Unit Two - Ratio Relationships	
5.1 Ratios	***I can understand ratios and language used to describe two different quantities.**

Discuss with your group – How do you THINK you would write the ratio of stars to stripes on the American flag?

What will I learn?

A ratio is a comparison of two quantities.
Ratios can be part-to-part, part-to-whole, or whole-to-part comparisons.

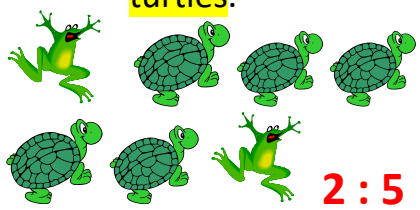
Ratios can be written in three different ways.

What is the ratio of calculators to the total number of objects? ***5 to 16*** *or* ***5:16*** *or* $\frac{5}{16}$

The circle graph shows the favorite ice-cream toppings of several students. Use ratio language to compare the number of students who favor peanuts to the number of students who like sprinkles? **5 to 4**

Show What I Know:

1) Write the ratio for frogs to turtles.



2 : 5

2) Use the table to write the ratio.

Movie	Number
Drama	3
Comedy	8
Action	4

(movies = add all types)

dramas to comedy

3 : 8

movies : action

15 : 4

A tape diagram is a diagram that looks like a segment of a tape. It shows the relationship between two quantities.

The ratio of your monthly allowance to your friend's monthly allowance is **5:3**. The monthly allowances total $40. How much is each allowance? ***(5 + 3 = 8)***

You	$5	$5	$5	$5	$5
Your friend	$5	$5	$5		

The 8 parts represent $40

Because there are 8 parts, you know that 1 part represents **$40 ÷ 8 = $5**, so each segment of this tape diagram is $5.

Your monthly allowance will be $5 • 5 = $25.
Your friend's monthly allowance will be $5 • 3 = $15.

Unit Two - Ratio Relationships	
5.3 Rates	***I can solve real world problems related to ratios in order to figure out the rate.**
	***I can solve unit rate problems.**

Discuss with your group – If a car travels 100 miles using 5 gallons of gas, how many miles could it travel on 1 gallon of gas.

What will I learn?

Key Idea

Rate and Unit Rate

Words A **rate** is a ratio of two quantities using different units. A **unit rate** compares a quantity to one unit of another quantity. **Equivalent rates** have the same unit rate.

Numbers You pay $27 for 3 pizzas.

Algebra Rate: a units : b units Unit rate: $\frac{a}{b}$ units : 1 unit

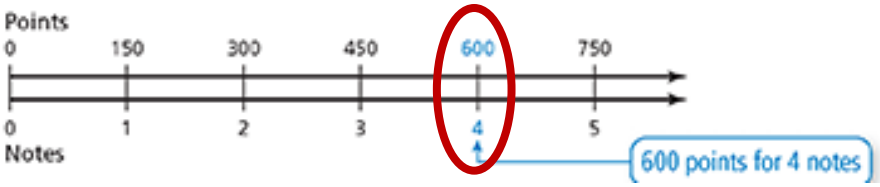
RATE: **$27 : 3 pizzas**

UNIT RATE: **$9 : 1 pizza**

EQUIVALENT RATES:

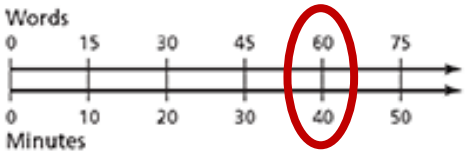
$$\frac{\$27}{3} = \frac{\$9}{1} = \frac{\$18}{2}$$

A double number line shows the rate at which you earn points for successfully hitting notes in a music video game. Write a rate that represents this situation.



One possible rate is 600 points for every 4 notes.

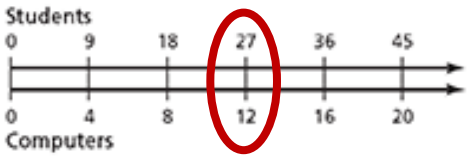
Write a rate that represents the situation. ***Choose any pair of numbers.***



1.

Write a rate: __**60:40**_____

Write equivalent rates: **15:10, 30:20, 60:40**



2.

Write a rate: __**27:12**_____

Write equivalent rates: **9:4, 18:8, 27:12**

Write a unit rate for the situation. ***Divide both numbers by the second value.***

3. $\frac{\$28}{4}$ saved in $\frac{4}{4}$ weeks

$7 per week or $7/week

4. $\frac{18}{3}$ necklaces made in $\frac{3}{3}$ hours

6 necklaces/hour

Unit Two – Ratio Relationships	
5.2 Ratio Tables	***I can make tables of equivalent ratios and plot those values on a coordinate plane.**

Discuss with your group – What do you do with ingredients for a recipe when you want to TRIPLE the recipe?

What will I learn?

Two ratios that describe the same relationship are equivalent ratios.

You can find equivalent ratios by:

**multiplying or dividing each quantity in a ratio by the same number.*

You can find and organize equivalent ratios in a ratio table.

Show What I Know:

Find the missing value(s) in the ratio table. Then write the equivalent ratios.

1.

Boys	**1**	x2	**2**
Girls	**5**	x2	**10**

Equivalent Ratios: **1:5, 2:10**

2.

Violins	**8**	x3	**24**
Cellos	**3**	x3	**9**

Equivalent Ratios: **8:3, 24:9**

3.

Taxis	**6**	x3	**18**	x2	**36**
Buses	**5**	x3	**15**	x2	**30**

Equivalent Ratios: **6:5, 18:15, 36:30**

4.

Burgers	**3**	x2	**6**		**9**
Hot Dogs	**5**	x2	**10**		**15**

Equivalent Ratios: **3:5, 6:10, 9:15**

5.

Towels	**14**	÷2	**7**	x4	**28**
Blankets	**8**	÷2	**4**	x4	**16**

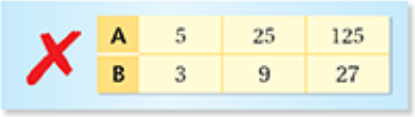
Equivalent Ratios: **14:8, 7:4, 28:16**

6.

Forks	**16**	÷2	**8**	x6	**48**
Spoons	**10**	÷2	**5**	x6	**30**

Equivalent Ratios: **16:10; 8:5, 48:30**

Error Analysis: Describe and correct the error in making the ratio table.



On the top, the numbers are multiplied by 5, on the bottom, the number are multiplied by 3.

Use the ratio table showing different batches of the same recipe for scrambled eggs.

Recipe	A	B	C	D	E	F
Servings	4	2	6	3	5	9
Eggs	8	4	12	6	10	18
Milk (cups)	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{3}{8}$	$\frac{5}{8}$	$1\frac{1}{8}$

7. How can you use Recipes B and D to create Recipe E? **B + D = E**

8. How can you use Recipes C and D to create Recipe F? **C + D = F**

9. How can you use Recipes B and C to create Recipe A? **A + B = C**

10. How can you use Recipes C and F to create Recipe D? **C + D = F**

11. Describe a way to use the recipes to create a batch with 11 servings. **B + F = 11 servings**

Unit Two – Ratio Relationships	
5.4 Compare & Order Ratios	***I can use graphs and tables to show the relationship between dependent and independent variables.**

Discuss with your group – Between two vehicles, how can you tell which vehicle has the better gas mileage?

You make purple frosting by adding **1 drop of red** food coloring for every **3 drops of blue** food coloring.

Complete the ratio table.

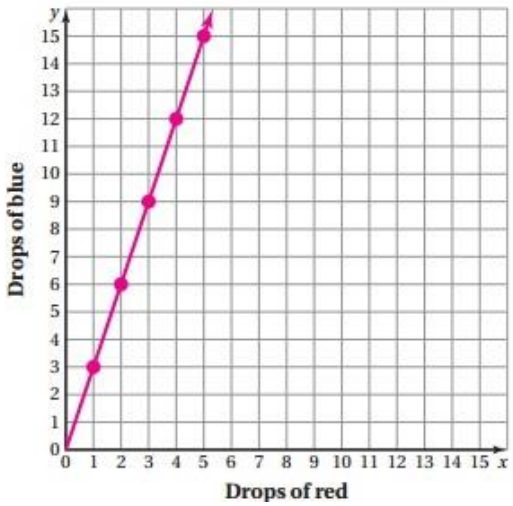
Your Frosting	
Drops of Red	***Drops of Blue***
1	**3**
2	**6**
3	**9**
4	**12**
5	**15**

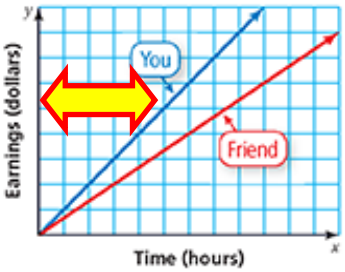
Your teacher makes purple frosting by adding **3 drops of red** food coloring for every **5 drops of blue** food coloring.

Complete the ratio table.

Your Teacher's Frosting	
Drops of Red	***Drops of Blue***
3	**5**
6	**10**
9	**15**
12	**20**
15	**25**

Red line represents "Your Frosting"





Just by looking at this graph, determine who earns a greater hourly wage. Explain.

You, because the line for "you" is closer to the "Earnings" axis.

Which car gets better gas mileage? **= higher**

Car	A	B
Distance (mi.)	125	120
Gallons Used	5	6

Divide miles by gallons used to find unit rate:

125 ÷ 5 = 25 miles/gallon = **better gas mileage**

120 ÷ 6 = 20 miles/gallon

Which car gets better gas mileage?

Car	A	B
Distance (mi.)	300	320
Gallons Used	8	10

A: 300÷8 = 37.5 mi./gal. = better gas mileage

B: 320÷10 = 32 mi./gal.

Which is the better buy? **= lower**

Ham	A	B
Cost (dollars)	5.70	8.75
Pounds	3	5

Divide cost by amount to find the unit price:

$5.70 ÷ 3 = $1.90/pound

$8.75 ÷ 5 = $1.75/pound = **better buy**

Which is the better buy?

Kitten Food	A	B
Cost (dollars)	15	9
Cans	18	12

For unit price - ALWAYS type $ in calc. first!!

A: $15÷18 = $.83/can

B: $9÷12 = $.75/can = better buy

Unit Two – Ratio Relationships	
7.4 Writing Equations in Two Variables	***I can use variables to represent two quantities in a real world problem and write an equation to express the quantities.**

Discuss with your group – How much would you earn for working five hours if you make $7.25 per hour?

What will I learn

Tell whether the ordered pair is a solution of the equation.

a. $y = 2x$; (3, 6)

$6 \stackrel{?}{=} 2(3)$ Substitute.

$6 = 6$ ✓ Compare.

So, (3, 6) is a solution.

b. $y = 4x - 3$; (4, 12)

$12 \stackrel{?}{=} 4(4) - 3$

$12 \neq 13$ ✗

So, (4, 12) is *not* a solution.

You can use equations in two variables to represent situations involving two related quantities. The variable representing the quantity that can change freely is the **independent variable**. The other variable is called the **dependent variable** because its value *depends* on the independent variable.

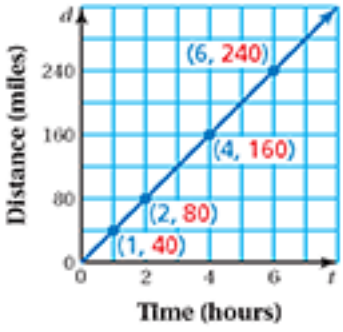
An equation in two variables represents two quantities that change in relationship to one another.

A solution of an equation in two variables is an ordered pair that makes the equation true.

A train averages 40 miles per hour between two cities. Use a graph to show the relationship between the time and the distance traveled.

Method 1: Use a ratio table.

You can use a ratio table and multiplication to find equivalent rates. Then plot the ordered pairs (time, distance) from the table and draw a line through the points.



Time (hours)	1	2	4	6
Distance (miles)	40	80	160	240

× 2 × 4 × 6

× 2 × 4 × 6

Tell whether the ordered pair is a solution of the equation.

1)	2)
y = x + 7 ; (1,6) $6 \neq 1 + 7$	y = 5x - 10 ; (3,5) $5 = 5(3) - 10$

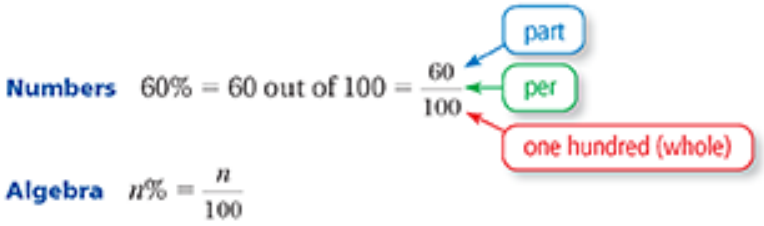
Unit Two – Ratio Relationships	
5.5 Percent	***I can find the part if I am given the whole and the percent.**

Discuss with your group – How much would you earn for working five hours if you make $7.25 per hour?

What will I learn?

A percent is a part-to-whole ratio where the whole is 100. So, you can write a percent as a fraction with a denominator of 100.

Write the percent as a fraction or mixed number in simplest form.



Write the percent as a fraction or mixed number in simplest form.
(Percent means "out of 100" ~ so denominator is 100.)

1.	2.	3.
45%	**77.5%**	**188%**
$\frac{45}{100} = \frac{9}{20}$	$\frac{77.5}{100}\ \frac{x10}{x10} = \frac{775}{1000} = \frac{31}{40}$ *you shouldn't have a decimal in your fraction, so multiply both by 10.	$\frac{188}{100} = 1\frac{22}{25}$

Write the fraction or mixed number as a percent.
(Change to a decimal *numerator ÷ denominator*; then multiply by 100)

4.	5.	6.
$\frac{11}{20}$	$\frac{18}{25}$	$2\frac{41}{50}$ *improper:* $\frac{141}{50}$
11 ÷ 20 x 100 = 55%	18 ÷ 25 x 100 = 72%	141 ÷ 50 x 100 = 282%

Find the percent.
(Write phrase as a fraction, then change to percent.)

7.	8.	9.
13 is what percent of 16?	9 is what percent of 16?	33 is what percent of 40?
$\frac{13}{16}$ 13 ÷ 16 x 100 = 81.25%	$\frac{9}{16}$ 9 ÷ 16 x 100 = 56.25%	$\frac{33}{40}$ 33 ÷ 40 x 100 = 82.5%

Unit Two – Ratio Relationships	
5.6 Solving Percent Problems	***I can find the whole if I am given a part and the percent.**

Discuss with your group – How much would you save if a $30 sweater was on sale with a savings of 20%?

What will I learn?

To find the part of the whole:

What is 18% of 150?

Change the percent to a decimal, and MULTIPLY.

0.18 x 150 = 27

1. ***What is 20% of 45?*** ***.20 x 45 = 9***	***2.*** ***What is 80% of 32?*** ***.80 x 32 = 25.6***	***3.*** ***What is 7% of 90?*** ***.07 x 90 = 6.3***

To find the whole from the part:

Change percent to decimal, and set up an equation.

120 is 75% of what number?

120 = .75 x n

4. ***50 is 10% of what number?*** $\frac{50}{.10} = \frac{.10 \times n}{.10}$ **500 = n**	***5.*** ***11 is 30% of what number?*** $\frac{11}{.30} = \frac{.30 \times n}{.30}$ **36.67 = n**	***6.*** ***90 is 35% of what number?*** $\frac{90}{.35} = \frac{.35 \times n}{.35}$ **257.14 = n**

Unit Two – Ratio Relationships	
5.7 Converting Measures	***I can use what I know about ratios to convert units of measurement.**

Discuss with your group – About how many centimeters are in one foot?

What will I learn?

The U.S. customary system is a system of measurement that contains units for length, capacity, and weight. The metric system is a decimal system of measurement, based on powers of 10, that contains units for length, capacity, and mass.

Key Idea

Conversion Factor

A **conversion factor** is a rate that equals 1.

	Relationship	*Conversion Factors*
Example	1 m = 3.28 ft	$\frac{1\text{ m}}{3.28\text{ ft}}$ and $\frac{3.28\text{ ft}}{1\text{ m}}$

Convert 36 quarts to gallons.

Use a conversion factor:

1 gal = 4 qt.

(match units on top and bottom)

$$\frac{36\ qt.}{x\ gal.} = \frac{4\ qt.}{1\ gal.}$$

Cross-multiply: 36 ● 1 = 4 ● x

$\frac{36}{4} = \frac{4x}{4}$ (now solve)

9 gall = x

Conversion Chart: *(Use conversion chart from back of book pg B1)*

1.	2.	3.
3 pt. = _____ c.	1500 mL = _____ L	40 oz. = _____ lb.
$\frac{3\ pt.}{x\ c.} = \frac{1\ pt.}{2\ c.}$	$\frac{1500\ mL}{x\ L} = \frac{1000\ mL}{1\ L}$	$\frac{40\ oz}{x\ lb} = \frac{16\ oz}{1\ lb}$
3 ● 2 = 1 ● x	**1500 ● 1 = 1000 ● x**	**40 ● 1 = 16 ● x**
6 cups = x	$\frac{1500}{1000} = \frac{1000x}{1000}$	$\frac{40}{16} = \frac{16x}{16}$
	1.5 L = x	**2.5 lb. = x**

4 Converting a Speed: Changing Both Units

You are riding on a zip line. Your speed is 15 miles per hour. What is your speed in feet per second?

$$\frac{15\text{ mi}}{1\text{ h}}\left(\frac{5280\text{ ft}}{1\text{ mi}}\right)\left(\frac{1\text{ h}}{3600\text{ sec}}\right) = \frac{15 \cdot 5280\text{ ft}}{3600\text{ sec}} = \frac{79{,}200\text{ ft}}{3600\text{ sec}} = \frac{22\text{ ft}}{1\text{ sec}}$$

1 mi = 5280 ft

1 h = 3600 sec

Your speed is 22 feet per second.