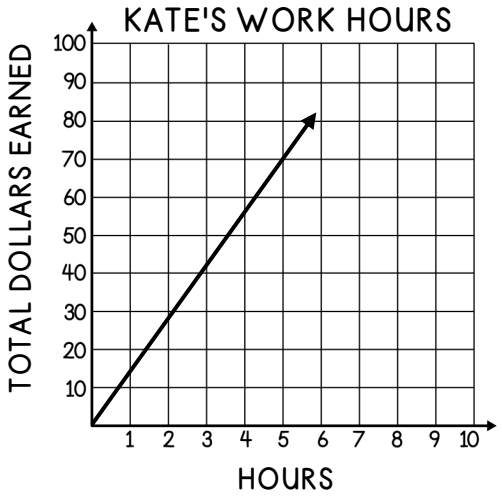
x	3	5	7	11
y	228	380	532	836

Which of the following equations best represents the relationship?

a. $y = 7.6x$ b. $y = 684x$
c. $y = 0.13x$ d. $y = 76x$

Use the graph below to answer questions 7-8. Be sure to show your thinking.

The graph shows the proportional relationship between the number of dollars Kate earned, y, and the hours she worked at the movie theater.



7. Using the graph, determine the constant of proportionality, k.

8. If Kate worked 80 hours last month, how much money did she earn?

9. Which of the following tables represents $y = 24x$?

a.

x	1	2	3	4
y	24	12	0	-12

b.

x	2	4	6	8
y	48	96	144	192

c.

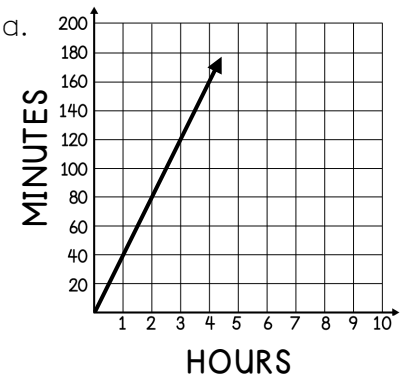
x	0	2	4	6
y	24	48	96	144

d.

x	1	2	3	4
y	24	21	18	15

10. Which of the representations below does NOT represent the number of minutes in an hour?

a.



b.

HOURS	MINUTES
2	120
5	300
6	360
8	480

c. $y = 60x$, where x represents the time in hours and y represents the time in minutes

d. There are 240 minutes in 4 hours.

Unit: Linear Relationships
Student Handout 5

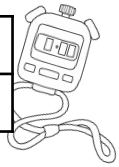
Name Answer Key

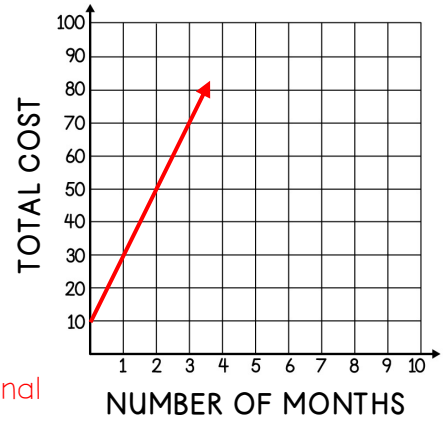
Date _____ Pd_____

NON-PROPORTIONAL RELATIONSHIPS

Fit Life Gym charges customers for each month of membership as shown in the table. Use the information to complete a-b.

# OF MONTHS	0	1	2	3
TOTAL COST ($)	10	30	50	70





a. Sketch a graph to show the relationship between the cost of the gym, y, and the number of months, x.

b. Is the relationship between the number of months and the total cost proportional? Explain. The relationship is not proportional because it does not pass through (0, 0) and the ratio of $\frac{y}{x}$ is not constant.

A relationship is non-proportional if the ratio between the two quantities is NOT constant.

NON-PROPORTIONAL RELATIONSHIPS

TABLES:

- The ratio of $\frac{y}{x}$ is not constant.
- Does not contain the point (0, 0) but instead when x is 0, y is a nonzero constant (0, y).

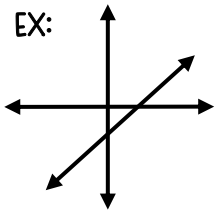
EX:

x	0	1	2	3
y	9	11	13	15

GRAPHS:

- The line will not pass through the origin (0, 0).
- Instead, the graph will cross the y-axis at a point known as the y-intercept.

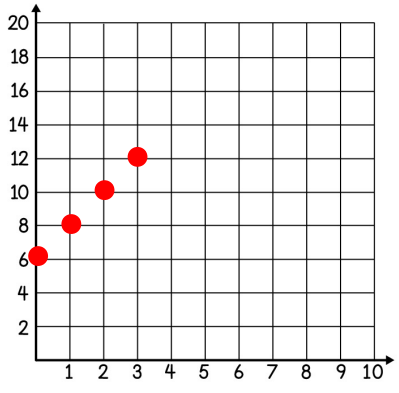
EX:



For 1-2, complete the graph to represent the non-proportional relationship given in the table.

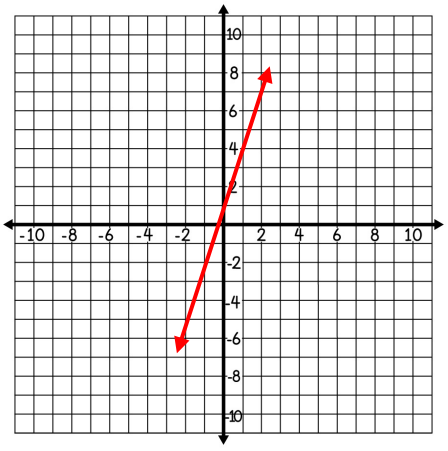
1. The table shows the cost in dollars of jumping at Terrific Trampolines, y, in relation to the hours of jumping, x.

HOURS	COST ($)
0	6
1	8
2	10
3	12



2. The table shows the relationship between x-values and y-values.

x	y
0	1
1	4
2	7
3	10



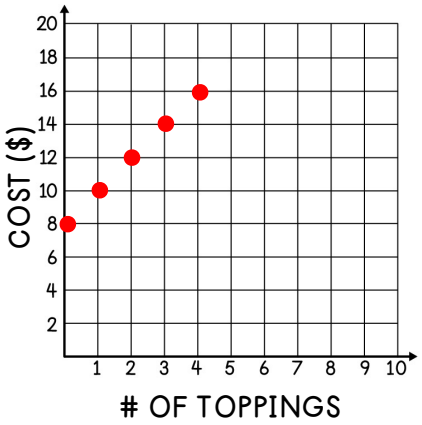
How can you determine the rate of change in questions 1 and 2?

Ex: Observe how much the y-value is changing when x increases by 1 unit. Count on the graph how much the y increases for each increase in x-value. (Consider softly introducing finding rise over run.)

For 3-5, use your understanding of non-proportional relationships to answer each question.

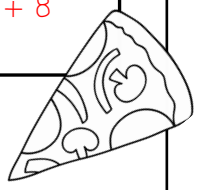
3. At Pizza Palace, Rasheed orders a pizza that costs $8.00 plus $2.00 per topping. Complete each representation to show the relationship between the number of toppings, x, and the cost of the pizza, y. Then answer a-d.

TOPPINGS	PROCESS	COST ($)
0	2(0) + 8	8
1	2(1) + 8	10
2	2(2) + 8	12
3	2(3) + 8	14
4	2(4) + 8	16



EQUATION:

$y = 2x + 8$



a. What is the initial value, or the cost of the pizza with 0 toppings?

$8

b. Where do you see the initial value in each representation?

Table: the value of y when x = 0
Graph: where the line crosses the y-axis
Equation: value added

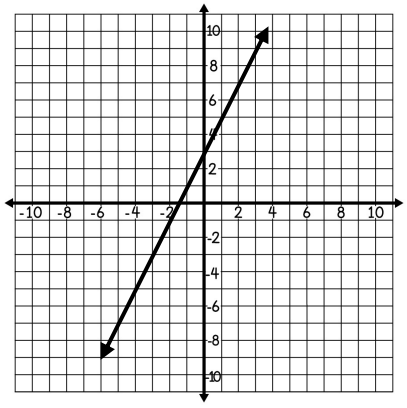
c. What is the rate of change for the situation?

$2

d. Where do you see the rate of change in the equation?

It is the coefficient of x (the number with the x variable)

4. Mr. Tien asked his students to write an equation to represent the relationship shown on the graph. Use the graph to complete the table and circle the name of the student whose equation is correct.



x	y
0	3
1	5
2	7
3	9

GARRY
$y = 3x + 2$

CEDRICK
$y = 2x$

ELLIE
$y = 2x + 3$

CENA
$y = 2x + 5$

5. Draw a line to match each equation to the table that represents the relationship between the x-values and y-values.

$y = 0.5x + 6$

$y = 4x + 6$

$y = 5x + 3$

x	0	1	2	3
y	6	10	14	18

x	0	2	4	6
y	3	13	23	33

x	0	5	10	15
y	6	8.5	11	13.5

Unit: Linear Relationships
Homework 5

Name Answer Key

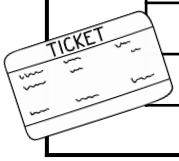
Date _____ Pd_____

NON-PROPORTIONAL RELATIONSHIPS

Three statements were made about each non-proportional relationship shown. Two are true and one is false. Mark each statement as true or false and rewrite the false statement to make it true.

1 A travel agency charges customers to book train tickets as shown.

# OF TICKETS	TOTAL COST
0	$25
2	$125
4	$225
6	$325
8	$425

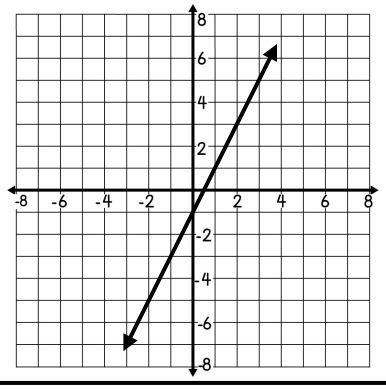


STATEMENT	T/F?
The travel agency charges at flat booking fee of $25.	T
The rate of change is $100 and represents the amount each ticket costs.	F
The situation can be represented by the equation $y = 50x + 25$, where y is the total cost and x is the number of tickets purchased.	T

REWRITE THE FALSE STATEMENT TO MAKE IT TRUE:

The rate of change is $50.

2 The graph shows the relationship between x and y-values.



STATEMENT	T/F?
The y-intercept is at -1.	T
The rate of change is 2.	T
The graph can be represented by the equation $y = 2x + 1$.	F

REWRITE THE FALSE STATEMENT TO MAKE IT TRUE:

The graph can be represented by the equation $y = 2x - 1$.

3 A snorkeling company charges tourists $30 for the snorkeling gear and $11 per hour of snorkeling. Let y be the total cost and x be the number of hours spent snorkeling.

STATEMENT	T/F?
The situation can be represented by the equation $y = 11x + 30$.	T
If a tourist snorkels for 4 hours, it will cost $44.	F
The rate of change in this situation is 11, and it represents the cost of each hour of snorkeling.	T

REWRITE THE FALSE STATEMENT TO MAKE IT TRUE:

If a tourist snorkels for 4 hours, it will cost $74.

Unit: Linear Relationships
Student Handout 6

Name Answer Key
Date _____ Pd_____

REPRESENTING NON-PROPORTIONAL RELATIONSHIPS

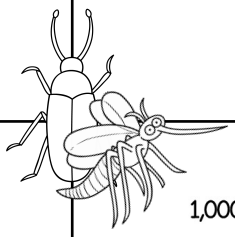
Practice representing non-proportional relationships in multiple ways with the following examples. Use the representation given to help you fill in the others.

[VERBAL DESCRIPTION]

A commercial pest control company charges businesses $2.50 per cubic inch of pesticides used, plus a service fee of $50 for the treatment.

[EQUATION]

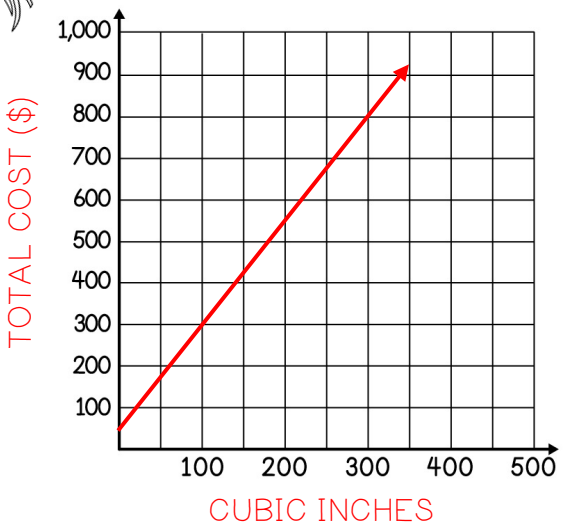
$y = 2.5x + 50$

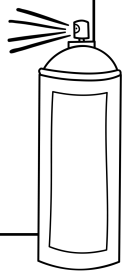


[TABLE]

CUBIC INCHES	PROCESS	TOTAL COST ($)
0	2.5(0) + 50	50
50	2.5(50) + 50	175
100	2.5(100) + 50	300
150	2.5(150) + 50	425
200	2.5(200) + 50	550
250	2.5(250) + 50	675
300	2.5(300) + 50	800

[GRAPH]





Use the representations in the example above to answer 1-4.

1. Determine if the situation above is proportional or non-proportional. Explain your reasoning.

The relationship is non-proportional because it does not pass through (0, 0) and the ratio of $\frac{y}{x}$ is not constant.

2. What is the y-intercept and what does it represent in this situation?

50, it represents the service fee for the pest control treatment.

3. What is the rate of change and what does it represent in this situation?

2.50, it represents the cost per cubic inch

4. If the total cost is $1,050, then how many cubic inches of pesticides were used?

400 cubic inches

Use the given information for each situation below to fill in the missing representations.

[VERBAL DESCRIPTION]

Sample answer: Joe has $180 in his savings account, and he spends $10 each week at the arcade.

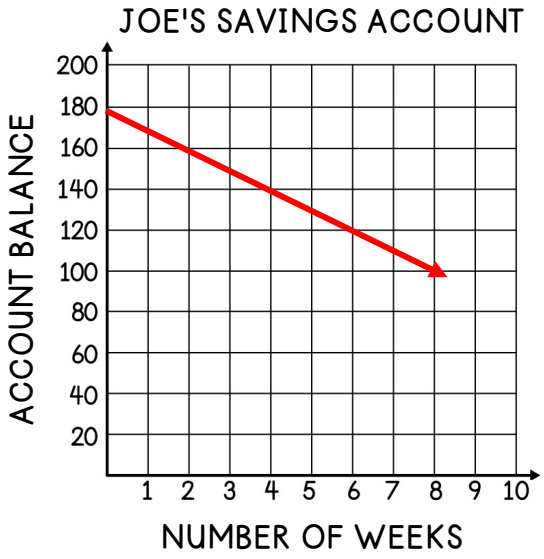
[EQUATION]

$$y = 180 - 10x$$

[TABLE]

NUMBER OF WEEKS	PROCESS	ACCOUNT BALANCE
0	180 – 10(0)	180
1	180 – 10(1)	170
2	180 – 10(2)	160
3	180 – 10(3)	150
4	180 – 10(4)	140
5	180 – 10(5)	130
6	180 – 10(6)	120

[GRAPH]



[VERBAL DESCRIPTION]

Sample answer: Speedy Clean Dry Cleaner charges a flat rate of $3 and $0.50 per shirt.

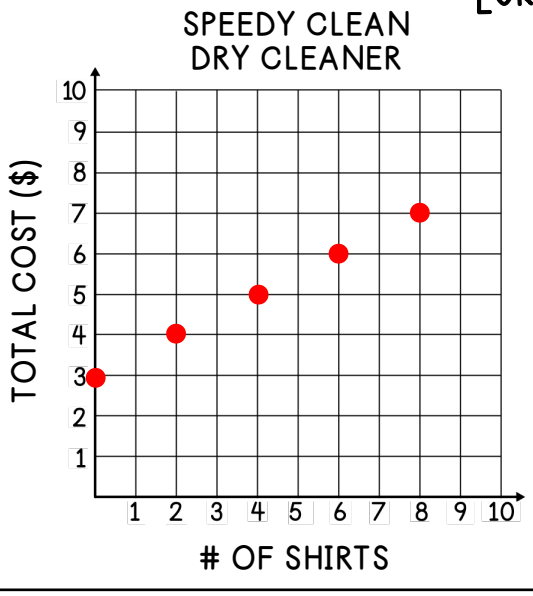
[EQUATION]

$$y = 0.5x + 3$$

[TABLE]

NUMBER OF SHIRTS	PROCESS	TOTAL COST
0	0.5(0) + 3	3
2	0.5(2) + 3	4
4	0.5(4) + 3	5
6	0.5(6) + 3	6
8	0.5(8) + 3	7
10	0.5(10) + 3	8
12	0.5(12) + 3	9

[GRAPH]



Summarize today's lesson:

Unit: Linear Relationships
Homework 6

Name Answer Key

Date _____ Pd_____

REPRESENTING NON-PROPORTIONAL RELATIONSHIPS

Mike, a local auto mechanic, charges a flat fee plus an hourly rate for the time it takes for the repair. Use the graph shown below to fill in the missing representations. Then, answer the questions that follow.

[VERBAL DESCRIPTION]

Mike charges a flat fee of $60 plus $40 per hour of working on the repair.

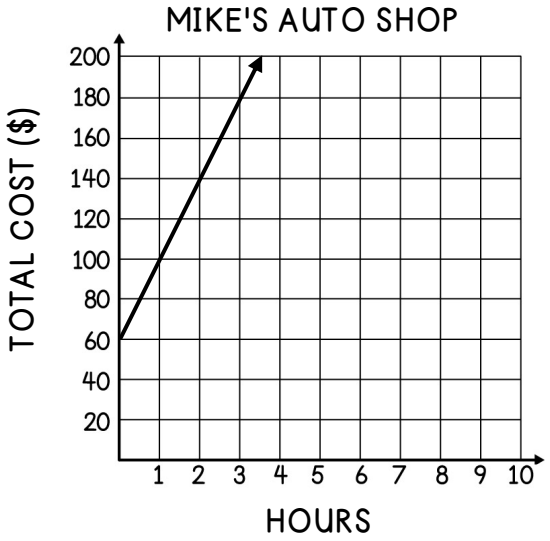
[EQUATION]

$y = 40x + 60$

[TABLE]

NUMBER OF HOURS	PROCESS	TOTAL COST
0	40(0) + 60	$60
1	40(1) + 60	$100
2	40(2) + 60	$140
3	40(3) + 60	$180
4	40(4) + 60	$220
5	40(5) + 60	$260
6	40(6) + 60	$300

[GRAPH]



1. What is the y-intercept and what does it represent in this situation?

The y-intercept is $60. It represents the flat fee that Mike charges for each repair.

2. What is the rate of change and what does it represent in this situation?

The rate of change is $40. The total cost increases by $40 for each hour of the repair.

3. What does the coordinate (4, 220) represent in the context of the situation?

A repair that take 4 hours will cost $220.

4. If a customer's bill was $340, how long did the repair take?

7 hours

Unit: Linear Relationships Review

Name Answer Key

Date _____ Pd_____

LINEAR RELATIONSHIPS UNIT STUDY GUIDE

Solve each of the problems below. These represent the types of questions on your test. Be sure to ask questions if you need more help with a topic.

I CAN DETERMINE IF A RELATIONSHIP IS PROPORTIONAL. 7.4C

1. Determine if the representations below are proportional (P) or non-proportional (NP).

a. NP

x	2	4	6	8	10
y	5	9	13	17	21

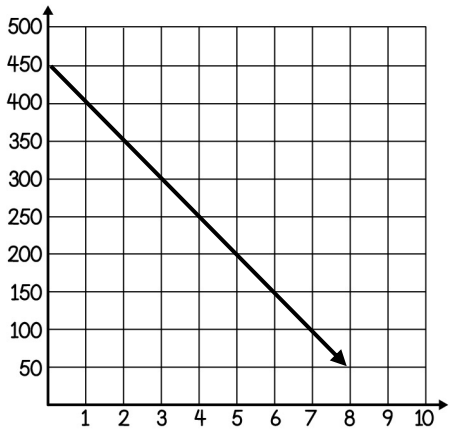
b. P

x	3	5	7	9	11
y	1.5	2.5	3.5	4.5	5.5

c. NP $y = 9x + \frac{1}{2}$

d. P $y = \frac{3}{4}x$

e. NP



I CAN FIND THE CONSTANT OF PROPORTIONALITY. 7.4C

2. Determine the constant of proportionality in each of the problems below.

a. $y = 8x$

k = 8

b.

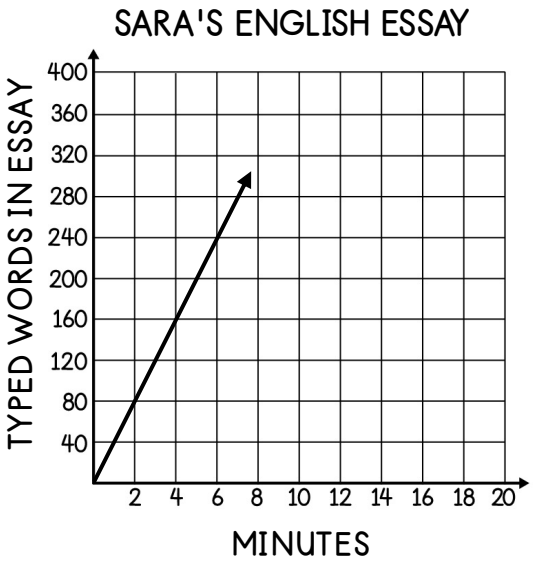
x	2	4	6	8	10
y	190	380	570	760	950

k = 95

c. A restaurant has an all-you-can-eat buffet. They charge $13.95 per person.

k = 13.95

d.

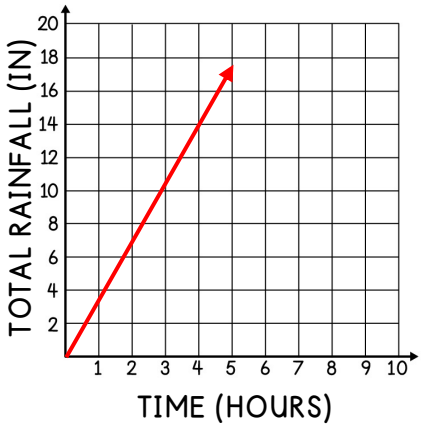


k = 40

I CAN USE TABLES TO REPRESENT PROPORTIONAL RELATIONSHIPS. 7.4A

3. Complete the table and sketch a graph of the relationship between the inches of rainfall, y, and the number of hours, x. Then answer a-c.

HOURS	1	2	3	4	5
TOTAL RAINFALL (IN)	3.5	7	10.5	14	17.5



a. What is the rate of change? Explain its meaning in the context of the situation.
The rate of change is 3.5. The total rainfall increases by 3.5 each hour.

b. Write an equation to represent the rainfall.
$y = 3.5x$

c. If the rainfall continues at this rate, how many inches of rain will fall after 6 hours?
21 inches

I CAN WRITE EQUATIONS TO REPRESENT PROPORTIONAL RELATIONSHIPS. 7.4A

4. An app developer projects that he will earn $20.00 for every 8 apps downloaded. Write an equation to represent the proportional relationship between the total earnings, y, and the number of apps downloaded, x.

$y = 2.5x$

5. As the x-value increases by 3, the y-value increases by 12.

a. Find the rate of change. 4

b. Write an equation to represent the relationship between the x and y-values.
$y = 4x$

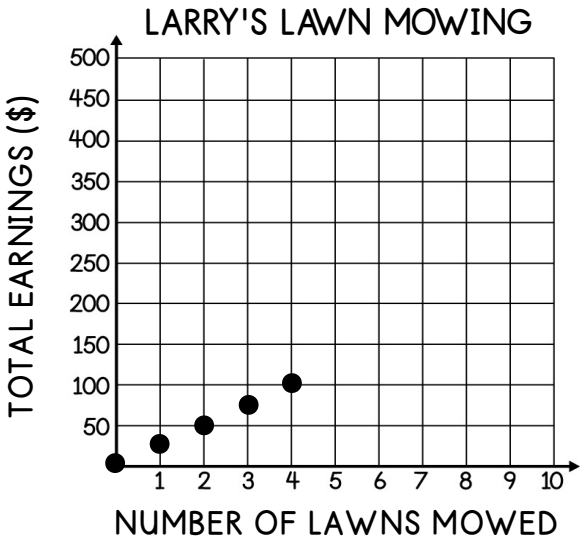
6. The table below shows the relationship between the total sales, y, and the number of textbooks sold, x.

TEXTBOOKS	TOTAL SALES
4	$64.00
7	$112.00
9	$144.00
13	$208.00
20	$320.00

a. What is the rate of change?
16

b. Write an equation to represent the relationship.
$y = 16x$

7.



a. What is the rate of change?
25

b. Write an equation to represent the relationship.
$y = 25x$

I CAN USE VERBAL DESCRIPTIONS TO REPRESENT PROPORTIONAL RELATIONSHIPS. 7.4A

8. It takes Joe 12 minutes to ride a roller coaster four times. Create a table to represent the relationship between the total time, y, and the number of rides, x.

# OF RIDES	1	2	3	4
MINUTES	3	6	9	12

9. Write a situation to represent the equation $y = 0.5x$.

Student responses will vary.

10. Margie saves $15 of her allowance every two weeks. Circle any of the following that represent the relationship between the total amount saved, y, and the number of weeks, x.

A.

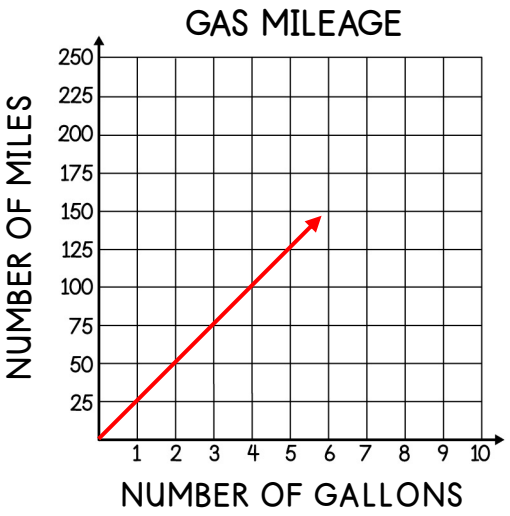
WEEKS	1	2	3
$ SAVED	7.50	15	22.50

B. $y = 7.5x$

C. Maggie will save $50 after 6 weeks.

I CAN USE A GRAPH TO REPRESENT PROPORTIONAL RELATIONSHIPS. 7.4A

11. Lacey drives 125 miles and uses 5 gallons of gasoline. Create a graph to represent the proportional relationship between the number of miles driven, y, and the amount of gasoline used, x.



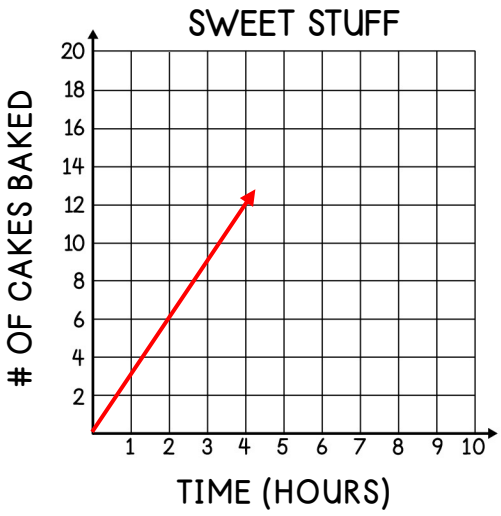
a. Write an equation to represent y, the number of miles traveled on x number of gallons of gas.

$y = 25x$

b. How many gallons of gas are necessary to travel 350 miles?

14 gallons

12. Sweet Stuff is a baking company that bakes specialty cakes. Sweet Stuff can bake 6 cakes in 2 hours. Create a graph to represent the relationship between y, the number of cakes baked, and x, the number of hours.



a. Write an equation to represent y, the number of cakes that can be baked in x hours.

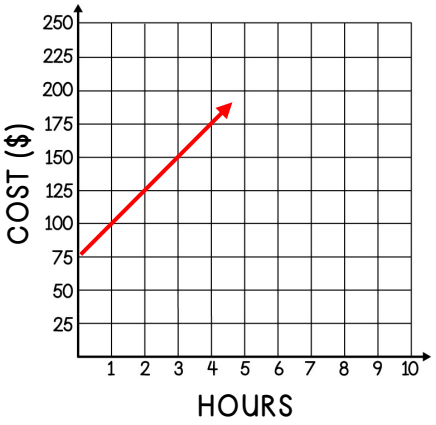
$y = 3x$

b. In this situation, what does the ordered pair (4, 12) represent?

In 4 hours, 12 cakes will be made.

13. Bob's Deep Sea Fishing charges customers a flat fee of $75 plus $25 per hour spent at sea. Complete each representation to show the relationship between the cost of a fishing trip, y, and the number of hours spent on the boat, x.

HOURS	PROCESS	COST ($)
0	25(0) + 75	$75
1	25(1) + 75	$100
2	25(2) + 75	$125
3	25(3) + 75	$150
4	25(4) + 75	$175

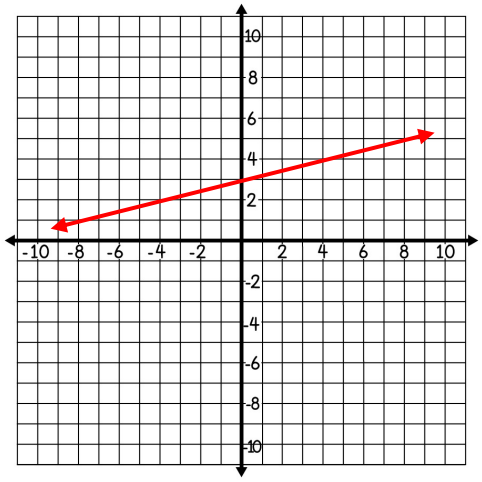


EQUATION:

$y = 25x + 75$

14. Complete the table below to represent $y = 0.25x + 3$. Then draw a graph to represent the relationship between the x and y-values.

x	0	2	4	6	8	10
y	3	3.5	4	4.5	5	5.5



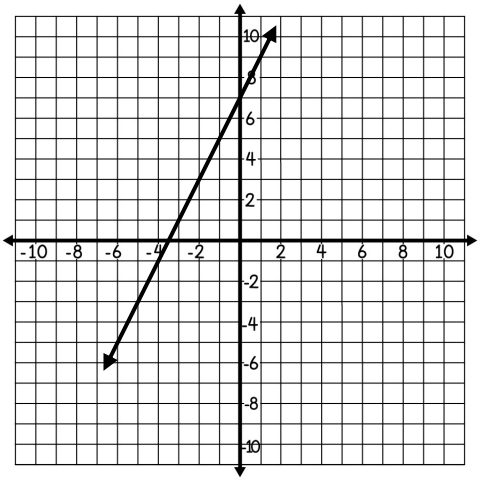
15. Mrs. Eaker asked her students to represent the equation, $y = 2x + 7$. Which student(s) correctly completed the task? Explain.

Both students correctly completed the task. Both representations show a y-intercept of 7 and a rate of change of 2.

BEAU

x	y
0	7
4	15
8	23
12	31

SEAN



I'VE GOT IT!

What concepts can I ace on the test?

HELP!

What concepts do I need to study?

Unit: Linear Relationships Test

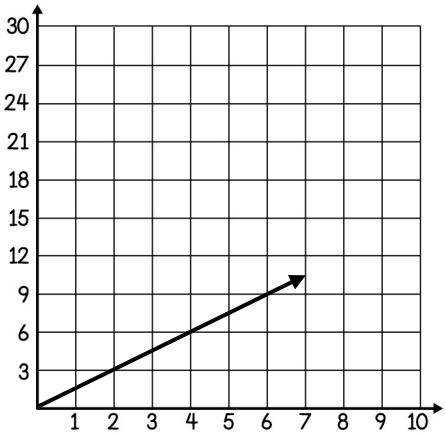
Name Answer Key

Date _____ Pd_____

LINEAR RELATIONSHIPS UNIT TEST

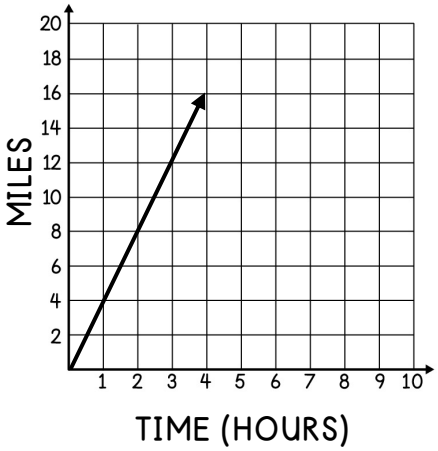
Solve the problems below. Be sure to show your thinking.

1. Which situation is best described by the graph shown?



a. JJ purchases chips for $0.75 per bag.
b. Mark buys a pack of gum for $1.50 each
c. Paula pays $0.50 per ticket at the fair.
d. Franco purchases flowers for $3.00 each.

2. Find the constant of proportionality in the graph below.



a. 9
b. 4
c. 3
d. 1.5

3. A tile backsplash is being installed. The installation fee is $150.00. The tile is priced at $2.75 per square foot, f. Which equation best represents the total cost, c, of the backsplash?

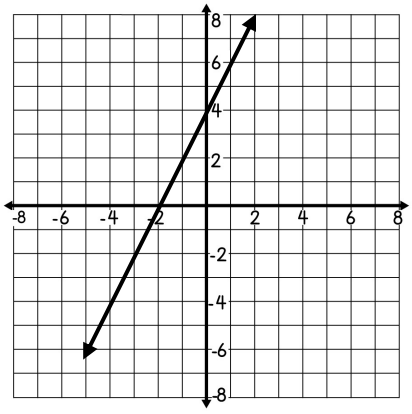
a. $c = 150f + 2.75$

b. $c = 2.75 - 150f$

c. $c = 2.75f + 150$

d. $c = 152.75f$

4. Which of the following equations best represents the relationship between x and y?



a. $y = 2x + 4$
b. $y = 2x - 4$
c. $y = 4x + 2$
d. $y = 4x - 2$

5. An app developer projects that he will earn $230.00 for every 100 apps downloaded. Which of the following equations can be used to represent the proportional relationship between the number of apps, x, and the total earnings, y.

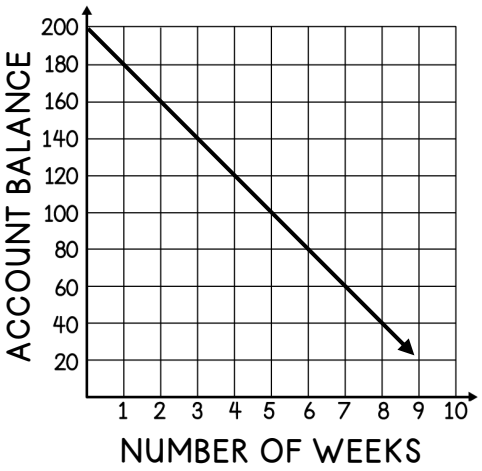
a. $y = 100x + 230$
b. $y = 230x + 100$
c. $x = 2.30y$
d. $y = 2.30x$

6. Based on the information in the table, which equation can be used to represent the relationship?

x	5	10	15	20	25
y	40	65	90	115	140

a. $y = 8x$
b. $y = 5x + 5$
c. $y = 5x + 15$
d. $y = 5x + 40$

7. The graph below shows the relationship between the amount of money in Sarah's savings account over a period of time. Which of the following statements is NOT true about the relationship?



a. After 5 weeks, Sarah has $100 in her account.
b. If Sarah has a balance of $60, then 7 weeks have passed.
c. The relationship is proportional.
d. The situation can be represented by the equation $y = 200 - 20x$.

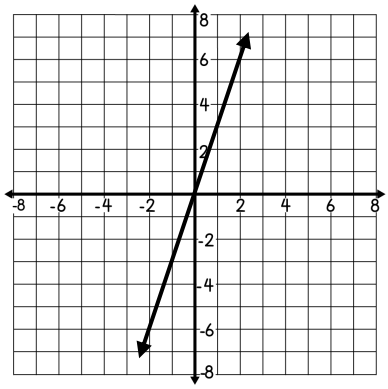
8. The table below shows the relationship between the number of miles traveled, x, and the gallons of gas used, y.

x	35	70	105	140	175
y	1	2	3	4	5

Which of the following equations best represents the relationship?

a. $y = 35x$
b. $y = \frac{1}{35}x$
c. $35 = 1x$
d. $y = 3.5x$

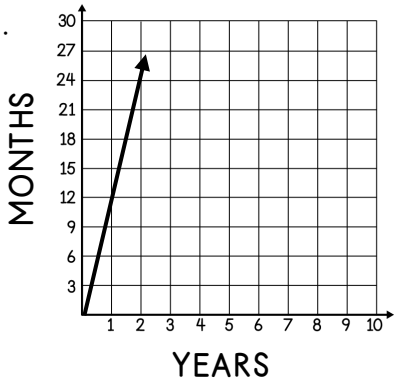
9. Which of the following equations best represents the relationship between x and y?



a. $y = 3x$
b. $y = 0.5x + 3$
c. $y = 0.5x - 3$
d. $y = 3x - 0.5$

10. Which of the following does NOT represent the number of months in a year?

a.



b.

YEARS	MONTHS
2	24
4	48
6	60
8	72

c. $y = 12x$, where x represents the number of years and y represents the number of months

d. There are 96 months in 8 years.

11. Which situation best represents the equation below?

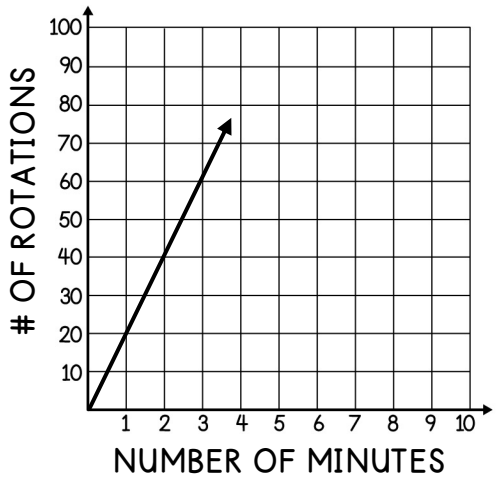
$$y = 2.5x$$

a. John has $2.50 more in his savings than his brother Sam.
b. Two cartons of eggs ring up at the register for $2.50.
c. A bank account is opened with a balance of $5, and $2.50 is deposited each day.
d. Meg pours 2.5 ounces of water onto the plant's soil each day.

12. Which of the following situations represents a proportional relationship?

a. A cheeseburger is $7.95 plus $1.00 for each additional topping.
b. A pool fills at a rate of 90 gallons per hour.
c. A health club charges a $40.00 membership fee plus $25.00 per month.
d. A bank account begins with $350.00 and gains $30.00 per month.

13. The following graph shows the relationship between the number of times a gear can rotate in a period of time. Which of the following statements is true?



a. If the gear rotates 30 times, then it has been rotating for 1.5 minutes.

b. The graph satisfies the equation $y = 10x$.

c. If the machine rotates for 15 minutes, then it will make 350 rotations.

d. The relationship is non-proportional.

14. Which of the following tables best represents the relationship between x and y in the equation $y = 0.5x + 7$?

a.

x	y
0	7
3	8.5
6	10
9	11.5
12	13

b.

x	y
0	0
1	7
2	8
3	8.5
4	9

c.

x	y
0	7
3	7.5
6	8
9	8.5
12	9

d.

x	y
0	7
1	8
2	9
3	10
4	11

Calvin is starting a new job this summer. The table below shows the relationship between Calvin's total earnings and number of hours he has worked. Use the table below to answer questions 15-16.

HOURS WORKED	3	7	15	24	30
TOTAL EARNINGS	$46.50	$108.50	?	$372.00	$465.00

15. y = 15.50x Write an equation to represent y, Calvin's total earnings based on x number of hours worked.

16. $232.50 How much will Calvin earn if he works 15 hours?