Name _____ Date _____

7-1 Study Guide

Adding and Subtracting Like Fractions

To add fractions with like denominators, add the numerators.

Examples **1** Solve $m = \frac{7}{8} + \left(-\frac{5}{8}\right)$.

$m = \frac{2}{8}$ *Add the numerators.*

$m = \frac{1}{4}$ *Simplify.*

2 Solve $n = \frac{5}{6} + \frac{5}{6}$.

$n = \frac{10}{6}$ *Add the numerators.*

$n = 1\frac{4}{6}$ *Rename the improper fraction as a mixed number.*

$n = 1\frac{2}{3}$ *Simplify.*

To subtract fractions with like denominators, subtract the numerators.

Examples **3** Solve $a = \frac{8}{9} - \frac{5}{9}$.

$a = \frac{3}{9}$ *Subtract the numerators.*

$a = \frac{1}{3}$ *Simplify*

4 Solve $b = -\frac{5}{8} - \left(-\frac{3}{8}\right)$.

$b = -\frac{2}{8}$ *Subtract the numerators.*

$b = -\frac{1}{4}$ *Simplify.*

Solve each equation. Write the solution in simplest form.

1. $\frac{4}{7} + \frac{2}{7} = f$
2. $\frac{3}{4} - \frac{1}{4} = p$
3. $a = \frac{5}{8} + \frac{5}{8}$
4. $z = -\frac{2}{3} + \frac{1}{3}$
5. $-\frac{5}{12} - \frac{1}{12} = t$
6. $v = -\frac{6}{11} + \left(-\frac{5}{11}\right)$
7. $-\frac{1}{8} - \left(-\frac{3}{8}\right) = k$
8. $\frac{14}{15} + \frac{6}{15} = x$
9. $c = -\frac{1}{2} - \frac{1}{2}$
10. $j = -\frac{12}{13} + \frac{5}{13}$
11. $-\frac{13}{16} + \left(-\frac{11}{16}\right) = k$
12. $r = -\frac{2}{3} - \left(-\frac{2}{3}\right)$

Name _____ Date _____

7-2 Study Guide

Adding and Subtracting Unlike Fractions

To add or subtract fractions or mixed numbers with unlike denominators, rename the fractions with a common denominator. Then add or subtract.

Examples **1** Solve $a = -\frac{5}{8} + \left(-\frac{3}{4}\right)$. *The least common denominator of 8 and 4 is 8.*

$a = -\frac{5}{8} + \left(-\frac{6}{8}\right)$ *Rename $-\frac{3}{4}$ as $-\frac{6}{8}$.*

$a = -\frac{11}{8}$ *Add.*

$a = -1\frac{3}{8}$ *Rename the improper fraction as a mixed number.*

2 Solve $c = -2\frac{3}{5} - 1\frac{1}{2}$. *The least common denominator of 5 and 12 is 10.*

$c = -2\frac{6}{10} - 1\frac{5}{10}$ *Rename $\frac{3}{5}$ as $\frac{6}{10}$. Rename $\frac{1}{2}$ as $\frac{5}{10}$.*

$c = -3\frac{11}{10}$ *Subtract.*

$c = -4\frac{1}{10}$ *Rename $\frac{11}{10}$ as $1\frac{1}{10}$.*

3 Solve $r = 5\frac{1}{4} - 2\frac{2}{3}$. *The least common denominator of 4 and 3 is 12.*

$r = 5\frac{3}{12} - 2\frac{8}{12}$ *Rename $\frac{1}{4}$ as $\frac{3}{12}$. Rename $\frac{2}{3}$ as $\frac{8}{12}$.*

$r = 4\frac{15}{12} - 2\frac{8}{12}$ *Rename $5\frac{3}{12}$ as $4\frac{15}{12}$.*

$r = 2\frac{7}{12}$ *Subtract.*

Solve each equation. Write the solution in simplest form.

1. $n = \frac{3}{4} + \frac{1}{3}$
2. $\frac{7}{8} - \frac{2}{3} = k$
3. $-\frac{11}{12} - \frac{1}{2} = y$
4. $1\frac{1}{2} + \left(-1\frac{1}{5}\right) = v$
5. $x = -3\frac{2}{3} + \left(-1\frac{1}{6}\right)$
6. $m = 10\frac{11}{12} + 9\frac{3}{8}$
7. $p = 7\frac{1}{3} - \left(-2\frac{5}{9}\right)$
8. $-\frac{15}{16} - \frac{3}{8} = f$
9. $3\frac{4}{5} - \left(-5\frac{1}{2}\right) = c$
10. $2\frac{3}{4} + \left(-6\frac{3}{8}\right) = a$
11. $-9\frac{5}{6} - \left(-3\frac{2}{3}\right) = q$
12. $m = \frac{5}{9} - \frac{1}{3}$

Name _____ Date _____

7-3 Study Guide

Multiplying Fractions

To multiply fractions, multiply the numerators and multiply the denominators. Use the rules for multiplying integers when you multiply negative fractions.

Example 1 Solve $k = -\frac{4}{7} \times \frac{5}{9}$.

$k = -\frac{4 \times 5}{7 \times 9}$ *Multiply the numerators. Multiply the denominators.*

$k = -\frac{20}{63}$ *The product of two rational numbers with different signs is negative.*

Example 2 Solve $n = 3\frac{1}{3} \times 2\frac{1}{5}$.

$n = \frac{{}^{2}\cancel{10}}{3} \times \frac{11}{\cancel{5}_{1}}$ *Rename $3\frac{1}{3}$ as $\frac{10}{3}$. Rename $2\frac{1}{5}$ as $\frac{11}{5}$. The GCF of 10 and 5 is 5. Divide 10 and 5 by 5.*

$n = \frac{2 \times 11}{3 \times 1} = \frac{22}{3}$ *Multiply the numerators. Multiply the denominators.*

$n = 7\frac{1}{3}$ *Simplify.*

Solve each equation. Write the solution in simplest form.

1. $k = \frac{2}{3} \times \frac{3}{5}$
2. $-\frac{1}{2} \times \frac{7}{9} = m$
3. $-\frac{4}{7} \times \left(-\frac{7}{8}\right) = n$
4. $1\frac{1}{2} \times 1\frac{2}{3} = v$
5. $x = -2\frac{1}{4} \times \frac{2}{9}$
6. $r = -8 \times \left(-\frac{3}{4}\right)$
7. $p = \frac{3}{8} \times \left(-2\frac{2}{3}\right)$
8. $6\frac{1}{2} \times \frac{4}{5} = w$
9. $9 \times \left(-2\frac{2}{3}\right) = h$
10. $4\left(5\frac{3}{4}\right) = f$
11. $c = \left(\frac{1}{2}\right)^2$
12. $t = \frac{4}{7} \times \left(-\frac{2}{3}\right)$

Name _____ Date _____

7-4 Study Guide

Properties of Rational Numbers

Use the basic properties for addition and multiplication of rational numbers to help you evaluate expressions.

Commutative Property

For any numbers a and b:
$a + b = b + a$
$a \times b = b \times a$

Examples

$\frac{1}{4} + \frac{2}{3} = \frac{2}{3} + \frac{1}{4}$

$\frac{4}{5} \times \frac{1}{2} = \frac{1}{2} \times \frac{4}{5}$

Associative Property

For any numbers a, b, and c:
$(a + b) + c = a + (b + c)$
$(a \times b) \times c = a \times (b \times c)$

Examples

$\left(-\frac{1}{3} + \frac{2}{5}\right) + \frac{1}{2} = -\frac{1}{3} + \left(\frac{2}{5} + \frac{1}{2}\right)$

$\left(\frac{5}{7} \times -\frac{3}{4}\right) \times \frac{1}{3} = \frac{5}{7} \times \left(-\frac{3}{4} \times \frac{1}{3}\right)$

Identity Property

For any number a:
$a + 0 = a$
$a \times 1 = a$

Examples

$\frac{7}{8} + 0 = \frac{7}{8}$

$-\frac{11}{12} \times 1 = -\frac{11}{12}$

Distributive Property

For any numbers a, b, and c:

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

Example

$4 \times \left(7 + \frac{5}{8}\right) = \left(4 \times 7\right) + \left(4 \times \frac{5}{8}\right)$

Inverse Property of Multiplication

For any numbers a and b, with $a, b \neq 0$:

$\frac{a}{b} \times \frac{b}{a} = 1$

Example

$\frac{2}{5} \times \frac{5}{2} = 1$ $\frac{2}{5}$ and $\frac{5}{2}$ are reciprocals or multiplicative inverses of each other.

Name the multiplicative inverse of each rational number.

1. 8
2. -7
3. $\frac{3}{4}$
4. $-\frac{9}{15}$
5. 0.5
6. $\frac{r}{t}$
7. $-p$
8. $2\frac{1}{4}$
9. $-\frac{m}{n}$
10. k

Evaluate each expression if $a = \frac{1}{4}$, $b = \frac{3}{8}$, $x = -1\frac{1}{2}$, and $y = 2\frac{2}{3}$.

11. ab
12. $2x$
13. by
14. a^2

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7-5 Study Guide

Integration: Patterns and Functions
Sequences

A list of numbers in a specific order is a **sequence.** Each number is called a **term** of the sequence. When the difference between any two consecutive terms is the same, the sequence is an **arithmetic sequence.**

Examples $0, \ 2\frac{1}{4}, \ 4\frac{1}{2}, \ 6\frac{3}{4}, \ 9, \ldots$ (each step $+ 2\frac{1}{4}$) The difference between consecutive terms is $2\frac{1}{4}$.

When consecutive terms are formed by multiplying by the same factor, the sequence is **geometric.**

Example $8, \ 4, \ 2, \ 1, \ \frac{1}{2}, \ldots$ (each step $\times \frac{1}{2}$) Multiply by $\frac{1}{2}$ to find consecutive terms.

Some sequences are neither arithmetic or geometric.

Example $100, \ 80, \ 62, \ 46, \ 32, \ldots$ (steps $-20, -18, -16, -14$) There is no common difference or common multiplier.

Identify each sequence as arithmetic, geometric, or neither. Then write the next three terms.

1. 47, 42, 37, 32, . . .

2. 9, 18, 36, 72, . . .

3. $\frac{1}{9}, \frac{1}{3}, 1, 3, 9, \ldots$

4. 15, 17, 20, 24, 29, . . .

5. $8, 7\frac{3}{5}, 7\frac{1}{5}, 6\frac{4}{5}, \ldots$

6. $8, 2, \frac{1}{2}, \frac{1}{8}, \ldots$

7. $-9, -5, -1, 3, 7, \ldots$

8. $\frac{4}{7}, \frac{2}{7}, 0, -\frac{2}{7}, \ldots$

9. 1, 1, 2, 3, 5, 8, . . .

10. $\frac{1}{10}, \frac{1}{2}, 2\frac{1}{2}, 12\frac{1}{2}, \ldots$

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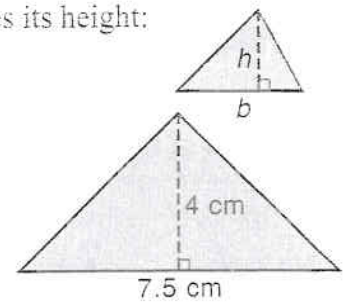
7-6 Study Guide

Integration: Geometry
Area of Triangles and Trapezoids

The area of a triangle is equal to one-half its base times its height: $A = \frac{1}{2}bh$.



Example 1 Find the area of the triangle.

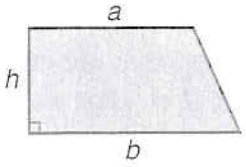
$A = \frac{1}{2}bh$.

$A = \frac{1}{2}(7.5)(4)$ $\quad b = 7.5,\ h = 4$

$A = 2(7.5)$

$A = 15$ The area is 15 square centimeters.

The area of a trapezoid is equal to one-half its height times the sum of its bases: $A = \frac{1}{2}h(a + b)$.



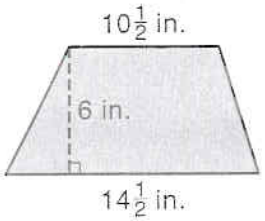
Example 2 Find the area of the trapezoid.

$A = \frac{1}{2}h(a + b)$

$A = \frac{1}{2}(6)\left(10\frac{1}{2} + 14\frac{1}{2}\right)$ $\quad h = 6,\ a = 10\frac{1}{2},\ b = 14\frac{1}{2}$

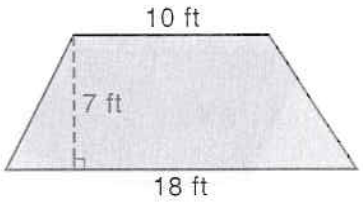
$A = 3(25)$

$A = 75$ The area is 75 square inches.



State the measures of the base(s) and the height of each triangle or trapezoid. Then find the area of each figure.

1.



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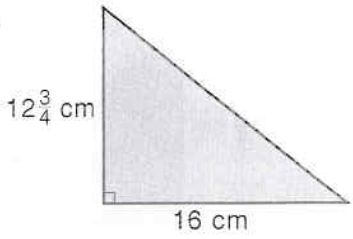

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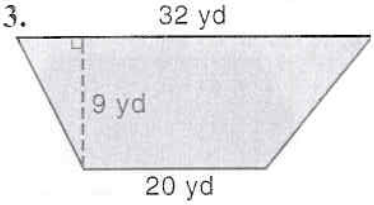

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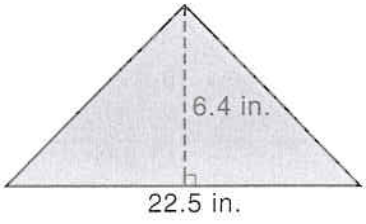

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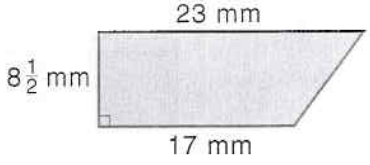

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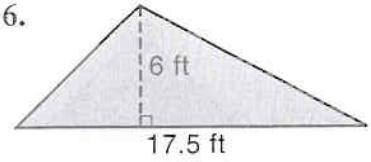
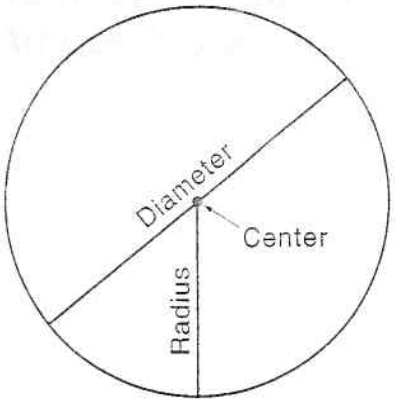


Name _____ Date _____

7-7 Study Guide

Integration: Geometry
Circles and Circumference



A **circle** is a set of points in a plane that are the same distance from a given point called the **center**.

The **diameter** (d) is the distance across the circle through its center.

The **radius** (r) is the distance from the center to any point on the circle.

The **circumference** (C) is the distance around the circle.

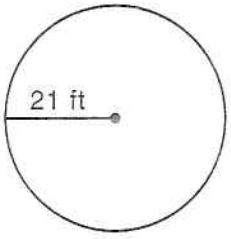
Examples **1** **Find the circumference of a circle with a diameter of 9.5 inches.**

$C = \pi d$
$C = 3.14 \times 9.5$ *Use 3.14 for π.*
$C \approx 29.83$
The circumference of the circle is about 29.83 inches.

2 **Find the circumference of a circle with a radius of 14 inches.**

$C = 2\pi r$
$C = 2 \times \frac{22}{7} \times 14$ *Use $\frac{22}{7}$ for π.*
$C \approx 88$
The circumference of the circle is approximately 88 inches.

Find the circumference of each circle to the nearest tenth. Use $\frac{22}{7}$ or 3.14 for π.

1.


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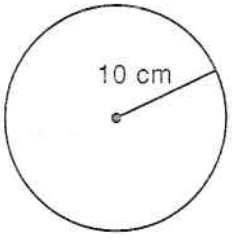

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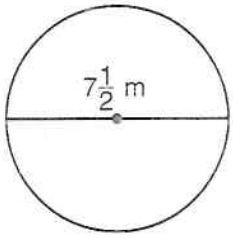

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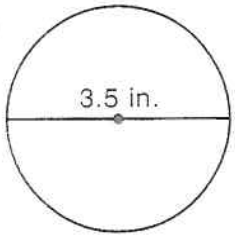

5. The radius is 42 miles.

6. The diameter is 68 meters.

7. The diameter is 700 feet.

8. The radius is $7\frac{3}{4}$ inches.

9. The radius is 91 centimeters.

10. The diameter is $2\frac{1}{3}$ kilometers.

Name _____ Date _____

7-8 Study Guide

Dividing Fractions

To divide by a fraction, multiply by its multiplicative inverse. Use the rules for dividing integers when you divide negative fractions.

Examples **1** Solve $m = 24 \div \frac{3}{4}$.

$m = \frac{24}{1} \div \frac{3}{4}$ *Rename 24 as* $\frac{24}{1}$.

$m = \frac{24}{1} \times \frac{4}{3}$ *Multiply by* $\frac{4}{3}$, *the multiplicative inverse of* $\frac{3}{4}$.

$m = 32$

2 Solve $p = -2\frac{1}{3} \div \frac{5}{6}$.

$p = -\frac{7}{3} \div \frac{5}{6}$ *Rename* $-2\frac{1}{3}$ *as* $-\frac{7}{3}$.

$p = -\frac{7}{3} \times \frac{6}{5}$ *Multiply by* $\frac{6}{5}$, *the multiplicative inverse of* $\frac{5}{6}$.

$p = -\frac{14}{5}$ *The product of a negative number and a positive number is negative.*

$p = -2\frac{4}{5}$ *Rename* $-\frac{14}{5}$ *as* $-2\frac{4}{5}$.

3 Solve $r = -\frac{7}{8} \div \left(-4\frac{1}{2}\right)$.

$r = -\frac{7}{8} \div \left(-\frac{9}{2}\right)$ *Rename* $-4\frac{1}{2}$ *as* $-\frac{9}{2}$.

$r = -\frac{7}{8} \times \left(-\frac{2}{9}\right)$ *Multiply by* $-\frac{2}{9}$, *the multiplicative inverse of* $-\frac{9}{2}$.

$r = \frac{7}{36}$ *The product of two negative numbers is positive.*

Solve each equation. Write the solution in simplest form.

1. $y = \frac{4}{5} \div \frac{1}{10}$

2. $15 \div \frac{5}{8} = k$

3. $r = -25 \div 1\frac{3}{7}$

4. $5\frac{1}{3} \div \left(-\frac{3}{8}\right) = t$

5. $f = -\frac{15}{16} \div \left(-\frac{3}{4}\right)$

6. $7\frac{1}{2} \div \left(-2\frac{1}{2}\right) = y$

Evaluate each expression.

7. $a \div b$ if $a = -10\frac{5}{6}$ and $b = 4\frac{1}{3}$

8. $r \div (s + t)$ if $r = 10$, $s = -4\frac{3}{8}$, $t = -1\frac{5}{8}$

9. $a^2 \div y$ if $a = -9$ and $y = -\frac{1}{3}$

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7-9 Study Guide

Solving Equations

Solve equations containing rational numbers the same way you solve integer equations.

Examples **1** Solve $-\frac{2}{3}m = \frac{10}{21}$.

$-\frac{3}{2} \times -\frac{2}{3}m = -\frac{3}{2} \times \frac{10}{21}$ *Multiply each side by $-\frac{3}{2}$, the multiplicative inverse of $-\frac{2}{3}$.*

$m = -\frac{5}{7}$

Check: $-\frac{2}{3} \times \left(-\frac{5}{7}\right) \stackrel{?}{=} \frac{10}{21}$

$\frac{10}{21} = \frac{10}{21}$ ✔

2 Solve $-\frac{3}{8} = \frac{t}{5}$.

$5 \times \left(-\frac{3}{8}\right) = 5 \times \frac{t}{5}$ *Multiply each side by 5.*

$-\frac{15}{8} = t$

$-1\frac{7}{8} = t$

Check: $-\frac{3}{8} \stackrel{?}{=} -\frac{15}{8} \div 5$

$-\frac{3}{8} \stackrel{?}{=} -\frac{15}{8} \times \frac{1}{5}$

$-\frac{3}{8} = -\frac{3}{8}$ ✔

Solve each equation. Check your solution.

1. $3m = -84$
2. $\frac{y}{5} = -9$
3. $-\frac{1}{2}p = 4.6$
4. $c \div 0.2 = 12$
5. $\frac{k}{1.2} = -5.5$
6. $y - \frac{3}{5} = -6$
7. $\frac{v}{8} = -3.2$
8. $\frac{t}{1.5} = -8$
9. $4.9 = \frac{x}{0.3}$
10. $3\frac{1}{2}n = 7\frac{7}{8}$
11. $-\frac{2}{3} = 8k$
12. $\frac{7}{9}f = 9\frac{1}{3}$

Name _____ Date _____

7-10 Study Guide

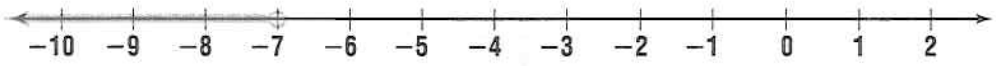
Solving Inequalities

You can solve inequalities that involve rational numbers by using the same steps you used to solve inequalities with integers.

Example Solve $5 + \frac{1}{3}y < 2\frac{1}{2}$.

$$5 + \tfrac{1}{3}y < 2\tfrac{1}{2}$$
$$5 + \tfrac{1}{3}y - 5 < 2\tfrac{1}{2} - 5$$
$$\tfrac{1}{3}y < -2\tfrac{1}{2}$$
$$3\left(\tfrac{1}{3}y\right) < 3\left(-2\tfrac{1}{2}\right)$$
$$y < -7\tfrac{1}{2}$$

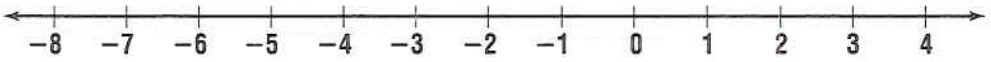
The numbers less than $-7\frac{1}{2}$ make up the solution set. The number line below shows the solution.



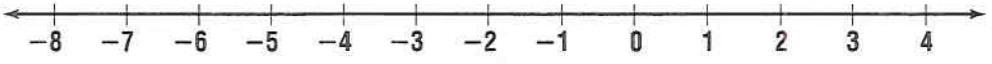
Solve each inequality. Graph the solution on a number line.

1. $a + 2\frac{1}{3} < -\frac{1}{6}$

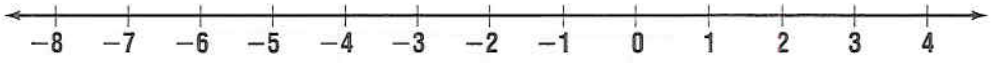
2. $1\frac{1}{8} - b \geq \frac{7}{16}$



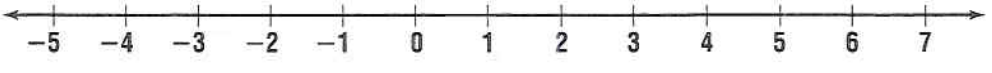
3. $-0.4c \leq 0.9$



4. $\frac{f - 6.25}{2.5} < -3.5$



5. $\frac{3}{2}d - 4 \geq \frac{7}{8}$



6. $\dfrac{-\frac{4}{3} - y}{\frac{5}{9}} < 2\frac{1}{5}$