

TABLE of CONTENTS

Introduction 5



UNIT 1

Ratio, Proportion, and Percent 7

LESSON 1 **Rates** 7.RP.1 8

LESSON 2 **Solving Proportions** 7.RP.2.a–c, 7.RP.3 12

LESSON 3 **Proportional Relationships** 7.RP.2.a–c 16

LESSON 4 **Graphing Proportional Relationships** 7.RP.2.a, b, d 20

LESSON 5 **Solving Percent Problems** 7.RP.3 24

LESSON 6 **More Percent Problems** 7.RP.3 28

REVIEW **Ratio, Proportion, and Percent** 32



UNIT 2

Operations with Rational Numbers, Part 1 35

LESSON 1 **Adding Rational Numbers** 7.NS.1.a, b, d 36

LESSON 2 **Subtracting Rational Numbers** 7.NS.1.c, d 40

LESSON 3 **Multiplying Rational Numbers** 7.NS.2.a, c 44

LESSON 4 **Dividing Rational Numbers** 7.NS.2.b, c 48

REVIEW **Operations with Rational Numbers, Part 1** 52



UNIT 3

Operations with Rational Numbers, Part 2 55

LESSON 1 **Terminating and Repeating Decimals** 7.NS.2.d 56

LESSON 2 **Solving Problems with Rational Numbers** 7.NS.3, 7.EE.3 60

LESSON 3 **Estimation** 7.EE.3 64

REVIEW **Operations with Rational Numbers, Part 2** 68



UNIT 4

Expressions 71

LESSON 1 **Equivalent Expressions** 7.EE.1, 7.EE.2 72

LESSON 2 **Simplifying Expressions** 7.EE.1 76

LESSON 3 **Adding and Subtracting Expressions** 7.EE.1 80

LESSON 4 **Factoring Expressions** 7.EE.1 84

REVIEW **Expressions** 88

**UNIT 5 Equations and Inequalities 91**

LESSON 1	Writing Equations and Inequalities 7.EE.4	92
LESSON 2	Solving Equations 7.EE.4.a	96
LESSON 3	Solving Inequalities 7.EE.4.b	100
REVIEW	Equations and Inequalities	104

**UNIT 6 Geometry 107**

LESSON 1	Scale Drawings 7.G.1	108
LESSON 2	Changing Scale Drawings 7.G.1	112
LESSON 3	Constructing Triangles 7.G.2	116
LESSON 4	Cross Sections 7.G.3	120
LESSON 5	Angle Relationships 7.G.5	124
REVIEW	Geometry	128

**UNIT 7 Area and Volume 131**

LESSON 1	Circumference and Area 7.G.4	132
LESSON 2	Area 7.G.6	136
LESSON 3	Surface Area 7.G.6	140
LESSON 4	Volume 7.G.6	144
REVIEW	Area and Volume	148

**UNIT 8 Statistics and Probability 151**

LESSON 1	Box Plots 7.SP.1	152
LESSON 2	Comparing Data Distributions 7.SP.3, 7.SP.4	156
LESSON 3	Compound Probability 7.SP.8.a–c	160
REVIEW	Statistics and Probability	164

Glossary	167
-----------------	------------

LESSON

1

Equivalent Expressions

An **algebraic expression** is a grouping of numbers, variables, and operations that shows the value of something.

You can rewrite expressions to have the same value. These are called **equivalent expressions**. Use the properties of operations to rewrite expressions.

Rewrite $(5 + 2n) + 6$ as equivalent expressions.

Use the commutative property to change the order of addends.

$$(5 + 2n) + 6 = (2n + 5) + 6$$

Use the associative property to change the grouping of addends.

$$(2n + 5) + 6 = 2n + (5 + 6)$$

Add the constants.

$$2n + (5 + 6) = 2n + 11$$

The expressions $(5 + 2n) + 6$, $(2n + 5) + 6$, $2n + (5 + 6)$, and $2n + 11$ are equivalent. They have the same value.

Equivalent expressions can tell you something about a situation.

A store is having a going-out-of-business sale. All items are 30% off. Write an expression that shows the percent of the original price, x , of each item a customer pays.

Use subtraction to represent a decrease in price.

$$x - 0.30x$$

This expression shows that 0.30, or 30%, of the original price is subtracted from the original price.

$$x - 0.30x = 0.70x$$

This means that a customer pays 0.70, or 70%, of the original price. The expressions $x - 0.30x$ and $0.70x$ are equivalent.

A **variable** is a symbol or letter that represents an unknown value or a value that can change.

A **coefficient** is a number in front of a variable that shows multiplication.

Commutative Property:

$$a + b = b + a$$

$$ab = ba$$

Associative Property:

$$(a + b) + c = a + (b + c)$$

$$(ab)c = a(bc)$$

Many different expressions can be written that are equivalent to each other.

GUIDED PRACTICE

Read and solve each problem.

1 Which expression is equivalent to $4a$?

- A $12a - 6a$
- B $4 + a$
- C $10a + (-6a)$
- D $a \cdot a \cdot a \cdot a$

What are some ways to rewrite the coefficient, the number that multiplies the variable?

2 Which expression has the same value as $2n + n$?

- A $2n^2$
- B $2 + n + n$
- C $3n$
- D $4n$

A variable by itself is understood to have a coefficient of 1.

3 Andrei buy 3 notebooks for d dollars each and a calculator for 7 dollars. A store coupon gives him \$2 off his entire purchase. The expression $(3d + 7) - 2$ represents this situation. Write an equivalent expression in simpler form.

Answer _____

What property lets you regroup numbers?

4 Brendan earns 25% more than his regular hourly rate, d , when he works on holidays. Write an expression to represent the hourly rate Brendan earns working on a holiday.

Answer _____

The holiday rate is more than 100% of Brendan's regular hourly rate.

TEST YOURSELF

Read and solve each problem.

1 Which expression is equivalent to $6y - 3 + y$?

- A $3y$
- B $3 + y$
- C $6 - 3y$
- D $7y - 3$

2 Which expression is equivalent to $32a + 12b$?

- A $12b + 32a$
- B $(32 + 12)ab$
- C $12a + 32b$
- D $44(a + b)$

3 Which equation shows equivalent expressions?

- A $(b + 2) + 6 = 2b + 6$
- B $c + (9 - 4) = 9c - 4c$
- C $(d \cdot 16) \cdot 25 = d \cdot (16 \cdot 25)$
- D $e \cdot 12 \cdot 5 = 12e \cdot 5e$

4 Which expression is equivalent to $w \cdot \frac{2}{5} \cdot \frac{3}{4}$?

- A $\frac{2}{5}w + \frac{3}{4}w$
- B $w \cdot \frac{2}{5} \cdot \frac{4}{3}$
- C $\frac{2w}{20}$
- D $\frac{3}{10}w$

5 Caroline has g goldfish. Her sister has 3 less than twice as many goldfish as Caroline. The total number of goldfish they have is represented by $g + 2g - 3$. Which expression is equivalent to this?

- A $3 - g$
- B $2g - 3$
- C $3 - 2g$
- D $3g - 3$

6 Rewrite the expression $4p + 9$ using the commutative property.

Answer _____

7 Rewrite the expression $(2t + 6) + 7t$ in simplest form. Show your work.

Answer _____

8 Jeremy is 4 inches shorter than Kevin. Kevin is n inches tall.

Part A Write an expression to represent Jeremy's height.

Answer _____

Part B Dimitri is 3 inches taller than Jeremy. Write an expression to represent Dimitri's height. Use the expression to explain how Dimitri's height compares to Kevin's height.

9 In a gift shop, magnets cost \$4.50 each and postcards cost \$0.75 each.

Part A Marisol bought the same number, n , of magnets as postcards in this gift shop. Write an expression to show her total cost.

Answer _____

Part B Write another expression equivalent to the one you wrote in part A. Explain why both expressions are correct.

