Dear Carver students and parents,

This summer, we encourage you to continue to practice your mathematics at home. Being actively involved in mathematical activities enhances learning.

In preparation for the 2015-2016 school year, students are provided with a summer review packet. This packet focuses on some of the prerequisite concepts and skills necessary for student success in 7th grade advanced mathematics. The packet may be graded at the teacher’s discretion, and may receive extra credit.

While completing the review packet, we recommend that students:

- Complete each problem, and show all steps used to arrive at the final answer.
- Show all work neatly in the actual packet, if it is printed. (Additional lined paper may be added if necessary.)
- If packet is not printed, then make sure to number each page and problem as it appears on the packet. All work must be neatly presented.
- Box your final answers.
- Label answers when necessary.
- Do NOT use a calculator.
- Do not rush! Use time wisely.
- If you are stuck on particular problems, check out one of the math websites posted below. Parents may also be able to help. If you are still having difficulty, circle the problem number and be prepared to ask questions in class in August.

HELPFUL APP:

“Virtual Nerd Mobile”

Requirements: iOS 6.0 or later; compatible with iPhone, iPad, and iPod Touch

Features: Virtual Nerd’s on-screen instructors provide clear and approachable explanations; students can mark “favorite” videos so that they can instantly return to them in the future.

Price: Free

HELPFUL WEBSITES:

http://www.khanacademy.org/
http://www.aplusmath.com
http://funbrain.com
http://aaamath.com
http://math.com

Have a fun and productive summer.

Regards,

G. W. Carver Mathematics Department
Rounding Decimals

Round 8.135 to the nearest tenth.
\[ 8.135 \rightarrow 8.1 \]
less than 5

Round 32.56713 to the nearest hundredth.
\[ 32.56713 \rightarrow 32.57 \]
greater than 5

Round to the nearest whole number.
1. 41.803 = 2. 119.63 = 3. 20.05 =
4. 3.45 =
5. 79.531 = 6. 8.437 = 7. 29.37 =
8. 109.96 =

Round to the nearest tenth.
9. 33.335 = 10. 1.861 = 11. 99.96 =
12. 103.103 =
13. 16.031 = 14. 281.05 = 15. 8.741 =
16. 27.773 =

Round to the nearest hundredth.
17. 69.713 = 18. 5.569 = 19. 609.906 =
20. 247.898 =
24. 6.9372 =
Multiplying and Dividing by 10, 100, etc.

When multiplying by a power of 10, move the decimal to the right:
- $34.61 \times 10 \rightarrow$ move 1 place $\rightarrow 346.1$
- $6.77 \times 100 \rightarrow$ move 2 places $\rightarrow 677$

When dividing by a power of 10, move the decimal to the left:
- $7.39 \div 100 \rightarrow$ move 2 place $\rightarrow 0.0739$
- $105.61 \div 1000 \rightarrow$ move 3 places $\rightarrow 0.10561$

1. $4.81 \times 100 =
2. $37.68 \div 10 =
3. $0.46 \times 1,000 =
4. $7.12 \div 10,000 =
5. $5.4 \times 10 =
6. $27,500 \div 1,000 =
7. $4.395 \times 100,000 =
8. $0.0075 \div 100 =
9. $2.274 \times 10 =
10. $90,000 \div 100 =
11. $0.000618 \times 1,000 =
12. $39.006 \div 1,000 =
13. $16 \times 100 =
14. $28.889 \div 10,000 =
15. $36.89 \times 10,000 =
16. $0.091 \div 100 =
17. $0.0336 \times 100,000 =
18. $1,672 \div 100,000 =
Study Guide and Intervention
Powers and Exponents

The exponent tells you how many times to use the base as a factor.

\[ 3^4 = 3 \cdot 3 \cdot 3 \cdot 3 = 81 \]

Base common factors

**EXAMPLE 1** Write \(6^3\) as a product of the same factor.

The base is 6. The exponent 3 means that 6 is used as a factor 3 times.

\[ 6^3 = 6 \cdot 6 \cdot 6 \]

**EXAMPLE 2** Evaluate \(5^4\).

\[ 5^4 = 5 \cdot 5 \cdot 5 \cdot 5 = 625 \]

**EXAMPLE 3** Write \(4 \cdot 4 \cdot 4 \cdot 4 \cdot 4\) in exponential form.

The base is 4. It is used as a factor 5 times, so the exponent is 5.

\[ 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 = 4^5 \]

**EXERCISES**

Write each power as a product of the same factor.

1. \(7^3\)  
2. \(2^7\)  
3. \(9^2\)  
4. \(15^4\)

Evaluate each expression.

5. \(3^5\)  
6. \(7^3\)  
7. \(8^4\)  
8. \(5^3\)

Write each product in exponential form.

9. \(2 \cdot 2 \cdot 2 \cdot 2\)  
10. \(7 \cdot 7 \cdot 7 \cdot 7 \cdot 7\)

11. \(10 \cdot 10 \cdot 10\)  
12. \(9 \cdot 9 \cdot 9 \cdot 9 \cdot 9\)

13. \(12 \cdot 12 \cdot 12\)  
14. \(5 \cdot 5 \cdot 5 \cdot 5\)

15. \(6 \cdot 6 \cdot 6 \cdot 6\)  
16. \(1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1\)
Study Guide and Intervention

Order of Operations

Use the order of operations to evaluate numerical expressions.
1. Do all operations within grouping symbols first.
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 \((10 - 2) - 4 \cdot 2\).

\[
(10 - 2) - 4 \cdot 2 = 8 - 4 \cdot 2 \quad \text{Subtract first since } 10 - 2 \text{ is in parentheses.}
\]

\[
= 8 - 8 \quad \text{Multiply 4 and 2.}
\]

\[
= 0 \quad \text{Subtract 8 from 8.}
\]

**EXAMPLE 2** Evaluate \(8 + (1 + 5)^2 \div 4\).

\[
8 + (1 + 5)^2 \div 4 = 8 + 6^2 \div 4 \quad \text{First, add 1 and 5 inside the parentheses.}
\]

\[
= 8 + 36 \div 4 \quad \text{Find the value of } 6^2.
\]

\[
= 8 + 9 \quad \text{Divide 36 by 4.}
\]

\[
= 17 \quad \text{Add 8 and 9.}
\]

**EXERCISES**

Evaluate each expression.

1. \((1 + 7) \times 3\)

2. \(28 - 4 \cdot 7\)

3. \(5 + 4 \cdot 3\)

4. \((40 \div 5) - 7 + 2\)

5. \(35 \div 7(2)\)

6. \(3 \times 10^8\)

7. \(45 \div 5 + 36 \div 4\)

8. \(42 \div 6 \times 2 - 9\)

9. \(2 \times 8 - 3^2 + 2\)

10. \(5 \times 2^2 + 32 \div 8\)

11. \(3 \times 6 - (9 - 8)^3\)

12. \(3.5 \times 10^2\)
Adding Integers

To add integers with the same sign, add their absolute values. Give the result the same sign as the integers.

**EXAMPLE 1** Find \(-3 + (-4)\).

\[-3 + (-4) = -7\]

Add \(|-3| + |-4|\). Both numbers are negative, so the sum is negative.

To add integers with different signs, subtract their absolute values. Give the result the same sign as the integer with the greater absolute value.

**EXAMPLE 2** Find \(-16 + 12\).

\[-16 + 12 = -4\]

Subtract \(|12|\) from \(|-16|\). The sum is negative because \(|-16| > |12|\).

**EXERCISES**

Add.

1. \(9 + 16\)
2. \(-10 + (-10)\)
3. \(18 + (-26)\)
4. \(-23 + (-15)\)
5. \(-45 + 35\)
6. \(39 + (-38)\)
7. \(-55 + 81\)
8. \(-61 + (-39)\)
9. \(-74 + 36\)
10. \(5 + (-4) + 8\)
11. \(-3 + 10 + (-6)\)
12. \(-13 + (-8) + (-12)\)
13. \(3 + (-10) + (-16) + 11\)
14. \(-17 + 31 + (-14) + 26\)

Evaluate each expression if \(x = 4\) and \(y = -3\).

15. \(11 + y\)
16. \(x + (-6)\)
17. \(y + 2\)
18. \(|x + y|\)
19. \(|x| + y\)
20. \(x + |y|\)
Study Guide and Intervention

Subtracting Integers

To subtract an integer, add its opposite or additive inverse.

**EXAMPLE 1** Find $8 - 15$.

$8 - 15 = 8 + (-15)$  
To subtract 15, add $-15$.

$= -7$  
Add.

**EXAMPLE 2** Find $13 - (-22)$.

$13 - (-22) = 13 + 22$  
To subtract $-22$, add 22.

$= 35$  
Add.

**EXERCISES**

Subtract.

1. $-3 - 4$
2. $5 - (-2)$
3. $-10 - 8$

4. $-15 - (-12)$
5. $-23 - (-28)$
6. $16 - 9$

7. $9 - 16$
8. $-21 - 16$
9. $28 - 37$

10. $-34 - (-46)$
11. $65 - (-6)$
12. $19 - |29|$

Evaluate each expression if $a = -7$, $b = -3$, and $c = 5$.

13. $a - 8$
14. $20 - b$
15. $a - c$

16. $c - b$
17. $b - a - c$
18. $c - b - a$
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. $\frac{a - 6}{c}$
**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.

\[
\frac{3}{8} \cdot \frac{4}{11} = \frac{3 \cdot 4}{8 \cdot 11} = \frac{12}{88} = \frac{3}{22}
\]

Divide 8 and 4 by their GCF, 4.

Multiply the numerators and denominators.

Simplify.

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

**EXAMPLE 2**

Find \(-2\frac{1}{3} \cdot 5\frac{3}{5}\). Write in simplest form.

\[
-2\frac{1}{3} \cdot 5\frac{3}{5} = -\frac{7}{3} \cdot \frac{18}{5} = -\frac{126}{15} = -\frac{3}{1} \cdot \frac{2}{5} \cdot \frac{3}{5} = -\frac{18}{5}
\]

Divide 18 and 3 by their GCF, 3.

Multiply the numerators and denominators.

Simplify.

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. \(-3\frac{1}{3} \cdot \frac{1}{2}\)
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. \(2\frac{2}{3} \cdot 2\frac{3}{7}\)
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 $-\frac{3}{4}$.

$-\frac{3}{4} = -\frac{11}{4}$

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

Since $-\frac{11}{4} \times \frac{4}{11} = 1$, the multiplicative inverse of $-\frac{3}{4}$ 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.

$\frac{3}{8} \div \frac{6}{7} = \frac{3}{8} \times \frac{7}{6}$

Multiply by the multiplicative inverse of $\frac{6}{7}$, which is $\frac{7}{6}$.

$= \frac{3}{8} \times \frac{7}{6}$

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. \( 3\frac{1}{7} \div (-3\frac{2}{3}) \)
14. \( -\frac{4}{9} \div 2 \)

15. \( \frac{6}{11} \div (-4) \)
16. \( 5 \div 2\frac{1}{3} \)
Study Guide and Intervention

Adding and Subtracting Unlike Fractions

Fractions that have different denominators are called **unlike fractions**. To add or subtract unlike fractions, first rewrite the fractions with a common denominator. Then add or subtract and simplify, if necessary.

**EXAMPLE 1**

Find $\frac{3}{5} + \frac{2}{3}$. Write in simplest form.

\[
\frac{3}{5} + \frac{2}{3} = \frac{3}{5} \cdot \frac{3}{3} + \frac{2}{3} \cdot \frac{5}{5} = \frac{9}{15} + \frac{10}{15} = \frac{9 + 10}{15} = \frac{19}{15} \text{ or } \frac{4}{16}
\]

The LCD is $5 \cdot 3 = 15$.

Rename each fraction using the LCD.

Add the numerators. The denominators are the same.

Simplify.

**EXAMPLE 2**

Find $-\frac{3}{2} - \frac{5}{6}$. Write in simplest form.

\[
-\frac{3}{2} - \frac{5}{6} = -\frac{7}{2} - \frac{11}{6}
\]

Write the mixed numbers as improper fractions.

\[
= -\frac{7 \cdot 3}{2 \cdot 3} - \frac{11}{6}
\]

The LCD is $2 \cdot 3 = 6$.

Rename $\frac{7}{2}$ using the LCD.

Subtract the numerators.

Simplify.

**EXERCISES**

Add or subtract. Write in simplest form.

1. $\frac{2}{5} + \frac{3}{10}$
2. $\frac{1}{3} + \frac{2}{9}$
3. $\frac{5}{9} + \left(-\frac{1}{6}\right)$
4. $-\frac{3}{4} - \frac{5}{6}$
5. $\frac{4}{5} - \left(-\frac{1}{3}\right)$
6. $1\frac{2}{3} - \left(-\frac{4}{9}\right)$
7. $-\frac{7}{10} - \left(-\frac{1}{2}\right)$
8. $2\frac{1}{4} + 1\frac{3}{8}$
9. $3\frac{3}{4} - 1\frac{1}{3}$
10. $-1\frac{1}{5} - 2\frac{1}{4}$
11. $-2\frac{4}{9} - \left(-1\frac{1}{3}\right)$
12. $3\frac{3}{5} - 2\frac{2}{3}$
Study Guide and Intervention

Solving Addition and Subtraction Equations

You can use the following properties to solve addition and subtraction equations.

- **Addition Property of Equality** - If you add the same number to each side of an equation, the two sides remain equal.
- **Subtraction Property of Equality** - If you subtract the same number from each side of an equation, the two sides remain equal.

**EXAMPLE 1** Solve \( w + 19 = 45 \). Check your solution.

\[
\begin{align*}
w + 19 &= 45 & \text{Write the equation.} \\
19 - 19 &= 45 - 19 & \text{Subtract 19 from each side.} \\
w &= 26 & 19 - 19 = 0 \text{ and } 45 - 19 = 26. \ w \text{ is by itself.}
\end{align*}
\]

Check

\[
\begin{align*}
w + 19 &= 45 & \text{Write the original equation.} \\
26 + 19 &= 45 & \text{Replace } w \text{ with } 26. \text{ Is this sentence true?} \\
45 &= 45 & 26 + 19 = 45
\end{align*}
\]

**EXAMPLE 2** Solve \( h - 25 = -76 \). Check your solution.

\[
\begin{align*}
h - 25 &= -76 & \text{Write the equation.} \\
25 + 25 &= -76 + 25 & \text{Add 25 to each side.} \\
h &= -51 & -25 + 25 = 0 \text{ and } -76 + 25 = -51. \ h \text{ is by itself.}
\end{align*}
\]

Check

\[
\begin{align*}
h - 25 &= -76 & \text{Write the original equation.} \\
-51 - 25 &= -76 & \text{Replace } h \text{ with } -51. \text{ Is this sentence true?} \\
-76 &= -76 & -51 - 25 = -51 + (-25) \text{ or } -76
\end{align*}
\]

**EXERCISES**

Solve each equation. Check your solution.

1. \( s - 4 = 12 \)  
2. \( d + 2 = 21 \)  
3. \( h + 6 = 15 \)

4. \( x + 5 = -8 \)  
5. \( b - 10 = -34 \)  
6. \( f - 22 = -6 \)

7. \( 17 + c = 41 \)  
8. \( v - 36 = 25 \)  
9. \( y - 29 = -51 \)

10. \( 19 = z - 32 \)  
11. \( 13 + t = -29 \)  
12. \( 55 = 39 + k \)

13. \( 62 + b = 45 \)  
14. \( x - 39 = -65 \)  
15. \( -56 = -47 + n \)

Study Guide and Intervention

Solving Multiplication and Division Equations

You can use the following properties to solve multiplication and division equations.
- **Multiplication Property of Equality** - If you multiply each side of an equation by the same number, the two sides remain equal.
- **Division Property of Equality** - If you divide each side of an equation by the same nonzero number, the two sides remain equal.

**EXAMPLE 1** Solve $19w = 104$. Check your solution.

$19w = 114$  
Write the equation.

$\frac{19w}{19} = \frac{114}{19}$  
Divide each side of the equation by 19.

$1w = 6$  
$19 + 19 = 1$ and $114 \div 19 = 6$.

$w = 6$  
Identity Property; $1w = w$

**Check**

$19w = 114$  
Write the original equation.

$19(6) \neq 114$  
Replace $w$ with 6.

$114 = 114 \checkmark$  
This sentence is true.

**EXAMPLE 2** Solve $\frac{d}{15} = -9$. Check your solution.

$\frac{d}{15} = -9$

$\frac{d}{15}(15) = -9(15)$  
Multiply each side of the equation by 15.

$d = -135$

**Check**

$\frac{d}{15} = -9$  
Write the original equation.

$\frac{-135}{15} \neq -9$  
Replace $d$ with $-135$.

$-9 = -9 \checkmark$  
$-135 \div 15 = -9$

**EXERCISES**

Solve each equation. Check your solution.

1. $\frac{r}{5} = 6$
2. $2d = 12$
3. $7h = -21$
4. $-8x = 40$
5. $\frac{f}{8} = -6$
6. $\frac{x}{-10} = -7$
7. $17c = -68$
8. $\frac{h}{-11} = 12$
9. $29t = -145$
10. $125 = 5x$
11. $13t = -182$
12. $117 = -39k$
Study Guide and Intervention
Solving Equations with Rational Numbers

The Addition, Subtraction, Multiplication, and Division Properties of Equality can be used to solve equations with rational numbers.

**Example 1** Solve \( x - 2.73 = 1.31 \). Check your solution.

\[
\begin{align*}
\text{Write the equation.} & \quad x - 2.73 = 1.31 \\
\text{Add 2.73 to each side.} & \quad x = 4.04 \\
\text{Simplify.} & \quad \text{Check} \\
\text{Write the original equation.} & \quad x - 2.73 = 1.31 \\
\text{Replace } x \text{ with } 4.04. & \quad 4.04 - 2.73 = \frac{1}{3} \\
\text{Simplify.} & \quad 1.31 = \frac{1}{3} \checkmark
\end{align*}
\]

**Example 2** Solve \( \frac{4}{5}y = \frac{2}{3} \). Check your solution.

\[
\begin{align*}
\text{Write the equation.} & \quad \frac{4}{5}y = \frac{2}{3} \\
\text{Multiply each side by } \frac{5}{4}. & \quad \frac{5}{4} \left( \frac{4}{5}y \right) = \frac{5}{4} \cdot \frac{2}{3} \\
\text{Simplify.} & \quad y = \frac{5}{6} \\
\text{Check} & \quad \text{Write the original equation.} \\
\text{Replace } y \text{ with } \frac{5}{6}. & \quad \frac{4}{5} \left( \frac{5}{6} \right) = \frac{2}{3} \\
\text{Simplify.} & \quad \frac{2}{3} = \frac{2}{3} \checkmark
\end{align*}
\]

**Exercises**

Solve each equation. Check your solution.

1. \( t + 1.32 = 3.48 \) 
2. \( b - 4.22 = 7.08 \) 
3. \( -8.07 = r - 4.48 \)

4. \( h + \frac{4}{9} = \frac{7}{9} \) 
5. \( -\frac{5}{8} = x - \frac{1}{4} \) 
6. \( -\frac{2}{3} + f = \frac{3}{5} \)

7. \( 3.2c = 9.6 \) 
8. \( -5.04 = 1.26d \) 
9. \( \frac{3}{5}x = 6 \)

10. \( -\frac{2}{3} = \frac{3}{4}t \) 
11. \( \frac{w}{2.5} = 4.2 \) 
12. \( 1\frac{3}{4}r = 3\frac{5}{8} \)
**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.

$20 \times 18 \rightarrow 24 \cdot 12 = 288$

$24 \times 12 \rightarrow 20 \cdot 18 = 360$

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. $\frac{16}{24} = \frac{x}{15}$

14. $\frac{5}{8} = \frac{x}{12}$

15. $\frac{14}{t} = \frac{10}{11}$

16. $\frac{w}{6} = \frac{2.8}{7}$

17. $\frac{5}{y} = \frac{7}{16.8}$

18. $\frac{x}{18} = \frac{7}{36}$
Study Guide and Intervention
Fractions, Decimals, and Percents

- To write a percent as a decimal, divide by 100 and remove the percent symbol.
- To write a decimal as a percent, multiply by 100 and add the percent symbol.
- To express a fraction as a percent, you can use a proportion. Alternatively, you can write the fraction as a decimal, and then express the decimal as a percent.

**EXAMPLE 1** Write 56% as a decimal.

\[ 56\% = \frac{56}{100} \] Divide by 100 and remove the percent symbol.
\[ = 0.56 \]

**EXAMPLE 2** Write 0.17 as a percent.

\[ 0.17 = 0.17 \] Multiply by 100 and add the percent symbol.
\[ = 17\% \]

**EXAMPLE 3** Write \( \frac{7}{20} \) as a percent.

**Method 1** Use a proportion.

\[
\frac{7}{20} = \frac{x}{100} \]
Write the proportion.
\[ 7 \cdot 100 = 20 \cdot x \] Find cross products.
\[ 700 = 20x \] Multiply.
\[ \frac{700}{20} = \frac{20x}{20} \] Divide each side by 20.
\[ 35 = x \] Simplify.

So, \( \frac{7}{20} \) can be written as 35%.

**EXERCISES**

Write each percent as a decimal.

1. 10%
2. 36%
3. 82%
4. 49.1%

Write each decimal as a percent.

5. 0.14
6. 0.59
7. 0.932
8. 1.07

Write each fraction as a percent.

9. \( \frac{3}{4} \)
10. \( \frac{7}{10} \)
11. \( \frac{9}{16} \)
12. \( \frac{1}{40} \)
Study Guide and Intervention
Area of Parallelograms, Triangles, and Trapezoids

The area $A$ of a parallelogram is the product of any base $b$ and its height $h$, or $A = bh$.
The area $A$ of a triangle is half the product of any base $b$ and its height $h$, or $A = \frac{1}{2}bh$.
The area $A$ of a trapezoid is half the product of the height $h$ and the sum of the bases, $b_1$ and $b_2$, or $A = \frac{1}{2}h(b_1 + b_2)$.

EXAMPLES

Find the area of each figure.

1. The base is 8 yards. The height is 6 yards.
   $A = bh$
   $A = 8 \cdot 6$ or 48
   The area is 48 square yards.

2. The base is 10 feet. The height is 4 feet.
   $A = \frac{1}{2}bh$
   $A = \frac{1}{2} \cdot 10 \cdot 4$ or 20
   The area is 20 square feet.

3. The height is 5 inches. The lengths of the bases are 9 inches and 7 inches.
   $A = \frac{1}{2}h(b_1 + b_2)$
   $A = \frac{1}{2} \cdot 5 \cdot (9 + 7)$ or 40
   The area is 40 square inches.

EXERCISES

Find the area of each figure.

1. 2. 3.

4. parallelogram: base, 11 cm; height, 12 cm

5. triangle: base, 8 mi; height, 13 mi

6. trapezoid: height, 7 km; bases, 8 km and 12 km
Circumference and Area of Circles

The circumference $C$ of a circle is equal to its diameter $d$ times $\pi$ or 2 times the radius $r$ times $\pi$, or $C = \pi d$ or $C = 2\pi r$.

The area $A$ of a circle is equal to $\pi$ times the square of the radius $r$, or $A = \pi r^2$.

**EXAMPLES**

Find the circumference of each circle.

1. $C = \pi d$

   $C = \pi \cdot 4$
   $C = 12.6$

   The circumference is about 12.6 inches.

2. $C = 2\pi r$

   $C = 2 \cdot \pi \cdot 5.4$
   $C \approx 33.9$

   The circumference is about 33.9 meters.

**EXAMPLE 3**

Find the area of the circle.

$A = \pi r^2$

$A = \pi (1.5)^2$

$A \approx 7.1$

The area is about 7.1 square feet.

**EXERCISES**

Find the circumference and area of each circle. Round to the nearest tenth.

1. 

2. 

3. 

4. The diameter is 9.3 meters.

5. The radius is 6.9 millimeter.

6. The diameter is 15.7 inches.
Study Guide and Intervention

The Coordinate Plane

The coordinate plane is used to locate points. The horizontal number line is the x-axis. The vertical number line is the y-axis. Their intersection is the origin.

Points are located using **ordered pairs**. The first number in an ordered pair is the **x-coordinate**; the second number is the **y-coordinate**.

The coordinate plane is separated into four sections called **quadrants**.

**EXAMPLE 1** Name the ordered pair for point P. Then identify the quadrant in which P lies.

- Start at the origin.
- Move 4 units left along the x-axis.
- Move 3 units up on the y-axis.
  The ordered pair for point P is (-4, 3).
  P is in the upper left quadrant or quadrant II.

**EXAMPLE 2** Graph and label the point M(0, -4).

- Start at the origin.
- Move 0 units along the x-axis.
- Move 4 units down on the y-axis.
- Draw a dot and label it M(0, -4).

**EXERCISES**

Name the ordered pair for each point graphed at the right. Then identify the quadrant in which each point lies.

1. P
2. Q
3. R
4. S

Graph and label each point on the coordinate plane.

5. A(-1, 1)  
6. B(0, -3)
7. C(3, 2)  
8. D(-3, -1)
9. E(1, -2)  
10. F(1, 3)
Plotting a Hidden Message

Connect each series of points to reveal a hidden message.

(-12,4) (-12,0) (6,-5) (4,-5) (4,-1) (6,-1) (-3,0) (-5,0) (-5,4) (-3,4) (-6,5) (-8,5) (-8,9) (-6,9)
(10,2) (12,2) (3,-8) (5,-8) (4,-3) (5,-3) (0,-6) (2,-6) (-2,4) (0,4) (4,0) (4,4) (-2,0) (0,0)
(-6,-10) (-6,-6) (-5,-9) (-4,-6) (-4,-10) (-6,-12) (-8,-2) (-8,-4) (-6,-5) (-6,-3) (-7,-3) (7,7) (8,7)
(-5,-9) (-5,-1) (-3,-1) (-3,-3) (-5,-3) (-11,9) (-11,5) (-10,7) (-9,5) (-9,9) (9,5) (7,5) (7,9) (9,9)
(1,5) (1,9) (3,9) (3,5) (1,5) (3,4) (1,3) (1,1) (3,0) (3,2) (2,2) (4,5) (4,9) (5,6) (6,9) (6,5)
(-8,7) (-7,7) (-5,9) (-5,5) (-3,5) (-1,6) (1,-10) (-3,-8) (-1,-8) (-4,-3) (-3,-5) (-2,-3) (0,-3)
(-13,4) (-11,4) (1,-5) (1,-1) (2,-1) (3,-3) (2,-5) (1,-5) (-3,-10) (-3,-8) (-2,-6) (-1,-8) (-1,-10)
(5,-10) (5,-6) (12,0) (12,4) (10,0) (10,4) (-1,0) (-1,4) (3,-10) (3,-6) (-5,2) (-4,2)
(-2,-5) (-2,-3) (-1,-1) (0,-3) (0,-5) (0,5) (-2,5) (-2,9) (0,9) (-10,0) (-10,4) (-8,4) (-8,0) (-10,0)
(8,4) (8,0) (4,2) (6,2) (7,4) (9,4) (6,0) (6,4)
Summer Review Packet Answers:

Rounding Decimals:
1) 42  
2) 120  
3) 20  
4) 3  
5) 80  
6) 8  
7) 29  
8) 110  
9) 33.3  
10) 1.9  
11) 100.0  
12) 103.1  
13) 16.0  
14) 281.1  
15) 8.7  
16) 27.8  
17) 69.71  
18) 5.57  
19) 609.91  
20) 247.90  
21) 5.54  
22) 67.20  
23) 14.03  
24) 6.94

Multiplying & Dividing by 10, 100, etc.
1) 481  
2) 3.768  
3) 460  
4) 0.000712  
5) 54  
6) 27.5  
7) 439,500  
8) 0.000075  
9) 22.74  
10) 900  
11) 0.618  
12) 0.039006  
13) 1,600  
14) 0.0028889  
15) 368,900  
16) 0.00091  
17) 3,360  
18) 0.01672

1-2 Powers and Exponents
1) 7 • 7 • 7  
2) 2 • 2 • 2 • 2 • 2  
3) 9 • 9  
4) 15 • 15 • 15 • 15  
5) 243  
6) 343  
7) 4,096  
8) 125  
9) 2^4  
10) 7^6  
11) 10^3  
12) 12^5  
13) 12^3  
14) 5^4  
15) 6^5  
16) 1^8

1-3 Order of Operations
1) 24  
2) 0  
3) 17  
4) 3  
5) 10  
6) 3,000  
7) 18  
8) 5  
9) 9  
10) 24  
11) 17  
12) 350

1-4 Adding Integers
1) 25  
2) -20  
3) -8  
4) -38  
5) -10  
6) 1  
7) 26  
8) -100  
9) -38  
10) 9  
11) 1  
12) -33  
13) -12  
14) 26  
15) 8  
16) -2  
17) -1  
18) 1  
19) 1  
20) 7

1-5 Subtracting Integers
1-5 Subtracting Integers
1) -7  2) 7  3) -18  4) -3  5) 5  6) 7  7) -7
8) -37  9) -9  10) 12  11) 71  12) -10  13) -15  14) 23
15) -12  16) 8  17) -1  18) 15

1-6 Multiplying and Dividing Integers
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

2-3 Multiplying Rational Numbers
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) 4\(\frac{1}{2}\)  11) -3\(\frac{17}{20}\)  12) 6\(\frac{10}{21}\)

2-4 Dividing Rational Numbers
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) \(-1\frac{1}{9}\)  12) \(\frac{8}{15}\)
13) \(-\frac{6}{7}\)  14) \(-\frac{7}{9}\)  15) \(-\frac{3}{22}\)  16) 2\(\frac{1}{7}\)

2-6 Adding and Subtracting Unlike Fractions
1) \(\frac{7}{10}\)  2) \(\frac{5}{9}\)  3) \(\frac{7}{18}\)  4) -1\(\frac{7}{12}\)  5) 1\(\frac{2}{13}\)  6) 2\(\frac{1}{9}\)
7) \(-\frac{1}{5}\)  8) \(3\frac{5}{8}\)  9) 2\(\frac{5}{12}\)  10) \(-3\frac{9}{20}\)  11) \(-1\frac{1}{9}\)  12) \(\frac{14}{15}\)

1-8 Solving Addition and Subtraction Equations
1) s = 16  2) d = 19  3) h = 9  4) x = -13  5) b = -24  6) f = 16
7) c = 24  8) v = 61  9) y = -22  10) z = 51  11) t = -42  12) k = 16
13) b = -17  14) x = -26  15) n = -9
1-9 Solving Multiplication and Division Equations

1) \( r = 30 \)  
2) \( d = 6 \)  
3) \( h = -3 \)  
4) \( x = -5 \)  
5) \( f = -48 \)  
6) \( x = 70 \)  
7) \( c = -4 \)  
8) \( h = -132 \)  
9) \( t = -5 \)  
10) \( z = 25 \)  
11) \( t = -14 \)  
12) \( k = -3 \)  

2-7 Solving Equations with Rational Numbers

1) \( t = 2.16 \)  
2) \( b = 11.3 \)  
3) \( r = -3.59 \)  
4) \( h = \frac{1}{3} \)  
5) \( x = -\frac{3}{8} \)  
6) \( f = 1\frac{4}{15} \)  
7) \( c = 3 \)  
8) \( d = -4 \)  
9) \( x = 10 \)  
10) \( t = -\frac{8}{9} \)  
11) \( w = 10.5 \)  
12) \( r = 2\frac{1}{4} \)  

4-4 Solving Proportions

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) \( x = 3.5 \)  

5-2 Fractions, Decimals, and Percents

1) 0.10  
2) 0.36  
3) 0.82  
4) 0.491  
5) 14\%  
6) 59\%  
7) 93.2\%  
8) 107\%  
9) 75\%  
10) 70\%  
11) 56.25\%  
12) 2.5\%  

7-1 Area of Parallelograms, Triangles, and Trapezoids

1) 72 sq. meters  
2) 12 sq. yards  
3) 25 sq. feet  
4) 132 sq. centimeters  
5) 52 sq. centimeters  
6) 70 sq. kilometers  

7-2 Circumference and Area of Circles

1) \( C = 6.3\text{cm}; A = 3.1 \text{ sq. cm} \)  
2) \( C = 34.6 \text{yd}; A = 95.0 \text{ sq. yd} \)  
3) \( C = 26.4 \text{m}; A = 55.4 \text{ sq. m} \)  
4) \( C = 29.2 \text{m}; A = 67.9 \text{ sq. m} \)  
5) \( C = 43.3 \text{mm}; A = 149.6 \text{ sq. mm} \)  
6) \( C = 49.3 \text{in}; A = 193.6 \text{ sq. in} \)
3-3 The Coordinate Plane

1) (2, -3); IV  2) (-3, -2); III  3) (1, 3); I  4) (-2, 2); II

5 - 10: See graph below

Plotting a Hidden Message
Rounding Decimals

Round 8.135 to the nearest tenth.
8.135 → 8.1
less than 5

Round 32.56713 to the nearest hundredth.
32.56713 → 32.57
greater than 5

Round to the nearest whole number.
1. 41.803 =
2. 119.63 =
3. 20.05 =
4. 3.45 =
5. 79.531 =
6. 8.437 =
7. 29.37 =
8. 109.96 =

Round to the nearest tenth.
9. 33.335 =
10. 1.861 =
11. 99.96 =
12. 103.103 =
13. 16.031 =
14. 281.05 =
15. 8.741 =
16. 27.773 =

Round to the nearest hundredth.
17. 69.713 =
18. 5.569 =
19. 609.906 =
20. 247.898 =
21. 5.535 =
22. 67.1951 =
23. 14.0305 =
24. 6.9372 =
Multiplying and Dividing by 10, 100, etc.

When multiplying by a power of 10, move the decimal to the right:
- $34.61 \times 10 \rightarrow$ move 1 place $\rightarrow 346.1$
- $6.77 \times 100 \rightarrow$ move 2 places $\rightarrow 677$

When dividing by a power of 10, move the decimal to the left:
- $7.39 \div 100 \rightarrow$ move 2 place $\rightarrow 0.0739$
- $105.61 \div 1000 \rightarrow$ move 3 places $\rightarrow 0.10561$

1. $4.81 \times 100 = \quad 10. \quad 90,000 \div 100 =

2. $37.68 \div 10 = \quad 11. \quad 0.000618 \times 1,000 =

3. $0.46 \times 1,000 = \quad 12. \quad 39.006 \div 1,000 =

4. $7.12 \div 10,000 = \quad 13. \quad 16 \times 100 =

5. $5.4 \times 10 = \quad 14. \quad 28.889 \div 10,000 =

6. $27,500 \div 1,000 = \quad 15. \quad 36.89 \times 10,000 =

7. $4.395 \times 100,000 = \quad 16. \quad 0.091 \div 100 =

8. $0.0075 \div 100 = \quad 17. \quad 0.0336 \times 100,000 =

9. $2.274 \times 10 = \quad 18. \quad 1,672 \div 100,000 =$
Study Guide and Intervention
Powers and Exponents

Exponent

\[ 3^4 = 3 \cdot 3 \cdot 3 \cdot 3 = 81 \]

The exponent tells you how many times to use the base as a factor.

**EXAMPLE 1** Write \( 6^3 \) as a product of the same factor.

The base is 6. The exponent 3 means that 6 is used as a factor 3 times.

\[ 6^3 = 6 \cdot 6 \cdot 6 \]

**EXAMPLE 2** Evaluate \( 5^4 \).

\[ 5^4 = 5 \cdot 5 \cdot 5 \cdot 5 = 625 \]

**EXAMPLE 3** Write \( 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \) in exponential form.

The base is 4. It is used as a factor 5 times, so the exponent is 5.

\[ 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 = 4^5 \]

**EXERCISES**

Write each power as a product of the same factor.

1. \( 7^3 \)  
2. \( 2^7 \)  
3. \( 9^2 \)  
4. \( 15^4 \)

Evaluate each expression.

5. \( 3^5 \)  
6. \( 7^3 \)  
7. \( 8^4 \)  
8. \( 5^3 \)

Write each product in exponential form.

9. \( 2 \cdot 2 \cdot 2 \cdot 2 \)  
10. \( 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7 \)

11. \( 10 \cdot 10 \cdot 10 \)  
12. \( 9 \cdot 9 \cdot 9 \cdot 9 \cdot 9 \)

13. \( 12 \cdot 12 \cdot 12 \)  
14. \( 5 \cdot 5 \cdot 5 \cdot 5 \)

15. \( 6 \cdot 6 \cdot 6 \cdot 6 \)  
16. \( 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \)

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Mathematics: Applications and Concepts, Course 2
1-3

Study Guide and Intervention

Order of Operations

Use the order of operations to evaluate numerical expressions.
1. Do all operations within grouping symbols first.
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 \((10 - 2) - 4 \cdot 2\).

\[
(10 - 2) - 4 \cdot 2 = 8 - 4 \cdot 2 \\
= 8 - 8 \\
= 0
\]

Subtract first since \(10 - 2\) is in parentheses.

Multiply 4 and 2.

Subtract 8 from 8.

**EXAMPLE 2**

Evaluate \(8 + (1 + 5)^2 \div 4\).

\[
8 + (1 + 5)^2 \div 4 = 8 + 6^2 \div 4 \\
= 8 + 36 \div 4 \\
= 8 + 9 \\
= 17
\]

First, add 1 and 5 inside the parentheses.

Find the value of \(6^2\).

Divide 36 by 4.

Add 8 and 9.

**EXERCISES**

Evaluate each expression.

1. \((1 + 7) \times 3\)
2. \(28 - 4 \cdot 7\)
3. \(5 + 4 \cdot 3\)

4. \((40 \div 5) - 7 + 2\)
5. \(35 \div 7(2)\)
6. \(3 \times 10^8\)

7. \(45 \div 5 + 36 \div 4\)
8. \(42 \div 6 \times 2 - 9\)
9. \(2 \times 8 - 3^2 + 2\)

10. \(5 \times 2^2 + 32 \div 8\)
11. \(3 \times 6 - (9 - 8)^3\)
12. \(3.5 \times 10^2\)
Study Guide and Intervention

Adding Integers

To add integers with the same sign, add their absolute values. Give the result the same sign as the integers.

**Example 1** Find \(-3 + (-4)\).

\[-3 + (-4) = -7\] Add \(|-3| + |-4|\). Both numbers are negative, so the sum is negative.

To add integers with different signs, subtract their absolute values. Give the result the same sign as the integer with the greater absolute value.

**Example 2** Find \(-16 + 12\).

\[-16 + 12 = -4\] Subtract \(|12|\) from \(|-16|\). The sum is negative because \(|-16| > |12|\).

**Exercises**

Add.

1. \(9 + 16\)  
2. \(-10 + (-10)\)  
3. \(18 + (-26)\)

4. \(-23 + (-15)\)  
5. \(-45 + 35\)  
6. \(39 + (-38)\)

7. \(-55 + 31\)  
8. \(-61 + (-39)\)  
9. \(-74 + 36\)

10. \(5 + (-4) + 8\)  
11. \(-3 + 10 + (-6)\)  
12. \(-13 + (-8) + (-12)\)

13. \(3 + (-10) + (-16) + 11\)  
14. \(-17 + 31 + (-14) + 26\)

Evaluate each expression if \(x = 4\) and \(y = -3\).

15. \(11 + y\)  
16. \(x + (-6)\)  
17. \(y + 2\)

18. \(|x + y|\)  
19. \(|x| + y\)  
20. \(x + |y|\)
Subtracting Integers

To subtract an integer, add its opposite or additive inverse.

**Example 1** Find \(8 - 15\).

\[
8 - 15 = 8 + (-15) \\
= -7
\]

To subtract 15, add -15. Add.

**Example 2** Find \(13 - (-22)\).

\[
13 - (-22) = 13 + 22 \\
= 35
\]

To subtract -22, add 22. Add.

**Exercises**

Subtract.

1. \(-3 - 4\)  
2. \(5 - (-2)\)  
3. \(-10 - 8\)

4. \(-15 - (-12)\)  
5. \(-23 - (-28)\)  
6. \(16 - 9\)

7. \(9 - 16\)  
8. \(-21 - 16\)  
9. \(28 - 37\)

10. \(-34 - (-46)\)  
11. \(65 - (-6)\)  
12. \(19 - |29|\)

Evaluate each expression if \(a = -7\), \(b = -3\), and \(c = 5\).

13. \(a - 8\)  
14. \(20 - b\)  
15. \(a - c\)

16. \(c - b\)  
17. \(b - a - c\)  
18. \(c - b - a\)
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 $15 ÷ (-3)$.

$$15 ÷ (-3) = -5$$

The dividend and divisor have different signs. The quotient is negative.

**EXAMPLE 4** Find $-54 ÷ (-6)$.

$$-54 ÷ (-6) = 9$$

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. $33 ÷ (-3)$
6. $-25 ÷ 5$
7. $48 ÷ 4$
8. $-63 ÷ (-7)$

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. $\frac{a - 6}{c}$
**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.

\[
\frac{3}{8} \cdot \frac{4}{11} = \frac{3 \cdot 4}{8 \cdot 11} = \frac{12}{88} = \frac{3}{22}
\]

Divide 8 and 4 by their GCF, 4.

Multiply the numerators and denominators.

Simplify.

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

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

\[
-2\frac{1}{3} \cdot 5\frac{3}{5} = -\frac{7}{3} \cdot \frac{28}{5} = -\frac{189}{15} = \frac{18}{5}
\]

Divide 18 and 3 by their GCF, 3.

Multiply the numerators and denominators.

Simplify.

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. $2\frac{2}{3} \cdot 2\frac{3}{7}$
Two numbers whose product is 1 are multiplicative inverses, or reciprocals, of each other.

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

$-\frac{3}{4} = -\frac{11}{4}$

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

Since $-\frac{11}{4} \cdot \left(-\frac{4}{11}\right) = 1$, the multiplicative inverse of $-\frac{3}{4}$ 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 $\frac{7}{6}$.

$= \frac{3}{8} \cdot \frac{7}{6}$

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. $3\frac{1}{7} \div (-3\frac{2}{3})$
14. $-\frac{4}{9} \div 2$

15. $\frac{6}{11} \div (-4)$
16. $5 \div 2\frac{1}{3}$
Study Guide and Intervention

Adding and Subtracting Unlike Fractions

Fractions that have different denominators are called unlike fractions. To add or subtract unlike fractions, first rewrite the fractions with a common denominator. Then add or subtract and simplify, if necessary.

**Example 1**  Find $\frac{3}{5} + \frac{2}{3}$. Write in simplest form.

$$\frac{3}{5} + \frac{2}{3} = \frac{3 \cdot 3}{5 \cdot 3} + \frac{2 \cdot 5}{3 \cdot 5} = \frac{9}{15} + \frac{10}{15} = \frac{19}{15}$$

The LCD is $5 \cdot 3$ or 15.

Rename each fraction using the LCD.

Add the numerators. The denominators are the same.

Simplify.

**Example 2**  Find $-2 \frac{1}{2} - 1 \frac{5}{6}$. Write in simplest form.

$$-2 \frac{1}{2} - 1 \frac{5}{6} = -\frac{5}{2} - \frac{11}{6}$$

Write the mixed numbers as improper fractions.

$$= -\frac{15}{6} - \frac{11}{6}$$

The LCD is $2 \cdot 3$ or 6.

Rename $\frac{7}{2}$ using the LCD.

Subtract the numerators.

Simplify.

**Exercises**

Add or subtract. Write in simplest form.

1. $\frac{2}{5} + \frac{3}{10}$  
2. $\frac{1}{3} + \frac{2}{9}$  
3. $\frac{5}{9} + \left(-\frac{1}{8}\right)$

4. $-\frac{3}{4} - \frac{5}{6}$  
5. $\frac{4}{5} - \left(-\frac{1}{3}\right)$  
6. $1\frac{2}{3} - \left(-\frac{4}{9}\right)$

7. $-\frac{7}{10} - \left(-\frac{1}{2}\right)$  
8. $2\frac{1}{4} + 1\frac{3}{8}$  
9. $3\frac{3}{4} - 1\frac{1}{3}$

10. $-1\frac{1}{5} - 2\frac{1}{4}$  
11. $-2\frac{4}{9} - \left(-1\frac{1}{3}\right)$  
12. $3\frac{3}{5} - 2\frac{2}{3}$
Study Guide and Intervention

Solving Addition and Subtraction Equations

You can use the following properties to solve addition and subtraction equations.

- **Addition Property of Equality** - If you add the same number to each side of an equation, the two sides remain equal.
- **Subtraction Property of Equality** - If you subtract the same number from each side of an equation, the two sides remain equal.

**EXAMPLE 1** Solve $w + 19 = 45$. Check your solution.

\[
\begin{align*}
\text{Write the equation.} & \quad w + 19 = 45 \\
\text{Subtract 19 from each side.} & \quad w = 26 \\
\text{Check} & \quad w + 19 = 45 \\
\text{Replace w with 26. Is this sentence true?} & \quad 26 + 19 = 45
\end{align*}
\]

**EXAMPLE 2** Solve $h - 25 = -76$. Check your solution.

\[
\begin{align*}
\text{Write the equation.} & \quad h - 25 = -76 \\
\text{Add 25 to each side.} & \quad h = -51 \\
\text{Check} & \quad h - 25 = -76 \\
\text{Replace h with -51. Is this sentence true?} & \quad -51 - 25 = -51 + (-25) or -76
\end{align*}
\]

**EXERCISES**

Solve each equation. Check your solution.

1. $s - 4 = 12$
2. $d + 2 = 21$
3. $h + 6 = 15$

4. $x + 5 = -8$
5. $b - 10 = -34$
6. $f - 22 = -6$

7. $17 + c = 41$
8. $v - 36 = 25$
9. $y - 29 = -51$

10. $19 = z - 32$
11. $13 + t = -29$
12. $55 = 39 + k$

13. $62 + b = 45$
14. $x - 39 = -65$
15. $-56 = -47 + n$

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Study Guide and Intervention
Solving Multiplication and Division Equations

You can use the following properties to solve multiplication and division equations.
- **Multiplication Property of Equality** - If you multiply each side of an equation by the same number, the two sides remain equal.
- **Division Property of Equality** - If you divide each side of an equation by the same nonzero number, the two sides remain equal.

**EXAMPLE 1** Solve $19w = 104$. Check your solution.

\[
\begin{align*}
19w &= 114 & \text{Write the equation.} \\
\frac{19w}{19} &= \frac{114}{19} & \text{Divide each side of the equation by } 19. \\
w &= 6 & 19 + 19 = 1 \text{ and } 114 \div 19 = 6. \\
&= 6 & \text{Identity Property; } 1w = w
\end{align*}
\]

Check
\[
\begin{align*}
19w &= 114 & \text{Write the original equation.} \\
19(6) &= 114 & \text{Replace } w \text{ with } 6. \\
114 &= 114 & \text{This sentence is true.}
\end{align*}
\]

**EXAMPLE 2** Solve $\frac{d}{15} = -9$. Check your solution.

\[
\begin{align*}
\frac{d}{15} &= -9 \\
\frac{d}{15}(15) &= -9(15) & \text{Multiply each side of the equation by } 15. \\
d &= -135
\end{align*}
\]

Check

\[
\begin{align*}
\frac{d}{15} &= -9 & \text{Write the original equation.} \\
\frac{-135}{15} &= -9 & \text{Replace } d \text{ with } -135. \\
-9 &= -9 & -135 \div 15 = -9
\end{align*}
\]

**EXERCISES**

Solve each equation. Check your solution.

1. $\frac{r}{5} = 6$
2. $2d = 12$
3. $7h = -21$
4. $-8x = 40$
5. $\frac{f}{8} = -6$
6. $\frac{x}{-10} = -7$
7. $17c = -68$
8. $\frac{h}{-11} = 12$
9. $29t = -145$
10. $125 = 5z$
11. $13t = -182$
12. $117 = -39k$

Study Guide and Intervention
Solving Equations with Rational Numbers

The Addition, Subtraction, Multiplication, and Division Properties of Equality can be used to solve equations with rational numbers.

**Example 1** Solve \(x - 2.73 = 1.31\). Check your solution.

\[
x - 2.73 = 1.31 \\
x - 2.73 + 2.73 = 1.31 + 2.73 \\
x = 4.04
\]
Write the equation.
Add 2.73 to each side.
Simplify.

Check
\[
x - 2.73 = 1.31 \\
4.04 - 2.73 \overset{?}{=} 1.31 \\
1.31 = 1.31 \checkmark
\]
Write the original equation.
Replace \(x\) with 4.04.
Simplify.

**Example 2** Solve \(\frac{4}{5}y = \frac{2}{3}\). Check your solution.

\[
\frac{4}{5}y = \frac{2}{3} \\
\frac{5}{4}(\frac{4}{5}y) = \frac{5}{4} \cdot \frac{2}{3} \\
y = \frac{5}{6}
\]
Write the equation.
Multiply each side by \(\frac{5}{4}\).
Simplify.

Check
\[
\frac{4}{5}y = \frac{2}{3} \\
\frac{5}{6} \cdot \frac{2}{3} \\
\frac{2}{3} = \frac{2}{3} \checkmark
\]
Write the original equation.
Replace \(y\) with \(\frac{5}{6}\).
Simplify.

**Exercises**
Solve each equation. Check your solution.

1. \(t + 1.32 = 3.48\) 
2. \(b - 4.22 = 7.08\) 
3. \(-8.07 = r - 4.48\)

4. \(h + \frac{4}{9} = \frac{7}{9}\) 
5. \(-\frac{5}{8} = x - \frac{1}{4}\) 
6. \(-\frac{2}{3} + f = \frac{3}{5}\)

7. \(3.2c = 9.6\) 
8. \(-5.04 = 1.26d\) 
9. \(\frac{3}{5}x = 6\)

10. \(-\frac{2}{3} = \frac{3}{4}t\) 
11. \(\frac{w}{2.5} = 4.2\) 
12. \(1\frac{3}{4}r = 3\frac{5}{8}\)
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.

\[
20 \cdot 12 \rightarrow 24 \cdot 12 = 288 \\
24 \cdot 18 \rightarrow 20 \cdot 18 = 360
\]

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

**Example 2**
Solve \( \frac{12}{30} = \frac{k}{70} \).

\[
\frac{12}{30} = \frac{k}{70} \\
30 \cdot 70 = 30 \cdot k \\
840 = 30k \\
\frac{840}{30} = \frac{30k}{30} \\
28 = k
\]

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. \( \frac{16}{24} = \frac{x}{15} \)

14. \( \frac{5}{8} = \frac{x}{12} \)

15. \( \frac{14}{t} = \frac{10}{11} \)

16. \( \frac{w}{6} = \frac{2.8}{7} \)

17. \( \frac{5}{y} = \frac{7}{16.8} \)

18. \( \frac{x}{18} = \frac{7}{36} \)
5-2
Study Guide and Intervention
Fractions, Decimals, and Percents

- To write a percent as a decimal, divide by 100 and remove the percent symbol.
- To write a decimal as a percent, multiply by 100 and add the percent symbol.
- To express a fraction as a percent, you can use a proportion. Alternatively, you can write the fraction as a decimal, and then express the decimal as a percent.

**EXAMPLE 1** Write 56% as a decimal.

\[
56\% = \frac{56}{100} \quad \text{Divide by 100 and remove the percent symbol.}
\]

\[
= 0.56
\]

**EXAMPLE 2** Write 0.17 as a percent.

\[
0.17 = \frac{0.17}{1} \quad \text{Multiply by 100 and add the percent symbol.}
\]

\[
= 17\%
\]

**EXAMPLE 3** Write \(\frac{7}{20}\) as a percent.

**Method 1** Use a proportion.

\[
\frac{7}{20} = \frac{x}{100}
\]

Write the proportion.

\[
7 \cdot 100 = 20 \cdot x
\]

Find cross products.

\[
700 = 20x
\]

Multiply.

\[
\frac{700}{20} = \frac{20x}{20}
\]

Divide each side by 20.

\[
35 = x
\]

Simplify.

So, \(\frac{7}{20}\) can be written as 35%.

**EXERCISES**

Write each percent as a decimal.

1. 10%  
2. 36%  
3. 82%  
4. 49.1%

Write each decimal as a percent.

5. 0.14  
6. 0.59  
7. 0.932  
8. 1.07

Write each fraction as a percent.

9. \(\frac{3}{4}\)  
10. \(\frac{7}{10}\)  
11. \(\frac{9}{16}\)  
12. \(\frac{1}{40}\)
Study Guide and Intervention

Area of Parallelograms, Triangles, and Trapezoids

The area $A$ of a parallelogram is the product of any base $b$ and its height $h$, or $A = bh$.
The area $A$ of a triangle is half the product of any base $b$ and its height $h$, or $A = \frac{1}{2}bh$.
The area $A$ of a trapezoid is half the product of the height $h$ and the sum of the bases, $b_1$ and $b_2$, or $A = \frac{1}{2}h(b_1 + b_2)$.

**EXAMPLES**

Find the area of each figure.

1. The base is 8 yards. The height is 6 yards.
   
   $A = bh$
   
   $A = 8 \cdot 6$ or 48
   
   Area of a parallelogram
   
   Replace $b$ with 8 and $h$ with 6. Multiply.
   
   The area is 48 square yards.

2. The base is 10 feet. The height is 4 feet.
   
   $A = \frac{1}{2}bh$
   
   Area of a triangle
   
   $A = \frac{1}{2} \cdot 10 \cdot 4$ or 20
   
   Replace $b$ with 10 and $h$ with 4. Multiply.
   
   The area is 20 square feet.

3. The height is 5 inches. The lengths of the bases are 9 inches and 7 inches.
   
   $A = \frac{1}{2}h(b_1 + b_2)$
   
   Area of a trapezoid
   
   $A = \frac{1}{2} \cdot 5 \cdot (9 + 7)$ or 40
   
   Replace $h$ with 5, $b_1$ with 9, and $b_2$ with 7. Simplify.
   
   The area is 40 square inches.

**EXERCISES**

Find the area of each figure.

1. 

2. 

3. 

4. parallelogram: base, 11 cm; height, 12 cm

5. triangle: base, 8 mi; height, 13 mi

6. trapezoid: height, 7 km; bases, 8 km and 12 km
Study Guide and Intervention

Circumference and Area of Circles

The circumference $C$ of a circle is equal to its diameter $d$ times $\pi$ or 2 times the radius $r$ times $\pi$, or $C = \pi d$ or $C = 2\pi r$.

The area $A$ of a circle is equal to $\pi$ times the square of the radius $r$, or $A = \pi r^2$.

**EXAMPLES**

Find the circumference of each circle.

1. $C = \pi d$
   
   $C = \pi \cdot 4$ Replace $d$ with 4.
   
   $C = 12.6$ Use a calculator.

   The circumference is about 12.6 inches.

2. $C = 2\pi r$

   $C = 2 \cdot \pi \cdot 5.4$ Replace $r$ with 5.4.

   $C \approx 33.9$ Use a calculator.

   The circumference is about 33.9 meters.

**EXAMPLE 3**

Find the area of the circle.

$A = \pi r^2$

$A = \pi (1.5)^2$ Replace $r$ with half of 3 or 1.5.

$A \approx 7.1$ Use a calculator.

The area is about 7.1 square feet.

**EXERCISES**

Find the circumference and area of each circle. Round to the nearest tenth.

1.  
2.  
3.  

4. The diameter is 9.3 meters.

5. The radius is 6.9 millimeter.

6. The diameter is 15.7 inches.
Study Guide and Intervention

The Coordinate Plane

The coordinate plane is used to locate points. The horizontal number line is the x-axis. The vertical number line is the y-axis. Their intersection is the origin.

Points are located using ordered pairs. The first number in an ordered pair is the x-coordinate; the second number is the y-coordinate.

The coordinate plane is separated into four sections called quadrants.

**Example 1** Name the ordered pair for point P. Then identify the quadrant in which P lies.

- Start at the origin.
- Move 4 units left along the x-axis.
- Move 3 units up on the y-axis.

The ordered pair for point P is (-4, 3).

P is in the upper left quadrant or quadrant II.

**Example 2** Graph and label the point M(0, -4).

- Start at the origin.
- Move 0 units along the x-axis.
- Move 4 units down on the y-axis.
- Draw a dot and label it M(0, -4).

**Exercises**

Name the ordered pair for each point graphed at the right. Then identify the quadrant in which each point lies.

1. P
2. Q
3. R
4. S

Graph and label each point on the coordinate plane.

5. A(-1, 1)
6. B(0, -3)
7. C(3, 2)
8. D(-3, -1)
9. E(1, -2)
10. F(1, 3)
Plotting a Hidden Message

Connect each series of points to reveal a hidden message.

(-12,4) (-12,0) (6,-5) (4,-5) (4,-1) (6,-1) (-3,0) (-5,0) (-5,4) (-3,4) (-6,5) (-8,5) (-8,9) (-6,9) (-10,2) (-12,2) (3,-8) (5,-8) (4,-3) (5,-3) (0,-6) (2,-6) (-2,4) (0,4) (4,0) (4,4) (-2,0) (0,0) (-6,-10) (-6,-6) (-5,-9) (-4,-6) (-4,-10) (-6,-1) (-8,-2) (-8,-4) (-6,-5) (-6,-3) (-7,-3) (7,7) (8,7) (-5,-5) (-5,1) (-3,1) (-3,-3) (-5,-3) (-11,9) (-11,5) (-10,7) (-9,5) (-9,9) (9,5) (7,5) (7,9) (9,9) (1,5) (1,9) (3,9) (3,5) (1,5) (3,4) (1,3) (1,1) (3,0) (3,2) (2,2) (4,5) (4,9) (5,6) (6,9) (6,5) (-8,7) (-7,7) (-5,9) (-5,5) (-3,5) (1,-6) (1,-10) (-3,-8) (-1,-8) (-4,-3) (-3,-5) (-2,-3) (0,-3) (-13,4) (-11,4) (1,-5) (1,-1) (2,-1) (3,-3) (2,-5) (1,-5) (-3,-10) (-3,-8) (-2,-6) (-1,-8) (-1,-10) (5,-10) (5,-6) (12,0) (12,4) (10,0) (10,4) (-1,0) (-1,4) (3,-10) (3,-6) (-5,2) (-4,2) (-2,-5) (-2,-3) (-1,-1) (0,-3) (0,-5) (0,5) (-2,5) (-2,9) (0,9) (-10,0) (-10,4) (-8,4) (-8,0) (-10,0) (8,4) (8,0) (4,2) (6,2) (7,4) (9,4) (6,0) (6,4)