

Course 3

Name _____ Class _____ Date _____

Reteaching 1-7

Solving Equations by Multiplying and Dividing

To solve one-step equations:

- ① Use opposite, or inverse, operations to isolate the variable.
- ② Simplify.
- ③ Check by substituting your answer for the variable.

Solve and check each equation.

$$7y = 84$$

$$\frac{7y}{7} = \frac{84}{7}$$

$$y = 12$$

Check: $7y = 84$

$$7 \cdot 12 \stackrel{?}{=} 84$$

$$84 = 84 \checkmark$$

← Divide each side by 7.

← Simplify.

$$\frac{w}{5} = 20$$

$$5 \cdot \frac{w}{5} = 5 \cdot 20$$

$$w = 100$$

Check: $\frac{w}{5} = 20$

$$\frac{100}{5} \stackrel{?}{=} 20$$

$$20 = 20 \checkmark$$

← Multiply each side by 5.

← Simplify.

Show your steps to solve each equation. Then check.

1. $3x = 18$

$$\frac{3x}{3} = \frac{18}{3}$$

$$x = 6$$

Check: $3x = 18$

$$3 \cdot \square \stackrel{?}{=} 18$$

$$\square = 18$$

2. $\frac{y}{-5} = -13$

$$\frac{y}{-5} \cdot \square = -13 \cdot \square$$

$$y = \square$$

Check: $\frac{y}{-5} = -13$

$$\frac{\square}{-5} \stackrel{?}{=} -13$$

$$\square = -13$$

3. $y \cdot 8 = 24$

Check: $y \cdot 8 = 24$

Solve.

4. $-16 = -8x$

$$x = \underline{\hspace{2cm}}$$

5. $\frac{b}{0.4} = 1.6$

$$b = \underline{\hspace{2cm}}$$

6. $7.5 = 1.5c$

$$c = \underline{\hspace{2cm}}$$

7. $\frac{b}{17} = -3$

$$b = \underline{\hspace{2cm}}$$

8. $9 = -k$

$$k = \underline{\hspace{2cm}}$$

9. $-14m = -70$

$$m = \underline{\hspace{2cm}}$$

10. $-0.4 = \frac{j}{22}$

$$j = \underline{\hspace{2cm}}$$

11. $-13t = -91$

$$t = \underline{\hspace{2cm}}$$

12. $4.5x = 27$

$$x = \underline{\hspace{2cm}}$$

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Reteaching 1-2

Exponents and Order of Operations

OBJECTIVE: Using the order of operations

MATERIALS: Three index cards or small pieces of paper

Review the order of operations to help you with this activity.

Order of Operations

1. Perform any operations inside grouping symbols.
2. Simplify any term with exponents.
3. Multiply and divide in order from left to right.
4. Add and subtract in order from left to right.

Example

Write + on the first index card, - on the second card, and × on the third card. Shuffle the cards and place them face down on your desk. Randomly pick cards to fill in the blanks with operation signs. Once you have filled in the operation signs, simplify the expression.

6 ___ (9 ___ 7) ___ 8 ← Pick cards to fill in the blanks with operation signs.

$6 \times (9 - 7) + 8$ ← Subtract 7 from 9 inside the grouping symbols.

$6 \times 2 + 8$ ← Do multiplication and division first. Multiply 6 by 2.

12 + 8 ← Do addition and subtraction last. Add 12 and 8 to get the answer.

20 ← The answer is 20.

Exercises

Randomly pick cards to fill in the operation symbols of the following expressions. Simplify the expressions.

1. $7 _ 5 _ 1$

2. $(3 _ 9) _ 4$

3. $8 _ 2 _ (5 _ 10)$

4. $(3 _ 7 _ 6) _ 1$

Simplify each expression.

5. $(5 \cdot 3) - 18$

6. $5 \cdot (3 - 18)$

7. $2 \cdot (27 - 13 \cdot 2)$

8. $2 \cdot 27 - 13 \cdot 2$

9. $18 \div (9 - 15 \div 5)$

10. $18 \div 9 - 15 \div 5$

11. $2 \cdot 8 - 6^2$

12. $2 \cdot (8 - 6^2)$

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Reteaching 2-1

Adding Rational Numbers

OBJECTIVE: Adding integers and decimals **MATERIALS:** None

Review the following addition rules.

- To add two numbers with the same sign, *add* their absolute values. The sum has the same sign as the numbers.
- To add two numbers with different signs, find the *difference* of their absolute values. The sum has the same sign as the number with the greater absolute value.

Example

The following example shows you step by step how to add two numbers with different signs.

$$\begin{array}{l}
 -6 + 2 \\
 6 - 2 \quad \longleftarrow \text{Find the difference of their absolute values.} \\
 4 \quad \longleftarrow \text{Subtract.} \\
 -4 \quad \longleftarrow \text{Since } -6 \text{ has the greater absolute value, the answer takes} \\
 \quad \quad \quad \text{the negative sign.}
 \end{array}$$

Exercises

Simplify. Be sure to check the sign of your answer.

- | | | | |
|--------------------|---------------------|---------------------|------------------|
| 1. $-3 + (-4)$ | 2. $12 + 5$ | 3. $-5 + 8$ | 4. $-8 + (-2)$ |
| 5. $-2 + (-3)$ | 6. $9 + (-12)$ | 7. $-3 + 5$ | 8. $-4 + 3$ |
| 9. $-2.3 + (-1.5)$ | 10. $4.5 + 3.1$ | 11. $-5.1 + 2.8$ | 12. $13.9 + 7.3$ |
| 13. $1.3 + (-1.1)$ | 14. $-3.6 + (-6.7)$ | 15. $1.4 + (-21.4)$ | 16. $-9.8 + 3.5$ |

Evaluate each expression for $a = 5$ and $b = -4$.

- | | | | |
|-----------------|--------------|-------------|----------------|
| 17. $-a + (-b)$ | 18. $-a + b$ | 19. $a + b$ | 20. $a + (-b)$ |
|-----------------|--------------|-------------|----------------|

Evaluate each expression for $h = 3.4$.

- | | | | |
|---------------|----------------|------------------|-------------------|
| 21. $2.5 + h$ | 22. $-2.5 + h$ | 23. $2.5 + (-h)$ | 24. $-2.5 + (-h)$ |
| 25. $h + 7.1$ | 26. $-h + 7.1$ | 27. $h + (-7.1)$ | 28. $-h + (-7.1)$ |

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Reteaching 2-2

Subtracting Rational Numbers

OBJECTIVE: Subtracting integers and decimals

MATERIALS: None

Review the following subtraction rules.

- To subtract a number, rewrite the problem to add the opposite of the number.
- Follow the rules for addition of numbers.

Example

The following example shows you step by step how to subtract two numbers.

$$\begin{array}{l}
 5 - 11 \\
 5 + (-11) \leftarrow \text{Rewrite the problem to add the opposite of the number.} \\
 11 - 5 \leftarrow \text{Find the difference of their absolute values.} \\
 6 \leftarrow \text{Subtract.} \\
 -6 \leftarrow \text{Since } -11 \text{ has the greater absolute value, the answer takes the} \\
 \text{negative sign.}
 \end{array}$$

Exercises

Simplify. Be sure to check the sign of your answer.

- | | | | |
|--------------------|-------------------|---------------------|------------------|
| 1. $7 - 12$ | 2. $6 - 9$ | 3. $4 - (-5)$ | 4. $7 - (-3)$ |
| 5. $-6 - 4$ | 6. $-7 - 2$ | 7. $-5 - (-4)$ | 8. $-3 - (-10)$ |
| 9. $-3.1 - (-5.4)$ | 10. $8.3 - 5.1$ | 11. $-7.8 - 6.6$ | 12. $-4.8 - 2.5$ |
| 13. $8.7 - 2.5$ | 14. $-4.6 - (-3)$ | 15. $-9.3 - (-8.1)$ | 16. $-9.9 - 3.8$ |

Evaluate each expression for $a = -4$ and $b = 3$.

- | | | | |
|--------------|--------------|----------------|------------------|
| 17. $a - b$ | 18. $-a - b$ | 19. $a - (-b)$ | 20. $-a - (-b)$ |
| 21. $3b - a$ | 22. $- b $ | 23. $ a - b $ | 24. $ a - 3 b $ |

Subtract. (Hint: Subtract corresponding elements.)

25. $\begin{bmatrix} -3 & -2 \\ 0 & 1 \end{bmatrix} - \begin{bmatrix} 3 & 1 \\ 2 & 4 \end{bmatrix}$

26. $\begin{bmatrix} \frac{1}{2} \\ -1 \end{bmatrix} - \begin{bmatrix} \frac{2}{3} \\ -3 \end{bmatrix}$

Reteaching 2-3

Multiplying and Dividing Rational Numbers

OBJECTIVE: Multiplying and dividing integers and decimals

MATERIALS: A number cube

Review the following multiplication and division rules.

- The product or quotient of two positive numbers is always positive.
- The product or quotient of two negative numbers is always positive.
- The product or quotient of a positive and a negative number is always negative.

Example

Roll the number cube to determine the signs of the numbers in the following example. If you roll an even number (2, 4, or 6), write + in the blank to make the number positive. If you roll an odd number (1, 3, or 5), write a - in the blank to make the number negative. Decide what sign the answer will have before you calculate the answer.

____ $56 \div$ ____ 7 ← **Roll the number cube to fill in the blanks.**

$-56 \div (+7)$ ← **Suppose your first roll was a 3, so 56 is negative. Suppose your second roll was 6, so 7 is positive. Now that you have the signs of the numbers, decide what the sign of the answer will be. Dividing a negative number by a positive number results in a negative number.**

-8 ← **The answer is -8 .**

Exercises

Roll the number cube to determine the signs of the numbers in the following exercises. Remember to decide what sign the answer will have before you calculate the answer.

- | | |
|------------------------------|-------------------------------|
| 1. ____ $20 \cdot$ ____ 8 | 2. ____ $3.2 \cdot$ ____ 10 |
| 3. ____ $27 \div$ ____ 3 | 4. ____ $14 \cdot$ ____ 4 |
| 5. ____ $120 \div$ ____ 12 | 6. ____ $45 \div$ ____ 9 |
| 7. ____ $1.4 \cdot$ ____ 3 | 8. ____ $96 \div$ ____ 8 |

Simplify each expression.

- | | | |
|--------------|--------------|---------------|
| 9. $4(-2)$ | 10. $-6(12)$ | 11. $-2(-5)$ |
| 12. $-8(11)$ | 13. $(-7)^2$ | 14. $-10(-5)$ |

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Reteaching 2-4

The Distributive Property

OBJECTIVE: Using the Distributive Property

MATERIALS: None

You can compare the Distributive Property to distributing paper to the class. Just as you distribute a piece of paper to each person in the class, you distribute the number immediately outside the parentheses to each term inside the parentheses by multiplying.

Example

Simplify $3(2x + 3)$ by using the Distributive Property.

$$3(2x + 3)$$

← Draw arrows to show that 3 is distributed to the $2x$ and to the 3.

$$3(2x) + 3(3)$$

← Use the Distributive Property.

$$6x + 9$$

← Simplify.

Example

Simplify $-(4x + 7)$ by using the Distributive Property.

$$-1(4x + 7)$$

← Rewrite using the Multiplication Property of -1 .

$$-1(4x + 7)$$

← Draw arrows to show that -1 is distributed to the $4x$ and to the 7.

$$-1(4x) + (-1)(7)$$

← Use the Distributive Property.

$$-4x - 7$$

← Simplify.

Exercises

Draw arrows to show the Distributive Property. Then simplify each expression.

1. $2(5x + 4)$

2. $\frac{1}{4}(12x - 8)$

3. $4(7x - 3)$

4. $5(4 + 2x)$

5. $6(5 - 3x)$

6. $0.1(30x - 50)$

7. $(2x - 4)3$

8. $(3x + 4)7$

9. $8(x + y)$

10. $-(4x + 3)$

11. $-(-2x + 1)$

12. $-(-6x - 3)$

13. $-(14x - 3)$

14. $-(-7x - 1)$

15. $-(3x + 4)$

Reteaching 3-1

Solving Two-Step Equations

OBJECTIVE: Solve two-step equations
Use deductive reasoning

MATERIALS: None

The order of operations tells you to do multiplication and division before you do addition and subtraction. However, when solving two-step equations, you must first do any addition or subtraction necessary to isolate the variable on one side of the equation. Start by asking yourself, "Has any adding or subtracting been done to the variable?" If the answer is yes, perform the inverse operation. Then repeat this step for multiplication and division.

Example

Write the steps and solve the equation.

$$3x + 4 = 10 \quad \leftarrow \text{Think: Is any adding or subtracting being done to the variable? 4 is being added. What is the inverse of adding 4?}$$

$$3x + 4 - 4 = 10 - 4 \quad \leftarrow \text{Subtract 4 from each side.}$$

$$3x = 6 \quad \leftarrow \text{Simplify.}$$

$$3x = 6 \quad \leftarrow \text{Think: Is any multiplying or dividing being done to the variable? It is being multiplied by 3. What is the inverse of multiplying by 3?}$$

$$\frac{3x}{3} = \frac{6}{3} \quad \leftarrow \text{Divide each side by 3.}$$

$$x = 2 \quad \leftarrow \text{Simplify.}$$

Exercises

Fill in the blanks to complete the steps and solve the equation.

$$1. \quad \frac{s}{6} - 5 = -8 \quad \leftarrow \text{Think: Is any adding or subtracting being done to the variable? _____ is being _____. What is the _____ of subtracting 5?}$$

$$\frac{s}{6} - 5 + 5 = -8 + 5 \quad \leftarrow \text{_____ 5 to _____ side.}$$

$$\frac{s}{6} = -3 \quad \leftarrow \text{Simplify.}$$

$$\frac{s}{6} = -3 \quad \leftarrow \text{Think: Is any multiplying or dividing being done to the variable? It is being _____ by 6. What is the inverse of _____ by 6?}$$

$$6\left(\frac{s}{6}\right) = 6(-3) \quad \leftarrow \text{Multiply each _____ by _____ .}$$

$$s = \text{_____} \quad \leftarrow \text{Simplify.}$$

Solve each equation.

2. $3x - 4 = 8$

3. $\frac{x}{4} + 3 = 10$

4. $4y + 5 = -7$

Reteaching 3-2

Solving Multi-Step Equations

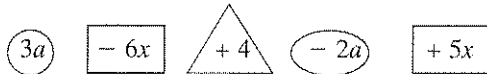
OBJECTIVE: Combine like terms

MATERIALS: None

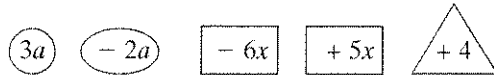
Example

Simplify $3a - 6x + 4 - 2a + 5x$ by combining like terms.

Ring each term that has the variable a . Draw a rectangle around each term that has the variable x , and a triangle around each constant term.



Group the like terms by reordering the terms so that all matching shapes are together.



Combine like terms by adding coefficients.

$$a - x + 4$$

Exercises

Draw circles, rectangles, and triangles to help you combine like terms and simplify each expression.

1. $3a + 5 - x + 7x - 2a$

2. $2x - 5 + 3a - 5x + 10a$

3. $7b - b - x + 5 - 2x - 7b$

4. $-6m + 3t + 4 - 4m - 2t$

5. $2r + 3s - 5r$

6. $4 - p - 2x + 3p - 7x$

7. $3k - 2x + 6k + 5$

8. $3 + 2a - 7x + 2.5 + 5x$

9. $4a + 3 - 2y - 5a - 7 + 4y$

10. $c - 3 + 2x - 6c + 4x$

Simplify each expression.

11. $2b + 2 - x + 4$

12. $-5 - c - 4 + 3c$

13. $\frac{1}{2}a - 5 - \frac{1}{2}a$

14. $1.5y - 1.5 + 0.5y + 0.5z + 1$

15. $6a + 3b - 2a + 4$

16. $\frac{2}{3}a + 5 - \frac{1}{3}a - 7$

17. $-8 + x - 2 + 3x$

18. $x + y - z + 4x - 5y + 2z$

19. $\frac{7}{8}x + 5 - \frac{3}{8}x - 4$

20. $10y - 3x + 5 - 8 - 2y$

Reteaching 3-3

Equations With Variables on Both Sides

OBJECTIVE: Solve equations with variables on both sides

MATERIALS: None

To solve equations with variables on both sides, use these strategies:

- Rewrite the equation until all terms with variables are combined on one side and all constant terms are combined on the other side. As you rewrite the equation, use inverse operations and the equality properties.
- When you perform an operation on one side, you must do the same on the other.

Example

Solve $5a - 12 = 3a + 7$.

$$\textcircled{5a} - 12 = \textcircled{3a} + 7$$

$$5a \boxed{- 12} = 3a \boxed{+ 7}$$

← Circle all the terms with variables.

← Put rectangles around all constant terms. Plan steps to collect variable terms on one side and constant terms on the other.

$$5a - 12 - 3a = 3a + 7 - 3a$$

← To get variables on the same side, subtract $3a$ from each side.

$$2a - 12 = 7$$

← Combine like terms.

$$2a - 12 + 12 = 7 + 12$$

← To get constants on the other side, add 12 to each side.

$$2a = 19$$

← Combine like terms.

$$a = 9.5$$

← To undo multiplication by 2, divide each side by 2.

Check $5(9.5) - 12 \stackrel{?}{=} 3(9.5) + 7$

$$47.5 - 12 \stackrel{?}{=} 28.5 + 7$$

$$35.5 = 35.5 \checkmark$$

In what other ways could you solve for a ? You could add 12 to each side, then subtract $3a$ from each side. Or, you could subtract $5a$ from each side, then subtract 7 from each side.

Exercises

Fill in the blanks to show a plan to solve each equation.

1. $9x + 4 = 6x - 11$ _____ $6x$ _____ each side; subtract _____ from each side.

2. $4b - 13 = 7b - 28$ Subtract _____ from each side; _____ 28 _____ each side.

Use circles and rectangles to mark the variables and constant terms. Write a plan that tells the steps you would use and then solve each equation.

3. $7c - 4 = 9c - 11$

4. $3 - 4d = 6d - 17$

5. $5e + 13 = 7e - 21$

Solve and check each equation.

6. $8f - 12 = 5f + 12$

7. $3k + 5 = 2(k + 1)$

8. $9 - x = 3x + 1$

Reteaching 3-4

Ratio and Proportion

OBJECTIVE: Solve proportions

MATERIALS: None

An equation that states that two ratios are equal is called a proportion. In a proportion, the cross products are equal.

Example

Use cross products to find out if the proportion $\frac{2}{7} = \frac{10}{40}$ is true.

$$\frac{2}{7} = \frac{10}{40}$$

$$2 \cdot 40 = 7 \cdot 10 \quad \leftarrow \text{Write cross products.}$$

$$80 = 70 \quad \leftarrow \text{Simplify.}$$

$$80 \neq 70 \quad \leftarrow \text{Proportion is not true since 80 does not equal 70.}$$

Use cross products to write and solve equations involving proportions.

Solve: $\frac{5}{6} = \frac{25}{x}$

$$\frac{5}{6} = \frac{25}{x} \quad \leftarrow \text{The cross products are } 5x \text{ and } 6 \cdot 25 \text{ or } 150.$$

$$5x = 6 \cdot 25 \quad \leftarrow \text{Set cross products equal to each other.}$$

$$5x = 150 \quad \leftarrow \text{Simplify.}$$

$$\frac{5x}{5} = \frac{150}{5} \quad \leftarrow \text{Use the Division Property of Equality.}$$

$$x = 30 \quad \leftarrow \text{Simplify.}$$

Exercises

Determine if the proportions are true. (Hint: the cross products should be equal.)

1. $\frac{6}{10} = \frac{12}{20}$

2. $\frac{4}{5} = \frac{7}{8}$

3. $\frac{33}{22} = \frac{24}{16}$

Solve each proportion.

4. $\frac{x}{5} = \frac{2}{10}$

5. $\frac{9}{180} = \frac{n}{60}$

6. $\frac{2}{x} = \frac{8}{36}$

7. $\frac{2}{6} = \frac{4}{x}$

8. $\frac{30}{125} = \frac{n}{100}$

9. $\frac{3}{18} = \frac{t}{6}$

10. $\frac{t}{5} = \frac{3}{5}$

11. $\frac{28}{8} = \frac{7}{x}$

12. $\frac{9}{n} = \frac{18}{2}$

Reteaching 3-9

The Pythagorean Theorem

OBJECTIVE: Solve problems using the Pythagorean Theorem

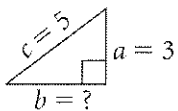
MATERIALS: None

As you solve problems using the Pythagorean Theorem, keep in mind these ideas.

- In the formula, a and b represent the *legs* of the right triangle.
- The *hypotenuse* is represented by c . This is the side *opposite* the right angle.
- Drawing a picture of the triangle each time is a good strategy for making sure you use the formula correctly.
- Writing a , b , and c on your picture with the values from your problem gives you a visual representation of your problem before you solve it.

Example

Find the length of the missing side: $a = 3$, $b = ?$, $c = 5$.



← Draw a triangle and include the values from the problem for a , b , and c .

$a^2 + b^2 = c^2$ ← Use the Pythagorean Theorem.

$3^2 + b^2 = 5^2$ ← Substitute 3 for a and 5 for c .

$9 + b^2 = 25$ ← Simplify.

$b^2 = 16$ ← Subtract 9 from each side.

$\sqrt{b^2} = \sqrt{16}$ ← Take the square root of each side.

$b = 4$ ← Use a calculator if necessary.

Exercises

Draw and label a triangle. Find the length of the missing side to the nearest tenth.

1. $a = 6$, $b = ?$, $c = 10$

2. $a = ?$, $b = 4$, $c = 10$

3. $a = 5$, $b = 12$, $c = ?$

Find the length of the missing side to the nearest tenth.

4. $a = ?$, $b = 5$, $c = 7$

5. $a = 4$, $b = ?$, $c = 9$

6. $a = 7.5$, $b = 4$, $c = ?$

7. $a = 5$, $b = ?$, $c = 12$

8. $a = 8$, $b = ?$, $c = 17$

9. $a = 6$, $b = 8$, $c = ?$

10. $a = ?$, $b = 24$, $c = 25$

11. $a = 4$, $b = 3$, $c = ?$

12. $a = 9$, $b = ?$, $c = 15$

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Reteaching 4-2

Solving Inequalities Using Addition and Subtraction

OBJECTIVE: Using addition and subtraction to solve one-step inequalities

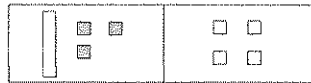
MATERIALS: Tiles

- To solve one-step inequalities, use the same strategies you use to solve equations. Apply the Addition and Subtraction Properties of Inequality.
- When you add or subtract the same quantity from each side of an inequality, the direction of the inequality symbol stays the same.

Example

Using tiles, solve the inequality $x - 3 < 4$.

a. Model the inequality with tiles.



$$x - 3 < 4$$

b. Add or subtract the same quantity on each side to get the variable alone on one side of the inequality symbol.



$$x - 3 + 3 < 4 + 3$$

For this example, add 3 to each side.

c. Simplify by removing zero pairs.



$$x < 7$$

d. Write the solution to the inequality.

Note that even though you are adding the same quantity to each side of the inequality, the direction of the inequality symbol stays the same.

Exercises

Use files and steps a–d to model and solve each inequality.

1. $y - 2 < 4$

2. $x - 4 < 1$

3. $7 < w + 2$

4. $x - 6 > 10$

5. $10 \leq y + 8$

6. $a - 1 > 3$

7. $4 + h \leq 7$

8. $s - 3 > 2$

9. $b + 3 < 8$

Solve.

10. $x - 9 < 6$

11. $a - 7 > 5$

12. $b - 4 < 10$

13. $c + 5 > 7$

14. $6 + d < 11$

15. $f - 4 > 15$

16. The band must earn at least \$75 for a trip. Band members already earned \$35. Write and solve an inequality to find how much money they still need to earn.

Reteaching 4-3

Solving Inequalities Using Multiplication and Division

OBJECTIVE: Using multiplication and division to solve one-step inequalities

MATERIALS: Tiles, an index card or piece of paper with $<$ written on it

Example

Use tiles and the card to compare quantities as shown in these steps.

$$2 \text{ _____ } 3$$



← Model the quantities with tiles and place your card to show how the quantities compare.

$$-2(2) \text{ _____ } -2(3)$$

← Multiply each quantity by -2 .

$$-4 \text{ _____ } -6$$

← Write the results.



← Model the new quantities with tiles and place your card to show how the new quantities compare. Notice that you must rotate the card to make the new statement true.

What happens to the direction of the inequality symbol when you multiply or divide an inequality by a negative number? The direction of the inequality symbol reverses.

Exercises

Model both lines of each exercise with tiles. Use your card to compare the quantities. Then fill in the blanks by writing $<$ or $>$.

1. $2 \text{ _____ } 4$

2. $-3 \text{ _____ } -2$

3. $4 \text{ _____ } -3$

$-2(2) \text{ _____ } -2(4)$

$-3(-3) \text{ _____ } -3(-2)$

$\frac{4}{-2} \text{ _____ } \frac{-3}{-2}$

4. $3 \text{ _____ } -1$

5. $-2 \text{ _____ } 2$

6. $-1 \text{ _____ } -3$

$-1(3) \text{ _____ } -1(-1)$

$\frac{-2}{-4} \text{ _____ } \frac{2}{-4}$

$-3(-1) \text{ _____ } -3(-3)$

Solve and check.

7. $2.5a < 15$

8. $-3b > 21$

9. $6c < 24$

10. $\frac{x}{7} < -2$

11. $-\frac{y}{6} < \frac{2}{3}$

12. $8f > 56$

13. $-4.2d \geq 10.5$

14. $-\frac{2}{3}m \leq 10$

15. $-1.7x > -34$

16. $\frac{n}{8} \leq -2.5$

17. $-1.5k < 2.4$

18. $\frac{3}{5}p \geq -9$

19. $4t > -14$

20. $\frac{z}{15} > -\frac{2}{3}$

21. $-\frac{1}{2}w \leq -3.6$

Reteaching 6-1

Rate of Change and Slope

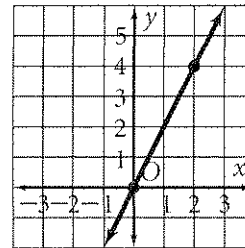
OBJECTIVE: Calculating the slope of a line

MATERIALS: None

Example

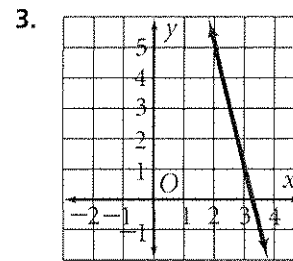
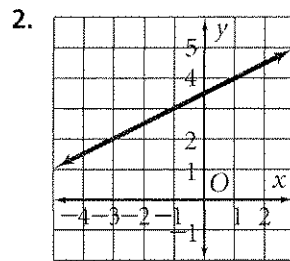
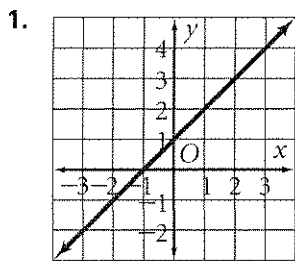
Calculate the slope of the line shown in the graph.

- Pick any two points on the line. Write their coordinates. Underline the x -coordinates and circle the y -coordinates. This example uses $(\underline{0}, \textcircled{0})$, $(\underline{2}, \textcircled{4})$.
- The difference of y -coordinates shows the vertical change or *rise*. Find the rise of the line by subtracting the y -coordinates.
vertical change = rise = $4 - 0 = 4$
- The difference of x -coordinates shows the horizontal change or *run*. Find the run of the line by subtracting the x -coordinates. Be sure to subtract the x -coordinates in the same order as the y -coordinates.
horizontal change = run = $2 - 0 = 2$
- Find the slope of the line through the two points by forming the ratio of rise to run.
slope = $\frac{\text{rise}}{\text{run}} = \frac{4}{2}$ or 2

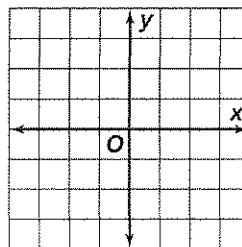


Exercises

Use steps a–d from the example to find the slope of each line.



- Draw a horizontal line. Find the slope of the line.
- Draw a vertical line. Find the slope of the line.



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Reteaching 6-2

Slope-Intercept Form

OBJECTIVE: Using the slope and y-intercept to draw graphs and write equations

MATERIALS: Graph paper, counters, ten index cards

Write these numbers on the index cards, one number to a card: $1, -1, 2, -2, \frac{1}{2}, -\frac{1}{2}, 3, -3, \frac{1}{3}, -\frac{1}{3}$. These numbers represent different slopes.

- Draw a coordinate plane on the graph paper.
- Put a counter at any integer on the y-axis. Choose one of the index cards.
- Use the y-intercept shown by the counter and the slope shown on the card to write the equation of a line.
- Draw the graph of that line.

Example

Place the counter at -4 . Choose the index card with the number 2 .

$$y = mx + b$$

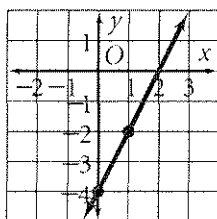
← Write the slope-intercept form of the equation of a straight line. The counter shows that $b = -4$. The first card gives a slope of 2 , so $m = 2$.

$$y = 2x + (-4)$$

← Substitute the values shown by the counter and the card.

$$y = 2x - 4$$

← Write the equation of the line in simplified form.



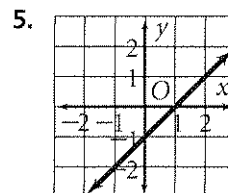
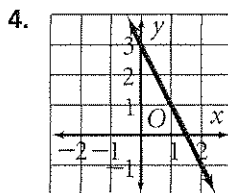
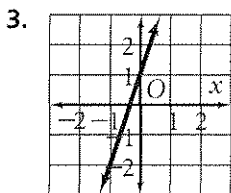
← Slope = $\frac{\text{vertical change}}{\text{horizontal change}}$, so rewrite 2 as $\frac{2}{1}$. Starting at the counter, move 2 units up and 1 unit to the right and place a second counter. Draw a straight line joining the two points for the graph of $y = 2x - 4$.

Exercises

Place the counter. Then choose an index card.

1. Write the equation of the line.
2. Draw the graph.

Write an equation for each line.



Reteaching 8-3

Multiplication Properties of Exponents

OBJECTIVE: Multiplying powers with the same base
MATERIALS: None

- A power is an expression in the form a^n .
- To multiply powers with the same base, add the exponents
 $a^m \cdot a^n = a^{m+n}$

Example

Simplify $4^6 \cdot 4^3$.

$$4^6 \cdot 4^3$$

$$= 4^{6+3}$$

$$= 4^9$$

← Rewrite as one base with the exponents added.

← Add the exponents.

So $4^6 \cdot 4^3 = 4^9$.

Exercises

Complete each equation.

- | | | |
|----------------------------------|--|---|
| 1. $8^2 \cdot 8^3 = 8^{\square}$ | 2. $2^{\square} \cdot 2^6 = 2^9$ | 3. $a^{12} \cdot a^{\square} = a^{15}$ |
| 4. $x^{\square} \cdot x^5 = x^6$ | 5. $b^{-4} \cdot b^3 = b^{\square}$ | 6. $6^4 \cdot 6^{\square} = 6^2$ |
| 7. $3^4 \cdot 3^8 = 3^{\square}$ | 8. $c^{\square} \cdot c^{-7} = c^{11}$ | 9. $10^{-6} \cdot 10^{-3} = 10^{\square}$ |

Simplify each expression.

- | | | |
|----------------------------------|---|--|
| 10. $3x^2 \cdot 4x \cdot 2x^3$ | 11. $m^2 \cdot 3m^4 \cdot 6a \cdot a^{-3}$ | 12. $p^3q^{-1} \cdot p^2q^{-8}$ |
| 13. $5x^2 \cdot 3x \cdot 8x^4$ | 14. $x^2 \cdot y^5 \cdot 8x^5 \cdot y^{-2}$ | 15. $7y^2 \cdot 3x^2 \cdot 9$ |
| 16. $2y^2 \cdot 3y^2 \cdot 4y^5$ | 17. $x^4 \cdot x^{-5} \cdot x^4$ | 18. $x^{12} \cdot x^{-8} \cdot y^{-2} \cdot y^3$ |
| 19. $6a^2 \cdot b \cdot 2a^{-1}$ | 20. $r^6 \cdot s^{-3} \cdot r^{-2} \cdot s$ | 21. $3p^{-2} \cdot q^3 \cdot p^3 \cdot q^{-2}$ |

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Reteaching 8-4

More Multiplication Properties of Exponents

OBJECTIVE: Using two more multiplication properties of exponents

MATERIALS: None

- To raise a power to a power, multiply the exponents.
- Every number and variable inside parentheses is being raised to the power to the right of the parentheses.

Example

Simplify $(4x^3)^2$.

$$(4x^3)^2$$

$$(4^1x^3)^2$$

$$(4^1x^3)^2$$

$$4^2 \cdot 1x^2 \cdot 3$$

$$4^2x^6$$

$$16x^6$$

← Rewrite each number and variable with an exponent.

← Draw arrows from the exponent outside the parentheses to each exponent inside the parentheses.

← Rewrite, showing the exponents to be multiplied.

← Multiply the exponents.

← Simplify.

Exercises

Draw arrows from the exponent outside the parentheses to each exponent inside the parentheses. Then simplify each expression.

1. $(5^2)^4$

2. $(a^5)^4$

3. $(2^3)^2$

4. $(4x)^3$

5. $(7a^4)^2$

6. $(3g^2)^3$

7. $(g^2h^3)^5$

8. $(s^6)^2$

Simplify each expression.

9. $(x^2y^4)^3$

10. $(3r^5)^0$

11. $g^9 \cdot g^{-7}$

12. $(c^4)^7$

13. $(3.2)^5 \cdot (3.2)^{-5}$

14. $(8ab^6)^3$

15. $(x^2y^3)^2$

16. $(x^7)^2$

17. $(3x^2y)^2$

18. $(-2x^2)^3$

19. $(x^3y^4)^3$

20. $(3x^2y)^3$

21. $(-4x^2y^3)^3$

22. $(xyz)^0$

23. $x^5 \cdot x^{-7}$

Reteaching 8-5

Division Properties of Exponents

OBJECTIVE: Applying division properties of exponents

MATERIALS: None

To divide powers with the same base, subtract exponents.

Example

Simplify $\frac{4^3}{4^5}$.

Method 1

$$\frac{4 \cdot 4 \cdot 4}{4 \cdot 4 \cdot 4 \cdot 4 \cdot 4}$$

← Expand the numerator and the denominator.

$$\frac{\cancel{4} \cdot \cancel{4} \cdot \cancel{4}}{\cancel{4} \cdot \cancel{4} \cdot \cancel{4} \cdot 4 \cdot 4}$$

← Draw lines through terms that are in both the numerator and the denominator.

$$\frac{1}{4 \cdot 4}$$

← Cancel.

$$\frac{1}{4^2} \text{ or } 4^{-2}$$

← Rewrite with exponents.

Method 2

$$3 - 5 = -2$$

← Subtract the exponents from the original equation. Compare this to the exponent in the first answer.

$$\text{So } \frac{4^3}{4^5} = 4^{3-5} = 4^{-2}.$$

← Subtract the exponents from the original equation. Compare this to the exponent in the first answer.

$$\frac{1}{4^2}$$

← Write with positive exponents.

To raise a quotient to a power use repeated multiplication.

Exercises

Use both methods shown in the example to simplify each expression. Use only positive exponents.

1. $\frac{z^6}{z^3}$

2. $\left(\frac{3^2}{4}\right)^3$

3. $\frac{m^{-3}}{m^{-4}}$

4. $\frac{5^3}{5^4}$

5. $\left(\frac{b^7}{b^5}\right)^3$

6. $\frac{5a^5}{15a^2}$

7. $\frac{2^2}{2^5}$

8. $\frac{d^8}{d^3}$

9. $\frac{x^7}{x^5}$

10. $\left(\frac{10^8}{10^2}\right)^3$

11. $\frac{14x^{11}}{7x^{10}}$

12. $\frac{8x^9}{12x^6}$

13. $\frac{x^{12}}{x^5}$

14. $\frac{6x^4}{4x^2}$

15. $\frac{x^3}{x^8}$

16. $\left(\frac{x^5}{x^3}\right)^4$

Reteaching 9-1

Adding and Subtracting Polynomials

OBJECTIVE: Adding and subtracting polynomials

MATERIALS: Tiles

Example

Using tiles, simplify $(2a^2 + 4a - 6) + (a^2 - 2a + 4)$.

← Use tiles to represent the terms of $2a^2 + 4a - 6$.

← Use tiles to represent the terms of $a^2 - 2a + 4$. Align like terms vertically with the tiles in the row above.

← Remove zero pairs.

← Count the remaining tiles.

← **Solution**

$3a^2 + 2a - 2$

Exercises

Use tiles to simplify each sum or difference.

1. $(4x - 5y + 3) + (2x + 7y - 7)$
2. $(3a^2 + 5a - 6) - (2a^2 - 3a - 9)$
3. $(6x^2 - 3x + 2) + (3x^2 + x - 5)$
4. $(4x^2 + 2x - 7) - (-3x^2 - 6x + 2)$
5. $(6z^3 - 5z^2 + 1) + (8z^3 + 7z^2 - 4)$
6. $(4x^2 + 2) - (-2x^2 + 5) + (x^2 + 4)$

Simplify. Write each answer in standard form.

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

Reteaching 9-2

Multiplying and Factoring

OBJECTIVE: Factoring a monomial from a polynomial

MATERIALS: None

- To factor a polynomial you must find the **Greatest Common Factor**. The **GCF** is the greatest factor that divides evenly into each term.

Example

Factor $18x^3 + 6x^2 - 12x$.

a. First find the GCF.

$$18x^3 = \textcircled{2} \textcircled{3} 3 \textcircled{x} x x$$

$$6x^2 = \textcircled{2} \textcircled{3} x \textcircled{x}$$

$$12x = \textcircled{2} 2 \textcircled{3} \textcircled{x}$$

$$2 \cdot 3 \cdot x = 6x$$

← List the factors of each term. Circle the factors common to all terms.

← Multiply the circled terms together to get the GCF.

b. Factor out the GCF from each term.

$$\frac{18x^3}{6x} = 3x^2$$

$$\frac{6x^2}{6x} = x$$

$$\frac{-12x}{6x} = -2$$

$$6x(3x^2 + x - 2)$$

← Divide each term by the GCF.

← Solution

Exercises

Use the GCF to factor each polynomial.

- | | | |
|-------------------------|---------------------------|-------------------------|
| 1. $21x - 14$ | 2. $5y^3 - 10y^2 + 15y$ | 3. $x^3 + 3x^2 + x$ |
| 4. $3x^2 + 6x^4$ | 5. $18x^3 - 6x^2 + 24x$ | 6. $z^3 - 3z^2$ |
| 7. $12k^3 + 6k^2 - 18k$ | 8. $6x^3 - 4x^2 + 8x$ | 9. $8p^4 + 12p^2 + 4p$ |
| 10. $36x^2 - 18x$ | 11. $6x^2 + 18x$ | 12. $6x^3 - 2x^2 + 8x$ |
| 13. $6x^3 + 6x^2 - 6x$ | 14. $5x^3 + 5x^2$ | 15. $3x^2 + 6x + 3$ |
| 16. $10x^2 + 35x$ | 17. $8x^5 + 16x^4 - 8x^3$ | 18. $9x^3 - 6x^2 - 15x$ |

Reteaching 9-3

Multiplying Binomials

OBJECTIVE: Multiplying binomials

MATERIALS: None

To multiply two binomials, follow these steps:

- Multiply each term in one binomial by each term of the other binomial. Drawing arrows as a visual reminder of what to do is a helpful technique.
- Circle like terms and combine.

Example

Find the product $(x + 7)(x + 2)$.

$$(x + 7)(x + 2)$$

← Draw arrows from the first term in the first binomial to both terms in the second binomial.

$$x^2 + 2x$$

← Multiply each term of the second binomial by x .

$$(x + 7)(x + 2)$$

← Draw arrows from the second term in the first binomial to both terms in the second binomial.

$$7x + 14$$

← Multiply each term of the second binomial by 7.

$$x^2 + 2x + 7x + 14$$

← Add the two expressions.

$$x^2 + \textcircled{2x} + \textcircled{7x} + 14$$

← Circle like terms and combine.

$$x^2 + 9x + 14$$

← Solution

Exercises

Use arrows as shown above to simplify each product.

1. $(x + 6)(x - 2)$

2. $(x - 8)(x - 4)$

3. $(x - 3)(x + 9)$

4. $(x + 2)(x - 7)$

5. $(2x + 3)(x + 4)$

6. $(x + 4)(2x + 5)$

Simplify each product.

7. $(7x + 4)(2x - 4)$

8. $(3x + 2)(3x + 2)$

9. $(5x + 1)(x + 1)$

10. $(2x + 1)(x + 1)$

11. $(4x + 1)(2x - 1)$

12. $(3x - 1)(x + 2)$

Reteaching 9-4

Multiplying Special Cases

OBJECTIVE: Finding the square of a binomial and finding the difference of two squares.

MATERIALS: None

Examples

Finding the square of a binomial.

- Remember:
- Square the first term.
 - Double the product of the two terms.
 - Square the last term.
 - Write the sum of your three products.

$(x - 5)^2$	Square the first term:	x^2
	Double $(x)(-5)$:	$2 \cdot (-5x) = -10x$
	Square the last term:	$(-5)^2 = 25$
	Write the sum of your three products:	$x^2 - 10x + 25$

Finding the difference of two squares.

- Remember:
- Square the first term.
 - Square the last term.
 - Write the difference of your first square and your second square.

$(3x - 2)(3x + 2)$	Square the first term:	$(3x)^2 = 9x^2$
	Square the last term:	$(2)^2 = 4$
	Write the difference of your first square and your second square:	$9x^2 - 4$

Exercises

Find each product.

- | | |
|------------------------|------------------------|
| 1. $(x - 7)^2$ | 2. $(x + 1)^2$ |
| 3. $(x - 4)^2$ | 4. $(x - y)^2$ |
| 5. $(2x + 3)^2$ | 6. $(3x - 5)^2$ |
| 7. $(2x + 1)^2$ | 8. $(5x - 4)^2$ |
| 9. $(x + 7)(x - 7)$ | 10. $(x + 8)(x - 8)$ |
| 11. $(x - 3)(x + 3)$ | 12. $(x + y)(x - y)$ |
| 13. $(4x + 3)(4x - 3)$ | 14. $(2x + 5)(2x - 5)$ |
| 15. $(3x + 2)(3x - 2)$ | 16. $(7x - 1)(7x + 1)$ |

Reteaching 9-5

Factoring Trinomials of the Type $x^2 + bx + c$

OBJECTIVE: Factoring trinomials of the type $x^2 + bx + c$

MATERIALS: Tiles

Examples

Factor $x^2 + 6x + 8$.

$(x \quad)(x \quad)$

+1 and +8 -1 and -8

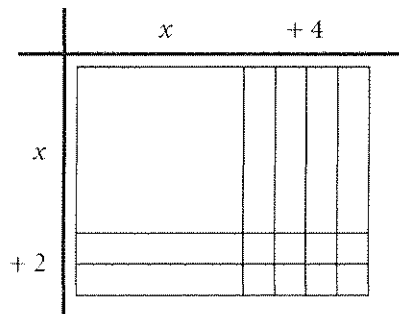
$\textcircled{+2}$ and $\textcircled{+4}$ -2 and -4

$(x + 2)(x + 4)$

← Write factors of x^2 , the first term of the trinomial, at the beginning of each set of parentheses. Note that the coefficient of x^2 is 1.

← List pairs of numbers that are factors of +8, which is the constant term of the trinomial. Choose the pair of factors that add to equal +6, the coefficient of the middle term of the trinomial.

← Write those two factors, with their signs, at the end of each set of parentheses.



← The trinomial $x^2 + 6x + 8$ represents the area of a rectangle with side of length $(x + 4)$ and $(x + 2)$.

Factor $x^2 + 4x - 21$.

$(x \quad)(x \quad)$

-1 and +21 +1 and -21

-3 and +7 +3 and -7

$(x - 3)(x + 7)$

← List pairs of numbers that are factors of -21.

← Choose the pair of factors that add to equal +4.

Exercises

Factor each expression.

- | | | |
|---------------------|----------------------|----------------------|
| 1. $y^2 + 11y + 18$ | 2. $x^2 - 8x + 15$ | 3. $x^2 - 11x + 18$ |
| 4. $y^2 - 5y + 4$ | 5. $x^2 + 6x + 8$ | 6. $y^2 - 8y + 12$ |
| 7. $r^2 + 13r + 12$ | 8. $x^2 - 16x + 39$ | 9. $x^2 - 10x + 16$ |
| 10. $x^2 - x - 2$ | 11. $x^2 - 4x - 32$ | 12. $x^2 - 7x - 18$ |
| 13. $x^2 + 7x + 10$ | 14. $x^2 - 11x + 24$ | 15. $x^2 + 16x + 63$ |