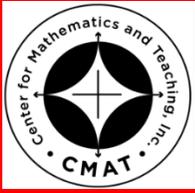


Name \_\_\_\_\_

Period \_\_\_\_\_

Date \_\_\_\_\_



**MathLinks**

**6-12**

STUDENT PACKET

**MATHLINKS: GRADE 6  
STUDENT PACKET 12  
MEASUREMENT CONVERSIONS AND PERCENT**

<b>12.1</b>	<b>Measurement Conversions</b> <ul style="list-style-type: none"><li>• Explore metric and customary units of measure.</li><li>• Compare units of measure.</li><li>• Convert measurements within and between measurement systems.</li><li>• Use conversion rates to make conversions.</li></ul>	<b>1</b>
<b>12.2</b>	<b>Understanding Percents of Numbers</b> <ul style="list-style-type: none"><li>• Convert between fraction, decimal, and percent representations.</li><li>• Find percents of numbers using sense-making strategies.</li></ul>	<b>10</b>
<b>12.3</b>	<b>Percent Problems</b> <ul style="list-style-type: none"><li>• Use double number line diagrams, chunking, multiplication, division, and equations to solve percent problems.</li></ul>	<b>19</b>
<b>12.4</b>	<b>Skill Builders, Vocabulary, and Review</b>	<b>26</b>

## WORD BANK

Word or Phrase	Definition or Description	Example or Picture
conversion rate		
customary measurement units		
metric measurement units		
ratio		
percent		
percent of a number		
tax		
unit rate		



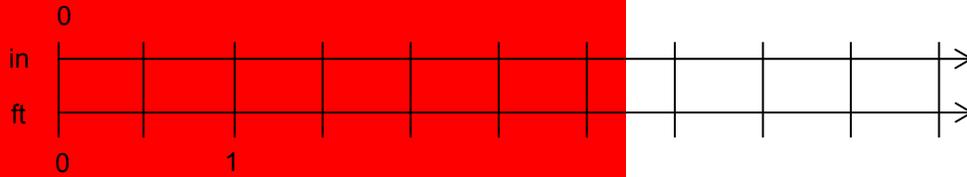
# MEASUREMENTS

Follow your teacher's direction to complete the chart below.

	Customary Measurements	Metric Measurements
length		
area		
volume (capacity)		
weight (mass)		

## CONVERSIONS WITHIN A MEASUREMENT SYSTEM

1. There are 12 inches in one foot. Complete the double number line below to show the relationship between inches and feet.

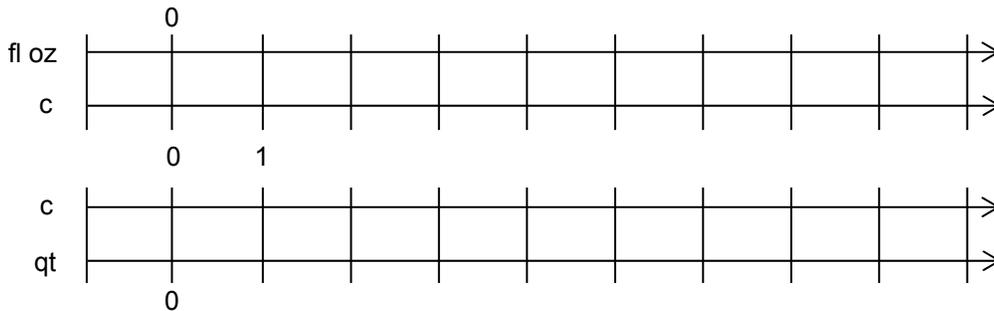


Convert the units below. Use your double number line above for reference.

2. 4 ft = _____ in	3. 6 in = _____ ft	4. $3\frac{1}{2}$ ft = _____ in
5. 4 in = _____ ft	6. 6 ft = _____ in	7. 21 in = _____ ft

8. Explain how you found the number of feet in 21 inches.

9. There are \_\_\_\_\_ fluid ounces in a cup and \_\_\_\_\_ cups in a quart. Complete the double number lines below to show the relationships between ounces, cups, and quarts.



Convert the units below. Use your double number lines above for reference.

10. 16 fl oz = _____ c	11. 24 c = _____ qt	12. $\frac{1}{2}$ c = _____ fl oz
13. 2 fl oz = _____ c	14. 6 c = _____ qt	15. 16 fl oz = _____ qt

16. Explain how you found the number of quarts in 16 fl oz.

## CONVERSIONS WITHIN A MEASUREMENT SYSTEM (Continued)

17. Complete the table below with the appropriate numbers of ounces (oz.) and pounds (lbs).

<b>oz</b>	<b>lb</b>	18. Explain how you found each of the following. a. The number of pounds in 80 ounces.  b. The number of ounces in $\frac{1}{2}$ pound.
0		
	1	
32		
64	4	
80		
	$\frac{1}{2}$	
4		

19. How many pounds are in 160 ounces?	20. How many ounces are in $\frac{1}{8}$ pound?
--	---

21. What fraction of a pound is an ounce?

22. Complete the table below with the appropriate numbers of milligrams, grams, and kilograms.

<b>mg</b>					1	2
<b>g</b>			1	2		0.002
<b>kg</b>	1	2		0.002		

23. How many grams are in 8 kilograms?

24. How many grams are in 5,000 milligrams?

25. How many milligrams are in 1.5 kilograms?

26. How many kilograms are in 15,000 grams?

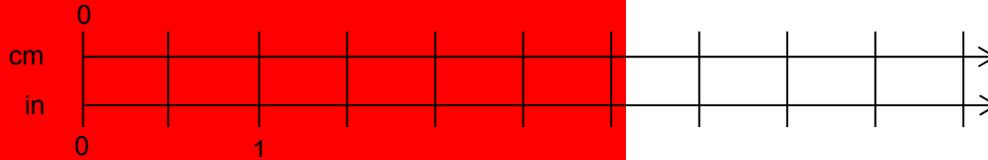
**PRACTICE WITH CONVERSIONS 1**

Make double number lines or tables of values as needed to convert units.

1. 10 cups is equal to how many quarts?	2. How many cups equal 10 quarts?
<hr/>	
3. How many feet are in 36 inches?	4. How many inches are in $4\frac{1}{2}$ feet?
<hr/>	
5. How many ounces are in 6 pounds?	6. How many pounds are in 40 ounces?
<hr/>	
7. How many meters are in 10 kilometers?	8. How many kilometers are in 50 meters?
<hr/>	

## CONVERSIONS BETWEEN MEASUREMENT SYSTEMS

1. There are about 2.54 centimeters in one inch. Complete a double number line to show the relationship between centimeters and inches.

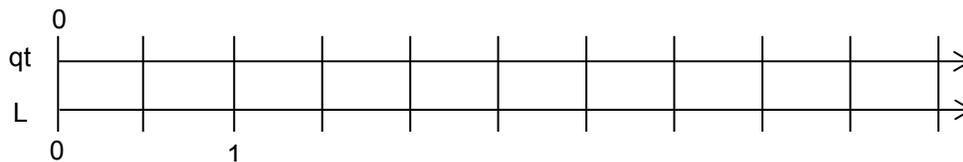


Use your double number line above and proportional reasoning to convert the units below. (The symbol for “approximately equal to” is  $\approx$ .)

2. 4 in $\approx$ _____ cm	3. 40 in $\approx$ _____ cm	4. 2 cm $\approx$ _____ in
5. 12 in $\approx$ _____ cm	6. 100 cm $\approx$ _____ in	7. 5 ft $\approx$ _____ cm

8. Explain how you approximated the number of centimeters in 5 feet.

9. There are about \_\_\_\_\_ quarts in a liter. Complete a double number line to show the relationship between quarts and liters.



Use your double number line above and proportional reasoning to convert the units below.

10. 3 L $\approx$ _____ qt	11. 9 L $\approx$ _____ qt	12. 5.3 qt $\approx$ _____ L
13. $\frac{1}{2}$ L $\approx$ _____ qt	14. 15.9 qt $\approx$ _____ L	15. 4 L $\approx$ _____ c

16. Explain how you found the number of cups in 4 liters.

## CONVERSIONS BETWEEN MEASUREMENT SYSTEMS (Continued)

17. Complete the table below with the appropriate numbers of kilograms and pounds. Note that the conversion rate given in the Resource Guide is an approximation.

kg	lb	18. Explain how you found each of the following. a. The number of pounds in 14 kilograms.  b. The number of kilograms in 0.22 pounds.	
0			
1			
2			
6			
14			
	1.1		
	0.22		
19. About how many pounds are in 140 kilograms?		20. About how many kilograms are in $\frac{1}{2}$ pound?	

21. About what fraction of a kilogram is a pound?

22. Complete the table below with the appropriate numbers of meters and inches. Note that the conversion rate given in the Resource Guide is an approximation.

<b>m</b>	0	1				
<b>in</b>			117	390	13	6.5

23. About what fraction of a meter is an inch?

24. What is the approximate difference between the lengths of 1 meter and 1 yard?

25. Describe the approximate difference between distances when running a 100 meter race versus running the length of a football field (not including end zones).

26. About how many inches are in  $\frac{1}{2}$  meter?

## PRACTICE WITH CONVERSIONS 2

Make double number lines or tables of values as needed to convert units.

1. 10 centimeters is about how many inches?

2. About how many centimeters is 10 inches?

3. 26.5 liters is about how many quarts?

4. About how many liters is 26.5 quarts?

5. 220 kilograms is about how many pounds?

6. About how many kilograms is 220 pounds?

7. 10 kilometers is about how many miles?

8. About how many kilometers is 10 miles?

## THE RECTANGULAR BOARD PROBLEM

Rosie and Pete find a rectangular board in the garage that is 36 inches long and 48 inches wide. They want to find the area of the board in square inches and in square feet. Their work is shown below.

Rosie's work:	Pete's work:
$(36)(48) = 1,728$ , so the board is $1,728 \text{ in}^2$ $\frac{36}{12} = 3$ and $\frac{48}{12} = 4$ $(3)(4) = 12$ , so the board is $12 \text{ ft}^2$	$36 \times 48 = 1,728$ , so the board is $1,728 \text{ sq. in}$ $1,728 \div 12 = 144$ , so the board is $144 \text{ sq. ft}$

Critique Rosie and Pete's reasoning to determine if either of them is correct in their calculations. For any mistakes, clearly explain what went wrong.

# UNDERSTANDING PERCENTS OF NUMBERS

## Summary

We will use double number lines and chunking strategies to find percents of numbers.

## Goals

- Convert between fraction, decimal, and percent representations.
- Find percents of numbers using sense-making strategies.

## Warmup

1. We can view percent as a number. Rewrite each number in its equivalent representations.

	Fraction	Decimal	Percent
a.	$\frac{1}{4}$		
b.	$\frac{29}{100}$		
c.	$\frac{7}{10}$		
d.		0.75	
e.		0.03	
f.		0.48	

2. We can find the percent of a number. In your own words, explain what each of the following means.

a. 100% of something	b. 50% of something	c. 0% of something
----------------------	---------------------	--------------------

## DOLLARS AND METERS

Complete each sentence.

1. A dollar is \_\_\_\_\_ cents.

Find the following percents of a dollar.

2. 100% of a dollar is \_\_\_\_\_ cents.

3. 50% of a dollar is \_\_\_\_\_ cents.

4. 25% of a dollar is \_\_\_\_\_ cents.

5. 75% of a dollar is \_\_\_\_\_ cents.

6. 0% of a dollar is \_\_\_\_\_ cents.

7. 10% of a dollar is \_\_\_\_\_ cents.

8. 20% of a dollar is \_\_\_\_\_ cents.

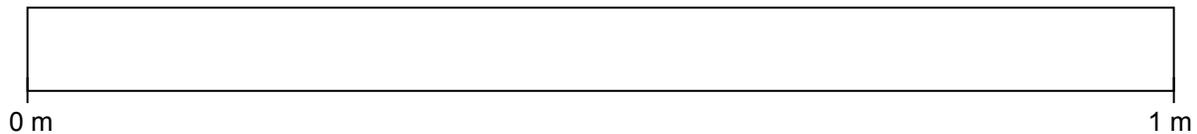
9. 5% of a dollar is \_\_\_\_\_ cents.

10. 34% of a dollar is \_\_\_\_\_ cents.

11. 76% of a dollar is \_\_\_\_\_ cents.

12. A meter is \_\_\_\_\_ centimeters.

13. The rectangle below represents a meter stick. Write some numbers on the meter stick to represent centimeters.



14. Write the letter on the meter stick above that represents the percent of the way (from zero) for each of the following:

A. 100%

B. 50%

C. 25%

D. 75%

E. 10%

F. 20%

G. 5%

H. 80%

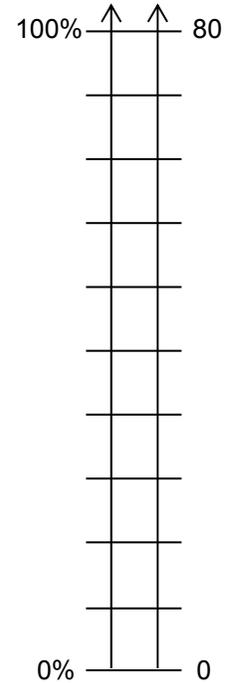
I. 55%

15. How are finding cents in a dollar and finding centimeters on a meter stick related?

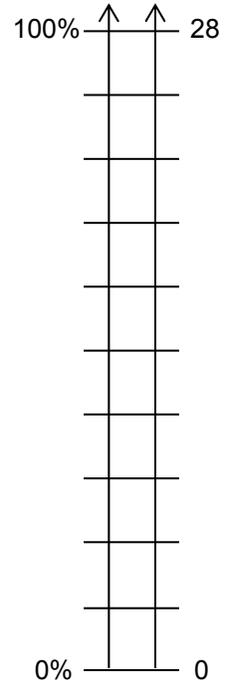
# FINDING PERCENTS WITH DOUBLE NUMBER LINES

Number each double number line diagram to the right of its corresponding chart. Then complete the chart below.

	Words	Equivalent Fractions
Ex.	50% of 80 is 40.	$\frac{50}{100} = \frac{40}{80}$
1.	40% of 80 is _____.	
2.		$\frac{60}{100} = \frac{\square}{80}$
3.	75% of 80 is _____.	
4.		$\frac{25}{100} = \frac{\square}{80}$



	Words	Equivalent Fractions
5.	30% of 28 is _____.	
6.		$\frac{80}{100} = \frac{\square}{28}$
7.	25% of 28 is _____.	
8.		$\frac{65}{100} = \frac{\square}{28}$



9. Explain your strategy for labeling the double number lines for problems 5-8.

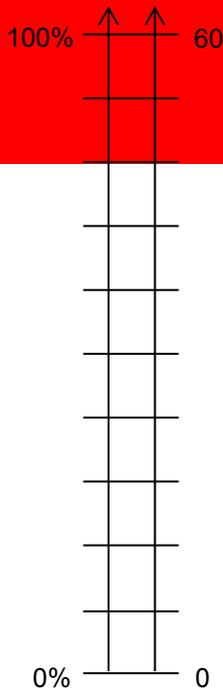
# PERCENTS AND DOUBLE NUMBER LINES 1

Use the double number lines below to help you write equivalent fractions to represent each percent problem. Then answer each question.

1. What is 20% of 60?

$$\frac{20}{100} = \frac{\boxed{\phantom{000}}}{60}$$

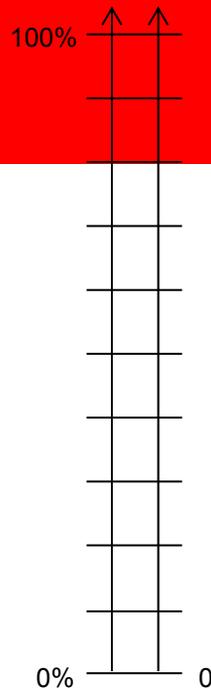
20% of 60  
is \_\_\_\_\_



2. What is 40% of 140?

$$\frac{\boxed{\phantom{000}}}{100} = \frac{\boxed{\phantom{000}}}{140}$$

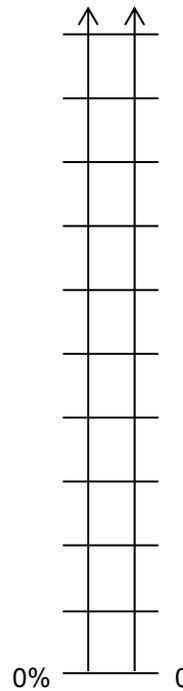
40% of 140  
is \_\_\_\_\_



3. What is 25% of 60?

$$\frac{\boxed{\phantom{000}}}{100} = \frac{\boxed{\phantom{000}}}{60}$$

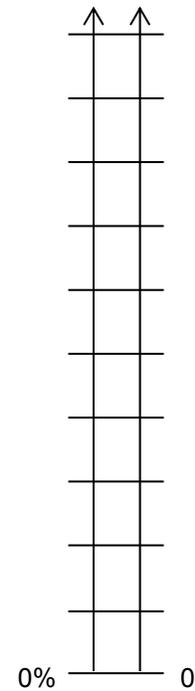
25% of 60  
is \_\_\_\_\_



4. What is 15% of 140?

$$\frac{\boxed{\phantom{000}}}{100} = \frac{\boxed{\phantom{000}}}{140}$$

15% of 140  
is \_\_\_\_\_

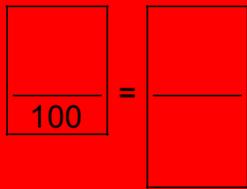


5. Look at the 10% tick mark for each problem above. How is 10% of a number related to the "whole" number?

# PRACTICE 1

Use the double number lines below to help you write equivalent fractions to represent each percent problem. Then answer each question under the diagram.

1. What is 60% of 400?

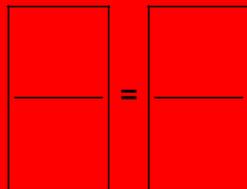


\_\_\_\_\_ % of \_\_\_\_\_ is \_\_\_\_\_



0% \_\_\_\_\_ 0

2. What is 80% of 64?

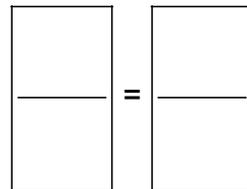


\_\_\_\_\_ % of \_\_\_\_\_ is \_\_\_\_\_



0% \_\_\_\_\_ 0

3. What is 75% of 400?



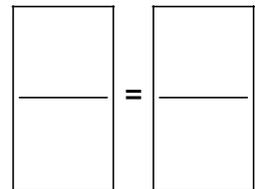
\_\_\_\_\_ % of \_\_\_\_\_

is \_\_\_\_\_



0% \_\_\_\_\_ 0

4. What is 85% of 64?



\_\_\_\_\_ % of \_\_\_\_\_

is \_\_\_\_\_



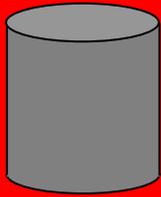
0% \_\_\_\_\_ 0

5. If you are given that 20% of 90 is 18, and 60% of 90 is 54, explain how you can use this information to find 40% of 90.

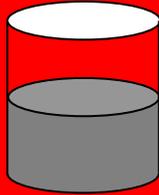
## PERCENT EXPLORATIONS

Complete the problems below.

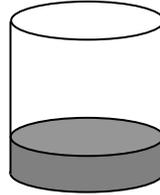
1. Estimate how full each container is using percents.



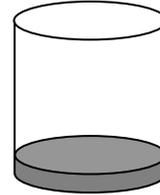
Container A



Container B



Container C



Container D

\_\_\_\_\_

2. You are now given the information that, when full, each container holds 800 ounces of liquid. How many ounces do you estimate are in each container?

\_\_\_\_\_

3. A correction is made to the above information. These containers actually hold 900 ounces of liquid. Now how many ounces do you estimate are in each container?

\_\_\_\_\_

Fill in the blanks below with appropriate words or numbers to complete each percent statement.

4. Finding 100% of something is the same as finding \_\_\_\_\_ of it.

So 100% of \$40 is \_\_\_\_\_.

5. Finding 50% of something is the same as finding \_\_\_\_\_ of it.

This is the same as multiplying by \_\_\_\_\_ or dividing by \_\_\_\_\_.

So 50% of \$40 is \_\_\_\_\_.

6. Finding 25% of something is the same as finding \_\_\_\_\_ of it.

This is the same as multiplying by \_\_\_\_\_ or dividing by \_\_\_\_\_.

So 25% of \$40 is \_\_\_\_\_.

7. Finding 10% of something is the same as finding \_\_\_\_\_ of it.

This is the same as multiplying by \_\_\_\_\_ or dividing by \_\_\_\_\_.

So 10% of \$40 is \_\_\_\_\_.

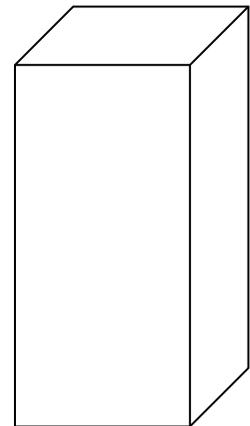
## PERCENT EXPLORATIONS (Continued)

Some percents may be computed by “chunking” them into parts.

8. Explain how you can use your answer to 10% of \$40 from problem 7 to find 20% of \$40.
9. Find 5% of \$40. Explain your strategy.

The container to the right holds 600 ounces of liquid when full.  
Determine how much liquid makes it:

- |                     |                     |
|---------------------|---------------------|
| 10. 50% full _____  | 11. 25% full _____  |
| 12. 75% full _____  | 13. 10% full _____  |
| 14. 20% full _____  | 15. 30% full _____  |
| 16. 5% full _____   | 17. 15% full _____  |
| 18. 1% full _____   | 19. 2% full _____   |
| 20. 0.5% full _____ | 21. 1.5% full _____ |



22. What would it mean for the container to be 150% full?

Do you think this is possible? Explain.

How much liquid would it contain if it were this full?

## CHUNKING TO FIND PERCENTS

Complete the charts below. Use division and chunking to compute.

	Amounts of Money	Find 10%	Find 5%	Find 15%	Find 20%
1.	\$30				
2.	\$42				
3.	\$16				
4.	\$150				
5.	\$500				

	Items	Find 10%	Find 5%	Find 50%	Find 25%
6.	80 games				
7.	60 apples				
8.	120 students				
9.	12 cars				

	More Amounts of Money	Find 1%	Find 0.5%	Find 1.5%	Find 150%
10.	\$1,000				
11.	\$150				
12.	\$7,500				

13. Describe a situation for which finding a percent greater than 100% makes sense.

## PRACTICE 2

1. Marco was on an exercise machine at the gym. The time display began at 60 minutes, and then counted down toward 0. When the display flashed “20% done,” how much time was left on the time display?

A box contains 36 apples. Julia has 3 of the apples. Kaelen has  $\frac{1}{6}$  of the apples.

Rosalie has 25% of the apples. Steve has the rest.

<p>2. How many apples does Steve have?</p>	<p>3. What percent of the apples does Steve have?</p>
--	---

Solve.

<p>4. What percent of a pint is a cup?</p>	<p>5. What percent of a cup is a pint?</p>
--	--

Find the percent of each amount using double number lines or chunking. Show your work clearly, and explain with words to clarify if necessary.

<p>6. 13% of \$60</p>	<p>7. 28% of \$60</p>
<p>8. 17% of \$110</p>	<p>9. 72% of \$110</p>

10. In sports there is a saying that refers to “giving 110%.”
- a. Explain what you think this means.
  - b. Explain why this is really not possible in this context.

# PERCENT PROBLEMS

<p style="text-align: center;"><b>Summary</b></p> <p>We will solve more percent problems using double number line diagrams and chunking. We will learn a multiplication procedure for finding percents of numbers.</p>	<p style="text-align: center;"><b>Goals</b></p> <ul style="list-style-type: none"> <li>• Use double number line diagrams, chunking, multiplication, division, and equations to solve percent problems.</li> </ul>
--	---

## Warmup

Use two methods to solve each problem. Be prepared to share your strategies. Remember to include units in your answers.

1. What is 30% of 100 cm?	2. What is 30% of 50 cm?
3. What is 30% of 20 cm?	4. What is 30% of 10 cm?

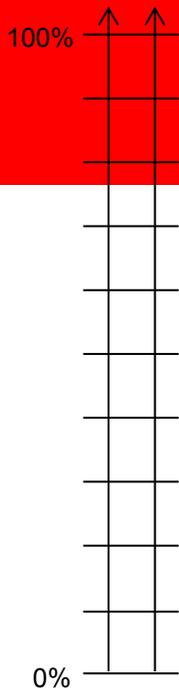
## PERCENTS AND DOUBLE NUMBER LINES 2

Use the double number lines below to help you write equivalent fractions to represent each of the following percent problems. Then answer each question.

1. What percent of 80 is 32?

$$\frac{\boxed{\phantom{000}}}{100} = \frac{32}{80}$$

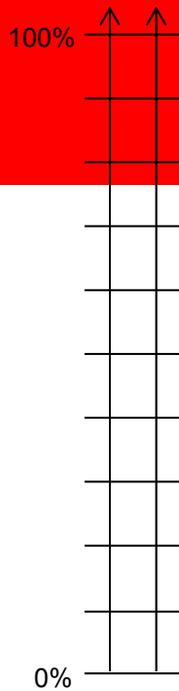
\_\_\_\_\_ % of \_\_\_\_\_ is \_\_\_\_\_



2. 30% of what amount is 15?

$$\frac{\boxed{\phantom{000}}}{100} = \frac{15}{\boxed{\phantom{000}}}$$

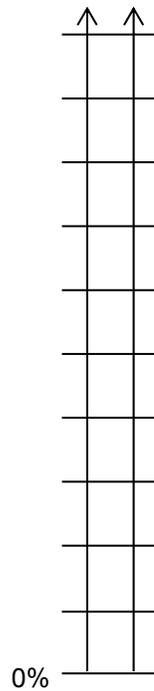
\_\_\_\_\_ % of \_\_\_\_\_ is \_\_\_\_\_



3. What percent of 220 is 11?

$$\frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}} = \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}}$$

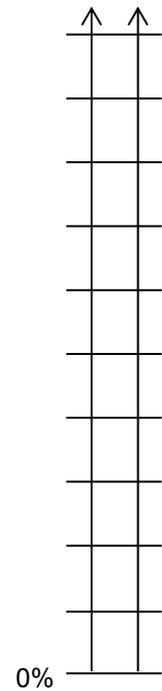
\_\_\_\_\_ % of \_\_\_\_\_  
is \_\_\_\_\_



4. 60% of 180 is what amount?

$$\frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}} = \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}}$$

\_\_\_\_\_ % of \_\_\_\_\_  
is \_\_\_\_\_

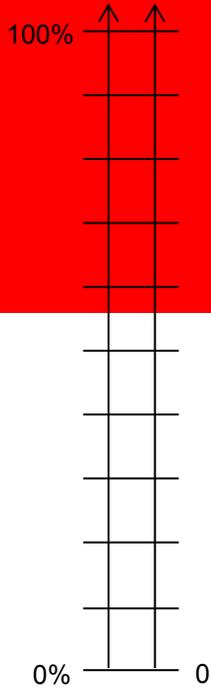


5. Becca says that 30% of 50 is the same as 50% of 30. Is she correct? \_\_\_\_\_ Explain.

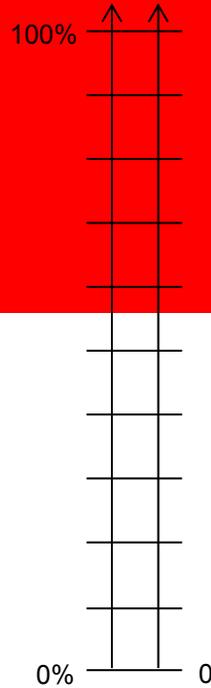
## PERCENTS AND DOUBLE NUMBER LINES 2 (Continued)

Use the double number lines below to help you write equivalent fractions to represent each of the following percent problems. Then answer each question.

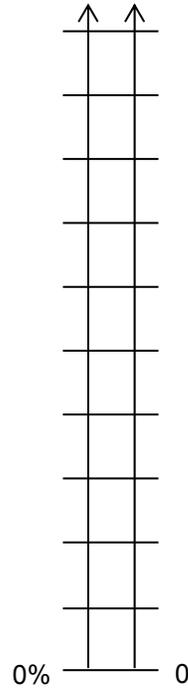
6. What is 40% of 50?



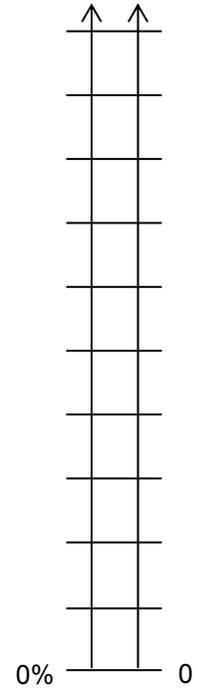
7. 50 is 25% of what number?



8. What is 15% of 400?



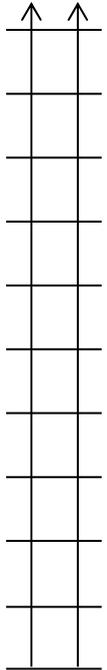
9. 100 is 20% of what number?



10. If 5% of a number is 40, what is 18% of the number?

## USING MULTIPLICATION TO FIND PERCENTS

1. Use the double number line diagram at the right to find 40% of \$60. _____		
2. Use chunking to find 40% of \$60.	3. Multiply 60 by $\frac{40}{100}$ .	4. Multiply 60 by 0.40.



5. What do you notice about the results of problems 1-4?
6. Which procedure, strategy, or calculation method above do you prefer?

7. Use the double number line diagram to the right to find 17% of \$60. _____		
8. Use chunking to find 17% of \$60.	9. Multiply 60 by $\frac{17}{100}$ .	10. Multiply 60 by 0.17.

11. What do you notice about the results of problems 7-10?
12. Which procedure, strategy, or calculation method above do you prefer?
13. Find 36% of 600 using multiplication.
- a. fractions: b. decimals:

## USING EQUATIONS TO SOLVE PERCENT PROBLEMS

Write each of the following statements as a numerical equation.

1. 10% of 20 is equal to 2.  
Change the percent to a fraction.

2. 15% of 24 is equal to 3.6.  
Change the percent to a decimal.

Write each of the following statements as an algebraic equation.

3. 10% of a number  $x$  is equal to 12.  
Change the percent to a fraction.  
Then solve for  $x$ .

4. 15% of a number  $y$  is equal to 9.3.  
Change the percent to a decimal.  
Then solve for  $y$ .

Write each of the following statements as an algebraic equation. Change the percent to a fraction or a decimal, choose a variable, and solve for the unknown.

5. 5% of a number is equal to 40.

6. 18% of a number is equal to 144.

7. 120% of a number is equal to 43.2.

8. 0.5% of a number is equal to 0.3

**PRACTICE**

Use any method to find the following. If you use mental math, write MM. Otherwise show all your work.

1. What number is 50% of 48?	2. 25% of 48 is what number?	3. 11% of what number is 4.4?
4. What number is 30% of 82?	5. 82% of 30 is what number?	6. 60% of what number is 60?
7. What is 11% of 60?	8. 2.5% of 22 is what number?	9. 150% of what number is 120?

10. You are told that the classroom next to yours has 36 students in it, and boys make up about 40% of the class. How many boys and how many girls do you think are in the class? Show your work and explain your reasoning.

Solve.

11. What percent of a gallon is a quart?	12. What percent of a quart is a gallon?
--	--

## PINEAPPLES

1. You want to buy 10 pounds (lbs.) of pineapples for a party. You see ads at five different stores. Choose the best buy(s). Show all your work and explain your answer in words.

<p><u>Store A</u>: pineapples cost \$2.50/lb.</p>	<p><u>Store B</u>: pineapples come in a 10 lb crate for \$20</p>
<p><u>Store C</u>: pineapples come in a 15 lb crate for \$28.50</p>	<p><u>Store D</u>: pineapples cost \$2.75 per pound; you can use a coupon to take off \$0.12 per half-pound.</p>
<p><u>Store E</u>: pineapples cost \$3.00 per pound; you can use a coupon to take off \$0.08 per quarter-pound</p>	<p>Best buy choice and explanation:</p>

2. Decorations for the party cost \$40, but the cashier asks for \$43.20. What is the sales tax rate?

# SKILL BUILDERS, VOCABULARY, AND REVIEW

## SKILL BUILDER 1

1. It takes Victoria 7 weeks to read 3 books. At that rate, how many books can she read in 42 weeks? Complete the double number line diagram below and use the results to answer the question.



Sean jogs 6 yards every 4 seconds.

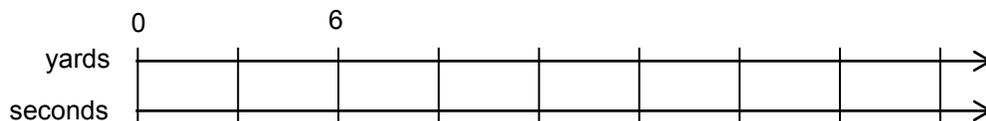
2. Complete the table.

<b>yards</b>	6			24			1	2
<b>seconds</b>		8	12		10	1		

3. Complete each sentence.

- Sean's rate of jogging is \_\_\_\_\_ yards for one second.
- Sean's unit rate in yards per second is \_\_\_\_\_.
- At this rate, Sean will jog \_\_\_\_\_ in one minute.

4. Make a double number line diagram below to represent this relationship. You do not need to put every value in the table on the lines.



5. Which is a better buy, a 3-pack of socks for \$3.75, or a 5-pack of the same socks for \$6.20? Explain.

## SKILL BUILDER 2

1. In your own words, explain what a rate is and give an example of a rate that relates to your life.

A shade of pink paint has a ratio of 5 cups of white paint to 2 cups of red paint.

<p>2. What is the unit rate of cups of white paint for each one cup of red paint?</p>	<p>3. At that rate how many cups of white paint are needed for 10 cups of red paint?</p>
<p>4. Allie wants to make a darker shade of pink. Write TWO different ratios representing cups of white paint to cups of red paint that Allie could use.</p>	

5. Measure the line segment below to the nearest tenth of a centimeter AND the nearest one-fourth inch.



cm: \_\_\_\_\_

in: \_\_\_\_\_

Find the perimeter ( $P$ ) and the area ( $A$ ) of each figure below.

<p>6.</p> <div style="text-align: center;"> </div>	<p>7.</p> <div style="text-align: center;"> </div>
<p><math>P =</math> _____      <math>A =</math> _____</p>	<p><math>P =</math> _____      <math>A =</math> _____</p>

### SKILL BUILDER 3

Rewrite each number in its equivalent representations in the chart below.

	Fraction or mixed number	Decimal	Percent
1.	$\frac{1}{5}$		
2.		1.6	
3.			0.9%
4.		0.235	

5. Casey took a spelling test and got 18 correct out of 24. Write the percent he got correct and the percent he got incorrect.

Compute.

6. $312 \div 24$	7. $28.602 \div 6.3$	8. $1.9626 \div 0.003$
9. $\left(2\frac{1}{4}\right)\left(1\frac{5}{9}\right)$	10. $5\frac{3}{4} \div 1\frac{1}{8}$	11. $2\frac{4}{5} \div 6\frac{9}{10}$

12. Circle all of the following that are equal to  $2^4$ .

16

$4^4$

$(2)(2)(2)(2)$

8

$4^2$

## SKILL BUILDER 4

For problem 1, simplify the given expression first if possible. For problem 2, apply the distributive property first. Then complete the table:

Expression	Number of terms	Constant term(s)	Terms with Variables	Coefficient(s) of the variable(s)
1. $3m + 5y + 3w$				
2. $5(a + b)$				

3. If a “great” earthquake is 10 times stronger than a “major” earthquake, and a major earthquake is 10 times stronger than a “large” earthquake, how many times stronger is a great earthquake than a large earthquake?

Complete the table.

Verbal Expression	Algebraic Expression	Evaluate for $m = 32.6$
4. the product of 20 and $m$		
5. 24 less than a number $m$		
6. the quotient of $m$ and 2		

7. A class of students was given the equation  $4.3y = 21.5$ . One student, Quinn, said he could “get  $y$  by itself” by subtracting 4.3 from both sides. Is Quinn correct? Explain.

8. On a math test, Kendra missed 4 questions. If there were a total of 20 questions, what percent correct did she get?

Solve.

9. $12.6 + f = 19$	10. $\frac{y}{5.2} = 3$	11. $w - 23.8 = 4.87$
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## SKILL BUILDER 5

Name the appropriate metric and customary units used to measure each item. Use abbreviations.

	Customary units	Metric units
1. length of an ant		
2. length of a house		
3. capacity of a large sand bucket		
4. capacity of a swimming pool		
5. weight of a grapefruit		

Use double number lines or tables of values as needed to convert units.

6. 12 gallons is equal to how many quarts?	7. How many gallons equal 12 quarts?
8. How many feet are in 18 inches?	9. How many inches are in $2\frac{1}{2}$ feet?

10. Christian wants to fill a 6 gallon bucket using a one quart plastic scoop. How many pours from the one quart scoop will Christian need to fill the bucket?

11. Athena wants to draw a line that is 3.5 yards long. She only has one ruler (1 foot long) to draw the line. How many times would she trace the ruler in order to get to 3.5 yards?

## SKILL BUILDER 6

Use the symbols  $>$ ,  $=$ , or  $<$  to compare the values of the following quantities. Use a conversion table as needed.

1. 8 feet \_\_\_\_\_ 120 inches

2. 2 miles \_\_\_\_\_ 10,300 feet

3. 4 yards \_\_\_\_\_ 3 feet

4. 250 yards \_\_\_\_\_  $\frac{1}{4}$  mile

5. 64 fluid ounces \_\_\_\_\_ 1 quart

6. 9 gallons \_\_\_\_\_ 45 quarts

Solve each measurement problem.

7. 10 cups is equal to how many liters?

8. 12 inches is equal to how many centimeters?

9. A popular long distance race is the 5K (or 5 kilometers). How long is this in miles?

10. A popular short distance race is the 100 meter dash. How long is this in feet? (Hint: First change meters to inches. Then change inches to feet.)

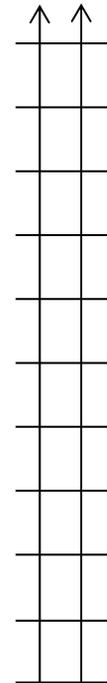
Is this longer or shorter than the distance you travel to get to school?

Is this longer or shorter than the distance you travel to get to school?

## SKILL BUILDER 7

Number the double number line diagram to the right.  
Then complete the chart below.

	Words	Equivalent fractions
1.	90% of 60 is _____	
2.		$\frac{75}{100} = \frac{\square}{60}$
3.	25% of 60 is _____	
4.		$\frac{15}{100} = \frac{\square}{60}$



Complete the chart below using chunking.

	Money	Find 10%	Find 5%	Find 15%	Find 20%
5.	\$45				
6.	\$325				

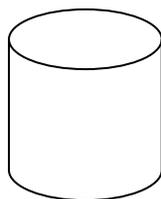
7. Maria, Juan, and Steve must paint a room. They each start with a gallon of paint. After painting for 3 hours, they tell each other how much paint they have left.

Maria says “I have about 60% of my paint left.”

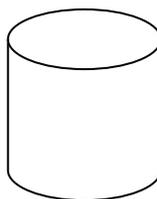
Juan says “I have about  $\frac{2}{5}$  of my paint left.”

Steve says “I have about two-thirds of my paint left.”

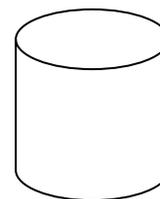
If each paint can below represents one gallon, shade each picture to show how much paint is left in each can.



Maria



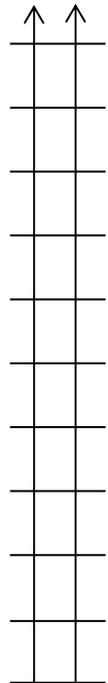
Juan



Steve

### SKILL BUILDER 8

1. Use the double number line diagram to the right to find 30% of \$95. _____		
2. Use chunking to find 30% of \$95.	3. Multiply 95 by $\frac{30}{100}$ .	4. Multiply 95 by 0.30.



Use multiplication to find the following.

5. 27% of 80	6. 80% of 27
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7. You are told that your rival school has 840 students in it, and girls make up about 60% of the school. How many boys and how many girls do you think are in the school? Show your work clearly.

Solve.

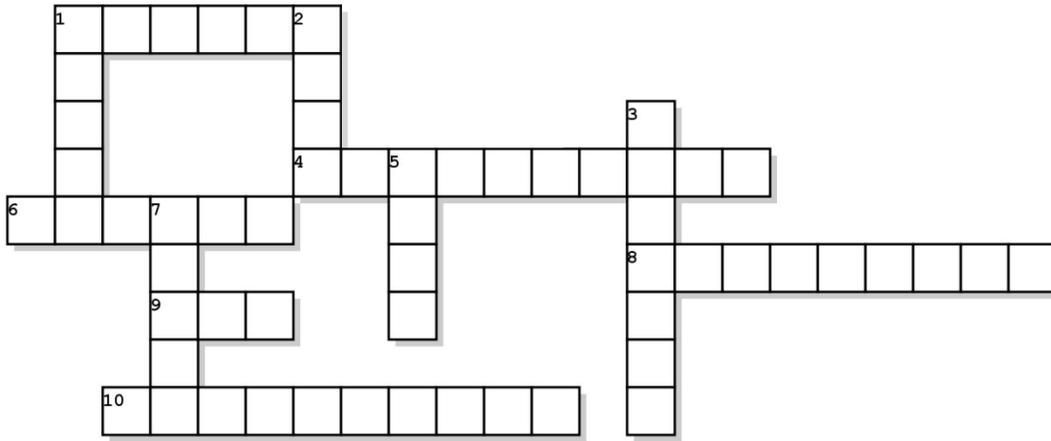
8. What percent of a quart is a cup?	9. What percent of a cup is a quart?
--------------------------------------	--------------------------------------

Solve using an equation.

10. 40% of what number is 28?	11. 14% of what number is 7.7?
-------------------------------	--------------------------------

12. If 15% of a number is 60, what is 27% if the number?

## FOCUS ON VOCABULARY



**Across**

- 1 a fraction  $\frac{m}{n}$  where  $0 \leq m < n$
- 4 fractions that represent the same point on the number line
- 6 units such as liters and kilometers
- 8 measurements such as feet and ounces
- 9 money paid to the government
- 10 a \_\_\_\_ rate is used to convert miles to kilometers

**Down**

- 1 unit \_\_\_\_ is the cost for one unit of measure
- 2 ratio with units attached
- 3 an amount per hundred
- 5 \_\_\_\_ rate is a rate for one unit of measure
- 7 comparison of two numbers

(For word hints, see the word bank and other vocabulary used in this packet.)

**SELECTED RESPONSE**

Show your work on a separate sheet of paper and select the best answer(s).

---

1. There are 16 tablespoons in 1 cup. How many tablespoons are there in 4 cups?

A. 4 tablespoons

B. 32 tablespoons

C. 64 tablespoons

D. None of these

---

2. There are about 6.2 kilometers in 10 miles. About how many km are there in 2.5 miles?

A. 1.55 km

B. 2.48 km

C. 15.5 km

D. 24.8 km

---

3. Choose all the values below that represent more than 75% of \$200.

A. \$60

B. \$120

C. \$175

D. \$200

---

4. Davida estimates that it will take about 30 hours to complete a project. She's spent 20 hours on the project already. Choose the percentage that best represents the amount of the project she has completed.

A. 20%

B. 60%

C. 66%

D. 150%

---

5. What is 30% of 500?

A. 30

B. 50

C. 150

D. 1,500

---

6. Oliver calculates that 15% of his bill would be \$60. What would 45% of his bill be?

A. \$180

B. \$9

C. \$45

D. \$400

---

7. There are three feet in one yard. Which calculations could be used to determine the number of square feet in a rug that is 2 yards by 4 yards?

A.  $3^2 \cdot 2 \cdot 4$

B.  $2 \cdot 4$

C.  $2 \cdot 4 \cdot 3$

D.  $(2 \cdot 3)(4 \cdot 3)$

---

## KNOWLEDGE CHECK

Show your work on a separate sheet of paper and write your answers on this page.

### 12.1 Measurement Conversions

Use double number lines or tables of values as needed to convert units.

1. 14 gallons is equal to how many quarts?

How many gallons are equal to 14 quarts?

2. How many miles are in 10 kilometers?

25 miles is equal to how many kilometers?

3. Horatio uses a scale to find out that he weighs 135 pounds. What is his weight in kilograms?

### 12.2 Understanding Percents of Numbers

4. Juan states that 75% of 40 is 30. Use a double number line show that Juan is correct.

5. Find 20% of \$90. Explain your strategy.

6. Wayne has a tank on his farm that holds 1200 gallons of fuel. How much fuel does he have in his tank when it is 40% full?

7. Use your answer in to problem 6 to calculate how many gallons are in the tank if it is

80% full \_\_\_\_\_

60% full \_\_\_\_\_

### 12.3 Percent Problems

8. Herman correctly answered 30 out of 40 questions on a math test. What percentage of questions did Herman get correct?

9. William and Marie want to leave an 18% tip on their \$48 meal. How much money should they leave for a tip?



# COMMON CORE STATE STANDARDS – MATHEMATICS

## STANDARDS FOR MATHEMATICAL CONTENT

- 6.RP.A Understand ratio concepts and use ratio reasoning to solve problems.**
- 6.RP.3c Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations: Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
- 6.RP.3d Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations: Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

## STANDARDS FOR MATHEMATICAL PRACTICE

- MP1 Make sense of problems and persevere in solving them.
- MP3 Construct viable arguments and critique the reasoning of others.
- MP5 Use appropriate tools strategically.
- MP6 Attend to precision.
- MP7 Look for and make use of structure.
- MP8 Look for and express regularity in repeated reasoning.



9 7 8 1 6 1 4 4 5 0 1 7 7

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