Unit #7: Ratios and Rates
Resources: Big Ideas Chapter 5
Common Core Standards: 6.RP.1; 6.RP.2; 6.RP.3a-d

Number	Learning Targets	Common Core Standard	Resources
1	I can use ratios to describe the relationship between two quantities.	6.RP.1	5.1
2	I can use ratio tables to find equivalent ratios.	6.RP.1, 6.RP.3a	5.2
3	I can write and interpret unit rates. (3 days)	6.RP.2, 6.RP.3a, 6.RP.3b	5.3
4	I can compare and graph ordered pairs to compare ratios and rates.	6.RP.2, 6.RP.3a	5.4
5	I can write percents as fractions and fractions as percents.	6.RP.3c	5.5
6	I can find percents of numbers.	6.RP.3c	5.6

My Practice:

Number	Pre-test:	Exit slip scores	Day #2 Homework	Extra Targeted Practice	Post-test:
1	_____/2				_____/4
2	_____/4				_____/4
3	_____/5				_____/6
4	_____/2				_____/4
5	_____/9				_____/9
6	_____/3				_____/5

My Final Pretest Score: _____ /25

My Final Posttest Score: _____ /34

2015

Section 5-1: Ratios Student Notes

Objective: Students will be able to understand the concept of a ratio and use ratios to describe the relationship between two quantities.

Vocabulary:
   1.) Ratio – a comparison of 2 quantities (numbers) by division
   2.) Equivalent Ratios – two rations that equal the same number when you simplify

How to Write a Ratio:
   1.) _____   _____
   2.) _____   =   _____   {
   3.) _____   _____

Examples
Simplify each ratio. Then write the ratio using a colon and the word "to."

	Simplify	:	"to"
1.)			
2.)			

There are 5 quarters, 6 dimes, and 4 pennies in the tip jar. Write each ratio as a fraction in simplest form.

3.) pennies to dimes	4.) dimes to pennies	5.) quarters to total coins

Using a tape diagram.

6.) 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?

You:

Friend:

7.) You separate 42 bulbs of garlic into two groups: one for planting and one for cooking. You will plant 3 bulbs for every 4 bulbs that you will use for cooking. How many bulbs will you plant and how many will you cook?
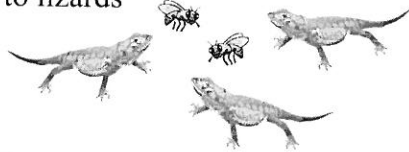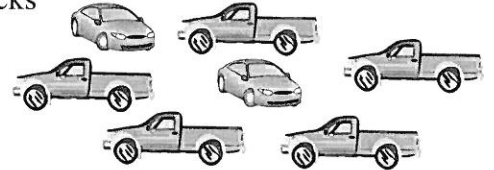
Planting:

Cooking:

5.1 **Day 1 Practice A**

Write the ratio in two ways. Write a sentence to explain what the ratio means.

1. flies to lizards

2. cars : trucks

3. notebooks : pencils

4. hamburgers to hot dogs

Use the table to write the ratio. Write a sentence to explain what the ratio means.

5. tubas : flutes

6. trumpets : tubas

7. flutes : tubas

8. trumpets : flutes

Instrument	Number
Tubas	2
Flutes	5
Trumpets	3

You and a friend make a total of 45 bird houses. Use the tape diagram to find how many bird houses you make. (Look at your notes)
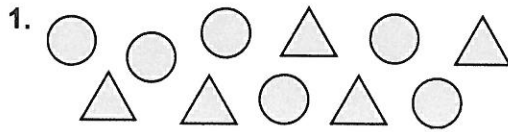
9. You:

Friend:

10. You:

Friend:

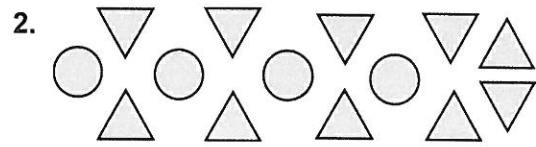**11.** There are 3 buses to carry 96 students on a field trip. Write the ratio of buses to students.

5.1 **Day 2 Homework Practice B**
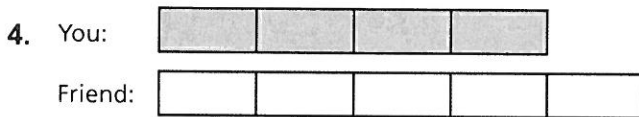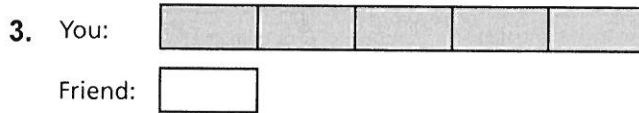
Write the ratio. Explain what the ratio means.

1.

circles to triangles

2.

triangles to circles

You and a friend tutor a total of 18 hours. Use the tape diagram to find how many hours you tutor.

3. You:

   Friend:

4. You:

   Friend:

Create either a table or a tape diagram to answer questions 5 – 7.

5. In a recipe, the ratio of fluid ounces of water to fluid ounces of tomato paste is 3 : 4. You plan to make 35 fluid ounces of sauce. How many fluid ounces of tomato paste do you need?

6. A middle school band has 45 sixth and seventh graders. The ratio of sixth graders to seventh graders is 2 to 3. How many sixth graders are in the band? Explain how you got your answer.

7. The ratio of the ages (in years) of three children is 2 : 4 : 5. The sum of their ages is 33. What is the age of each child?

Section 5.2: Ratio Tables Student Notes

Objective: Students will be able to use ratio tables to find equivalent ratios and solve real-life problems.

Vocabulary:
1.) Ratio – a comparison of two quantities (numbers) by division
2.) Equivalent Ratios – two ratios that describe the same relationship

Completing Ratio Tables

Find the missing values in each ratio table. Then write the equivalent ratios.

1.)

Pens	1	2	
Pencils	3		9

Equivalent Ratios:

2.)

Dogs	4		12		20	24
Cats	6	12		24		

Equivalent Ratios:

Making a Ratio Table

3.) You are making sugar water for your hummingbird feeder. A website indicates to use 4 parts of water for every 1 part of sugar. You use 20 cups of water. How much sugar do you need?

Water					
Sugar					

4.) For every 3 tickets you sell, you friend sells 4. You sell a total of 12 tickets. How many does your friend sell?

You				
Friend				

5.) You are downloading songs to our IPod. The ratio of pop songs to rock songs is 5 : 4. You download 40 pop songs. How many rock songs do you download?
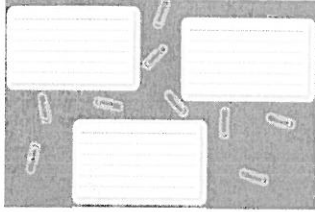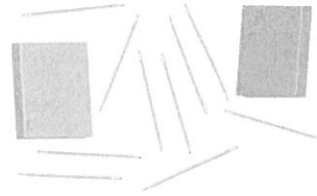
Pop								
Rock								

5.2 Day 1 Practice A Homework

Write a ratio that describes the collection.

1. paper clips to index cards

2. books to pencils

Find the missing value in the ratio table. Then write the equivalent ratios using a " : ".

3.

Cars	Trucks
3	5
6	

3.) _____

4.

TVs	Computers
2	6
	9

4.) _____

Complete the ratio table to solve the problem.

5. For every 2 cars you wash, your friend washes 3 cars. You wash a total of 8 cars. How many does your friend wash?

You	Friend
2	3
	9
8	

6. Your closet has 5 shirts for every 2 sweaters. Your closet has *30 shirts*. How many sweaters are in your closet? *(Follow the pattern)*

Shirts	Sweaters
5	2
10	
	6
20	

7. You are making a salad. The ratio of olives to croutons is 5 : 3. You put 12 croutons in your salad. How many olives do you put in your salad?

5.2 **Day 2 Practice B**

Find the missing value in the ratio table. Then write the equivalent ratios using a " : ".

1.

Flutes	Clarinets
10	8
5	
	16

2.

Green	Blue
12	16
	4
36	

1.) _____   2.) _____

Complete the ratio table to solve the problem.

3. You baked 42 chocolate cupcakes and 28 red velvet cupcakes. You package them in boxes that have the same ratio of chocolate to red velvet as the total cupcakes. How many red velvet cupcakes are in a box that has 24 chocolate cupcakes?

Chocolate	Red Velvet
42	28
24	

4. The number of free song downloads is determined using a ratio. When you purchase 40 songs, you get 24 free song downloads. How many songs must you purchase in order to get 18 free song downloads?

Purchase	Free
40	24
	18

5. Describe and correct the error in making the ratio table.

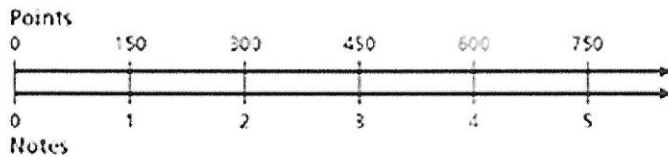| ✗	A	B
	64	32
	56	24
	48	16

Section 5-3: Rates Student Notes

Objective: Students will be able to understand the concepts of rates and unit rates, write unit rates, and solve real-life problems.

Vocabulary:
    1.) Rate – a ratio that compares two quantities measured in different units
    2.) Unit Rate – Compares a quantity to one unit of another quantity
    3.) Equivalent Rates – Have the same unit rate

Writing a Rate

1.) The 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 the situation.

```
Points
0        150      300      450      600      750
|---------|--------|--------|--------|--------|------->
|---------|--------|--------|--------|--------|------->
0         1        2        3        4        5
Notes
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Finding Unit Rates

2.) Mrs. Bollinger drove 220 miles in 4 hours. How many miles did she drive in one hour?

    Drive 220 miles in 4 hours: $\dfrac{miles}{hour} =$

2.) A Japanese bullet train travels 558 miles in 3 hours. How far does it travel in every hour?   Divide by 3

Miles		
Hours		

3.) A chef buys 6 pounds of salmon for $51. How much will the chef pay for 8 more pounds of salmon?   Divide by 6   Multiply by 8

Find Unit Rate:

Multiply:

Cost			
Salmon			

4.) You earn $35 for washing 7 cars. How much do you earn for washing 4 cars?
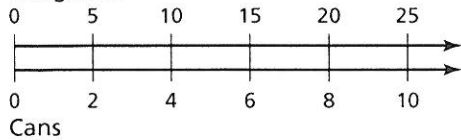
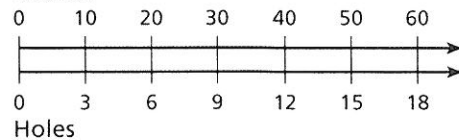Divide by 7   Multiply by 4

Find Unit Rate:

Money			
Cars			

Multiply:

5.3 Day 1 Practice A

Write a rate that represents the situation.

1. Kilograms
   | 0 | 5 | 10 | 15 | 20 | 25 |

   | 0 | 2 | 4 | 6 | 8 | 10 |
   Cans

   1.) _____

2. Strokes
   | 0 | 10 | 20 | 30 | 40 | 50 | 60 |

   | 0 | 3 | 6 | 9 | 12 | 15 | 18 |
   Holes

   2.) _____

Write a <u>unit rate</u> for the situation. Use any method.

3. $44 in 4 days

4. 12 haircuts in 4 hours

5. 256 heartbeats in 4 minutes

6. 15 liters in 3 minutes

7. 12 cans for 6 people

8. 27 outs in 9 innings

For problems #11 and #12, decide whether the rates are equivalent.

9. 17 heartbeats in 15 seconds,
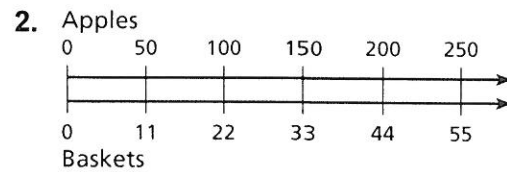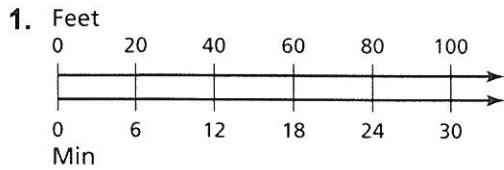   68 heartbeats in 60 seconds

10. 96 miles on 4 gallons,
    380 miles on 15 gallons

11. You studied for 14 hours last week. What was your unit rate of hours of study per day?

5.3 Practice B Homework DAY 2

Write a rate that represents the situation.

1. Feet

0	20	40	60	80	100

0	6	12	18	24	30

Min

2. Apples

0	50	100	150	200	250

0	11	22	33	44	55

Baskets

Write a unit rate for the situation.

3. 6 kittens in 3 boxes

4. $96 for 16 hours of work

5. 72 biscuits from 9 batches

6. 1800 revolutions in 50 seconds

Decide whether the rates are equivalent.

7. 35 kilometer in 25 minutes,
14 kilometers in 10 minutes

8. 25 minutes for $3,
1 hour for $6

9. A teacher keeps track of how many books are read by students in each class.

	Grade 6		Grade 7	
	Class A	Class B	Class C	Class D
Students	25	31	21	23
Books Read	181	155	116	126

a.) Which grade has read a higher rate of books per student?

b.) How many more books does the other grade need to read to have the same rate?

Section 5-4: Comparing and Graphing Rates

Objective: Students will be able to graph ordered pairs to compare ratios and rates, and solve real-life problems.

Vocabulary:

    1.) Rate – a ratio that compares two quantities measured in different units

    2.) Unit Rate – Compares a quantity to one unit of another quantity

Why do we compare unit rates?   To find the better buy

                                      To find out who/what is faster

Comparing Unit Rates with Tables

1.) Which bag of dog food is the better buy? Use ratio tables to find and compare the unit costs.

            20-Pound Bag   30-Pound Bag

Cost (dollars)	17.20	
Food (pounds)	20	

Cost (dollars)	25.20	
Food (pounds)	30	

2.) Which package of Gatorade is the better buy? Use ratio tables to find and compare the unit costs.

            8-Bottle Case   12-Bottle Case

Cost (dollars)	5.44	
Bottles	8	

Cost (dollars)	7.92	
Bottles	12	

Graphing Values from Ratio Tables

3.) A hot-air balloon rises 9 meters every 3 seconds. A blimp rises 7 meters every 2 seconds.

a.) Complete the ratio table for each aircraft. Which rises faster?
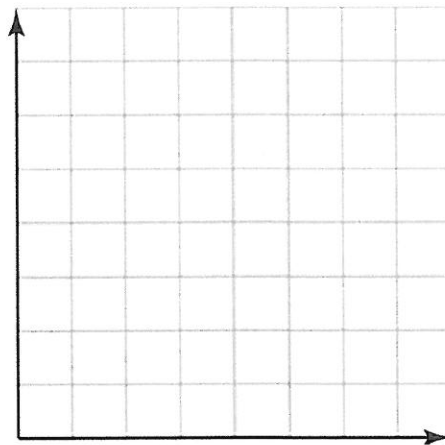
Balloon

Time (seconds)	Height (meters)
3	9

Blimp

Time (seconds)	Height (meters)
2	7

b.) Graph the ordered pairs (time, height) from the tables in part (a). What can you conclude?

Write the ordered pairs:

Balloon: Blimp:

5.4 Day 1 Practice A Homework

Determine which car gets the better gas mileage. Compare the ratio of miles per gallon.

1.

Car	A	B
Distance (miles)	130	125
Gallons used	8	9

2.

Car	A	B
Distance (miles)	400	440
Gallons used	12	15

Determine which is the better buy. Compare the ratio of cost per item.

3.

Chord Charts	A	B
Cost (dollars)	13	18
Downloads	10	15

4.

Pens	A	B
Cost (dollars)	5	2
Pens	20	7

5. Protein Bar A has 15 grams of protein in a 40 gram bar. Protein Bar B has 20 grams of protein in a 60 gram bar. Which bar has more protein per gram?
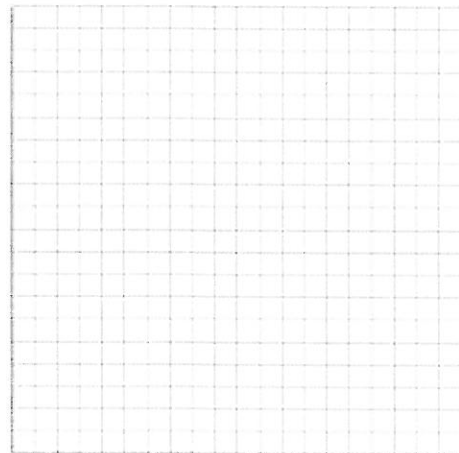
6. You are choosing a song for your dance recital. Song A has 11 beats in 10 seconds. Song B has 7 beats in 6 seconds. Which song has the greater rate?

Complete the ratio tables and graph the ordered pairs from the table. What can you conclude about how fast the temperature drops?

7.

Miami, FL	
Time (min)	Temperature Drop (F)
5	2
10	
15	
20	

Orlando, FL	
Time (min)	Temperature Drop (F)
3	1
6	
9	
12	

Determine which car gets the better gas mileage. Compare the miles per gallon.

1.

Car	A	B
Distance (miles)	510	550
Gallons used	18	20

2.

Car	A	B
Distance (miles)	460	430
Gallons used	35	32

Determine which is the better buy. Compare the cost per item.

3.

Tissues	A	B
Cost (dollars)	4.50	3.25
Boxes	5	3

4.

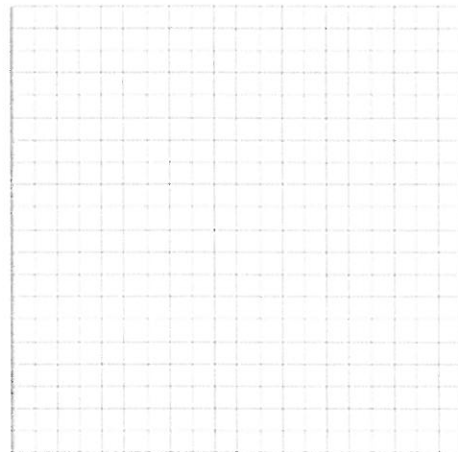| Frozen Waffles	A	B
Cost (dollars)	2.29	3.59
Waffles	8	12

Complete the ratio tables and graph the ordered pairs from the table. What can you conclude?

5.

Ranch Dressing	
Tablespoons	Milligrams of Sodium
4	580
8	
12	
16	

Ketchup	
Tablespoons	Milligrams of Sodium
3	400
6	
9	
12	

TURN OVER

6. The deli offers a fruit salad with 5 blueberries for every 3 pieces of cantaloupe. The deli changes the mixture to have 6 blueberries for every 4 pieces of cantaloupe, but the number of pieces of fruit in the salad does not change.

a. Create a ratio table for each salad.

Old	Blueberries				
	Cantaloupe				

New	Blueberries				
	Cantaloupe				

How many blueberries are in the smallest possible salad?

b. Blueberries cost less than cantaloupe. Should the company charge more or less for the new salad? Explain your reasoning.

Section 5-5: Percents Student Notes

Objective: Students will be able to convert between fractions and percents.

Vocabulary:

    1.) Percent – a ratio of part to whole where the whole is 100. It is the number of parts <u>per</u> hundred.

Create equivalent fraction with
a denominator of 100; Then
write numerator with % symbol

Fractions	Percents
$\dfrac{1}{5}$ × $\dfrac{20}{20}$ = $\dfrac{20}{100}$	20%
$\dfrac{6}{50}$	

Write as a fraction with a
denominator of 100

Fraction Equivalent of common percents:

10% =	20% =	25% =	30% =
40% =	50% =	60% =	70% =
75% =	80% =	90% =	100% =

Writing Fractions as Percents

1.) Write 3/50 as a percent.

2.) Write 13/20 as a percent.

3.) Write 1 1/5 as a percent.

Writing Percents as Fractions

4.) Write 35% as a fraction in simplest form.

5.) Write 100% as a fraction in simplest form.

6.) Write 174% as a fraction in simplest form.

Multiply by 100
Put % at end

Decimals	Percents
0.15 x 100	15%
2.35	

Divide by 100
Remove % symbol
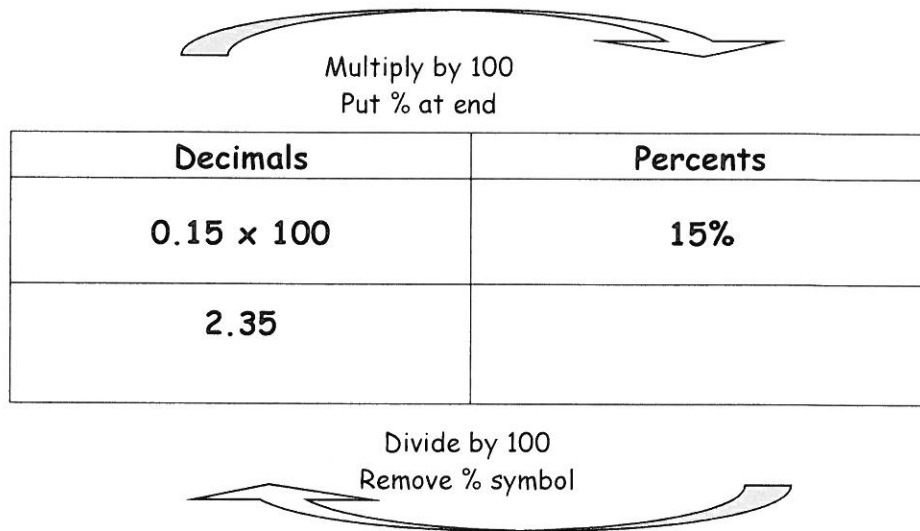
Writing Decimals as Percents

1.) Write 0.35 as a percent.

2.) Write 0.2 as a percent.

3.) Write 1.18 as a percent.

Writing Percents as Decimals

4.) Write 35% as a decimal.

5.) Write 4% as a decimal.

6.) Write 174% as a decimal.

5.5 Day 1 Practice A Homework

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

1. 20%

2. 25%

3. 44%

4. 9%

5. Describe and correct the error in writing 8% as a fraction.

$$\text{✗} \quad 8\% = \frac{8}{10} = \frac{4}{5}$$
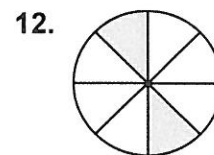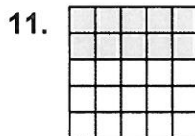
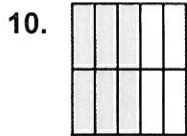**Write the fraction or mixed number as a percent.**

6. $\dfrac{6}{25}$

7. $\dfrac{3}{20}$

8. $\dfrac{3}{4}$

9. $\dfrac{12}{25}$

Write a fraction and a percent to represent the shaded portion of the model.

10.

11.

12.

Write the percent as a decimal.

13. 20%

14. 25%

15. 165%

Write the decimal as a percent.

16. 0.24

17. 0.7

18. 1.19

5.5 Day 2 Practice B Homework

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

1. 35%   **2.** 210%   **3.** 0.8%

Write the fraction or mixed number as a percent.

4. $\dfrac{37}{50}$ **5.** $\dfrac{1}{5}$ **6.** $3\dfrac{1}{4}$ **7.** $1\dfrac{4}{5}$

Write the percent as a decimal.

8. 26%   **9.** 122%   **10.** 4%

Write the decimal as a percent.
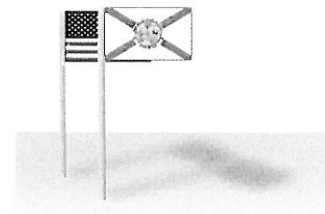
11. 0.3   **12.** 0.09   **13.** 1.19

14. On a school bus, 22 of the 50 students are in window seats. What fraction of the students are in window seats?

15. The United States flag is actually 105% as tall as the state flag of Florida. Write this percent as a mixed number and explain why the perspective in the figure may be misleading.

Section 5-6: Solving Percent Problems Student Notes

Objective: Students will write and solve percent equations.

Vocabulary:
1.) Percent – a ratio of part to whole where the whole is 100. It is the number of parts <u>per</u> hundred.

How to Solve Percent Problems Using Equations:
1.) Translate the problem into an algebraic equation:
   a. "is" means equal
   b. "of" means multiply
   c. "what", "what number", or "what percent" is the unknown, represent the unknown with a variable
2.) Solve the equation. **(Make sure you turn percents into decimals or fractions!!!)**

Examples

Write an equation, then solve.

1.) 25% of 40 is what number?	2.) 60% of 150 is what number?
3.) 40% of what number is 30?	4.) 25% of what number is 21?

5.) The price of an <u>old version</u> <u>of a computer game is 40%</u> of the price of the original version. The original version cost $48. What is the cost of the <u>old version</u>?

_____% of _____ is _____.

6.) In a parking lot, 16% of the cars are blue. There are 4 blue cars in the parking lot. How many total cars are in the parking lot?

_____% of _____ is _____.

5.6 Day 1 Practice A
Homework

Find the percent of the number.

1. 25% of 80

2. 60% of 20

3. 20% of 50

4. 30% of 70

5. 35% of 80

6. 62% of 50

7. Describe and correct the error in finding 4% of 65.

$$\text{4\% of } 65 = 0.4 \times 65 = 26$$

Write each sentence as an equation. Then solve.

8. 20% of what number is 12?

9. 30% of what number is 15?

10. 75% of what number is 24?

11. 65% of what number is 39?

5.6 Day 2 Homework Practice B

Find the percent of the number.

1. 60% of 40

2. 10% of 80

3. 25% of 70

4. 15% of 30

5. 6% of 15

6. 65% of 60

Copy and complete the statement using <, >, or =.

7. 55% of 60 __?__ 60% of 65

8. The table shows the grading scale for one of your classes.

Letter grade	A	B	C	D
Percent range	90–100%	80–89%	70–79%	60–69%

Tell the letter grade that you earn for each score.

a. You earn 14 out of a possible 20 points on a quiz.

b. You earn 66 out of a possible 80 points on a test.

c. You earn 216 out of a possible 250 points for a report.
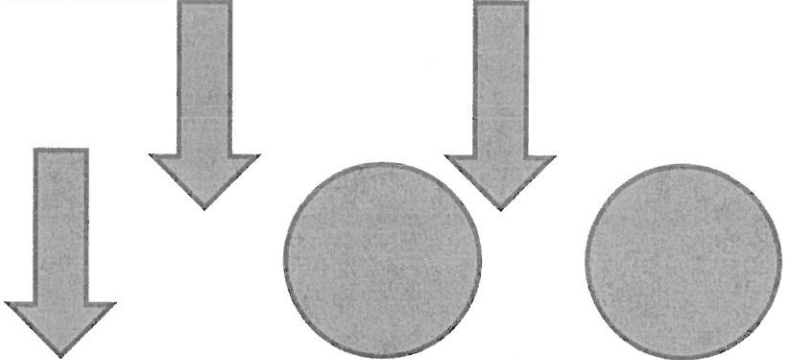
Write each sentence as an equation. Then solve.

9. 10% of what number is 16?

10. 80% of what number is 24?

Name _____ Units _____ Date _____

Total Score: _____/25

<u>Directions</u>: Carefully read and follow the directions for each section. Remember to <u>SHOW YOUR</u> WORK and write your answers on the lines provided. Don't forget the correct units!

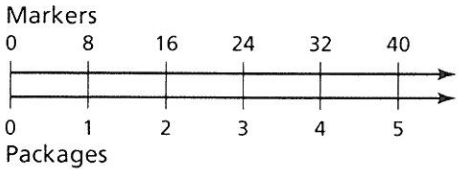| Total:	
1 points LT1 Score:	Write the ratio. Explain what the ratio means. 1.) Arrows to Circles Ratio: _____ Explanation:
1 point LT1 Score:	2.) The ratio of sugar to flour in a cookie recipe is 3 : 5. The recipe uses 15 cups of flour. How much sugar is needed? 2.) _____
Learning Target #1 Score: Add points from 1-2: _____ /2 pts	
4 points LT2 Score:	Find the missing values in the ratio table. 3.) <table><tr><td>**Dogs**</td><td>4</td><td>12</td><td></td></tr><tr><td>**Cats**</td><td>7</td><td></td><td>56</td></tr></table> 4.) <table><tr><td>Pencils</td><td>9</td><td>27</td><td></td></tr><tr><td>Erasers</td><td>3</td><td></td><td>33</td></tr></table>
Learning Target #2 Score: Add points from 3-4: _____ /4 pts	
1 points LT3 Score:	Write a rate that represents the situation. Explain what the rate means. 5.) Markers 0 8 16 24 32 40 0 1 2 3 4 5 Packages Rate: _____ Explanation:

2 points LT3 Score:	6.) A dog can run at a speed of 11 feet per second on land. At this rate, how far can it run in 8 seconds? 6.) _____
2 points LT3 Score:	**Write a unit rate for the situation.** 7.) 15 goals in 5 hours 8.) 1800 calories in 2 sandwiches 7.) _____ 8.) _____

Learning Target #3 Score: Add points from 5-8: _____ /5 pts

1 points LT4 Score:	9.) Determine which hand soap is the better buy. Explain your reasoning. Circle the better buy: A B Explain:

Hand Soap	A	B
Cost (dollars)	1	6
Fluid ounces	6	45

1 points LT4 Score:	10.) Which vehicle goes further on one gallon of gas? Explain your reasoning.

Truck

Gallons used	Distance
2	72
3	108
4	144

Car

Gallons used	Distance
5	200
6	240
7	280

Circle the vehicle that goes further on one gallon of gas: Truck   Car

Explain:

Learning Target #4 Score: Add points from 9-10: _____ /2 pts

2 points **LT5** **Score:**	**Write the fraction or mixed number as a percent.** 11.) $\frac{3}{25}$ 12.) $2\frac{12}{50}$ 11.) _____ 12.) _____
2 points **LT5** **Score:**	**Write the percent as a simplified fraction or mixed number.** 13.) 352% 14.) 32% 13.) _____ 14.) _____

5 points
LT5
 	
Score:
	15.) The ratio of males to total students in a mathematics class is 7 to 20.
	
	   a. What fraction of the class is male? _____
	
	   b. What percent is male? _____
	
	   c. How many females are in the class? _____
	
	   d. What fraction of the class is female? _____
	
	   e. What percent is female? _____

Learning Target #5 Score: Add points from 11-15: _____ /9 pts	
2 points **LT6** **Score:**	**Find the percent of the number.** 16.) 35.3% of 80 17.) 19% of 30 16.) _____ 17.) _____
1 point **LT6** **Score:**	18.) You answer 95% of the questions correctly on a 60-question test. How many questions do you answer *incorrectly*? 18.) _____
Learning Target #6 Score: Add points from 16-18: _____ /3 pts	

Selected Answers Chapter 5

5.1 Day 1 Practice A

1. 2 to 3, 2 : 3; There are 2 flies for every 3 lizards.

5. 2 to 5, 2 : 5; There are 2 tubas for every 5 flutes.

9. 15 bird houses

5.1 Day 2 Practice B

1. 6 to 5; There are 6 circles for every 5 triangles.

6. 18 sixth graders; The ratio of sixth graders to seventh graders is 2 : 3, so each part is $45 \div 5 = 9$. So, there are $2 \bullet 9 = 18$ sixth graders and $3 \bullet 9 = 27$ seventh graders.

5.2 Day 1 Practice A

3.

Cars	3	6
Trucks	5	10

3 : 5 and 6 : 10

5. 12 cars

You	2	4	6	8
Friend	3	6	9	12

5.2 Day 2 Practice B

2.

Green	12	3	36
Blue	16	4	48

12 : 16, 3 : 4, and 36 : 48

3. 16 red velvet cupcakes

Chocolate	42	3	24
Red Velvet	28	2	16

5.3 Day 1 Practice A

1. *Sample answer:* 10 kg in 4 cans

3. $11 per day

6. 5 liters per minute

9. equivalent (17/15 = 1.13 and 68/60 = 1.13)

5.3 Day 2 Practice B

1. *Sample answer:* 40 feet in 12 minutes

3. 2 kittens per box

6. 36 revolutions per seconds

5.4 Day 1 Practice A

1. A (A: 130/8=16.25mpg and B: 129/9=13.9 mpg)

5.5 Day 1 Practice A

3. $\dfrac{11}{25}$

6. 24%

11. $\dfrac{2}{5}$; 40%

5.5 Day 2 Practice B

2. $2\dfrac{1}{10}$ **4.** 74%   **9.** 1.22

5.6 Day 1 Practice A

1. 20

5. 28

8. $.20x = 12$ $x = 60$

5.6 Day 2 Practice B

1. 24

5. 0.9

7. 33 < 39