Name ______________________________ Period__________ Date ____________

7-6
STUDENT PACKET

MATHLINKS: GRADE 7
STUDENT PACKET 6
RATIONAL NUMBERS: MULTIPLICATION AND DIVISION 2

WORD BANK

Word or Phrase	Definition or Explanation	Example or Picture
complex fraction		
exponential notation		
order of operations		
ratio		
rational number		
unit rate		

ORDER OF OPERATIONS

Summary	Goals
We will learn conventions for the order of operations and apply them to evaluate expressions.	• Understand the convention for order of operations. • Use the order of operations to evaluate expressions.

Warmup

1. A local food bank had 150 cans of food. For three weeks, the food bank gave 25 cans of food each week to families in need.

   a. How many cans of food did the food bank have left at the end of three weeks?

   b. Write a numerical expression to describe this situation.

2. The local food bank had 150 cans of food. The food bank gave 25 cans of food to families in need. Then the food bank received a donation of food that tripled the number of cans that were left.

   a. How many cans of food do they have now?

   b. Write a numerical expression to describe this situation.

EXPONENTS

The exponential notation b^n (read as "b to the n^{th} power") is used to express n factors of b. The number b is the base, and the natural number n is the exponent.

Example: $2^3 = 2 \bullet 2 \bullet 2 = 8$; The base is 2 and the exponent is 3.

1. When Jorde first saw 2^3, he thought it was equal to 6. Explain Jorde's confusion.

First write out all factors and then compute.

2. 5^2 = _____ • _____ = ________

3. $(-3)^4$ = ______________________________ = ________

4. $(-2)^5$ = ______________________________ = ________

5. 14^1 = ______________________________ = ________

Compute.

6. 3^2	7. 2^5	8. $(-4)^3$
9. 6^2	10. $3^2 + 3^4$	11. $(-2)^3 \bullet 3^2$
12. $2^5 + 2^5$	13. $2(2^5)$	14. $3(3^1 + 3^2)$

CONVENTIONS FOR ORDER OF OPERATIONS

The order in which we perform mathematical calculations is determined by agreed-upon rules. Order of operations is a mathematical convention.

Order of Operations

1. Simplify expressions that are grouped.
2. Simplify exponential expressions.
3. Perform multiplication and division from left to right.
4. Perform addition and subtraction from left to right.

Simplify each expression	List the operations in order from first to last
1. $75 \div (2+3)^2 \bullet 4$ $= 75 \div (5)^2 \bullet 4$ $= 75 \div 25 \bullet 4$ $= 3 \bullet 4$ $= 12$	1. Grouping (add 2 + 3) 2. Exponent (compute 5^2) 3. Mult and div from L to R (compute 75 ÷ 25) 4. Mult and div from L to R (compute 3 • 4)
2. 3(-2 + 7)	
3. $-16 \div 8 \bullet 2^3$	
4. $\dfrac{-8}{2-(-4)+2}$	
5. (8 – 10) • 3 + (-7)	

WHERE DO THE PARENTHESES GO?

Place parentheses in each equation below to create a true statement.
Write “none needed” if the equation is already true.

1a. $5 \bullet 4 - 3 + 2(-1) = 3$

1b. $5 \bullet 4 - 3 + 2(-1) = -5$

2a. $6 + 3 \bullet 6 \div 3 = 18$

2b. $6 + 3 \bullet 6 \div 3 = 8$

3a. $\frac{6 - 4 \bullet 3}{-3} = 2$

3b. $\frac{6 - 4 \bullet 3}{-3} = -2$

4. Jo says that both sets of parentheses for the problem below are necessary to make the equation true.

$$3^2 + (5 \bullet 2) \div (7 - 5) = 14$$

Is Jo correct? Explain.

PRACTICE WITH ORDER OF OPERATIONS

Simplify each expression. Fractions are permitted.

1. $25 - (6 - 4)$	2. $48 \div 8 - 1$	3. $6^2 - 12 \div 2 \div 2$
4. $(-3)^2$	5. $0 - 3^2$	6. -3^2
7. $60 \div 3 - 5 \bullet 2^3$	8. $18 \div (2 - 6)$	9. $4 - 2 - 6 \bullet 2$
10. $(36 - 8) \div 14 + 6 \div 2$	11. $\dfrac{3 + (21 \div 7)}{5}$	12. $\dfrac{(-24 \div 8) + (-3)}{-8 + 2^4}$

Use the symbols >, <, or = to make each statement true.

13. $15 \bullet 3 - 2$ ______ $15 \bullet (3 - 2)$	14. $8 + 12 \div 4$ ______ $(8 + 12) \div 4$
15. $12 \div 3 + 9 \bullet 4$ ______ $12 \div (3 + 9) \bullet 4$	16. $(7 \bullet 3) - (4 \bullet 2)$ ______ $7 \bullet 3 - 4 \bullet 2$
17. $11 \bullet 3 - 2$ ______ $11 \bullet (3 - 2)$	18. $3 \bullet (4 - 2) \bullet 5$ ______ $3 \bullet 4 - 2 \bullet 5$

TARGET PRACTICE

Use a deck of cards with the picture cards removed. Aces represent 1. Red cards represent positive numbers. Black cards represent negative numbers.

Turn over 4 cards and record their values: ________ ________ ________ ________

For problems 1-4 below, use the numbers you recorded above to write an expression, *E*, whose value fits the requirements below. Show your work.

1. $0 < E < 1$	2. $-20 < E < -15$
3. $9 < E < 10$	4. $E < -200$

Turn over 4 different cards and record their values: ________ ________ ________ ________

For problems 5-8 below, use the second set of numbers you recorded above to write an expression, *E*, whose value fits the requirements below. Show your work.

5. *E* is an even number	6. *E* is a prime number
7. *E* is an odd number less than 10	8. *E* is a square number

RATIOS OF FRACTIONS

Summary	Goals
We will learn how to compute the unit rate for various measurements. We will learn strategies for working with ratios of fractions.	• Compute rates associated with ratios of fractions. • Convert complex fraction rates to unit rates.

Warmup

Solve each problem and show your work.

1. How many hours are in 360 minutes?	2. How many inches are there in 2 feet?
3. $\frac{3}{4} \bullet \frac{2}{5}$	4. $\frac{2}{3} \div \frac{1}{6}$
5. Vinita walks at a rate of 4 miles per hour. If Vinita walks for two hours, how far will she walk?	6. Cynthia walks 6 miles at a rate of 2 miles per hour. How long will it take her to arrive at her destination?

POSTER PROBLEMS 2

Part 1: Your teacher will divide you into groups.

- Identify members of your group as A, B, C, or D. I am group member _______.
- Each group will start at a numbered poster. Our group start poster is _______.
- Each group will have a different color marker. Our group marker is _________.

Part 2: Answer the problems on the posters by following your teacher's directions.

Part 3: Return to your seats.

Refer to the poster problems. Discuss and answer each question.

1. Gigi can buy one dozen pens for $9.60. How many pens can she buy for $1.00?

2. A hockey team plays 14 games in 6 weeks. Levon says, "The unit rate of games per week does not make sense." Explain what you think Levon means.

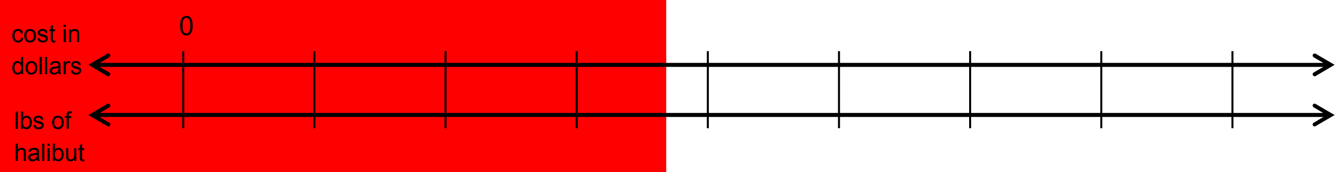
3. A recipe has a ratio of 4 cups of flour to 5 cups of milk. Elisa says combining 4 cups of flour and 5 cups of milk makes a 9 cup mixture. Peggy disagrees. Who do you think is correct? Explain.

4. Graham grows 2 inches in 50 weeks. Explain why this situation could make sense for Graham, but not for other people.

CAPTAIN CLEO'S FISHOP

You can buy fresh fish at Captain Cleo's Fishop. Misha bought 0.75 pounds (lbs) of halibut for $7.35.

1. Make a double number line diagram to show the cost for different amounts of halibut purchased at this same rate.

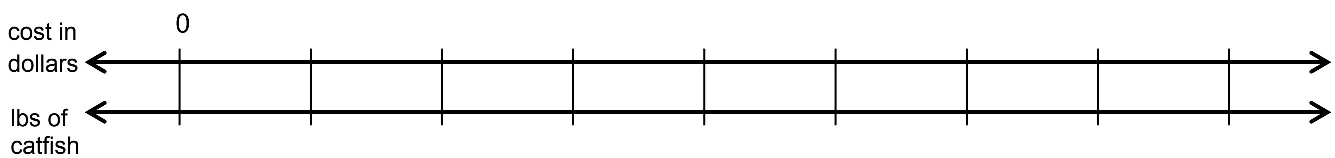


Find each cost or amount of halibut.

2. What is the cost per 1 pound?	3. What is the cost for 1.5 pounds?
4. How many pounds can you buy for $2.45?	5. What is the cost for 4.5 pounds?

Lindsay bought 1.5 pounds (lbs) of catfish for $7.35.

6. Make a double number line diagram to show the cost for different amounts of catfish purchased at this same rate.



Find each cost or amount of catfish.

7. What is the cost per 1 pound?	8. What is the cost for 0.75 pounds?
9. What is the cost for one-quarter of a pound?	10. How many pounds can you buy for $22.05?

CAPTAIN CLEO'S FISHOP RECIPES

Use Tables I and II below throughout this lesson.

1. The halibut seasoning at Captain Cleo's Fishop calls for $\frac{1}{4}$ teaspoon (tsp) of paprika for every $3\frac{1}{2}$ tsp of salt. Fill in table I below using this paprika to salt ratio.

TABLE I		A	B	C	D	E	F
Halibut Seasoning	Number of tsp of paprika	$\frac{1}{4}$	$\frac{1}{2}$	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$
	Number of tsp of salt	$3\frac{1}{2}$					

2. Write the multipliers used to obtain these new values.

a. $\frac{1}{4} : 3\frac{1}{2}$

×_____ ×_____

1 : _____

b. $\frac{1}{4} : 3\frac{1}{2}$

×_____ ×_____

2 : _____

3. How much salt is needed for every one teaspoon of paprika (e.g., the unit rate)? _________

4. The catfish seasoning at Captain Cleo's Fishop calls for $\frac{1}{3}$ teaspoon (tsp) of cayenne pepper for every $2\frac{1}{2}$ tsp of salt. Fill in table II below using this cayenne to salt ratio.

TABLE II		A	B	C	D	E	F
Catfish Seasoning	Number of tsp of cayenne	$\frac{1}{3}$	$\frac{2}{3}$	1	$1\frac{1}{3}$	$1\frac{2}{3}$	2
	Number of tsp of salt	$2\frac{1}{2}$					

5. Write the multipliers used to obtain these new values.

a. $\frac{1}{3} : 2\frac{1}{2}$

×_____ ×_____

1 : _____

b. $\frac{1}{3} : 2\frac{1}{2}$

×_____ ×_____

2 : _____

6. How much salt is needed per teaspoon of cayenne? _________________

CAPTAIN CLEO'S FISHOP RECIPES (Continued)

Chef Marvin is going to make different batches of seasoning. Find the number of teaspoons of each ingredient to yield each total.

Halibut seasoning			**Catfish seasoning**		
total # of tsp	**# of tsp of paprika**	**# of tsp of salt**	**total # of tsp**	**# of tsp of cayenne**	**# of tsp of salt**
7. 30			10. 17		
8. $3\frac{3}{4}$			11. $2\frac{5}{6}$		
9. 75			12. 68		

13. Chef Marvin is going to marinate shrimp. His marinade is $\frac{1}{4}$ cup Worcestershire sauce for every $\frac{1}{3}$ cup soy sauce. How many cups of each ingredient does he need to make 28 cups of marinade? Show your solution using a table and a tape diagram.

STRATEGIES FOR SIMPLIFYING COMPLEX FRACTIONS

A <u>complex fraction</u> is a fraction whose numerator or denominator is a fraction.

1. Here are two mathematical strategies for simplifying complex fractions. Fill in the missing parts of the fractions.

Strategy 1:
Write the complex fraction as a division problem.

$$\frac{\frac{1}{2}}{\frac{3}{4}} = \underbrace{\frac{1}{2} \div \frac{\square}{\square}}_{\text{step 1}} = \underbrace{\frac{\square}{\square} \bullet \frac{\square}{\square}}_{\text{step 2}} = \underbrace{\frac{\square}{\square}}_{\text{step 3}}$$

Strategy 2:
Multiply by a form of the "big one" to create a denominator equal to one.

$$\underbrace{\frac{\frac{1}{2}}{\frac{3}{4}} \bullet \frac{\frac{4}{3}}{\frac{4}{3}}}_{\text{step 1}} = \underbrace{\frac{\frac{1}{2} \bullet \frac{\square}{\square}}{\frac{3}{4} \bullet \frac{\square}{\square}}}_{\text{step 2}} = \underbrace{\frac{\frac{\square}{\square}}{\square}}_{\text{step 3}} = \underbrace{\frac{\square}{\square}}_{\text{step 4}}$$

Circle all "step numbers" that apply. Note that a procedure may occur in one strategy or both.

	Strategy 1 Step #	Strategy 2 Step #
2. The complex fraction is rewritten using the "÷" symbol for division.	1 2 3	1 2 3 4
3. A form of the "big one" (multiplicative identity) is used to create a denominator equal to one.	1 2 3	1 2 3 4
4. The "multiply by the reciprocal" method for fraction division is applied.	1 2 3	1 2 3 4
5. The "multiply across" method for fraction multiplication is applied.	1 2 3	1 2 3 4
6. Describe where it is clear that Strategy 1 and Strategy 2 will give the same result.	1 2 3	1 2 3 4

SIMPLIFYING COMPLEX FRACTIONS

Simplify each fraction by rewriting it as a division problem (strategy 1).

1. $\dfrac{\frac{3}{5}}{\frac{1}{5}}$

2. $\dfrac{\frac{2}{3}}{\frac{5}{6}}$

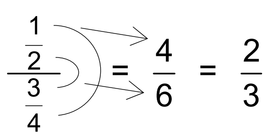
Simplify each fraction by using a form of "the big one" to create a denominator equal to one (strategy 2).

3. $\dfrac{\frac{1}{4}}{\frac{5}{8}}$

4. $\dfrac{\frac{5}{9}}{\frac{3}{6}}$

5. Which strategy do you prefer? Why?

6. Blakely said, "I think I know a shortcut for simplifying complex fractions," and she drew the picture below. Is her work correct? Explain what she did.



Simplify each complex fraction. Use a strategy of your choice.

7. $\dfrac{\frac{5}{3}}{\frac{1}{10}}$

8. $\dfrac{\frac{2}{5}}{\frac{2}{15}}$

BACK TO THE FISHOP

Refer to Table I on page 10.

1. Captain Cleo's recipe uses $\frac{1}{4}$ tsp paprika for every ______ tsp of salt in the halibut seasoning. The total amount of seasoning in this mixture is _______ tsp.

2. Write a fraction representing the part of the seasoning that is paprika. Simplify.

3. Write a fraction representing the part of the seasoning that is salt. Simplify.

4. Choose another column from Table I. Based on Column ____, Captain Cleo's recipe uses ____ tsp of paprika for every ____ tsp of salt. The total amount of seasoning in this mixture is _____ tsp.

5. Write a fraction representing the part of the seasoning that is paprika. Simplify.

6. Write a fraction representing the part of the seasoning that is salt. Simplify.

7. Use any two methods to determine the amount of salt needed in a mixture that contains 5 tsp of paprika.

OTHER REPRESENTATIONS

Chef Marissa wants to find how much paprika and salt are needed for 135 tsp of halibut seasoning. She started to make some calculations based on column A in Table I on page 10.

1. What does each of the calculations below represent?

a. $\frac{1}{4} + 3\frac{1}{2} = 3\frac{3}{4}$

b. $\frac{1}{4} \div 3\frac{3}{4} = \frac{1}{15}$

c. $\frac{1}{15} \bullet 135 = 9$

d. $135 - 9 = 126$

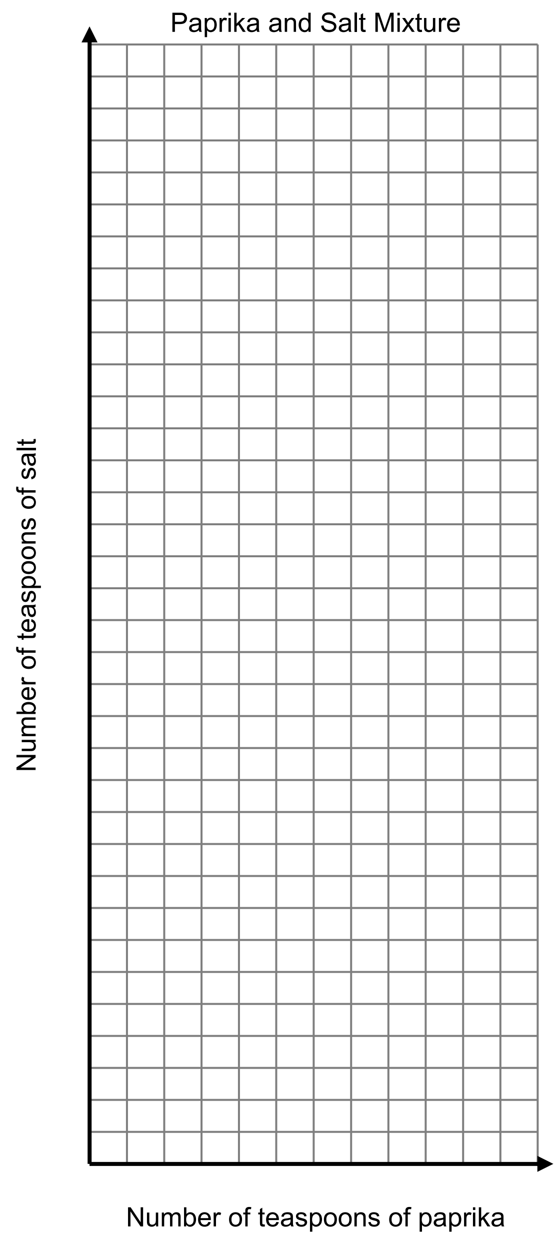
Chef Marissa thinks a graph might be useful for displaying the paprika and salt mixture.

2. Graph the entries from Table I as ordered pairs to the right. Be sure to scale the axes appropriately. You may use a different scale on each axis.

3. Does the point (0, 0) "line up" with the other points you graphed?

4. What does (0, 0) represent in the context of the seasoning mixture?

5. The graph includes the ordered pair (1, ______). What does this point represent in the context of the seasoning mixture?



PRACTICE

Refer to Table II on page 10.

1. Captain Cleo's recipe uses $1\frac{1}{3}$ tsp cayenne for every ______ tsp of salt in the catfish seasoning. The total amount of seasoning in this mixture is _______.

2. Write a fraction representing part of the seasoning that is cayenne. Simplify.

3. Write a fraction representing the part of the seasoning that is salt. Simplify.

4. Choose another column from Table II. Based on Column ____, Captain Cleo's recipe uses ____ tsp of cayenne for every ____ tsp of salt. The total amount of seasoning in this mixture is _____ tsp.

5. Write a fraction representing part of the seasoning that is cayenne. Simplify.

6. Write a fraction representing the part of the seasoning that is salt. Simplify.

7. Use any two methods to determine the amount of salt needed in a mixture that contains $2\frac{1}{3}$ tsp of cayenne.

PRACTICE (Continued)

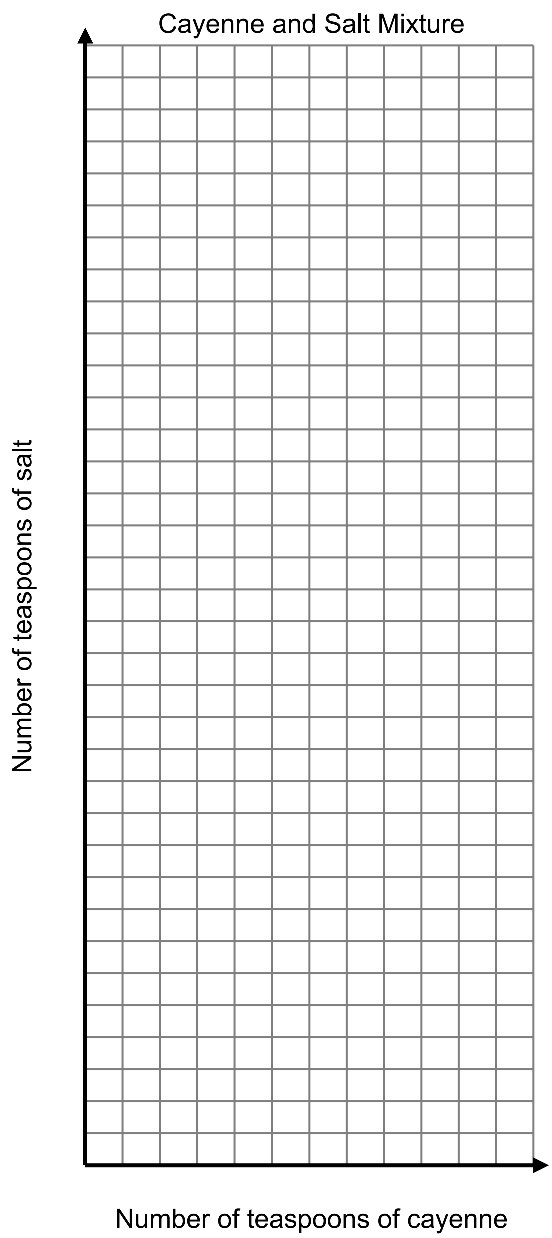
8. Chef Marissa wants to find how much cayenne and salt are needed for 170 tsp of catfish seasoning. Help Chef Marissa with this calculation.

9. Graph the entries from Table II as ordered pairs to the right. Be sure to scale the axes appropriately. You may use a different scale on each axis.

10. Does the point (0, 0) "line up" with the other points you graphed?

11. What does (0, 0) represent in the context of the seasoning mixture?

12. The graph includes the coordinates (1, ______). What does this point represent in the context of the seasoning mixture?



MULTIPLICATION AND DIVISION: RATIONAL NUMBERS

Summary	Goals
We will multiply and divide rational numbers.	• Apply integer multiplication and division rules and procedures to multiplying and dividing rational numbers.

Warmup

1. Compute. (2.5) • (3.8)

2. Without computing, explain why each of the following expressions is equivalent to the expression in problem 1.

   a. $2\frac{1}{2} \bullet 3\frac{4}{5}$

   b. (-2.5) • (-3.8)

3. Compute. $\frac{8}{25} \div \frac{2}{5}$

4. Without computing, explain why $\left(-\frac{8}{25}\right) \div \frac{2}{5}$ is not equivalent to the expression in problem 3.

MULTIPLYING AND DIVIDING RATIONAL NUMBERS

Compute. Use your knowledge of the rules for signed number multiplication and division, and the procedures you've learned for fraction and decimal multiplication and division.

1. $(12.6) \bullet (-0.81)$	2. $(-2.9) \bullet (-13.7)$	3. $-4.05 \div (-1.5)$
4. $(-0.0475) \div (-0.025)$	5. $(2.5) \bullet (3.8)$	6. $-\frac{4}{5} \bullet \frac{3}{4}$
7. $\left(-1\frac{2}{3}\right)\left(-2\frac{1}{3}\right)$	8. $-\frac{4}{5} \bullet \frac{3}{4} \bullet \left(-1\frac{1}{9}\right)$	9. $\left(-\frac{1}{2}\right) \div \left(-1\frac{1}{8}\right)$
10. $2\frac{5}{14} \div \left(-1\frac{4}{7}\right)$	11. $\dfrac{-\frac{3}{4}}{-\frac{5}{6}}$	12. $-\left(\dfrac{\frac{5}{6}}{-\frac{3}{4}}\right)$

A PATIO GARDEN PROBLEM

Let each small square on the grid below represent $\frac{1}{4}$ yard by $\frac{1}{4}$ yard.

1. An unplanted rectangular patio garden is $2\frac{1}{2}$ yd $\times$ $3\frac{1}{4}$ yd.

   Draw this garden and find its area.

2. You plant herbs on a 1.8 yd $\times$ 2.2 yd rectangular patch inside the garden.

   Draw and lightly shade this planted part, and then **estimate** its area.

   Explain why you think your estimate is reasonable.

3. Calculate the **exact** planted area.	4. How far off is your estimate compared to your exact calculation?

5. What percent of the total area of the garden is planted?

SAL'S MONEY PROBLEMS

Sal recently graduated from college and is having money problems. Answer his questions (with words and numbers) to help him understand his situation.

1. **Sal:** My bank statement at the end of September showed that I had $250.25, and at the end of October it showed that I had -$48.30. What does a negative bank balance mean?

   Your response:

2. **Sal:** How do I figure out the difference between my ending balances?

   Your response:

3. **Sal:** The bank sent me a letter about my negative balance, telling me that I was overdrawn. They charged me a $30 penalty. What was my new balance?

   Your response:

4. **Sal:** Without making any withdrawals from my account, I deposited $25 per month in November, December, and January. What was my balance at the end of January?

   Your response:

5. To help him pay rent during November, December, and January, Sal borrowed $140 per month from his parents. Write Sal's debt to his parents as a negative number.

6. At the end of Janaury, his parents said, "Sal, we will cancel your debt to us."

   Is this good or bad for Sal? __________

   Write a numerical equation that represents this situation. __________________________

SPORTS WEATHER PROBLEMS

Here are two equivalent equations for converting between Celsius and Fahrenheit temperature measures.

Let C = degrees Celsius and F = degrees Fahrenheit	
$F = \frac{9}{5}C + 32$	$C = \frac{5}{9}(F - 32)$

1. The NFL Championship game on December 31, 1967 between the Green Bay Packers and the Dallas Cowboys in Green Bay, Wisconsin is known as the “Ice Bowl.” The low temperature for that game was 13 degrees below zero (F).
   a. Write this temperature as an integer. _____
   b. Choose one of the equations above and substitute this value to solve for C.

2. The weather report before an NFL playoff game on January 5, 2014 (also in Green Bay Wisconsin) was expected to be 17 degrees below zero (F).*
   a. Write this temperature as an integer. _____
   b. Choose one of the equations above and substitute this value to solve for C.
   c. Is this temperature colder than the Ice Bowl in 1967? _____

3. A soccer match in Trondheim, Norway in December, 2010 reported a kickoff temperature of -14°C. What is this temperature in degrees Fahrenheit?

4. In Sochi, Russia, the historical average high temperature for January is about 50°F. When they hosted the XXII Olympic Winter Games in 2014, temperatures reached 20°C. Is this temperature higher or lower than the historical average high, and by how much?

(*The temperature that day never actually reached the record low.)

SKILL BUILDERS, VOCABULARY, AND REVIEW

SKILL BUILDER 1

Write <, =, or > to make each statement true. Show work.

1. 4(-3) ____ 3(-4)	2. 13 – 18 ____ (-5) + (-4)	3. 18 ÷ (-6) ____ (-3)(-1)

4. A submarine hovers at 140 feet below sea level. If it descends 20 feet, what would be its new position?

5. Mr. Hernandez drives a school bus twice a day for 5 days a week. Each trip averages 35 miles. How many miles does Mr. Hernandez drive in one week?

6. Last week, Jane made deposits of $64, $25, and $37 into her checking account. She then wrote checks for $52 and $49. What is the overall change in Jane's account balance?

7. There are 3 bananas and 1 apple in a bag.

   a. Write the ratio of the number of bananas to the total number of fruit. _____ to _____

   b. Grace adds 4 pieces of fruit to the bag. The ratio of the number of bananas to the total number of fruit stays the same. Draw Grace's collection of fruit now.

   c. Write the ratio of bananas to total fruit in Grace's collection. _____ to _____

   d. Explain why these two collections of fruit represent equivalent ratios.

8. Circle the following expressions that are equivalent to $5m - 8$.

   $4(m - 2) + m$ $8m - 8 + (-3m)$ $-8 + 6m - m$ $4(m - 8) + m$

SKILL BUILDER 2

1. Using the two numbers -9 and -6, and the following symbols once each, write four true statements.

____ $<$ ____ ____ $\leq$ ____ ____ $>$ ____ ____ $\geq$ ____

2. At the party store, they sell party hats in packages of 8 and they sell party favors in packages of 10.

   a. You want to give each one of your party guests one hat and one party favor. What is the least number of guests you can have in order to not have any leftover supplies?

   b. Is this an example of GCF or LCM? Explain.

   c. If you will have this number of guests (from part (a) above) how many packages of hats and favors will you need to buy?

Compute.

3. (-5.64) – (-3.8)	4. $\frac{5}{8} - 4\frac{1}{4}$	5. $-3\frac{1}{5} + 1\frac{1}{3}$

6. Bryce likes to make lemonade when he has people over to his house. He has determined that the lemon juice to water ratio should be 1 : 5. He estimates that he will want 60 cups of lemonade.

   a. Draw a tape diagram below to represent this.

   b. How many rectangles does your tape diagram have in all? ______

   c. What does each rectangle represent?

   d. How much lemon juice and how much water will he need for the 60 cups of lemonade?

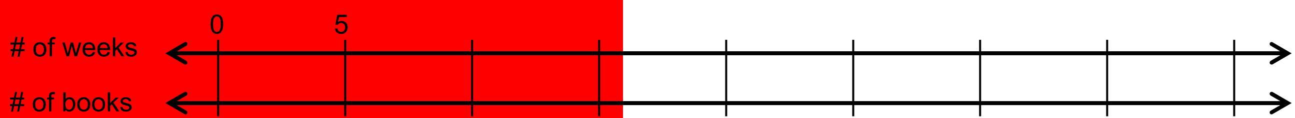
SKILL BUILDER 3

1. In your own words, explain what percent means.

Complete the chart.

	Percent Form	Decimal Form	Fraction Form
2.	20%		
3.		1.4	
4.	0.5%		

5. Complete the double number line below. It takes Nany 5 weeks to read 4 books. At that rate, how many books can she read in 25 weeks?



Write an expression and evaluate.

	Write an Algebraic Expression	Evaluate for *n* = 3
6. 8 increased by three times a number *n*		
7. 8 increased by three, times a number *n*		
8. the product of 3 and the quantity of 5 minus *n*		
9. 6 less than the quotient of 12 and a number, *n*		

Each expression below is written as the sum (or difference) of two terms. Use the GCF to rewrite each as a product of factors.

10. $8x + 16$	11. $4 - 6y$	12. $6x + 9y$

SKILL BUILDER 4

Place parentheses in each equation below to create a true statement.
Write “none needed” if the equation is already true.

1. $12 - 4 \div 2 = 4$	2. $-12 \div 2 \bullet 3 = -18$
3. $\dfrac{12 + (-6)}{-5 + 2} = -2$	4. $12 + (-6) \div -5 + 2 = -2$

Compute.

5. $25 - 3 \bullet 6 + 7^2$	6. $-4 \bullet 5 - (4 - 6)^2$
7. $\dfrac{-12 - 6 \bullet 3}{-9 - 1}$	8. $-12 - 6 \bullet 3 \div (-9) - 1$

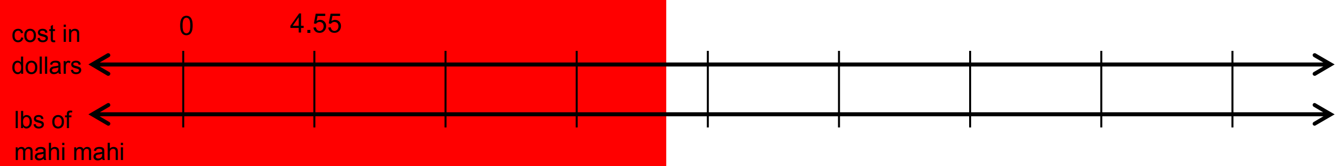
Write <, =, or > to make the statement true.

9. $12 - 6(-2)$ ____ $8 - 2(4)$	10. $(-3)(-2) - 10$ _____ $8 + 5(-2)$
11. $\dfrac{9(-2)}{-6}$ ____ $\dfrac{3 - 9}{2}$	12. $\dfrac{10 - (-2)}{2 - 4}$ ____ $\dfrac{7(-2) + 10}{(-4) + 6}$

SKILL BUILDER 5

You can buy fresh fish at Admiral Abe's Fishop. Avery bought 0.25 pounds (lbs) of mahi mahi for $4.55.

1. Make a double number line diagram to show the cost for different amounts of mahi mahi purchased at this same rate.



Find each cost or amount of mahi mahi.

2. What is the cost per 1 pound?	3. How many pounds of mahi mahi could you buy for $27.30?
4. What is the cost for two-quarters of a pound?	5. What is the cost for 2.5 pounds?

6. The mahi mahi seasoning at Admiral Abe's Fishop calls for $\frac{1}{3}$ teaspoon (tsp) of cumin for every $2\frac{1}{4}$ tsp of salt. Fill in the table below using this cumin to salt ratio.

	A	B	C	D	E	F
# of tsp of cumin	$\frac{1}{3}$	$\frac{2}{3}$	1	$1\frac{1}{3}$	2	$2\frac{1}{3}$
# of tsp of salt	$2\frac{1}{4}$					

7. How much salt is needed for every one teaspoon of cumin (e.g., the unit rate)? ________

8. Prove that the cumin to salt ratio is the same for the values in columns D and F.

Fill in the blank to make the equation true.

9. $4 \bullet$ ______ $= 1$	10. $\frac{1}{3} \bullet$ ______ $= 1$	11. $\frac{4}{5} \bullet$ ______ $= 1$

SKILL BUILDER 6

Simplify each complex fraction. Use a strategy of your choice.

1. $\dfrac{\frac{6}{8}}{\frac{2}{3}}$	2. $\dfrac{\frac{4}{5}}{\frac{6}{9}}$

3. Donald is making a pasta dish and is adding spices to add flavor. For every $1\frac{1}{2}$ cups of spaghetti, Donald adds $\frac{3}{4}$ tsp of oregano. Fill in the table below using this spaghetti to oregano ratio.

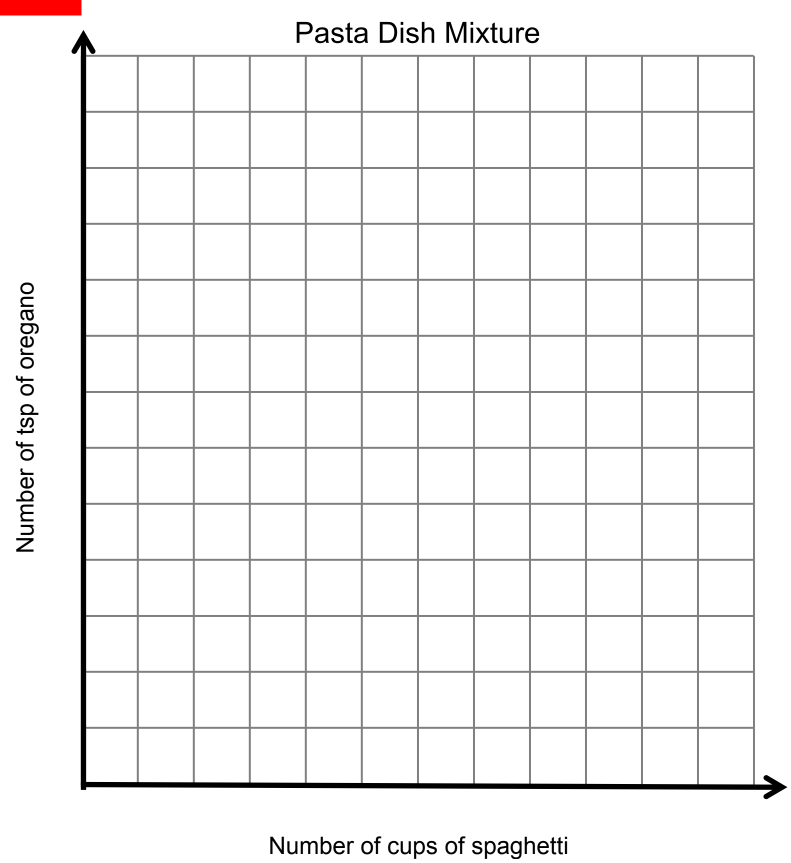
	A	B	C	D	E	F
# of cups of spaghetti	$1\frac{1}{2}$	1	$\frac{1}{2}$	2	$2\frac{1}{2}$	3
# of tsp of oregano	$\frac{3}{4}$					

4. Graph the entries from the table above as ordered pairs to the right. Be sure to scale the axes appropriately. You may use a different scale on each axis.

5. Does the point (0, 0) "line up" with the other points you graphed?

6. What does (0, 0) represent in the context of the pasta mixture?

7. The graph includes the ordered pair (1, ______). What does this point represent in the context of the pasta mixture?



SKILL BUILDER 7

Compute.

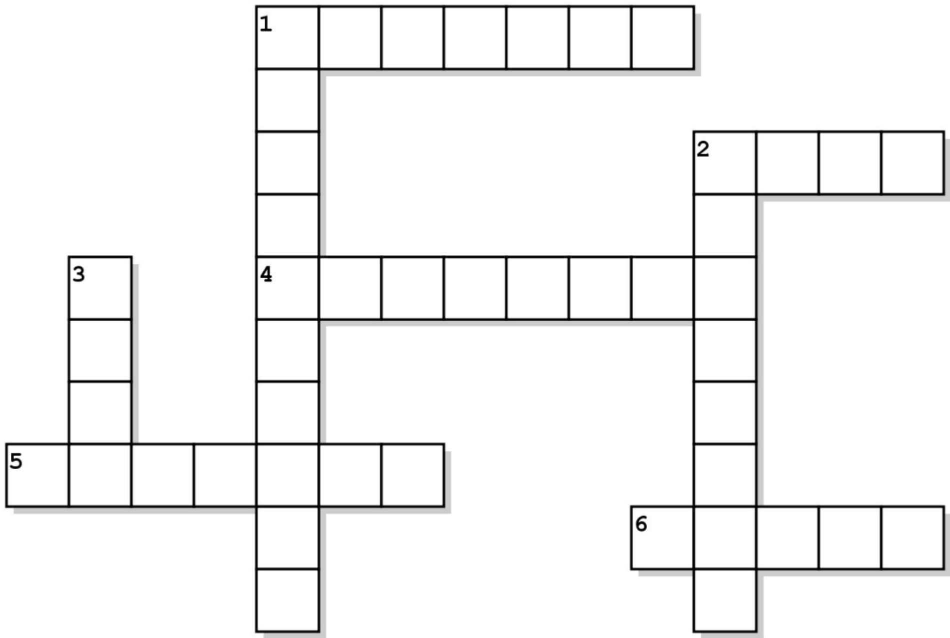
1. (-5.6)(-14.3)	2. 18.3 ÷ (-0.03)	3. 1.5(-9.21)
4. $\frac{-3}{2} \div \frac{5}{6}$	5. $-5\frac{1}{3} \bullet 2\frac{2}{5}$	6. $\left(\frac{5}{6}\right)\left(-2\frac{3}{4}\right)$

7. The stock market measures earnings per share of stock of companies. On Monday, Company XYZ opened and closed at $25.11 per share. Over the next 5 days the shares dropped $1.16 each day. What was the price of a share of stock for Company XYZ at the close of the stock market after those 5 days?

8. In South Africa during the 2010 World Cup, the temperature at the start of the final match was 68°F. When Brazil hosted the World Cup in 2014, the temperature was 26°C at the start of the final match. Which World Cup starting game time had the higher temperature? (Hint: See lesson 6.3 for temperature conversions.)

9. Jorge ran 15 miles in $3\frac{1}{2}$ hours. What was his rate in miles per hour?

FOCUS ON VOCABULARY



Across

1 A quotient of two fractions is called a _____ fraction.

2 The unit _____ associated with a ratio is the value of the ratio.

4 The "2" in 4^2

5 Temperature measurement in degrees

6 Comparison of two numbers

Down

1 Agreed-upon rule

2 The quotient of two integers, where the divisor cannot be zero, is a _______ number.

3 The "4" in 4^2

(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 choose the best answer(s).

1. Compute. 2^4

   A. 6 B. 8 C. 16 D. None of these

2. Compute. $2(10 - 3^2) + 4$

   A. 6 B. 102 C. 200 D. None of these

3. Choose all of the following expressions that have a value of -3.

   A. $7 - 5(11 - 3^2)$

   B. $7 - 5(11 - 3)^2$

   C. $-4(2^3 - 3) + 17$

   D. None of these

4. Karla ran a $3\frac{1}{3}$ mile race in $\frac{1}{2}$ an hour. What was her unit rate in miles per hour?

   A. $\frac{3}{20}$ B. $6\frac{2}{3}$ C. $3\frac{1}{6}$ D. $3\frac{5}{6}$

5. Choose all the expressions that have a value of 12.

   A. $(-14.4) \div (1.2)$

   B. $(-14.4) \div (-0.2)$

   C. $(-1.2) \div (-0.1)$

   D. $(-0.1) \div (-1.2)$

6. Choose all the expressions that have a value of $-3\frac{2}{3}$.

   A. $\left(-16\frac{1}{2}\right) \div \left(4\frac{1}{2}\right)$

   B. $\left(-16\frac{1}{2}\right) \div \left(-4\frac{1}{2}\right)$

   C. $\left(-\frac{2}{3}\right) \bullet \left(5\frac{1}{2}\right)$

   D. $\left(-\frac{2}{3}\right) \bullet \left(-5\frac{1}{2}\right)$

7. Compute. $-\frac{3}{4} \div 2\frac{1}{3}$

   A. $-\frac{7}{4}$ B. $-\frac{9}{28}$ C. $-\frac{7}{4}$ D. $-\frac{28}{9}$

8. Christina collected data on daily low temperatures in her town. During a four-day stretch in January, she recorded temperatures (in degrees Celsius) of -1.2°, 2.3°, -5.8°, and 0.5°. What was the average low temperature over those 4 days?

   A. -4.2° C B. -1.05° C C. 1.05° C D. 4.2° C

KNOWLEDGE CHECK

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

6.1 Order of Operations

Simplify each expression.

1. $34 \div 2 - (4 \bullet 2)^2$	2. $34 \div 2 - 4 \bullet 2^2$

Use the symbols <, =, or > to make each statement true.

3. $5 \bullet (4 - 1)$ ____ $5 \bullet 4 - 1$	4. $(7 \bullet 3) + (2 \bullet 5)$ _____ $7 \bullet 3 + 2 \bullet 5$

6.2 Ratios of Fractions

Simplify each complex fraction. Use a strategy of your choice.

5. $\dfrac{\frac{5}{4}}{\frac{15}{8}}$	6. $\dfrac{\frac{3}{7}}{\frac{3}{21}}$

7. Marsha bought 2.5 pounds of vegetables for \$8.75. What is the cost per pound?

6.3 Multiplication and Division: Rational Numbers

Compute.

8. $7.8 \div (-1.2)$	9. $\left(-1\frac{1}{2}\right)\left(\frac{8}{9}\right)$

HOME-SCHOOL CONNECTION

Here are some problems to review with your young mathematician.

Place parentheses in each equation to create a true statement. Write "none needed" if the equation is already true.

1. $16 \div 4 - 2 \bullet 3 + 1 = 25$

To make a dozen cupcakes, a recipe requires $3\frac{1}{2}$ cups of flour and $\frac{3}{4}$ cups of sugar.

2. Fill in the table using this flour to sugar ratio.

Dozens of cupcakes	**1**	**2**	**3**	**4**	**5**
Cups of flour	$3\frac{1}{2}$				
Cups of sugar	$\frac{3}{4}$				

3. How much flour should be used for 1 cup of sugar? Explain.

Compute.

4. 3.2(-1.05)

5. $\dfrac{\frac{5}{4}}{-\frac{30}{16}}$

Parent (or Guardian) Signature______________________________

COMMON CORE STATE STANDARDS – MATHEMATICS

STANDARDS FOR MATHEMATICAL CONTENT	
6.RP.3a*	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: Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.
7.RP.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.*
7.RP.2a	Recognize and represent proportional relationships between quantities: Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
7.RP.2b	Recognize and represent proportional relationships between quantities: Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
7.RP.2d	Recognize and represent proportional relationships between quantities: Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and $(1, r)$ where r is the unit rate.
7.NS.2a	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers: Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
7.NS.3	Solve real-world and mathematical problems involving the four operations with rational numbers. **
7.EE.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.*

*Review of content essential for success in 7th grade.

STANDARDS FOR MATHEMATICAL PRACTICE	
MP2	Reason abstractly and quantitatively.
MP4	Model with Mathematics.
MP6	Attend to precision.

9 7 8 1 6 1 4 4 5 0 2 9 0

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