Summer 8th grade Math packet

Dear Parents, Guardians, and Students,

The 8th grade teachers at Rotolo Middle School are already busy preparing a great year for you! They have provided two opportunities for you to review essential math skills that will help you be successful in 8th grade. Please choose **ONE** of the following, TenMarks online program or Summer Packet, to complete over the summer.

TenMarks Online Summer Program.
Parents, we are very excited to inform you about a free program offered by TenMarks Education that will provide your child with access to a powerful, personalized summer math program designed to help them prepare for a successful school year. The expectation is for students to spend an hour per week on this program.
The program is called TenMarks Summer Math Program and here is how it works:

1. Visit http://summer.tenmarks.com and sign up.
2. At the start of the program, your child will receive a short diagnostic assessment based on the grade s/he is entering this fall.
3. The assessment will be automatically graded and TenMarks will create a personalized program designed for your child to prepare for the upcoming year.
4. At the end of the summer, print the student report card and bring it to their 8th grade math teacher.

The TenMarks Summer Math Program will guide your child through their personalized program, one topic at a time. Each assignment contains embedded instruction (hints, video lessons, and interventions) to help your child refresh concepts from the past year and prepare for the ones ahead. This will not count for a grade, however, teachers will review the student report card and will reference these skills throughout the school year.

Summer Packet
The second option is the completion of a summer packet that can be found online http://rms.bps101.net/ (hard copies will be available in the main office at RMS throughout the summer). Please select the correct packet for the course you will be taking in 8th grade (Math 1 **OR** Math 2 **OR** Math 3).

It will not be assessed and will not count for a grade. However, teachers will collect completed packets and the skills reviewed will be referenced throughout the school year. Please bring the completed packet to school on the first day.
Each new topic in the packet has an example and a hint on how to solve the problems on the page. Please read them carefully before answering the problems.

Parents, so you know how well-prepared your child is for 8th grade math, please check the answers and mark incorrect answers with a colored pen. If your child is struggling with a particular topic please encourage your child to redo the problems associated with that skill. An additional resource that your child may find helpful is www.khanacademy.org.

Please choose **ONE of the above opportunities to prepare your child for a successful year in 8th grade math.
Reminder: In the fall, please bring back a printed report card from TenMarks **OR** the completed paper copy of the summer packet. Your math teacher will be collecting this on the first day of school!

We look forward to meeting all of you in the upcoming school year. Enjoy your summer!

Thank you,
Your Eighth Grade Math teachers

NAME _____ DATE _____

Study Guide

Student Edition
Pages 85–92

Adding and Subtracting Integers

Use the following definitions, rules, and properties when adding or subtracting integers.

Definition, Rule, or Property		Example
Definition of Absolute Value	For any real number a: if $a > 0$, then $\|a\| = a$, and if $a < 0$, then $\|a\| = -a$. $\|0\| = 0$	$\|2\| = 2$ $\|-2\| = 2$
Adding Integers with the Same Sign	To add integers with the same sign, add their absolute values. Give the sum the same sign as the addends.	$3 + 2 = 5$ $-3 + (-2) = -5$
Adding Integers with Different Signs	To add integers with different signs, subtract the lesser absolute value from the greater absolute value. Give the result the same sign as the addend with the greater absolute value.	$-7 + 6 = -1$ $8 + (-4) = 4$
Additive Inverse Property	For every number a, $a + (-a) = 0$.	$-9 + 9 = 0$
Subtraction Rule	To subtract a number, add its additive inverse. For any numbers a and b, $a - b = a + (-b)$.	$8 - (-2) = 8 + 2$ $= 10$

You can use the distributive property and the addition and subtraction rules for integers to simplify expressions with like terms.

Example: Simplify $-6x - x + 9x$.

$$\begin{aligned} -6x - x + 9x &= -6x + (-1x) + 9x \\ &= [-6 + (-1) + 9]x \\ &= (-7 + 9)x \\ &= 2x \end{aligned}$$

Find each sum or difference.

1. $-17 + (-16)$

2. $107 + (-40)$

3. $75 + 86$

4. $11 - 41$

5. $15 - (-21)$

6. $-33 - (-17)$

7. $3m + (-15m) - 11m$

8. $-6a + 15a + (-11a)$

9. $-9y + 20y - (-6y)$

Evaluate each expression if $x = -4$, $y = 3$, and $z = -7$.

10. $456 + |z|$

11. $z + (-71) + |y|$

12. $-11 - |x|$

13. $31 - y - |x|$

NAME _____ DATE _____ PERIOD ____

1-6 Study Guide and Intervention

Multiplying and Dividing Integers

Use the following rules to determine whether the product or quotient of two integers is positive or negative.

- The product of two integers with different signs is negative.
- The product of two integers with the same sign is positive.
- The quotient of two integers with different signs is negative.
- The quotient of two integers with the same sign is positive.

EXAMPLE 1 **Find $7(-4)$.**

$7(-4) = -28$ The factors have different signs. The product is negative.

EXAMPLE 2 **Find $-5(-6)$.**

$-5(-6) = 30$ The factors have the same sign. The product is positive.

EXAMPLE 3 **Find $15 \div (-3)$.**

$15 \div (-3) = -5$ The dividend and divisor have different signs. The quotient is negative.

EXAMPLE 4 **Find $-54 \div (-6)$.**

$-54 \div (-6) = 9$ The dividend and divisor have the same sign. The quotient is positive.

EXERCISES

Multiply or divide.

1. $8(-8)$
2. $-3(-7)$
3. $-9(4)$
4. $12(8)$
5. $33 \div (-3)$
6. $-25 \div 5$
7. $48 \div 4$
8. $-63 \div (-7)$
9. $(-4)^2$
10. $\frac{-75}{15}$
11. $-6(3)(-5)$
12. $\frac{-143}{-13}$

Evaluate each expression if $a = -1$, $b = 4$, and $c = -7$.

13. $3c + b$
14. $a(b + c)$
15. $c^2 - 5b$
16. $\frac{a - 6}{c}$

(3)

NAME _____ DATE _____ PERIOD ____

2-3 Study Guide and Intervention

Multiplying Rational Numbers

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

EXAMPLE 1 **Find $\frac{3}{8} \cdot \frac{4}{11}$. Write in simplest form.**

$\frac{3}{8} \cdot \frac{4}{11} = \frac{3}{\cancel{8}_{2}} \cdot \frac{\cancel{4}^{1}}{11}$ Divide 8 and 4 by their GCF, 4.

$= \frac{3 \cdot 1}{2 \cdot 11}$ Multiply the numerators and denominators.

$= \frac{3}{22}$ Simplify.

To multiply mixed numbers, first rewrite them as improper fractions.

EXAMPLE 2 **Find $-2\frac{1}{3} \cdot 3\frac{3}{5}$. Write in simplest form.**

$-2\frac{1}{3} \cdot 3\frac{3}{5} = -\frac{7}{3} \cdot \frac{18}{5}$ $-2\frac{1}{3} = -\frac{7}{3}, 3\frac{3}{5} = \frac{18}{5}$

$= -\frac{7}{\cancel{3}_{1}} \cdot \frac{\cancel{18}^{6}}{5}$ Divide 18 and 3 by their GCF, 3.

$= -\frac{7 \cdot 6}{1 \cdot 5}$ Multiply the numerators and denominators.

$= -\frac{42}{5}$ Simplify.

$= -8\frac{2}{5}$ Write the result as a mixed number.

EXERCISES

Multiply. Write in simplest form.

1. $\frac{2}{3} \cdot \frac{3}{5}$
2. $\frac{4}{7} \cdot \frac{3}{4}$
3. $-\frac{1}{2} \cdot \frac{7}{9}$
4. $\frac{9}{10} \cdot \frac{2}{3}$
5. $\frac{5}{8} \cdot \left(-\frac{4}{9}\right)$
6. $-\frac{4}{7} \cdot \left(-\frac{2}{3}\right)$
7. $2\frac{2}{5} \cdot \frac{1}{6}$
8. $-3\frac{1}{3} \cdot 1\frac{1}{2}$
9. $3\frac{3}{7} \cdot 2\frac{5}{8}$
10. $-1\frac{7}{8} \cdot \left(-2\frac{2}{5}\right)$
11. $-1\frac{3}{4} \cdot 2\frac{1}{5}$
12. $2\frac{2}{3} \cdot 2\frac{3}{7}$

Lesson 2–3

4

NAME _____ DATE _____ PERIOD _____

2-4 Study Guide and Intervention

Dividing Rational Numbers

Two numbers whose product is 1 are **multiplicative inverses**, or **reciprocals**, of each other.

EXAMPLE 1 **Write the multiplicative inverse of $-2\frac{3}{4}$.**

$-2\frac{3}{4} = -\frac{11}{4}$ Write $-2\frac{3}{4}$ as an improper fraction.

Since $-\frac{11}{4}\left(-\frac{4}{11}\right) = 1$, the multiplicative inverse of $-2\frac{3}{4}$ is $-\frac{4}{11}$.

To divide by a fraction or mixed number, multiply by its multiplicative inverse.

EXAMPLE 2 **Find $\frac{3}{8} \div \frac{6}{7}$. Write in simplest form.**

$\frac{3}{8} \div \frac{6}{7} = \frac{3}{8} \cdot \frac{7}{6}$ Multiply by the multiplicative inverse of $\frac{6}{7}$, which is $\frac{7}{6}$.

$= \frac{\overset{1}{\cancel{3}}}{8} \cdot \frac{7}{\underset{2}{\cancel{6}}}$ Divide 6 and 3 by their GCF, 3.

$= \frac{7}{16}$ Simplify.

EXERCISES

Write the multiplicative inverse of each number.

1. $\frac{3}{5}$
2. $-\frac{8}{9}$
3. $\frac{1}{10}$
4. $-\frac{1}{6}$
5. $2\frac{3}{5}$
6. $-1\frac{2}{3}$
7. $-5\frac{2}{5}$
8. $7\frac{1}{4}$

Divide. Write in simplest form.

9. $\frac{1}{3} \div \frac{1}{6}$
10. $\frac{2}{5} \div \frac{4}{7}$
11. $-\frac{5}{6} \div \frac{3}{4}$
12. $1\frac{1}{5} \div 2\frac{1}{4}$
13. $3\frac{1}{7} \div \left(-3\frac{2}{3}\right)$
14. $-\frac{4}{9} \div 2$
15. $\frac{6}{11} \div (-4)$
16. $5 \div 2\frac{1}{3}$

5

NAME _____ DATE _____ PERIOD ____

2-2 Study Guide and Intervention

Adding and Subtracting Rational Numbers

Add Rational Numbers

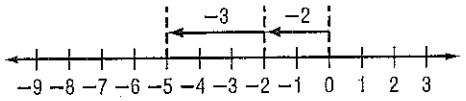
Adding Rational Numbers, Same Sign	Add the numbers. If both are positive, the sum is positive; if both are negative, the sum is negative.
Adding Rational Numbers, Different Signs	Subtract the number with the lesser absolute value from the number with the greater absolute value. The sign of the sum is the same as the sign of the number with the greater absolute value.

Example 1 **Use a number line to find the sum $-2 + (-3)$.**

Step 1 Draw an arrow from 0 to -2.

Step 2 From the tip of the first arrow, draw a second arrow 3 units to the left to represent adding -3.

Step 3 The second arrow ends at the sum -5. So $-2 + (-3) = -5$.



Example 2 **Find each sum.**

a. $-8 + 5$

$$\begin{aligned} -8 + 5 &= -(|-8| - |5|) \\ &= -(8 - 5) \\ &= -3 \end{aligned}$$

b. $\frac{3}{4} + \left(-\frac{1}{2}\right)$

$$\begin{aligned} \frac{3}{4} + \left(-\frac{1}{2}\right) &= \frac{3}{4} + \left(-\frac{2}{4}\right) \\ &= +\left(\left|\frac{3}{4}\right| - \left|-\frac{2}{4}\right|\right) \\ &= +\left(\frac{3}{4} - \frac{2}{4}\right) \\ &= \frac{1}{4} \end{aligned}$$

Lesson 2-2

Exercises

Find each sum.

1. $12 + 24$
2. $-6 + 14$
3. $-12 + (-15)$
4. $-21.5 + 34.2$
5. $8.2 + (-3.5)$
6. $23.5 + (-15.2)$
7. $90 + (-105)$
8. $108 + (-62)$
9. $-84 + (-90)$
10. $\frac{5}{7} + \frac{1}{3}$
11. $\frac{3}{14} + \frac{6}{17}$
12. $-\frac{4}{9} + \frac{3}{5}$
13. $-\frac{2}{3} + \left(-\frac{1}{4}\right)$
14. $-\frac{1}{5} + \frac{7}{11}$
15. $-\frac{18}{40} + \left(-\frac{10}{20}\right)$
16. $-\frac{3}{5} + \left(-\frac{5}{6}\right)$
17. $-1.6 + (-1.8)$
18. $-0.008 + (-0.25)$

6

NAME _____ DATE _____ PERIOD ____

2-2 Study Guide and Intervention *(continued)*

Adding and Subtracting Rational Numbers

Subtract Rational Numbers Every positive rational number can be paired with a negative rational number so that their sum is 0. The numbers, called **opposites**, are **additive inverses** of each other.

Additive Inverse Property	For every number a, $a + (-a) = 0$.

To subtract a rational number, add its inverse and use the rules for addition given on page 81.

Subtraction of Rational Numbers	For any numbers a and b, $a - b = a + (-b)$.

Example **Find 8.5 − 10.2.**

$8.5 - 10.2 = 8.5 + (-10.2)$ To subtract 10.2, add its inverse.

$= -(|-10.2| - |8.5|)$ $|-10.2|$ is greater, so the result is negative.

$= -1.7$ Simplify.

Exercises

Find each difference.

1. $11 - 41$
2. $15 - (-21)$
3. $-33 - (-17)$
4. $18 - (-12)$
5. $15.5 - (-2.5)$
6. $65.8 - (-23.5)$
7. $90 - (-15)$
8. $-10.8 - (6.8)$
9. $-84 - (-72)$
10. $58.8 - (-11.2)$
11. $-18.2 - 3.2$
12. $-9 - (-5.6)$
13. $-\frac{1}{3} - \left(-\frac{3}{4}\right)$
14. $-\frac{1}{5} - \left(-\frac{4}{7}\right)$
15. $\frac{9}{4} - \frac{5}{9}$
16. $\frac{12}{23} - \left(-\frac{1}{2}\right)$
17. $-\frac{7}{8} - \left(-\frac{3}{9}\right)$
18. $\frac{24}{10} - \frac{18}{20}$

19. Sanelle was playing a video game. Her scores were +50, +75, −18, and −22. What was her final score?

20. The football team offense began a drive from their 20-yard line. They gained 8 yards, lost 12 yards and lost 2 yards before having to kick the ball. What yard line were they on when they had to kick the ball?

7

NAME _____ DATE _____ PERIOD ____

1-2 Study Guide and Intervention

Variables, Expressions, and Properties

When finding the value of an expression with more than one operation, perform the operations in the order specified by the order of operations.

Order of Operations

1. Do all operations within grouping symbols first; start with the innermost grouping symbols.
2. Evaluate all powers before other operations.
3. Multiply and divide in order from left to right.
4. Add and subtract in order from left to right.

EXAMPLE 1 **Evaluate the expression $(5 + 7) \div 2 \times 3 - (8 + 1)$.**

$(5 + 7) \div 2 \times 3 - (8 + 1)$	$= 12 \div 2 \times 3 - (8 + 1)$	Add inside the left parentheses.
	$= 12 \div 2 \times 3 - 9$	Add inside the remaining parentheses.
	$= 6 \times 3 - 9$	Divide.
	$= 18 - 9$	Multiply.
	$= 9$	Subtract.

EXAMPLE 2 **Evaluate the expression $3x^2 - 4y$ if $x = 3$ and $y = 2$.**

$3x^2 - 4y$	$= 3(3)^2 - 4(2)$	Replace x with 3 and y with 2.
	$= 3(9) - 4(2)$	Evaluate the power first.
	$= 27 - 8$	Do all multiplications.
	$= 19$	Subtract.

EXERCISES

Evaluate each expression.

1. $4 \times 5 + 8$
2. $16 - 12 \div 4$
3. $14 \div 2 + 3(5)$
4. $5 - 6 \times 2 \div 3$
5. $2 \cdot 3^2 + 10 - 14$
6. $2^2 + 32 \div 8 - 5$
7. $(10 + 5) \div 3$
8. $5^2 \cdot (8 - 6)$
9. $(17 - 5)(6 + 5)$
10. $3 + 7(14 - 8 \div 2)$
11. $5[24 - (6 + 8)]$
12. $\frac{14}{3^2 - 2}$

Evaluate each expression if $a = 3$, $b = 5$, and $c = 6$.

13. $a + 3b$
14. $4b - 3c$
15. $2a - b + 5c$
16. $(ab)^2$
17. $a(b + c)$
18. $3(bc - 8) \div a$

8

NAME _____ DATE _____ PERIOD ____

1-5 The Distributive Property *(Pages 26–31)*

A **term** is a number, a variable, or a product or quotient of numbers and variables. Some examples of terms are x^2 and $3y$. The expression $3a + 5$ has two terms. **Like terms** are terms that contain the same variable, with corresponding variables having the same power. For example, $2x^2$ and $7x^2$ are like terms, but $4b^2$ and $2b$ are not. The expressions $8g + 4g$ and $12g$ are **equivalent expressions** because they denote the same number. An expression is in **simplest form** when it is replaced by an equivalent expression having no like terms and no parentheses. The **coefficient** of a term is the numerical factor. For example, in $8g$, 8 is the coefficient. You can use these facts plus the **Distributive Property** to simplify expressions.

Distributive Property	For any numbers a, b, and c, $a(b + c) = ab + ac$ and $(b + c)a = ba + ca$; $a(b - c) = ab - ac$ and $(b - c)a = ba - ca$.

Examples

a. Rewrite $7(2x + 3)$ without parentheses.

Use the Distributive Property.

$7(2x + 3) = 14x + 21$

The expression $14x + 21$ is in simplest form because it has no parentheses and no like terms.

b. Simplify the expression $3x^2 + 2x + 6x + x^2$.

Group and combine like terms using the Distributive Property.

$3x^2 + 2x + 6x + x^2$

$= 3x^2 + x^2 + 2x + 6x$ *Rearrange the terms.*

$= (3 + 1)x^2 + (2 + 6)x$ *Remember, $x^2 = 1x^2$.*

$= 4x^2 + 8x$ *Simplify.*

Practice

Use the distributive property to rewrite each expression without parentheses.

1. $3(a + 4)$
2. $2(x + 3)$
3. $(h - 5)6$
4. $-3(b + f)$
5. $x(2 + y)$
6. $a(b + c)$

Simplify each expression, if possible. If not possible, write *in simplest form*.

7. $4x + 2x$
8. $6a + 3b$
9. $12xy + 4xy$
10. $11m + 7m^2 + 5m^2$
11. $10b + 6b^2 + 4b^3$
12. $27x^2 - 18x^2$
13. $15b^3 + 10b + 20b^3$
14. $2x^2 + 2x^2$
15. $3y^4 - 9y^5 + 15y^4 + 3y^6$

16. **Mental Math** How would you use the Distributive Property to find the product of 6 and 104 mentally? Show your steps.

17. **Standardized Test Practice** Use the Distributive Property to rewrite the expression $2(m + 4h + 2a)$ without using parentheses.

A $2m + 4h + 2a$ **B** $2m + 8h + 4a$ **C** $m + 4h^2 + 4a$ **D** $4m + 4h + 4a$

Answers: 1. $3a + 12$ 2. $2x + 6$ 3. $6h - 30$ 4. $-3b - 3f$ 5. $2x + xy$ 6. $ab + ac$ 7. $6x$ 8. in simplest form 9. $16xy$ 10. $11m + 12m^2$ 11. in simplest form 12. $9x^2$ 13. $35b^3 + 10b$ 14. $4x^2$ 15. $18y^4 - 9y^5 + 3y^6$ 16. $6(100 + 4) = 600 + 24 = 624$ 17. B

9

NAME _____ DATE _____ PERIOD _____

10-1 Study Guide and Intervention

Simplifying Algebraic Expressions

The **Distributive Property** can be used to simplify algebraic expressions.

EXAMPLES **Use the Distributive Property to rewrite each expression.**

1 $3(a + 5)$

$3(a + 5) = 3(a) + 3(5)$ Distributive Property
$= 3a + 15$ Simplify.

2 $-2(d - 3)$

$-2(d - 3) = -2[d + (-3)]$ Rewrite $d - 3$ as $d + (-3)$.
$= -2(d) + (-2)(-3)$ Distributive Property
$= -2(d) + 6$ Simplify.

When a plus sign separates an algebraic expression into parts, each part is called a **term**. In terms that contain a variable, the numerical part of the term is called the **coefficient** of the variable. A term without a variable is called a **constant. Like terms** contain the same variables, such as $3x$ and $2x$.

EXAMPLE 3 **Identify the terms, like terms, coefficients, and constants in the expression $7x - 5 + x - 3x$.**

$7x - 5 + x - 3x = 7x + (-5) + x + (-3x)$ Definition of subtraction
$= 7x + (-5) + 1x + (-3x)$ Identity Property; $x = 1x$

The terms are $7x$, -5, x, and $-3x$. The like terms are $7x$, x, and $-3x$. The coefficients are 7, 1, and -3. The constant is -5.

An algebraic expression is in **simplest form** if it has no like terms and no parentheses.

EXAMPLE 4 **Simplify the expression $-2m + 5 + 6m - 3$.**

$-2m$ and $6m$ are like terms. 5 and -3 are also like terms.

$-2m + 5 + 6m - 3 = -2m + 5 + 6m + (-3)$ Definition of subtraction
$= -2m + 6m + 5 + (-3)$ Commutative Property
$= (-2 + 6)m + 5 + (-3)$ Distributive Property
$= 4m + 2$ Simplify.

EXERCISES

Use the Distributive Property to rewrite each expression.

1. $2(c + 6)$
2. $-4(w + 6)$
3. $(b - 4)(-3)$
4. Identify the terms, like terms, coefficients, and constants in the expression $4m - 2 + 3m + 5$.

Simplify each expression.

5. $3d + 6d$
6. $2 + 5s - 4$
7. $2z + 3 + 9z - 8$

Lesson 10–1

10

NAME _____ DATE _____ PERIOD _____

3-2 Solving Equations by Using Addition and Subtraction *(Pages 128–134)*

You can add or subtract the same number on each side of an equation and the result is an **equivalent equation**. Equivalent equations have the same solution.

Addition Property of Equality	For any numbers a, b, and c, if $a = b$, then $a + c = b + c$.
Subtraction Property of Equality	For any numbers a, b, and c, if $a = b$, then $a - c = b - c$.
Solving Equations	To **solve an equation** means to get the variable (with a coefficient of 1) by itself on one side of the equation. You can do this by undoing what has been done to the variable, using the properties of equality.

Examples

a. Solve $x - \frac{2}{3} = \frac{1}{3}$.

The number $\frac{2}{3}$ has been subtracted from x. The opposite of subtracting $\frac{2}{3}$ is adding $\frac{2}{3}$. Add $\frac{2}{3}$ to each side of the equation. $x - \frac{2}{3} + \frac{2}{3} = \frac{1}{3} + \frac{2}{3}$ is an equivalent equation. Simplify to obtain $x = 1$.

Check: Is $1 - \frac{2}{3} = \frac{1}{3}$? Yes.

The solution is 1.

b. Solve $9 + y = 13$.

Write an equivalent equation by subtracting 9 from each side of the original equation.

$9 + y - 9 = 13 - 9$, so $y = 4$.

Check: Does $9 + 4 = 13$? Yes.

The solution is 4.

Try These Together

1. Solve $a + (-8) = 17$.
HINT: Add 8 to each side.

2. Solve $b - (-18) = 4$.
HINT: This equation is equivalent to $b + 18 = 4$.

Practice

Solve each equation. Check your solution.

3. $11 - c = -16$ **4.** $5.4 = d + 6.2$ **5.** $e - (-23) = 31$

6. $4.8 + f = 9.6$ **7.** $g - (-20) = 11$ **8.** $14 = h - 21$

9. $-2.8 = j + (-5.1)$ **10.** $-12 + k = -19$ **11.** $m + (-8) = \frac{1}{2}$

12. Age Minya is 30 years younger than her mom, and the sum of their ages is 58. How old is Minya?

13. **Standardized Test Practice** If the low temperature for the day is $-14°F$ and the high is $22°F$, by how much did the temperature increase?

A $8°F$ **B** $18°F$ **C** $28°F$ **D** $36°F$

Answers: 1. 25 2. −14 3. 27 4. −0.8 5. 8 6. 4.8 7. −9 8. 35 9. 2.3 10. −7 11. $8\frac{1}{2}$ 12. 14 13. D

11

NAME _____ DATE _____ PERIOD ____

3-3 Solving Equations by Using Multiplication and Division *(Pages 135–140)*

You can solve a multiplication or division equation by using the Multiplication and Division Properties of Equality.

Multiplication Property of Equality	For any numbers a, b, and c, if $a = b$, then $ac = bc$.
Division Property of Equality	For any numbers a, b, and c, with $c \neq 0$, if $a = b$, then $\frac{a}{c} = \frac{b}{c}$.

Examples

a. Solve $\left(2\frac{1}{2}\right)x = 1\frac{3}{4}$.

Rewrite the mixed numbers as improper fractions.

$\frac{5}{2}x = \frac{7}{4}$ *Multiply each side by $\frac{2}{5}$, the reciprocal of the number that is multiplied by x.*

$\left(\frac{2}{5}\right)\left(\frac{5}{2}\right)x = \left(\frac{7}{4}\right)\left(\frac{2}{5}\right)$ *so* $x = \frac{14}{20}$ *or* $\frac{7}{10}$.

b. Solve $7y = -63$.

Since y has been multiplied by 7, divide each side by 7 to isolate the variable.

$\frac{7y}{7} = \frac{-63}{7}$, *so* $y = -9$.

Try These Together

1. Solve $-5a = 55$.

HINT: Divide each side by -5 or multiply by $\frac{1}{-5}$.

2. Solve $\frac{x}{-5} = 4$.

HINT: Multiply each side by -5.

Practice

Solve each equation. Check your solution.

3. $6y = 54$

4. $-7d = -84$

5. $22b = 176$

6. $2.4f = 21.6$

7. $0.36g = 1.8$

8. $\frac{1}{6}k = 8$

9. $-\frac{4}{5}m = 2$

10. $\frac{n}{8} = -4$

11. $\frac{p}{-6} = \frac{7}{12}$

12. $\left(-2\frac{1}{3}\right)q = 21$

13. $5x = \frac{10}{13}$

14. $\frac{-r}{8} = -18$

Define a variable, write an equation and solve the problem.

15. Two-thirds of a number is $9\frac{3}{5}$.

16. Negative fourteen times a number is 84.

Complete.

17. If $6a = 36$, then $3a =$ ___?___.

18. If $2d = 7$, then $10d =$ ___?___.

19. Standardized Test Practice There are nine boys in a class. If the boys make up three-eighths of the entire class, how many students are in the class?

A 72 **B** 24 **C** 20 **D** 10

Answers: 1. −11 2. −20 3. 9 4. 12 5. 8 6. 9 7. 5 8. 48 9. $-2\frac{1}{2}$ 10. −32 11. $-3\frac{1}{2}$ 12. −9 13. $\frac{2}{13}$ 14. 144 15. $14\frac{2}{5}$ 16. −6 17. 18 18. 35 19. B

12

NAME _____ DATE _____ PERIOD ____

10-2 Study Guide and Intervention

Solving Two-Step Equations

A **two-step equation** contains two operations. To solve a two-step equation, work backward using inverse operations to undo each operation in reverse order.

EXAMPLE 1 **Solve $-2a + 6 = 14$. Check your solution.**

Method 1 Vertical Method

$-2a + 6 = 14$	Write the equation.
$\quad -6 = -6$	Subtract 6 from each side.
$-2a \quad = \quad 8$	Simplify.
$\frac{-2a}{-2} = \frac{8}{-2}$	Divide each side by -2.
$a = -4$	Simplify.

Method 2 Horizontal Method

$-2a + 6 = 14$

$-2a + 6 - 6 = 14 - 6$

$-2a = 8$

$\frac{-2a}{-2} = \frac{8}{-2}$

$a = -4$

Check

$-2a + 6 = 14$	Write the equation.
$-2(-4) + 6 \stackrel{?}{=} 14$	Replace a with -4 to see if the sentence is true.
$14 = 14$ ✓	The sentence is true.

The solution is -4.

Sometimes it is necessary to combine like terms before solving an equation.

EXAMPLE 2 **Solve $5 = 8x - 2x - 7$. Check your solution.**

$5 = 8x - 2x - 7$	Write the equation.
$5 = 6x - 7$	Combine like terms.
$5 + 7 = 6x - 7 + 7$	Add 7 to each side.
$12 = 6x$	Simplify.
$\frac{12}{6} = \frac{6x}{6}$	Divide each side by 6.
$2 = x$	Simplify.
The solution is 2.	Check this solution.

EXERCISES

Solve each equation. Check your solution.

1. $2d + 7 = 9$
2. $11 = 3z + 5$
3. $2s - 4 = 6$
4. $-12 = 5r + 8$
5. $-6p - 3 = 9$
6. $-14 = 3x + x - 2$
7. $5c + 2 - 3c = 10$
8. $3 + 7n + 2n = 21$
9. $21 = 6r + 5 - 7r$
10. $8 - 5b = -7$
11. $-10 = 6 - 4m$
12. $-3t + 4 = 19$
13. $2 + \frac{a}{6} = 5$
14. $-\frac{1}{3}q - 7 = -3$
15. $4 - \frac{v}{5} = 0$

NAME _____ DATE _____ PERIOD _____

Lesson 4 Reteach

Solve Equations with Variables on Each Side

Some equations, like $3x - 9 = 6x$, have variables on each side of the equals sign. Use the Addition or Subtraction Property of Equality to write an equivalent equation with the variables on one side of the equals sign. Then solve the equation.

Example 1

Solve $3x - 9 = 6x$. Check your solution.

$3x - 9 = 6x$	Write the equation.
$3x - 3x - 9 = 6x - 3x$	Subtraction Property of Equality
$-9 = 3x$	Simplify by combining like terms.
$-3 = x$	Mentally divide each side by 3.

To check your solution, replace x with -3 in the original equation.

Check $3x - 9 = 6x$	Write the equation.
$3(-3) - 9 \stackrel{?}{=} 6(-3)$	Replace x with -3.
$-18 = -18$ ✓	The sentence is true.

The solution is -3.

Example 2

Solve $4a - 7 = 5 - 2a$.

$4a - 7 = 5 - 2a$	Write the equation.
$4a + 2a - 7 = 5 - 2a + 2a$	Addition Property of Equality
$6a - 7 = 5$	Simplify by combining like terms.
$6a - 7 + 7 = 5 + 7$	Addition Property of Equality
$6a = 12$	Simplify.
$a = 2$	Mentally divide each side by 6.

The solution is 2. Check this solution.

Exercises

Solve each equation. Check your solution.

1. $6s - 10 = s$
2. $8r = 4r - 16$
3. $25 - 3u = 2u$
4. $14t - 8 = 6t$
5. $k + 20 = 9k - 4$
6. $11m + 13 = m + 23$
7. $-4b - 5 = 3b + 9$
8. $6y - 1 = 27 - y$
9. $1.6h - 72 = 4h - 30$
10. $8.5 - 3z = -8z$
11. $10x + 8 = 5x - 3$
12. $16 - 7d = -3d + 2$

14

NAME _____ DATE _____ PERIOD ____

4-4 Study Guide and Intervention

Solving Proportions

A **proportion** is an equation that states that two ratios are equivalent. To determine whether a pair of ratios forms a proportion, use cross products. You can also use cross products to solve proportions.

EXAMPLE 1 **Determine whether the pair of ratios $\frac{20}{24}$ and $\frac{12}{18}$ forms a proportion.**

Find the cross products.

$20 \times 12 \rightarrow 24 \cdot 12 = 288$

$24 \overset{?}{=} 18 \rightarrow 20 \cdot 18 = 360$

Since the cross products are not equal, the ratios do not form a proportion.

EXAMPLE 2 **Solve $\frac{12}{30} = \frac{k}{70}$.**

$\frac{12}{30} = \frac{k}{70}$	Write the equation.
$12 \cdot 70 = 30 \cdot k$	Find the cross products.
$840 = 30k$	Multiply.
$\frac{840}{30} = \frac{30k}{30}$	Divide each side by 30.
$28 = k$	Simplify.

The solution is 28.

EXERCISES

Determine whether each pair of ratios forms a proportion.

1. $\frac{17}{10}, \frac{12}{5}$
2. $\frac{6}{9}, \frac{12}{18}$
3. $\frac{8}{12}, \frac{10}{15}$
4. $\frac{7}{15}, \frac{13}{32}$
5. $\frac{7}{9}, \frac{49}{63}$
6. $\frac{8}{24}, \frac{12}{28}$
7. $\frac{4}{7}, \frac{12}{71}$
8. $\frac{20}{35}, \frac{30}{45}$
9. $\frac{18}{24}, \frac{3}{4}$

Solve each proportion.

10. $\frac{x}{5} = \frac{15}{25}$
11. $\frac{3}{4} = \frac{12}{c}$
12. $\frac{6}{9} = \frac{10}{r}$
13. $\frac{16}{24} = \frac{z}{15}$
14. $\frac{5}{8} = \frac{s}{12}$
15. $\frac{14}{t} = \frac{10}{11}$
16. $\frac{w}{6} = \frac{2.8}{7}$
17. $\frac{5}{y} = \frac{7}{16.8}$
18. $\frac{x}{18} = \frac{7}{36}$

15

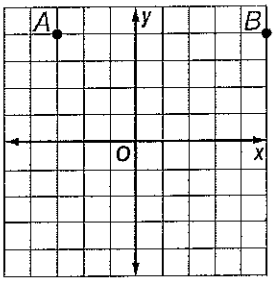
NAME _____ DATE _____ PERIOD _____

Lesson 2 Reteach

Relations

Example 1

Name the ordered pair for point *A*.



- Start at the origin.
- Move left on the x-axis to find the x-coordinate of point A, which is -3.
- Move up the y-axis to find the y-coordinate, which is 4.

So, the ordered pair for point A is $(-3, 4)$.

Example 2

Graph point *B* at (5, 4).

- Use the coordinate plane shown above. Start at the origin and move 5 units to the right. Then move up 4 units.
- Draw a dot and label it $B(5, 4)$.

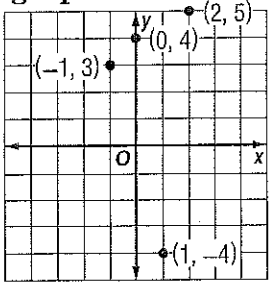
Example 3

Express the relation {(2, 5), (−1, 3), (0, 4), (1, −4)} as a table and a graph. Then state the domain and range.

The domain is $\{-1, 0, 1, 2\}$.

The range is $\{-4, 3, 4, 5\}$.

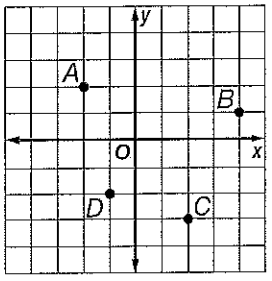
x	y
2	5
−1	3
0	4
1	−4



Exercises

Name the ordered pair for each point.

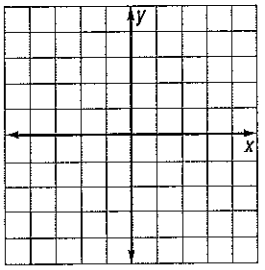
1. A
2. B
3. C
4. D



Express the relation as a table and a graph. Then state the domain and range.

5. $\{(-3, 1), (2, 4), (-1, 0), (4, -4)\}$

x	y



NAME _____ DATE _____ PERIOD ____

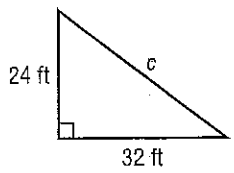
3-4 Study Guide and Intervention

The Pythagorean Theorem

The **Pythagorean Theorem** describes the relationship among the lengths of the sides of any right triangle. In a right triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the legs. You can use the Pythagorean Theorem to find the length of a side of a right triangle if the lengths of the other two sides are known.

EXAMPLES **Find the missing measure for each right triangle. Round to the nearest tenth.**

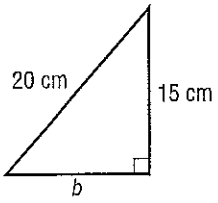
1



$c^2 = a^2 + b^2$
$c^2 = 24^2 + 32^2$
$c^2 = 576 + 1{,}024$
$c^2 = 1{,}600$
$c = \sqrt{1{,}600}$
$c = 40$

The length of the hypotenuse is 40 feet.

2



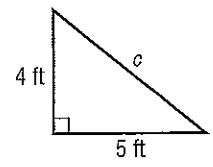
$c^2 = a^2 + b^2$
$20^2 = 15^2 + b^2$
$400 = 225 + b^2$
$400 - 225 = 225 + b^2 - 225$
$175 = b^2$
$\sqrt{175} = \sqrt{b^2}$
$13.2 \approx b$

The length of the other leg is about 13.2 centimeters.

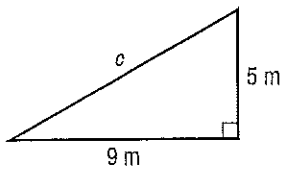
EXERCISES

Write an equation you could use to find the length of the missing side of each right triangle. Then find the missing length. Round to the nearest tenth if necessary.

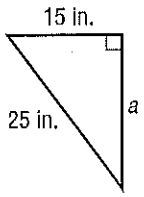
1.



2.



3.



4. $a = 7$ km, $b = 12$ km

5. $a = 10$ yd, $c = 25$ yd

6. $b = 14$ ft, $c = 20$ ft

17

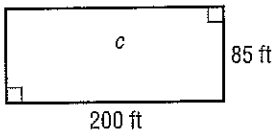
NAME _____ DATE _____ PERIOD ____

3-5 Study Guide and Intervention

Using The Pythagorean Theorem

You can use the Pythagorean Theorem to help you solve problems.

EXAMPLE 1 **A professional ice hockey rink is 200 feet long and 85 feet wide. What is the length of the diagonal of the rink?**



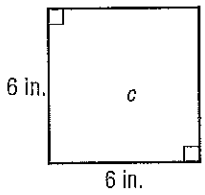
$c^2 = a^2 + b^2$	The Pythagorean Theorem
$c^2 = 200^2 + 85^2$	Replace a with 200 and b with 85.
$c^2 = 40{,}000 + 7{,}225$	Evaluate 200^2 and 85^2.
$c^2 = 47{,}225$	Simplify.
$\sqrt{c^2} = \sqrt{47{,}225}$	Take the square root of each side.
$c \approx 217.3$	Simplify.

The length of the diagonal of an ice hockey rink is about 217.3 feet.

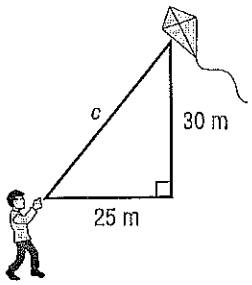
EXERCISES

Write an equation that can be used to answer the question. Then solve. Round to the nearest tenth if necessary.

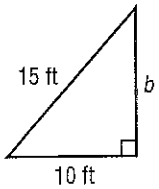
1. What is the length of the diagonal?



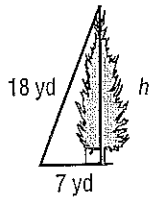
2. How long is the kite string?



3. How high is the ramp?



4. How tall is the tree?



Math 2 Summer Review Packet Answers

Page 2

1. -33
2. 67
3. 161
4. -30
5. 36
6. -16
7. -23m
8. -2a
9. 17y
10. 463
11. -75
12. -15
13. 24

Page 3

1. -64
2. 21
3. -36
4. 96
5. -11
6. -5
7. 12
8. 9
9. 16
10. -5
11. 90
12. 11
13. -17
14. 3
15. 29
16. 1

Page 4

1. $\frac{2}{5}$
2. $\frac{3}{7}$
3. $-\frac{7}{18}$
4. $\frac{3}{5}$
5. $-\frac{5}{18}$
6. $\frac{8}{21}$
7. $\frac{2}{5}$
8. -5
9. 9
10. $\frac{9}{2}$
11. $-\frac{77}{20}$
12. $\frac{136}{21}$

Page 5

1. $\frac{5}{3}$
2. $-\frac{9}{8}$
3. 10
4. -6
5. $\frac{5}{13}$
6. $-\frac{3}{5}$
7. $-\frac{5}{27}$
8. $\frac{4}{29}$
9. 2
10. $\frac{7}{10}$
11. $-\frac{10}{9}$
12. $\frac{8}{15}$
13. $-\frac{6}{7}$
14. $-\frac{2}{9}$
15. $-\frac{3}{22}$
16. $\frac{15}{7}$

Page 6

1. 36
2. 8
3. -27
4. 12.7
5. 4.7
6. 8.3
7. -15
8. 46
9. -174
10. $\frac{22}{21}$
11. $\frac{135}{238}$
12. $\frac{7}{45}$
13. $-\frac{11}{12}$
14. $\frac{24}{55}$
15. $-\frac{19}{20}$
16. $-\frac{43}{30}$
17. --3.4
18. -0.258

Page 7

1. -30
2. 36
3. -16
4. 30
5. 18
6. 89.3
7. 105
8. -17.6
9. -12
10. 70
11. -21.4
12. -3.4
13. $\frac{5}{12}$
14. $\frac{13}{35}$
15. $-\frac{61}{36}$
16. $\frac{47}{46}$
17. $-\frac{13}{24}$
18. $\frac{3}{2}$
19. 85
20. 14 yard line

Page 8

1. 28
2. 13
3. 22
4. 1
5. 14
6. 3
7. 5
8. 50
9. 132
10. 73
11. 50
12. 2
13. 18
14. 2
15. 31
16. 225
17. 33
18. 22

Page 9

(answers along the bottom of the sheet)

Page 10

1. 2c + 12
2. -4w+-24
3. -3b+12
4. Terms: 4m, -2, 3m, 5
   Coefficients 4, 3
   Constants -2, 5
5. 9d
6. 5s+ -2
7. 11z + -5

Page 11

(answers along the bottom of the sheet)

Page 12

(answers along the bottom of the sheet)

Page 13

1. d=1
2. z=2
3. s=5
4. r=-4
5. p=-2
6. x=-3
7. c=4
8. n=2
9. r=-16
10. b=3
11. m=4
12. t=-5
13. a=18
14. q=-12
15. v=20

Page 14

1. s=2
2. r=-4
3. u=5
4. t=1
5. k=3
6. m=1
7. b=-2
8. y=4
9. h=-17.5
10. z=-1.7
11. x=-2.2
12. d=3.5

Page 15

1. No
2. Yes
3. Yes
4. No
5. Yes
6. No
7. No
8. No
9. Yes
10. X=3
11. C=16
12. R=15
13. Z=10
14. S=7.5
15. T=15.4
16. W=2.4
17. Y=12
18. X=3.5

Page 16

1. (-2,2)
2. (4,1)
3. (2,-3)
4. (-1,-2)
5. Domain {-3,-1,2,4}
   Range {-4,0,1,4}

x	y
-3	1
2	4
-1	0
4	-4

Page 17

1. 6.4 feet
2. 10.3 m
3. 20 inches
4. 13.9 km
5. 22.9 yards
6. 14.3 feet

Page 18

1. 8.5 inches
2. 39.1 m
3. 11.2 feet
4. 16.6 yards