$$\frac{6}{4} = \frac{12}{8} = \frac{18}{12} = \frac{24}{16} = \frac{30}{20}$$

Proportional Progressions

Green	Red
2	6
3	9
5	15
6	18
10	X

$$\frac{3}{12} = \frac{5}{x}$$

$$\frac{4}{6} = \frac{x}{21}$$

Equivalent ratios ALWAYS form a line going through the origin.

In this session, teachers will explore how the Common Core standards of ratios and proportions progress from 6th grade through 8th grade. Teachers will complete and discuss a variety of learning tasks that they can take back to their classrooms to teach proportional reasoning. Activities include games, centers, stations, and guided practice.

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Agenda:
- ◉ 6th Grade Topics
  - Interpreting Unit Rates
  - Tape Diagrams
  - Trip to Paris
- ◉ 6 Plus/7th Grade Topics
  - KABOOM!
- ◉ 7 Plus Topics
  - Unit Rate to Slope
  - Graphs vs. Equations

All of the activities and worksheets can be found on our weebly page:
http://proportionalprogressions.weebly.com

Interpreting the Unit Rate

Part 1: Cut and Paste
1. Teachers will give each group a baggie that contains squares of rates, unit rates, interpretations, and pictures.
2. Students will use their grid to place each square in the correct box.
3. Discuss as a class.

Part 2: Independent Practice
1. Students will now take what they learned with the cut and paste activity and apply it independently by filling out their worksheet.
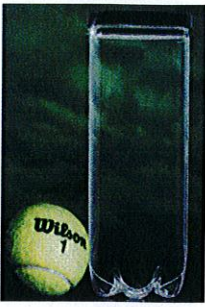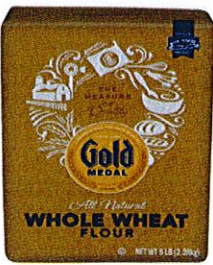
Part 3: Application
1. Student will use what they learned and apply it to a real world scenario. They will determine the 2 unit rates, determine which one applies to answering the question, complete a chart, write an expression, and solve the problem.

Part 4: Evaluation
1. Students are given 2 different scenarios and will have to evaluate the discussion between 2 friends. They will also have to explain who is correct and be able to justify their answers.

Interpreting the Unit Rate

9 tennis balls come in 3 cans			
Rate	**Unit Rate**	**Interpretation**	**Picture**
$\dfrac{9\ tennis\ balls}{3\ cans}$	$\dfrac{3}{1}$	1 can holds 3 tennis balls	
$\dfrac{3\ cans}{9\ tennis\ balls}$	$\dfrac{\frac{1}{3}}{1}$	1 tennis ball fills 1/3 of a can	

6 bags of flour weigh 30 pounds			
Rate	**Unit Rate**	**Interpretation**	**Picture**
$\dfrac{6\ bags\ of\ flour}{30\ pounds}$	$\dfrac{\frac{1}{5}}{1}$	1 pound fills 1/5 of a bag of flour	Only 1/5 full
$\dfrac{30\ pounds}{6\ bags\ of\ flour}$	$\dfrac{5}{1}$	1 bag of flour holds 5 pounds of flour	

9 tennis balls come in 3 cans			
Rate	Unit Rate	Interpretation	Picture

Independent Practice

6 bags of flour weigh 30 pounds			
Rate	Unit Rate	Interpretation	Picture

5 gallons of gas cost $18.25

Rate	Unit Rate	Interpretation	Picture
$\dfrac{5 \; gallons \; of \; gas}{\$18.25}$	$\dfrac{\quad}{\$1}$	$1.00 will purchase you .27 gallons of gas	
$\dfrac{\$18.25}{5 \; gallons \; of \; gas}$	$\dfrac{\$3.65}{1}$		

In 25 minutes, Jenny can run 10 laps

Rate	Unit Rate	Interpretation	Picture
$\dfrac{25 \; minutes}{10 \; laps}$	$\dfrac{\quad}{1}$		
$\dfrac{10 \; laps}{25 \; minutes}$	$\dfrac{\quad}{1}$		

Independent Practice

5 gallons of gas cost $18.25			
Rate	**Unit Rate**	**Interpretation**	**Picture**
$\dfrac{5 \; gallons \; of \; gas}{\$18.25}$	$\dfrac{\mathbf{0.2739} \; \boldsymbol{gal}}{\$1}$	$1.00 will purchase you .27 gallons of gas	
$\dfrac{\$18.25}{5 \; gallons \; of \; gas}$	$\dfrac{\$3.65}{1 \; gal}$	**1 gallon of gas costs $3.65**	

In 25 minutes, Jenny can run 10 laps			
Rate	**Unit Rate**	**Interpretation**	**Picture**
$\dfrac{25 \; minutes}{10 \; laps}$	$\dfrac{\mathbf{2.5} \; \boldsymbol{min}}{1 \; lap}$	**Jenny runs 1 lap in 2.5 minutes**	
$\dfrac{10 \; laps}{25 \; minutes}$	$\dfrac{\mathbf{0.4} \; \boldsymbol{laps}}{1 \; min}$	**It takes Jenny 1 minute to run 0.4 of a lap.**	

You and your family are planning a trip to England. Because England uses a different currency than the United States, you first need to exchange dollars for pounds at your local bank. You exchange 150 U.S. dollars for British pounds. The exchange rate is 3 U.S. dollars for 2 British Pounds. How many pounds did you receive?
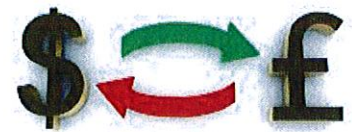
What are the two possible rates for this problem?	Write each rate as a unit rate.	What does the unit rate tell you?
1)		
2)		

Which unit rate will help you solve this problem?

Complete this table:
How many British pounds can be exchanged for 1 U.S. dollar? For 2 U.S. dollars? For 3 U.S. dollars?

Dollars	Pounds
1	
2	
3	
4	
5	

What number pattern do you see?

Write an expression to help you solve the number of pounds (*p*) for any number of US dollars (*d*).

Since you know the unit rate, write a number sentence for the number of pounds you can exchange for 150 U.S. dollars.

You and your family are planning a trip to England. Because England uses a different currency than the United States, you first need to exchange dollars for pounds at your local bank. You exchange 150 U.S. dollars for British pounds. The exchange rate is 3 U.S. dollars for 2 British Pounds. How many pounds did you receive?

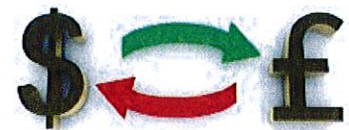| What are the two possible rates for this problem?	Write each rate as a unit rate.	What does the unit rate tell you?
1) $\dfrac{\$3}{£2}$	$\dfrac{\$1.5}{£1}$	1 pound costs $1.50
2) $\dfrac{£2}{\$3}$	$\dfrac{£\frac{2}{3}}{\$1}$	$1 will purchase $\frac{2}{3}$ of a pound

Which unit rate will help you solve this problem?

$$\dfrac{£\frac{2}{3}}{\$1}$$

Complete this table:

How many British pounds can be exchanged for 1 U.S. dollar? For 2 U.S. dollars? For 3 U.S. dollars?

Dollars	Pounds
1	2/3
2	4/3
3	6/3
4	8/3
5	10/3

What number pattern do you see? **Increases by $\frac{2}{3}$.**

Write an expression to help you solve the number of pounds (*p*) for any number of US dollars (*d*).

$$d \bullet \tfrac{2}{3} = p$$

Since you know the unit rate, write a number sentence for the number of pounds you can exchange for 150 U.S. dollars.

$$\$150 \bullet \tfrac{2}{3} = £100$$

Gabriella and Vivianna purchase oranges at the grocery store. The sign for oranges read,

5 pounds for $4

At this store, you can buy any number pounds of oranges at this same rate, and all prices include tax.

Gabriella said,

"The ratio of the number of dollars to the number of pounds is 4:5. That's $0.80 per pound."

Vivianna said,

"The sign says the ratio of the number of pounds to the number of dollars is 5:4. That's 1.25 pounds per dollar."

Questions:
1. Who is correct? Explain.

2. Gabriella needs two pounds of oranges to make her smoothie. How much money will she need?

3. Vivianna has $10 and wants to stock up on oranges. How many pounds of oranges can she buy?

4. Did you answer question 2 and 3 using Gabriella's rate of $0.80 per pound, using Vivianna's rate of 1.25 pounds per dollar, or using another strategy? Explain.

Solution: using a ratio table

1.   Gabriella and Vivianna are both correct. Their rates could be illustrated with a double number line or a ratio table like the following:

Pounds	Dollars
1	.80
1.25	1
2.5	2
5	4

2.   Double the quantities in Gabriella's rate to find the price of two pounds:

Pounds	Dollars
1	.80
2	1.60

3.   Starting from Vivianna's rate and multiplying both quantities by ten shows the number of pounds that can be purchased for 10 dollars:

Pounds	Dollars
1.25	1
12.50	10

3.   Answers may vary. We can efficiently answer question 2 using Gabriella's rate and question 3 using Vivianna's rate.

Juan and Alejandro were searching for the cheapest price of gasoline per gallon. A local gas station is advertising gas for:

Regular
326 $\frac{9}{10}$

Juan said,
"That means we can write the ratio 3.26:1, or $3.26 per gallon."

Alejandro said,
"I thought we had to write the ratio the other way, 1:3.26, or .31 gallon per $1.00."

Can we write different ratios for this situation? Explain why or why not.

Situation A:
- The boys have $20. How many gallons of gas can they purchase?

- If the car uses 25 miles per gallon, how far can the boys travel on $20 worth of gas?

Situation B:
- The boys purchase 14 gallons of gas. How much money did they spend?

- They are taking a trip to Virginia Beach, which is 236 miles away. The car uses 25 miles per gallon. Will they have enough gas to get them to Virginia Beach? Explain.
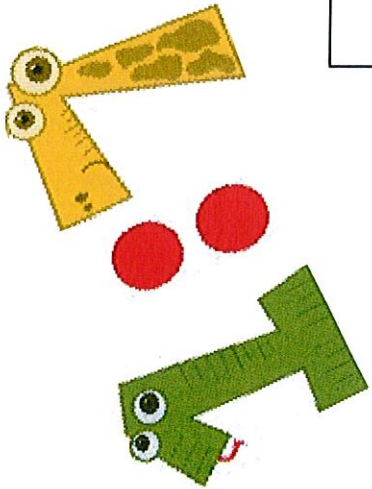
Solutions

Yes, this context can be modeled by both of these ratios and their associated unit rates. The context itself doesn't determine the order of the quantities in the ratio; we choose the order depending on what we want to know.

Situation A:
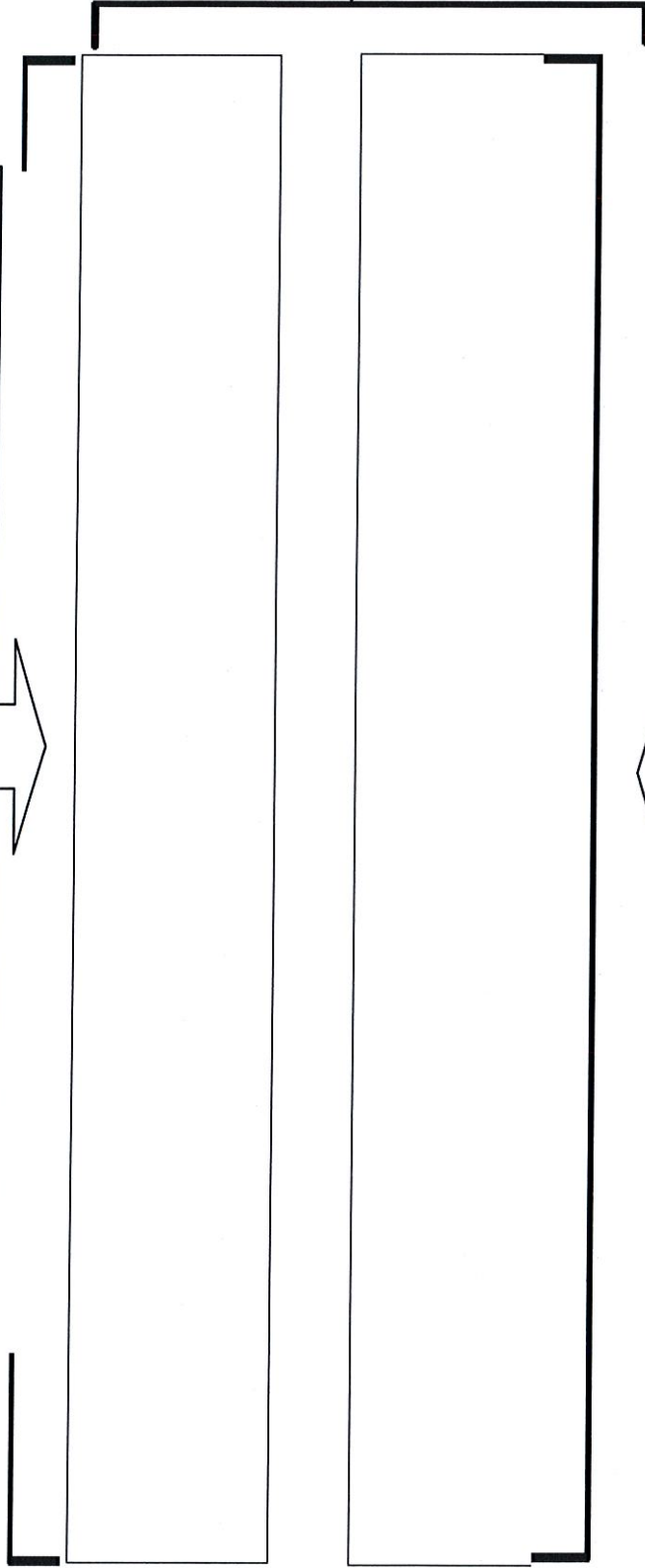1. They can purchase 6.2 gallons of gas for $20.
2. They can travel 155 miles.

Situation B:
1. The boys spent $45.64 for 14 gallons of gas.
2. To travel 236 miles, they would need 9.44 gallons of gas. Yes, they will have enough money to get them to Virginia Beach.
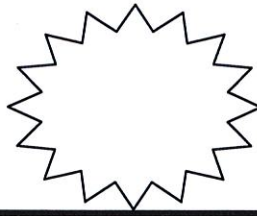
Tape Diagrams

TOTAL:

Each Square Value: _____

Part Value: _____

Each Square Value: _____

Part Value: _____

Label

Label

Johnny made trail mix by combining raisins and granola in a 3:7 ratio. If Johnny has 15 ounces of raisins to use, how many ounces of granola would be needed?	Two numbers are in the ratio 4:3. If the smaller number is 21, what is the larger number?
Nick and Amelia shared a bag of jelly beans in the ratio 2:5. If the bag contained a total of 98 jelly beans, how many jelly beans did Nick eat?	Harold created a fruit drink by mixing 4 parts grape juice with 5 parts apple juice. If Harold used 20 ounces of grape juice, how many ounces of apple juice would he need?
Patricia and Laura won first and second place in a school contest. They have to share the cash prize in a ratio of 7:3. If the cash prize was $200, how much did Laura win?	The ratio of country songs to Top 40 songs on Michael's iPod is 3:2. If Michael has 16 Top 40 songs, how many country songs does he have?
Two numbers are in the ratio of 4:1. If the smaller number is 6, what is the sum of the two numbers?	Hank created a fruit drink by mixing 5 parts orange juice with 3 parts pineapple juice. If he made a total of 112 ounces of juice, how many ounces of pineapple juice did he use?

Trip to Paris
Overview

In this exercise, students will take a "trip" to Paris, France. The students will be challenged with different activities throughout their visit.

The first exercise in their "trip" to Paris will be working with exchanging their dollars to Euros. In leveraging the daily exchange rate, the students will use the concept of unit rate to go through several questions for the desired answer.

A very common and useful conversion metric will be for the price of gas. For their travel around Paris, it will be important for the students to understand the price of gas by the gallon, by the liter, by the dollar, and by the Euro. The students will calculate the price of gas and the amount of gas in various ways.

In this exercise the students will use a very popular treat to understand the comparison and contrast methodology while utilizing the concept of unit price for the best purchase option.

The students will make a very intricate log of activities and hours spent at each activity. The students will convert each of those hours and activities into fractions, decimals, percents, and degrees. This multi-day fictitious event log will test the students' ability to create a pie chart related degrees to the fractional representation to each activity.

In understanding the temperature of the weather forecast in Paris, the students will use the conversion rates between Celsius and Fahrenheit. The students will also study averages and use logic to prepare for their trip and the weather.

Every trip needs food and in Paris there is some of the best food in the world. The students will once again use the conversion rate of Euros to dollars to see how much a Parisian meal would cost their group.
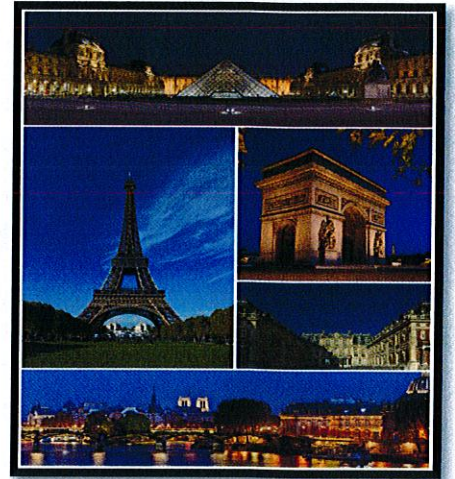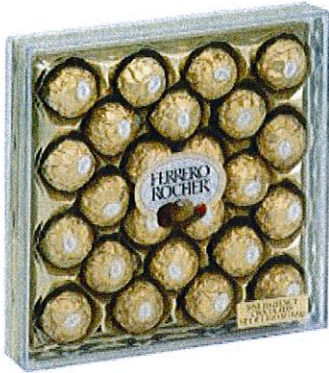
Better Buy

Your sister asked you to bring back some chocolate from Paris for your family to enjoy. The store has the following selections of Ferrero Rocher. Calculate the unit price for each package and determine which one would be the better deal to buy for your family.

$11.99 for 25 pieces

$6.36 for 16 pieces
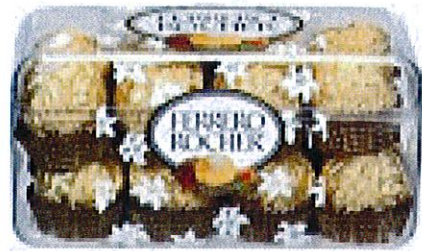
12 packs for $19.99

48 count for $18.40

Better Buy _ KEY

Your sister asked you to bring back some chocolate from Paris for your family to enjoy. The store has the following selections of Ferrero Rocher. Calculate the unit price for each package and determine which one would be the better deal to buy for your family.

$11.99 for 25 pieces

$6.36 for 16 pieces

$$\frac{\$11.99}{25} = \$0.4796 \text{ per piece}$$

$$\frac{\$6.36}{16} = \$0.3975 \text{ per piece}$$

12 packs for $19.99

48 count for $18.40

$$\frac{\$19.99}{36} = \$0.555 \text{ per piece}$$

$$\frac{\$18.40}{48} = \$0.3833 \text{ per piece}$$
BEST BUY

How I Spent My Trip to Paris

List your daily activities on your trip to Paris in the first column. In the second column, estimate the number of whole hours you spent on this activity in a day. Then, complete each row of the table by converting the number of hours per day to a fraction in lowest terms, a decimal, a percent, and the number of degrees this represents in a circle. Use the values you calculated to create a pie chart that represents your day in Paris. I have attached some cards that include famous sights around Paris. You cannot visit all of the sights in one day so choose only a few to include in your daily log. There is so much to do and see in Paris! Don't forget to include time to eat and sleep ☺

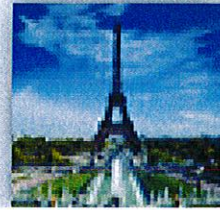| Activity	Hours	Fraction	Decimal	Percent	Degrees

Remember: There are 360° in a circle. Set up a proportion to calculate the degrees in the circle.

$$\frac{\%}{100} = \frac{degrees}{360}$$

Triumphal Arch

The majestic arch honours those who died in the French Revolution and Napoleonic wars. One of Paris' illustrious monuments.

Eiffel Tower

The most iconic sight in all of Paris. Do not miss this iron lady known all around the world. The views from the top are out of this world.
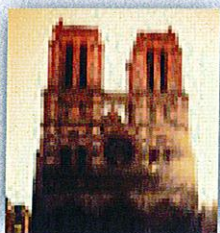
Avenue des Champs-Élysées

Said to be the most beautiful avenue in the world. The cafés and luxury shops here lined by chestnut trees create a special scenery.

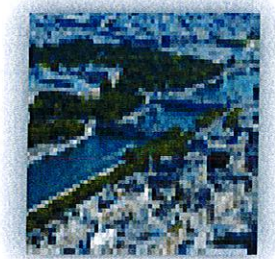## Concorde Square

A famous square close to many important sights.

Notre Dame de Paris

A true masterpiece of Gothic architecture, both on the outside and the inside. Do not miss.

Louvre Museum

The most-visited museum in the world – for a reason. Of course, do not miss the Mona Lisa, but there are many other gems, too.
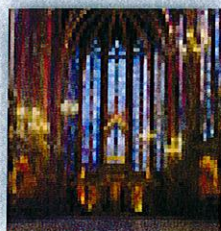
Seine River

A stroll along Seine's waterfront is a must while in the city of lights, no matter if you have a sweetheart or not.

Pont Neuf

The oldest bridge in Paris. Bronze equestrian statue of King Henry IV and 384 of the sculptured faces.

The Holy Chapel

The whole chapel is lined by 13th century stained glass – just visit in a sunny day and marvel at the spectacular lightshow.

BANK: Exchange Dollars to Euros

When you are traveling to Paris, you must use France's currency. The currency in France is the Euro. The exchange rate varies daily. Today, you are exchanging your dollar ($) for Euro (€). Look at the chart below for today's rates.

8	US Dollar ⬍
6.20	Euro ⬍

0.90
0.80
0.70
0.60
2009 2010 2011 2012 2013
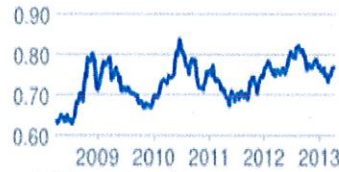
What is the unit rate of Euros to US Dollars?   What is the unit rate of US Dollars to Euros?

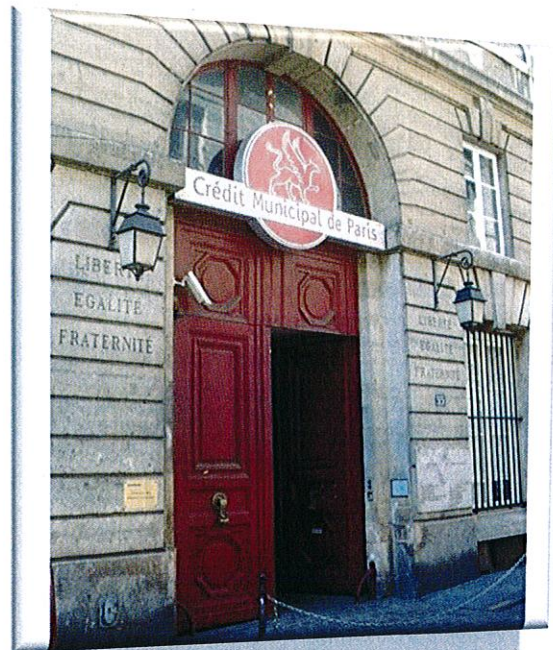**Complete the chart showing the given amounts of dollars with the corresponding numbers of Euros.**

Dollars	$1	$4	$8	$10	$50
Euros			€6,20		

Write a rule to help you determine the number of Euros that you will receive in exchange for any given number of dollars. Use e for the number of Euros and d for the number of dollars.

Your parents are giving you some money to take on the trip. How many Euros will you receive in exchange for $850?

Why is it important to be cognizant of the daily exchange rate?

BANK: Exchange Dollars to Euros KEY

When you are traveling to Paris, you must use France's currency. The currency in France is the Euro. The exchange rate varies daily. Today, you are exchanging your dollar ($) for Euro (€). Look at the chart below for today's rates.

| 8 | US Dollar ↕ |
| 6.20 | Euro ↕ |

0.90
0.80
0.70
0.60
2009 2010 2011 2012 2013
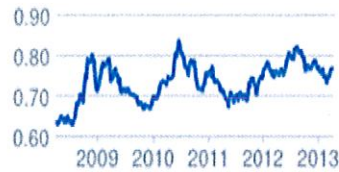
What is the unit rate of Euros to US Dollars?   What is the unit rate of US Dollars to Euros?

€0.775 : $1.00 $1.29 : €1.00

Complete the chart showing the given amounts of dollars with the corresponding numbers of Euros.

Dollars	$1	$4	$8	$10	$50
Euros	€0.775	€3.10	€6,20	€7.75	€38.75

Write a rule to help you determine the number of Euros that you will receive in exchange for any given number of dollars. Use *e* for the number of Euros and *d* for the number of dollars.
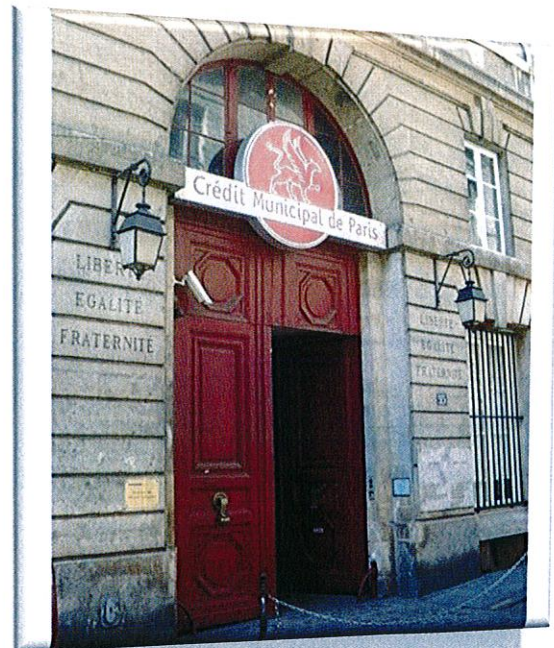
e = d • 0.775

Your parents are giving you some money to take on the trip. How many Euros will you receive in exchange for $850?

e = $850 • 0.775
e = €658.75

Why is it important to be cognizant of the daily exchange rate? **Due to daily fluctuation, you may get a better exchange if you watch closely.**

PRICE OF GAS

In the US, we use gallons to compare gasoline prices but in France, they use liters. If the price of gas in America is ———, and in France, the price of gas is ———. If you spend €40, how many liters did you purchase and how many gallons would that be converted?

(One liter is equal to approximately 0.2642 gallons)

In the US, we use gallons to compare gasoline prices but in France, they use liters. If the price of gas in America is ——, and in France, the price of gas is ——. If you spend €40, how many liters did you purchase and how many gallons would that be converted?

(One liter is equal to approximately 0.2642 gallons)

$$€40 \cdot \text{——} = 34.48 \ l$$

$$(0.2642) \ 34.48 \ l = 9.11 \ gal$$

ESSO

Super Plus 98	1,32	
Sans Plomb 95	1,29	
Gasoil	1,16	

Before you depart for your trip, you researched the temperature for the week so you can prepare your outfits for the weather. Because Paris uses Celsius and the United States uses Fahrenheit, you will need to convert the temperature to see what to pack.

$$\frac{°C \bullet 9}{5} + 32 = °F$$

Weather Forecast Paris

Thursday

Cloudy — Max: 9°C Min: 5°C

Friday

Cloudy — Max: 13°C Min: 4°C

Saturday

Cloudy — Max: 8°C Min: 3°C

Sunday

Very cloudy — Max: 6°C Min: 1°C

Monday

Cloudy — Max: 4°C Min: 0°C

What is the average maximum temperature for the week converted to Fahrenheit?

What is the average minimum temperature for the week converted to Fahrenheit?

What time of the year do you think this weather forecast is for?

Before you depart for your trip, you researched the temperature for the week so you can prepare your outfits for the weather. Because Paris uses Celsius and the United States uses Fahrenheit, you will need to convert the temperature to see what to pack.

$$\frac{°C \bullet 9}{5} + 32 = °F$$

Weather Forecast Paris

Thursday

Cloudy — Max: 9°C / Min: 5°C

Friday

Cloudy — Max: 13°C / Min: 4°C

Saturday

Cloudy — Max: 8°C / Min: 3°C

Sunday

Very cloudy — Max: 6°C / Min: 1°C

Monday

Cloudy — Max: 4°C / Min: 0°C

What is the average maximum temperature for the week converted to Fahrenheit?

$$\frac{9+13+8+6+4}{5} = 8°C$$

$$\frac{72}{5} + 32 = 46.4°F$$

What is the average minimum temperature for the week converted to Fahrenheit?

$$\frac{5+4+3+1+0}{5} = 2.6°C$$

$$\frac{23.4}{5} + 32 = 36.68°F$$

What time of the year do you think this weather forecast is for?

FALL

CREPES de PARIS

You can't go to Paris and not savor their Crepes! You and your friend have enjoyed a long day of sight-seeing and decide to try some street food. You order a nutella banana crepe, and 75CL eau minerale. Your friend ordered beurre sucre and 50CL eau minerale. What was the total bill of you and your friends order?

There is an 8% sales tax. How much is your order including the sales tax?

How much is that converted to dollars?
(1 Euro = $1.31)

CREPES SALEES:	
JAMBON (HAM)	3.10 €
FROMAGE (CHEESE)	3.10 €
MIXTE (HAM+CHEESE)	4.00 €
COMPLETE (HAM+CHEESE+EGG)	4.50 €

CREPES SUCRÉES:	
BEURRE, SUCRE (SUGAR)	2.00 €
MARRON (CHESNUT)	2.40 €
CONFITURE (JAM)	2.40 €
CHOCOLAT NOIR	2.40 €
CHOCOLAT, COCO	2.70 €
CHOCOLAT, BANANE	3.30 €
NUTELLA (HAZELNUT)	2.80 €
NUTELLA, COCO	3.60 €
NUTELLA, BANANE	3.60 €
GRD MARNIER OU RHUM	2.80 €

SANDWICHES:	
JAMBON (HAM)	2.80 €
FROMAGE (CHEESE)	2.80 €
MIXTE (HAM+CHEESE)	3.30 €
THON, SALADE, TOMATE, OEUF	3.60 €
POULET, SALADE, TOMATE	3.60 €
JAMBON, SALADE, TOMATE, FROMAGE	3.60 €
HOT DOG (SAUCISSES, FROMAGE)	3.30 €
HOT DOG (SAUCISSES)	3.00 €

BOISSONS (DRINKS):		
BOISSONS FRAICHES	33 CL	1.80 €
BOISSONS FRAICHES	50 CL	2.50 €
EAU MINERALE	50 CL	1.80 €
EAU MINERALE	75 CL	2.60 €
BIERE	33 CL	2.40 €

You can't go to Paris and not savor their Crepes! You and your friend have enjoyed a long day of sight-seeing and decide to try some street food. You order a nutella banana crepe, and 75CL eau minerale. Your friend ordered beurre sucre and 50CL eau minerale. What was the total bill of you and your friends order?

There is an 8% sales tax. How much is your order including the sales tax?

3.60+2.60=6.20
2.00+1.80=3.80
Total = 10.00
Tax = 0.80
Total = 10.80

How much is that converted to dollars?

(1 Euro = $1.31)

10.80 = d(1.31)
D = $14.15

CREPES SALEES:

JAMBON (HAM)	
FROMAGE (CHEESE)	3.10 €
MIXTE (HAM+CHEESE)	3.10 €
COMPLETE (HAM+CHEESE+EGG)	4.00 €
	4.50 €

CREPES SUCRÉES:

BEURRE, SUCRE (SUGAR)	2.00 €
MARRON (CHESNUT)	2.40 €
CONFITURE (JAM)	2.40 €
CHOCOLAT NOIR	2.40 €
CHOCOLAT, COCO	2.70 €
CHOCOLAT, BANANE	3.30 €
NUTELLA (HAZELNUT)	2.80 €
NUTELLA, COCO	3.60 €
NUTELLA, BANANE	3.60 €
GRD MARNIER OU RHUM	2.80 €

SANDWICHES:

JAMBON (HAM)	2.80 €
FROMAGE (CHEESE)	2.80 €
MIXTE (HAM+CHEESE)	3.30 €
THON, SALADE, TOMATE, OEUF	3.60 €
POULET, SALADE, TOMATE	3.60 €
JAMBON, SALADE, TOMATE, FROMAGE	3.60 €
HOT DOG (SAUCISSES, FROMAGE)	3.30 €
HOT DOG (SAUCISSES)	3.00 €

BOISSONS (DRINKS):

BOISSONS FRAICHES	33 CL	1.80 €
BOISSONS FRAICHES	50 CL	2.50 €
EAU MINERALE	50 CL	1.80 €
EAU MINERALE	75 CL	2.60 €
BIERE	33 CL	2.40 €

EXTENSIONS

BANK: Exchange Dollars to Euros

Option 1

Construct a bar graph of the 5 countries currencies. Research 5 different country's currencies using the internet and convert to 1 US Dollar.   Construct a bar graph that depicts the information collected. The x-axis will be the currency of represented county. The y-axis will be the total number of US Dollars.

Option 2

Make a graph for the rule that gives the number of Euros for any number of dollars. Use grid paper, a graphing calculator, or a computer with a spreadsheet software program. Describe what the graph looks like. Look especially at the slope and y-intercept.

Better Buy

Calculate the cost of each of the packages of Ferro Rocher if you had a 20% off coupon. How much would you save on each of the packages?

How I Spent My Trip to Paris

Create a journal entry detailing your day in Paris. Include as much information about what you saw that day. You may use the internet or reference books to gain more information regarding the places visited. Include pictures in your journal entry.

Kaboom!

Kaboom!

Kaboom!

Kaboom!

Kaboom!

-5
-4
-3
-2
-1

5

4

3

2

1

KABOOM! Directions

Split students into small groups of about 3 to 4 students.

Give each group a group whiteboard for their final answer. Follow along with the questions on the PowerPoint (be sure to enable macros). Students will work the questions as a group (you may have them work individually for the first minute of each question, then have a minute to come to a group consensus).

After a specified time that you set based on question difficulty/student need, you will press the pink square to select a random group.   The pink square is a random number generator that is set up to pick a number between 1 and 9. If you don't have that many groups, you can just skip over to the next random number by clicking the box again.

The group that the random number generator picks gets to give you their final answer for the problem. If they are correct, they select a KABOOM! Card from your stack. If they are not correct, you will use the random number generator to pick the next group that will attempt the problem. Answers are on the last page of the PowerPoint- print these off in advance!

The KABOOM! Cards are found on the first four pages of these directions. The KABOOM side is printed on one side, and the -5 to -1 & 5 to 1 are printed on the other. The groups who answer correctly will get to pick a KABOOM! Card. If they select a positive value, they get to keep those points for their team. If they get a negative value, they have the opportunity to take those points from any other team of their choosing.

Additionally, after a team gives you the correct answer, press the scores button to take you back to the question/scores page. Update the scores based on what the team decides. Move onto the next question (suggestion: complete the problems in numerical order).

Unit Rate Leading to Slope

Nana likes her milk "just right". This means that for every 2 cups of milk, you must mix in 8 scoops of chocolate powder.   Fill in the missing values in the table, being sure to maintain a proportional relationship.
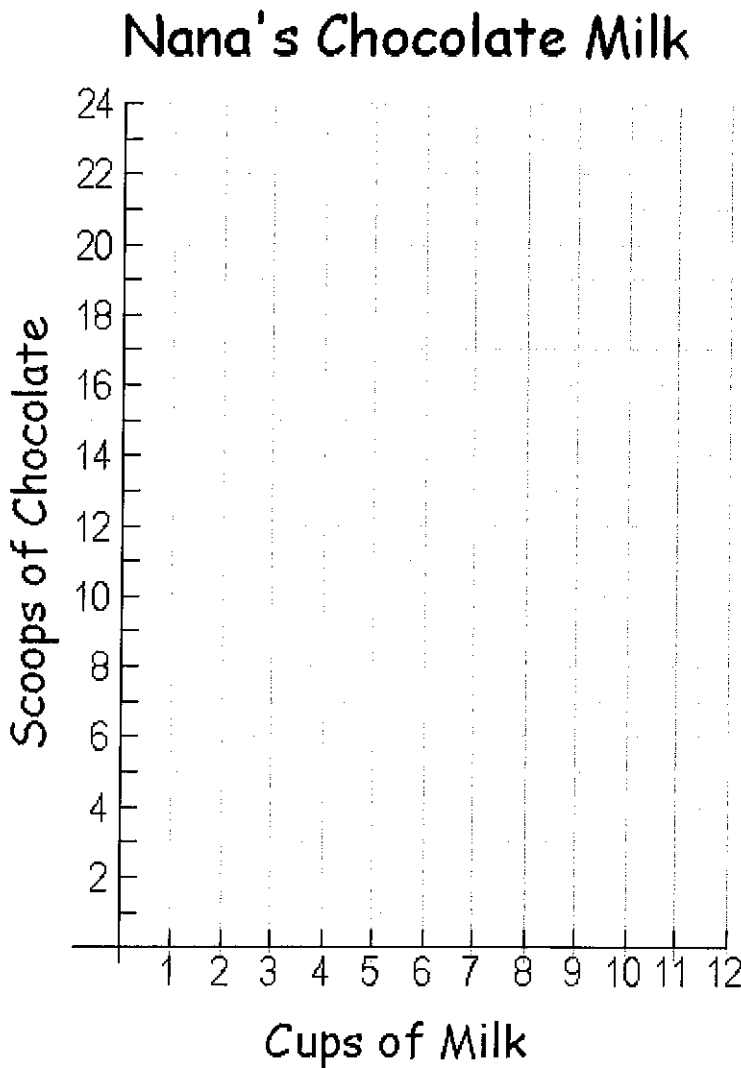
Cups of Milk (x)	Scoops of Chocolate
2	8
6	
	20
3	
1	
	16

Use the ordered pairs from the table to create a graphical representation of the relationship.

What is the unit rate? What does it mean?

What is the constant of proportionality?

What is the equation (y = kx) of the relationship?

Nana's Chocolate Milk

(y-axis: Scoops of Chocolate — 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24)
(x-axis: Cups of Milk — 1 2 3 4 5 6 7 8 9 10 11 12)

*The unit rate is the slope of the line.

Slope: _____

$$\text{Slope} = \frac{\text{change}}{\text{change}} = \underline{\qquad}$$

Find the ratio of rise to run between each set of points on the graph by counting vertical and horizontal change.

Between (0, 0) and (1,4)	Between (0, 0) and (3,12)	Between (1, 4) and (5,20)	Between (2, 8) and (6,24)
$\dfrac{\text{rise}}{\text{run}} =$	$\dfrac{\text{rise}}{\text{run}} =$	$\dfrac{\text{rise}}{\text{run}} =$	$\dfrac{\text{rise}}{\text{run}} =$

The slope equals _____. What else had this value?

Suppose my favorite lemonade recipe calls for 8 lemons to 12 cups of sugar water. Fill in the missing values in the table, being sure to maintain a proportional relationship.
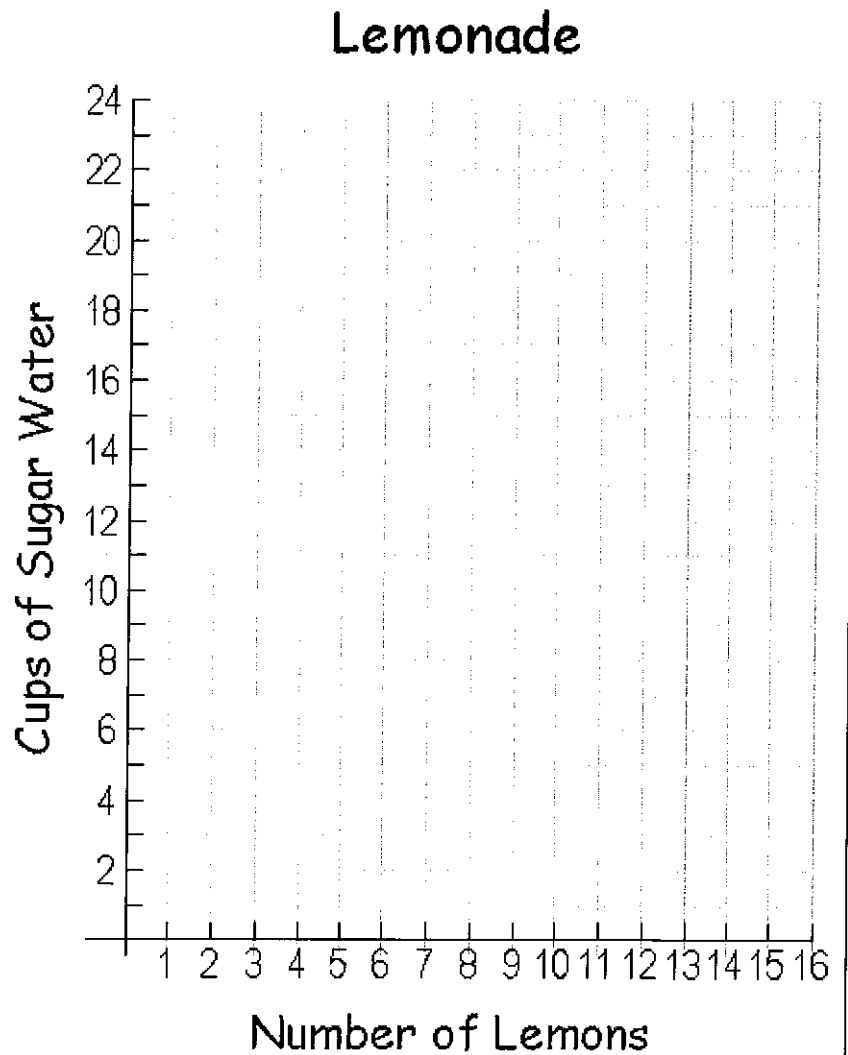
Number of Lemons (x)	Sugar Water (cups)
8	12
16	
	6
2	
	$\frac{3}{2}$
	1

Use the ordered pairs from the table to create a graphical representation of the relationship.

What is the unit rate? What does it mean?   (write improper)

What is the constant of proportionality? (write as an improper fraction)

What is the equation (y = kx) of the relationship?

Lemonade

(Y-axis: Cups of Sugar Water, marked 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24; X-axis: Number of Lemons, marked 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16)

Find the ratio of rise to run between each set of points on the graph by counting vertical and horizontal change. Simplify each answer, but leave fractions improper if applicable.

Between (0, 0) and (2,3)	Between (0,0) and (16,24)	Between (2,3) and (16,24)	Between (4,6) and (8,12)
$\frac{rise}{run} =$	$\frac{rise}{run} =$	$\frac{rise}{run} =$	$\frac{rise}{run} =$

What is the slope of the line between any two points on the graph?

In which ordered pair do you see this in the table?   What special ordered pair is this?

Where do you see the slope in the equation?

Graphs versus Equations

1. Pilar has two job offers and wants to take the job with the highest pay. The pay scale for company A is shown in the graph. The pay scale for Company B is given by the boxed equation where P is the pay, and h represents the number of hours worked.

Salary Comparison

Salary ($) vs Hours Worked

$$P = 9h$$
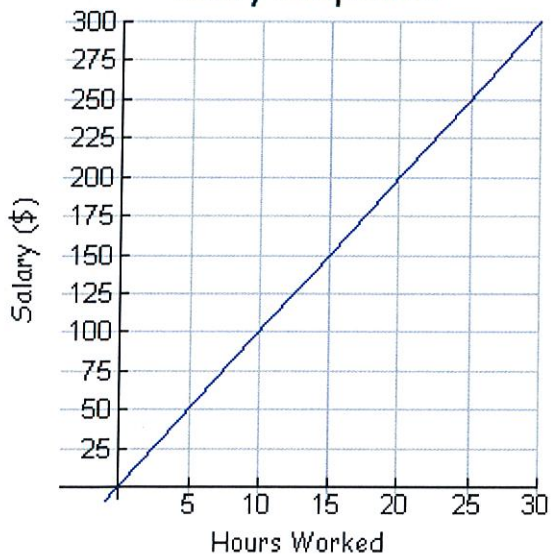
1. Based on the graph, how much did Pilar make after working 15 hours? 20 hours?

Hours	Salary
15	
20	

2. Can you use the table above to determine the constant of proportionality? What is the constant and how did you find it?

3. What is the equation that is represented by the graph?

4. Which company offers the highest pay, and what is the hourly rate for that company?

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2. Kelsey recorded the speed of two storms by mapping how long they took to move certain distances. The speed of Storm A is shown in the graph. Storm B's speed is given by the boxed equation where D is the distance in miles, and h represents the time in hours.

Distance Versus Time

Distance (Miles) vs Time (Hours)
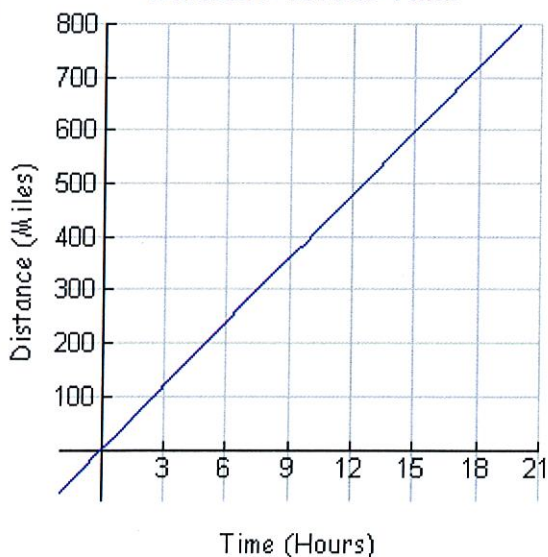
$$D = 25h$$

1. Can you find an ordered pair that goes through two whole number values?

2. Use that point help you to determine the constant of proportionality. (What do you have to do to x to get to y?)

3. What is the equation that is represented by the graph?

4. Which storm is moving faster? What is the speed of that storm in miles per hour?

3. Paco has two job offers at Burger Town and wants to take the job with the highest pay. The pay scale for cook is shown in the graph. The pay scale for taking customer orders is given by the boxed equation where P is the pay, and h represents the number of hours worked.

Burger Town Salary

$$S = 8h$$
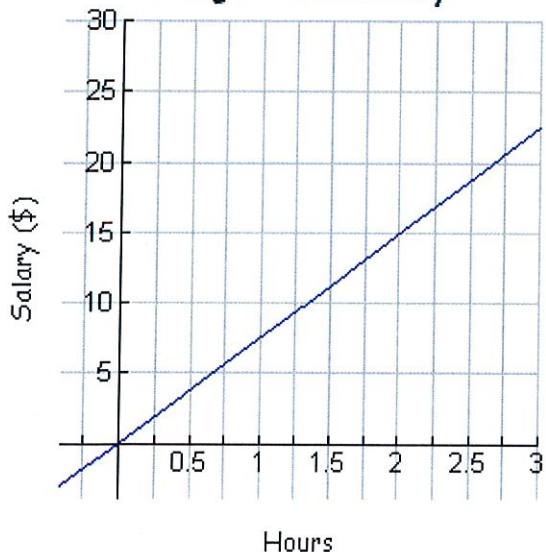
1. What is the equation that is represented by the graph? How do you know? Use complete sentences to prove how you determined your answer.

2. Which job offers the highest pay, and what is the hourly rate for that job?

4. Waterslides at WaterRapids Water Park pump different amounts of water through the slides. Slide of Terror is shown in the graph. The amount of water pumped through Waterfall Alley the boxed equation where W is the water pumped, and m represents the number of minutes.

Waterslide Waterfall
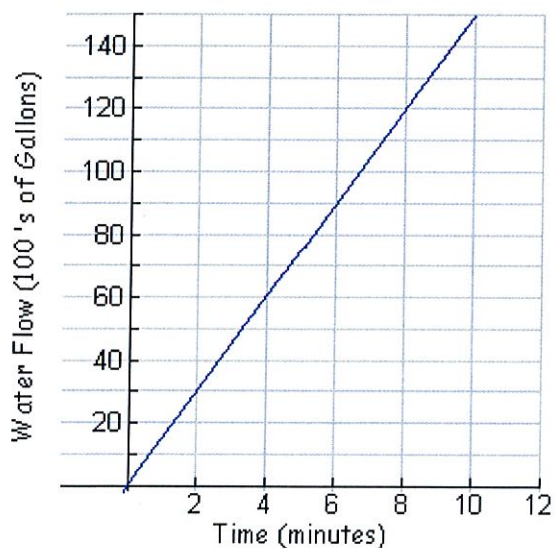
$$W = 2000m$$

1. How many gallons of water did Slide of Terror pump through after 6 minutes? How do you know?

2. What is the constant of proportionality?

3. What is the equation that is represented by the graph?

3. If you were afraid of fast rides, which waterslide would you enjoy more? What is the rate of water speed for that water slide?

5. Megan's parents are allowing her to get a cell phone, but she must pay for the text message plan. Text Plan A is shown in the graph. The text plan cost for Text Plan B is given by the boxed equation where C is the cost, and n represents the number of texts sent and received.

Cost of Texting

Number of Texts
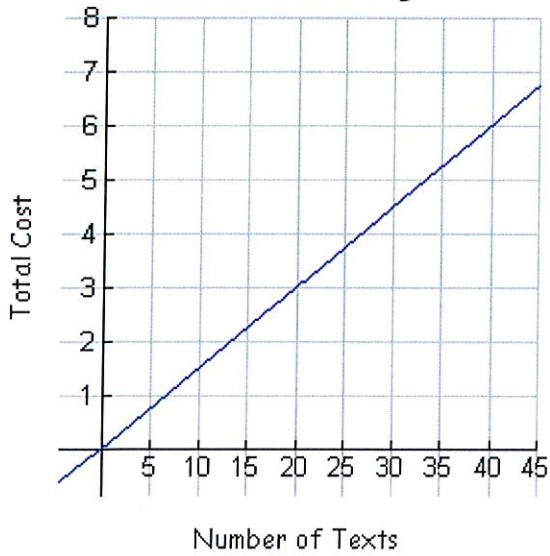
$$C = .20n$$

1. How much would Megan pay to send or receive 20 texts? What about 40 texts?

| Texts	Cost ($)
20	
40	

2. Can you use the table above to determine the constant of proportionality? What is the constant and how did you find it?

3. What is the equation that is represented by the graph?

4. Which text plan would Megan select to ensure that she is saving the most money? How much is she paying for each text sent or received?

6. For her science project, Georgia recorded the speed of two snails. Snail Bert is shown in the graph. The speed of Snail Ernie is given by the boxed equation where D is the distance, and h represents the hours elapsed.

A Snail's Pace

Time (Hours)
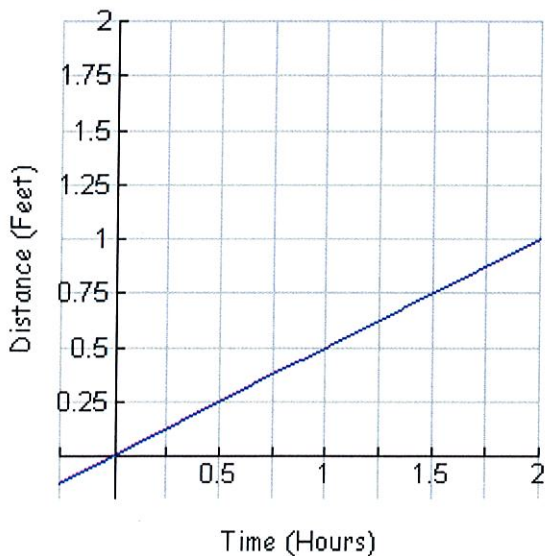
$$D = .75h$$

1. What is the equation that is represented by the graph? How do you know? Use complete sentences to prove how you determined your answer.

2. Which snail moves at a faster rate? What is the speed of each snail per hour?

Graphs versus Equations

1. Pilar has two job offers and wants to take the job with the highest pay. The pay scale for company A is shown in the graph. The pay scale for Company B is given by the boxed equation where P is the pay, and h represents the number of hours worked.

Salary Comparison

$$P = 9h$$
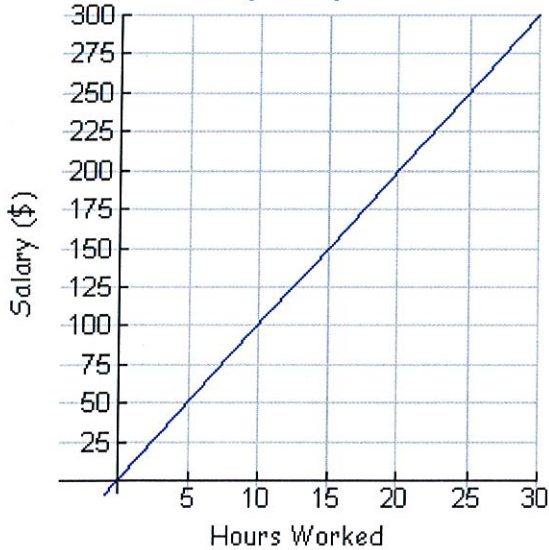
1. Based on the graph, how much did Pilar make after working 15 hours? 20 hours?

Hours	Salary
15	150
20	200

2. Can you use the table above to determine the constant of proportionality? What is the constant and how did you find it?
Constant : 10   The number used to go from x to y.

3. What is the equation that is represented by the graph?
P = 10h

4. Which company offers the highest pay, and what is the hourly rate for that company?
Company A: $10/hour

2. Kelsey recorded the speed of two storms by mapping how long they took to move certain distances. The speed of Storm A is shown in the graph. Storm B's speed is given by the boxed equation where D is the distance in miles, and h represents the time in hours.

Distance Versus Time
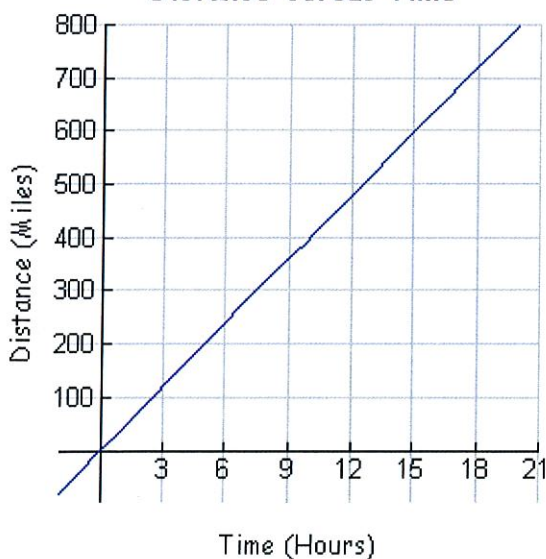
$$D = 25h$$

1. Can you find an ordered pair that goes through two whole number values?
(15, 600)

2. Use that point help you to determine the constant of proportionality. (What do you have to do to x to get to y?)
Multiply h by 40. So the constant is 40.

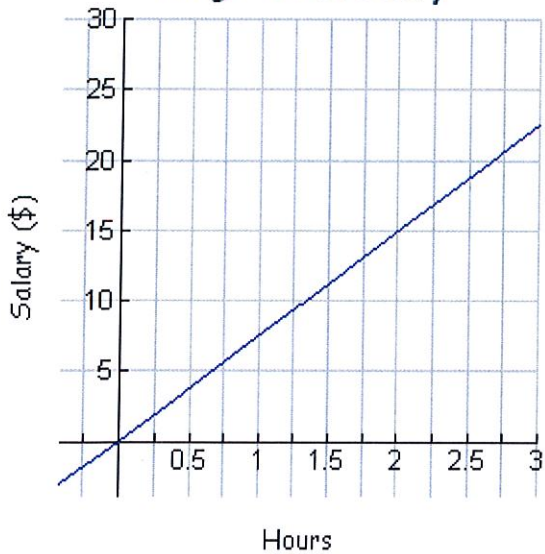3. What is the equation that is represented by the graph?
D = 40h

4. Which storm is moving faster? What is the speed of that storm in miles per hour?
Storm A moves faster at 40 miles per hour

3. Paco has two job offers at Burger Town and wants to take the job with the highest pay. The pay scale for cook is shown in the graph. The pay scale for taking customer orders is given by the boxed equation where P is the pay, and h represents the number of hours worked.

Burger Town Salary

$$S = 8h$$

1. What is the equation that is represented by the graph? How do you know? Use complete sentences to prove how you determined your answer.
2 hours = $15
1 hour = $7.50
Constant = 7.5

S = 7.5h

2. Which job offers the highest pay, and what is the hourly rate for that job?
Customer Orders pays more at $8 an hour

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4. Waterslides at WaterRapids Water Park pump different amounts of water through the slides. Slide of Terror is shown in the graph. The amount of water pumped through Waterfall Alley the boxed equation where W is the water pumped, and m represents the number of minutes.

Waterslide Waterfall
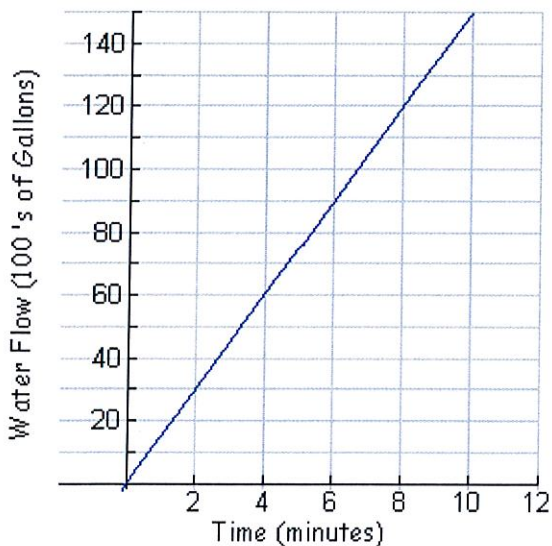
$$W = 2000m$$

1. How many gallons of water did Slide of Terror pump through after 6 minutes? How do you know?
Using the graph, after 6 minutes, 9,000 gallons of water is pumped through.

2. What is the constant of proportionality?
6 → 9,000, so the constant is 1,500.

3. What is the equation that is represented by the graph?
W = 1500m

3. If you were afraid of fast rides, which waterslide would you enjoy more? What is the rate of water speed for that water slide?
Slide of Terror is slower since it only pumps 1,500 gallons per minute compared to 2000.

5. Megan's parents are allowing her to get a cell phone, but she must pay for the text message plan. Text Plan A is shown in the graph. The text plan cost for Text Plan B is given by the boxed equation where C is the cost, and n represents the number of texts sent and received.

Cost of Texting

Total Cost vs. Number of Texts
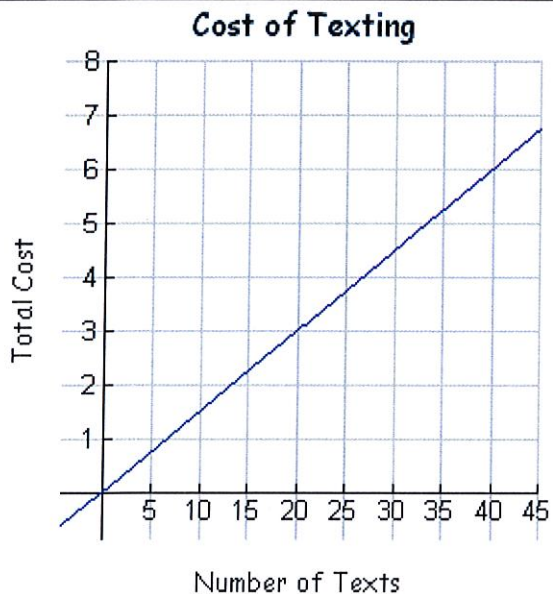
$$C = .20n$$

1. How much would Megan pay to send or receive 20 texts? What about 40 texts?

Texts	Cost ($)
20	3
40	6

2. Can you use the table above to determine the constant of proportionality? What is the constant and how did you find it? Constant: .15 I found it by dividing 3 by 20

3. What is the equation that is represented by the graph?
C = .15n

4. Which text plan would Megan select to ensure that she is saving the most money? How much is she paying for each text sent or received?
Text Plan A is the cheapest at $.15 per text.

6. For her science project, Georgia recorded the speed of two snails. Snail Bert is shown in the graph. The speed of Snail Ernie is given by the boxed equation where D is the distance, and h represents the hours elapsed.

A Snail's Pace

Distance (Feet) vs. Time (Hours)

$$D = .75h$$

1. What is the equation that is represented by the graph? How do you know? Use complete sentences to prove how you determined your answer.
1 hour = .5 miles

D = .5h
2. Which snail moves at a faster rate? What is the speed of each snail per hour?
Snail Ernie= .75 feet per hour
Snail Bert= .5 feet per hour

Ernie is faster