Table of Contents

Introduction 5

Unit 1 Ratios and Percents 7

6.RP.1	Lesson 1	Ratios	8
6.RP.3.a	Lesson 2	Equivalent Ratios	12
6.RP.2, 6.RP.3.b	Lesson 3	Rates	16
6.RP.3.d	Lesson 4	Measurement Conversions	20
6.RP.3.c	Lesson 5	Percents	24
	Review	Ratios and Percents	28

Unit 2 Operations 31

6.NS.2	Lesson 1	Dividing Whole Numbers	32
6.NS.1	Lesson 2	Dividing Fractions	36
6.NS.3	Lesson 3	Adding and Subtracting Decimals	40
6.NS.3	Lesson 4	Multiplying and Dividing Decimals	44
	Review	Operations	48

Unit 3 Factors and Multiples 51

6.NS.4	Lesson 1	Greatest Common Factors	52
6.NS.4	Lesson 2	Least Common Multiples	56
	Review	Factors and Multiples	60

Unit 4 Positive and Negative Numbers 63

6.NS.5	Lesson 1	Integers	64
6.NS.6.a, c	Lesson 2	Rational Numbers on Number Lines	68
6.NS.6.b, c; 6.NS.8	Lesson 3	Coordinate Graphing	72
6.NS.7.a, b	Lesson 4	Comparing Integers	76
6.NS.7.c, d	Lesson 5	Absolute Value	80
	Review	Positive and Negative Numbers	84

Unit 5 Expressions 87

6.EE.1; 6.EE.2.a, b	Lesson 1	Writing Expressions	88
6.EE.1, 6.EE.2.c	Lesson 2	Evaluating Expressions	92
6.EE.3, 6.EE.4	Lesson 3	Operation Properties	96
	Review	Expressions	100

Unit 6 Equations and Inequalities 103

6.EE.5	Lesson 1	Equations and Inequalities	104
6.EE.6	Lesson 2	Writing Equations	108
6.EE.7	Lesson 3	Solving Equations	112
6.EE.8	Lesson 4	Representing Inequalities	116
	Review	Equations and Inequalities	120

Unit 7 Relationships Between Two Variables 123

6.EE.9	Lesson 1	Functions	124
6.EE.9	Lesson 2	Graphing Relationships	128
	Review	Relationships Between Two Variables	132

Unit 8 Geometry 135

6.G.1	Lesson 1	Area	136
6.G.2	Lesson 2	Volume	140
6.G.4	Lesson 3	Nets and Surface Area	144
6.G.3, 6.NS.8	Lesson 4	Coordinate Geometry	148
	Review	Geometry	152

Unit 9 Data and Statistics 155

6.SP.1	Lesson 1	Collecting Data	156
6.SP.2, 6.SP.3	Lesson 2	Data Distributions	160
6.SP.5.a–d	Lesson 3	Measures of Central Tendency	164
6.SP.5.a–d	Lesson 4	Measures of Spread	168
6.SP.4	Lesson 5	Representing Data	172
	Review	Data and Statistics	176

Practice Test 179

Glossary 191

LESSON 2

Dividing Fractions

6.NS.1

The product of a number and its reciprocal is always 1.

To multiply fractions, multiply the numerators. Then multiply the denominators.

$$\frac{2}{3} \times \frac{4}{5} = \frac{2 \times 4}{3 \times 5} = \frac{8}{15}$$

To change a **mixed number** to a fraction greater than 1, multiply the whole number part by the denominator. Then add the numerator. This becomes the new numerator of the fraction. The denominator stays the same.

To change a fraction greater than 1 to a mixed number, divide the numerator by the denominator. Write the remainder as a fraction.

To divide fractions, multiply by the **reciprocal** of the second fraction. The numerator and denominator of a reciprocal switch places.

What is the reciprocal of each number?

$\frac{5}{6}$ $\frac{1}{8}$ 2

Switch the numerator and the denominator.

The reciprocal of $\frac{5}{6}$ is $\frac{6}{5}$.

The reciprocal of $\frac{1}{8}$ is $\frac{8}{1} = 8$.

As a fraction, $2 = \frac{2}{1}$. The reciprocal of $\frac{2}{1}$ is $\frac{1}{2}$.

What is the quotient of $\frac{3}{4} \div \frac{3}{8}$?

First rewrite as multiplication using the reciprocal of $\frac{3}{8}$.

The reciprocal of $\frac{3}{8}$ is $\frac{8}{3}$, so the equivalent multiplication expression is $\frac{3}{4} \times \frac{8}{3}$.

Multiply and reduce to lowest terms if necessary.

$$\frac{3}{4} \times \frac{8}{3} = \frac{24}{12} = 2$$

The quotient of $\frac{3}{4} \div \frac{3}{8} = 2$.

SAMPLE

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Read each problem. Circle the letter of the best answer.

SAMPLE Travis has a 6-foot long rope. He ties a knot in the rope every $\frac{2}{3}$ foot. How many knots are tied in the rope?

A 4 **B** 8 **C** 9 **D** 12

The correct answer is C. To find the number of knots, divide 6 by $\frac{2}{3}$. First write 6 as the fraction $\frac{6}{1}$. Use it to write the division problem: $\frac{6}{1} \div \frac{2}{3}$. Multiply by the reciprocal of $\frac{2}{3}$ and reduce: $\frac{6}{1} \times \frac{3}{2} = \frac{18}{2} = 9$ knots. Choice A is not correct because the numbers are multiplied, not divided. Choices B and D are not correct because a mathematical error was made.

1 What is the reciprocal of $\frac{5}{4}$?

A $\frac{1}{4}$ **C** $\frac{4}{5}$

B $\frac{4}{4}$ **D** $\frac{5}{5}$

2 Which number sentence shows the product of a number and its reciprocal?

A $\frac{2}{7} \times 0 = 0$ **C** $\frac{2}{7} \times 1 = \frac{2}{7}$

B $\frac{2}{7} \times \frac{7}{2} = 1$ **D** $\frac{2}{7} \times \frac{2}{7} = \frac{4}{49}$

3 A hiking trail is $\frac{4}{5}$-mile long. A total of 8 markers are placed equal distances apart to help guide hikers. How far is one marker from the next?

A $\frac{1}{10}$ mi **C** $\frac{5}{32}$ mi

B $\frac{2}{5}$ mi **D** $\frac{32}{5}$ mi

4 What is the quotient of $\frac{3}{10} \div \frac{5}{12}$?

A $\frac{1}{8}$ **C** $\frac{5}{6}$

B $\frac{4}{11}$ **D** $\frac{18}{25}$

5 A piece of land is $\frac{2}{3}$ acre. It is divided evenly into 3 pieces. What is the size of each piece of land?

A $\frac{1}{3}$ acre **C** 2 acres

B $\frac{2}{9}$ acre **D** $2\frac{1}{3}$ acres

6 A bottle contains 8 cups of juice. The juice is poured into glasses that hold $\frac{3}{4}$ cup each. How many glasses can be filled with the juice?

A 6 **C** $10\frac{2}{3}$

B $8\frac{3}{4}$ **D** 12

SAMPLE

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Read each problem. Write your answer.

SAMPLE Carmen walked $2\frac{1}{2}$ miles in $\frac{3}{4}$ hour. What was her average walking speed, in miles per hour?

Answer _____

To find the average walking speed, divide $2\frac{1}{2}$ by $\frac{3}{4}$. Change the mixed number to a fraction: $2\frac{1}{2} = \frac{2 \times 2 + 1}{2} = \frac{5}{2}$. Now divide: $\frac{5}{2} \div \frac{3}{4} = \frac{5}{2} \times \frac{4}{3} = \frac{20}{6} = \frac{10}{3}$. The fraction $\frac{10}{3} = 10 \div 3 = 3\frac{1}{3}$. The average walking speed was $3\frac{1}{3}$ miles per hour.

7 It rained a total of $\frac{2}{3}$ inch in 4 hours. What was the average amount of rainfall each hour? Show your work.

Answer _____

8 A recipe makes a total of 5 cups of pudding. A serving of pudding is $\frac{3}{4}$ cup. How many servings of pudding does the recipe make? Show your work.

Answer _____

9 Horses are measured in units called hands. One hand equals $\frac{1}{3}$ foot. A horse is $5\frac{1}{3}$ feet tall. How tall is this horse in hands? Show your work.

Answer _____

SAMPLE

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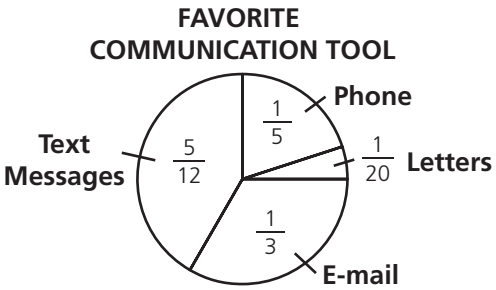
Read the problem. Write your answer to each part.

10 Jada surveyed some students to see which tool they most favored for communicating with friends. The results of her survey are shown in this circle graph.



Part A What is the reciprocal of each fraction in the circle graph?

Answer _____

Part B A total of 50 students said they favored text messages to communicate with friends. How many total students did Jada survey? Show your work or explain how you know.

What division expression can be used to answer this question?

_____

_____

_____

SAMPLE

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