NAME _____ DATE _____ PERIOD _____

Lesson 1 Reteach

Fractions and Decimals

Some fractions can be written as decimals by making equivalent fractions with denominators of 10, 100, or 1,000. All fractions can be written as decimals by dividing the numerator by the denominator. **Repeating decimals** have a pattern in their digits that repeats without ending. If the repeating digit is zero, then the decimal is a **terminating decimal.**

Example 1

Write $\frac{3}{8}$ as a decimal.

$\frac{3}{8} \longrightarrow$

```
      0.375
   8)3.000
     2 4
       60
       56
        40
        40
         0
```

0.375 is a terminating decimal.

Example 2

Write $\frac{4}{9}$ as a decimal.

$\frac{4}{9} \longrightarrow$

```
      0.444
   9)4.000
     3 6
       40
       36
        40
        36
         4
```

0.444... is a repeating decimal. You can indicate that a decimal repeats by writing a bar or line over the repeating digit(s): $\frac{4}{9} = 0.\overline{4}$.

It may be easier to compare numbers when they are written as decimals.

Example 3

Replace ● with $<$, $>$, or $=$ to make -0.37 ● $-\frac{4}{11}$ a true sentence.

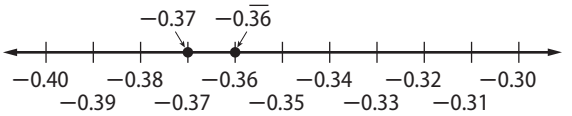
-0.37 ● $-\frac{4}{11}$

-0.37 ● $-0.\overline{36}$

$-0.37 < -0.\overline{36}$

Write $\frac{4}{11}$ as a decimal.

-0.37 is to the left of $-0.\overline{36}$ on the number line, so $-0.37 < -0.\overline{36}$.



Exercises

Write each fraction as a decimal. Use a bar to show a repeating decimal.

1. $\frac{7}{20}$ **2.** $\frac{2}{11}$ **3.** $\frac{5}{9}$

4. $-\frac{7}{9}$ **5.** $\frac{27}{40}$ **6.** $-\frac{2}{3}$

Replace each ● with $<$, $>$, or $=$ to make a true sentence.

7. $\frac{5}{8}$ ● $\frac{6}{9}$ **8.** $\frac{4}{5}$ ● 0.8 **9.** $\frac{7}{8}$ ● $\frac{4}{5}$

10. 0.16 ● $\frac{4}{25}$ **11.** $-\frac{11}{40}$ ● -0.02 **12.** $\frac{7}{8}$ ● 0.88

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Lesson 1 Reteach

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Write $\frac{3}{8}$ as a decimal.

$\frac{3}{8} \longrightarrow$

```
      0.375
   8)3.000
     2 4
       60
       56
        40
        40
         0
```

0.375 is a terminating decimal.

Example 2

Write $\frac{4}{9}$ as a decimal.

$\frac{4}{9} \longrightarrow$

```
      0.444
   9)4.000
     3 6
       40
       36
        40
        36
         4
```

0.444... is a repeating decimal. You can indicate that a decimal repeats by writing a bar or line over the repeating digit(s): $\frac{4}{9} = 0.\overline{4}$.

It may be easier to compare numbers when they are written as decimals.

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Replace ● with $<$, $>$, or $=$ to make -0.37 ● $-\frac{4}{11}$ a true sentence.

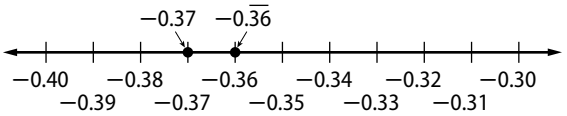
-0.37 ● $-\frac{4}{11}$

-0.37 ● $-0.\overline{36}$

Write $\frac{4}{11}$ as a decimal.

$-0.37 < -0.\overline{36}$

-0.37 is to the left of $-0.\overline{36}$ on the number line, so $-0.37 < -0.\overline{36}$.



Exercises

Write each fraction as a decimal. Use a bar to show a repeating decimal.

1. $\frac{7}{20}$ **0.35**
2. $\frac{2}{11}$ **$0.\overline{18}$**
3. $\frac{5}{9}$ **$0.\overline{5}$**
4. $-\frac{7}{9}$ **$-0.\overline{7}$**
5. $\frac{27}{40}$ **0.675**
6. $-\frac{2}{3}$ **$-0.\overline{6}$**

Replace each ● with $<$, $>$, or $=$ to make a true sentence.

7. $\frac{5}{8}$ ● $\frac{6}{9}$ $<$
8. $\frac{4}{5}$ ● 0.8 $=$
9. $\frac{7}{8}$ ● $\frac{4}{5}$ $>$
10. 0.16 ● $\frac{4}{25}$ $=$
11. $-\frac{11}{40}$ ● -0.02 $<$
12. $\frac{7}{8}$ ● 0.88 $<$

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NAME _____ DATE _____ PERIOD _____

Lesson 2 Reteach

Rational Numbers

A number that can be written as a fraction is a **rational number**. Mixed numbers, integers, terminating decimals, and repeating decimals can all be written as fractions. Any number that can be expressed as $\frac{a}{b}$, where a and b are integers and $b \neq 0$ is a rational number.

Example 1 Write each number as a fraction.

a. $3\frac{2}{5}$

$3\frac{2}{5} = \frac{17}{5}$ Write the mixed number as an improper fraction.

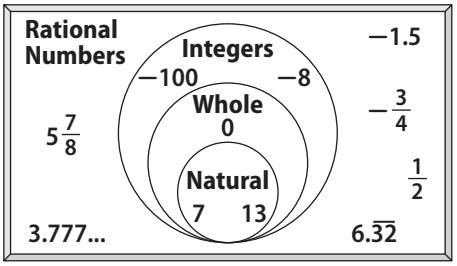
b. 0.14

0.14 is 14 hundredths.

$0.14 = \frac{14}{100}$ or $\frac{7}{50}$ Simplify.

Numbers can be classified into a variety of different sets. The diagram at the right illustrates the relationships among the sets of natural numbers, whole numbers, integers, and rational numbers.

Decimal numbers such as $\pi = 3.141592...$ and 6.767767776... are infinite and nonrepeating. They are called irrational numbers.



Example 2 Identify all sets to which each number belongs.

a. −0.08 This is neither a whole number nor an integer. Since −0.08 can be written as $-\frac{8}{100}$, it is rational.

b. 8.282282228... This is a nonterminating and nonrepeating decimal. So, it is irrational.

Exercises

Write each number as a fraction.

1. $1\frac{1}{5}$ **2.** −2 **3.** 0.7

4. −9.08 **5.** $-0.0\overline{6}$ **6.** $6\frac{8}{11}$

Identify all sets to which each number belongs.

7. −12 **8.** 8.5 **9.** 582

10. 0 **11.** −68 **12.** $\frac{1}{5}$

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Lesson 2 Reteach

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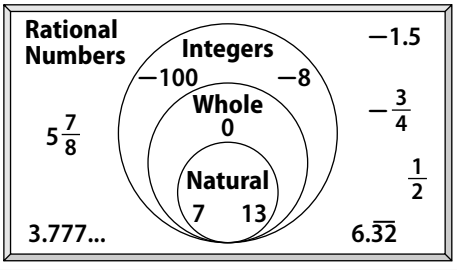

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b. 8.282282228... This is a nonterminating and nonrepeating decimal. So, it is irrational.

Exercises

Write each number as a fraction.

1. $1\frac{1}{5}$ $\frac{6}{5}$

2. −2 $-\frac{2}{1}$

3. 0.7 $\frac{7}{10}$

4. −9.08 $-9\frac{2}{25}$

5. $-0.0\overline{6}$ $-\frac{1}{15}$

6. $6\frac{8}{11}$ $\frac{74}{11}$

Identify all sets to which each number belongs.

7. −12
integer, rational

8. 8.5
rational

9. 582
natural, whole, integer, rational

10. 0
whole, integer, rational

11. −68
integer, rational

12. $\frac{1}{5}$
rational

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Lesson 3 Reteach

Multiplying Rational Numbers

To multiply fractions, multiply the numerators and multiply the denominators: $\frac{a}{b} \cdot \frac{c}{d} = \frac{a \cdot c}{b \cdot d}$, where $b, d \neq 0$. Fractions may be simplified before or after multiplying. For negative fractions, assign the negative sign to the numerator.

Example 1 **Find $7\frac{1}{2} \cdot 2\frac{2}{3}$. Write in simplest form.**

$7\frac{1}{2} \cdot 2\frac{2}{3} = \frac{15}{2} \cdot \frac{8}{3}$ Rename mixed numbers as improper fractions.

$= \frac{\overset{5}{\cancel{15}}}{\cancel{2}} \cdot \frac{\overset{4}{\cancel{8}}}{\cancel{3}}$ Divide 15 and 3 by 3, and 8 and 2 by 2.

$= \frac{5 \cdot 4}{1 \cdot 1}$ Multiply.

$= \frac{20}{1}$ or 20 Simplify.

Algebraic expressions are expressions which contain one or more variables. Variables can represent fractions in algebraic expressions.

Example 2 **Evaluate $\frac{2}{3}ab$ if $a = 3\frac{3}{7}$ and $b = -\frac{5}{12}$. Write the product in simplest form.**

$\frac{2}{3}ab = \frac{2}{3}\left(3\frac{3}{7}\right)\left(-\frac{5}{12}\right)$ Replace a with $3\frac{3}{7}$ and b with $-\frac{5}{12}$.

$= \frac{2}{3}\left(\frac{24}{7}\right)\left(\frac{-5}{12}\right)$ Rename $3\frac{3}{7}$ as $\frac{24}{7}$.

$= \frac{2}{3}\left(\frac{\overset{2}{\cancel{24}}}{7}\right)\left(\frac{-5}{\underset{1}{\cancel{12}}}\right)$ The GCF of 24 and 12 is 12.

$= -\frac{20}{21}$ or $-\frac{20}{21}$ Simplify.

Exercises

Find each product. Write in simplest form.

1. $\frac{1}{2} \cdot \frac{3}{5}$

2. $-\frac{8}{9} \cdot \frac{5}{16}$

3. $\frac{4}{5} \cdot \frac{5}{8}$

4. $\frac{3}{10} \cdot \left(-\frac{1}{4}\right)$

5. $-2\frac{1}{8} \cdot \left(-4\frac{4}{7}\right)$

6. $2\frac{4}{9} \cdot \left(-3\frac{6}{11}\right)$

Evaluate each expression if $x = \frac{7}{10}$, $y = -4\frac{2}{5}$, and $z = -\frac{4}{7}$. Write the product in simplest form.

7. xy

8. yz

9. xyz

10. $5\frac{5}{6}xz$

11. $\frac{2}{5}(-x)$

12. $\frac{9}{10}y$

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Lesson 3 Reteach

Multiplying Rational Numbers

To multiply fractions, multiply the numerators and multiply the denominators: $\frac{a}{b} \cdot \frac{c}{d} = \frac{a \cdot c}{b \cdot d}$, where $b, d \neq 0$. Fractions may be simplified before or after multiplying. For negative fractions, assign the negative sign to the numerator.

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$7\frac{1}{2} \cdot 2\frac{2}{3} = \frac{15}{2} \cdot \frac{8}{3}$ Rename mixed numbers as improper fractions.

$= \frac{\overset{5}{\cancel{15}}}{\cancel{2}} \cdot \frac{\overset{4}{\cancel{8}}}{\cancel{3}}$ Divide 15 and 3 by 3, and 8 and 2 by 2.

$= \frac{5 \cdot 4}{1 \cdot 1}$ Multiply.

$= \frac{20}{1}$ or 20 Simplify.

Algebraic expressions are expressions which contain one or more variables. Variables can represent fractions in algebraic expressions.

Example 2 **Evaluate $\frac{2}{3}ab$ if $a = 3\frac{3}{7}$ and $b = -\frac{5}{12}$. Write the product in simplest form.**

$\frac{2}{3}ab = \frac{2}{3}\left(3\frac{3}{7}\right)\left(-\frac{5}{12}\right)$ Replace a with $3\frac{3}{7}$ and b with $-\frac{5}{12}$.

$= \frac{2}{3}\left(\frac{24}{7}\right)\left(\frac{-5}{12}\right)$ Rename $3\frac{3}{7}$ as $\frac{24}{7}$.

$= \frac{2}{3}\left(\frac{\overset{2}{\cancel{24}}}{7}\right)\left(\frac{-5}{\underset{1}{\cancel{12}}}\right)$ The GCF of 24 and 12 is 12.

$= -\frac{20}{21}$ or $-\frac{20}{21}$ Simplify.

Exercises

Find each product. Write in simplest form.

1. $\frac{1}{2} \cdot \frac{3}{5}$ $\mathbf{\frac{3}{10}}$
2. $-\frac{8}{9} \cdot \frac{5}{16}$ $\mathbf{-\frac{5}{18}}$
3. $\frac{4}{5} \cdot \frac{5}{8}$ $\mathbf{\frac{1}{2}}$
4. $\frac{3}{10} \cdot \left(-\frac{1}{4}\right)$ $\mathbf{-\frac{3}{40}}$
5. $-2\frac{1}{8} \cdot \left(-4\frac{4}{7}\right)$ $\mathbf{9\frac{5}{7}}$
6. $2\frac{4}{9} \cdot \left(-3\frac{6}{11}\right)$ $\mathbf{-8\frac{2}{3}}$

Evaluate each expression if $x = \frac{7}{10}$, $y = -4\frac{2}{5}$, and $z = -\frac{4}{7}$. Write the product in simplest form.

7. xy $\mathbf{-3\frac{2}{25}}$
8. yz $\mathbf{2\frac{18}{35}}$
9. xyz $\mathbf{1\frac{19}{25}}$
10. $5\frac{5}{6}xz$ $\mathbf{-2\frac{1}{3}}$
11. $\frac{2}{5}(-x)$ $\mathbf{-\frac{7}{25}}$
12. $\frac{9}{10}y$ $\mathbf{-3\frac{24}{25}}$

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Lesson 4 Reteach

Dividing Rational Numbers

Two numbers whose product is 1 are called multiplicative inverses or reciprocals.
For any fraction $\frac{a}{b}$, where $a, b \neq 0$, $\frac{b}{a}$ is the multiplicative inverse and $\frac{a}{b} \cdot \frac{b}{a} = 1$.
This means that $\frac{2}{3}$ and $\frac{3}{2}$ are multiplicative inverses because $\frac{2}{3} \cdot \frac{3}{2} = 1$.
To divide by a fraction, multiply by its multiplicative inverse: $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c} = \frac{ad}{bc}$, where $b, c, d \neq 0$.

Example 1 Find $\frac{3}{4} \div \frac{5}{8}$. Write in simplest form.

$\frac{3}{4} \div \frac{5}{8} = \frac{3}{4} \cdot \frac{8}{5}$ Multiply by the multiplicative inverse of $\frac{5}{8}$, $\frac{8}{5}$.

$= \frac{3}{\cancel{4}_{1}} \cdot \frac{\cancel{8}^{2}}{5}$ Divide 4 and 8 by their GCF, 4.

$= \frac{6}{5}$ or $1\frac{1}{5}$ Simplify.

Algebraic fractions are fractions which contain one or more variables. You can divide algebraic fractions just as you would divide numerical fractions.

Example 2 Find $\frac{4}{qrs} \div \frac{10}{qs}$. Write in simplest form.

$\frac{4}{qrs} \div \frac{10}{qs} = \frac{4}{qrs} \cdot \frac{qs}{10}$ Multiply by the reciprocal of $\frac{10}{qs}$, $\frac{qs}{10}$.

$= \frac{\cancel{4}^{2}}{\cancel{q}_{1}\cancel{r}\cancel{s}_{1}} \cdot \frac{\cancel{qs}^{1}}{\cancel{10}_{5}}$ Divide out common factors.

$= \frac{2}{5r}$ Simplify.

Exercises

Find each quotient. Write in simplest form.

1. $\frac{5}{16} \div \frac{5}{8}$

2. $\frac{7}{9} \div \frac{2}{3}$

3. $\frac{16}{21} \div \left(-\frac{2}{7}\right)$

4. $-\frac{4}{5} \div \frac{3}{10}$

5. $\frac{18}{21} \div 3$

6. $-4\frac{5}{8} \div \left(-3\frac{1}{3}\right)$

7. $\frac{2x}{y} \div \frac{3}{y}$

8. $\frac{c}{4d} \div \frac{3}{8d}$

9. $\frac{4a}{b} \div \frac{2ac}{b}$

10. $\frac{m}{9} \div \frac{mn^2}{3}$

11. $\frac{ab}{9} \div \frac{bc}{12}$

12. $\frac{2st}{q} \div \frac{4t}{q}$

13. $\frac{15yz}{6x} \div \frac{10z}{3x}$

14. $\frac{de}{20f} \div \frac{e}{2f}$

15. $\frac{6i}{5gh} \div \frac{8i}{3h}$

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NAME _____ DATE _____ PERIOD _____

Lesson 4 Reteach

Dividing Rational Numbers

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For any fraction $\frac{a}{b}$, where $a, b \neq 0$, $\frac{b}{a}$ is the multiplicative inverse and $\frac{a}{b} \cdot \frac{b}{a} = 1$.
This means that $\frac{2}{3}$ and $\frac{3}{2}$ are multiplicative inverses because $\frac{2}{3} \cdot \frac{3}{2} = 1$.
To divide by a fraction, multiply by its multiplicative inverse: $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c} = \frac{ad}{bc}$, where $b, c, d \neq 0$.

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$\frac{3}{4} \div \frac{5}{8} = \frac{3}{4} \cdot \frac{8}{5}$ Multiply by the multiplicative inverse of $\frac{5}{8}$, $\frac{8}{5}$.

$= \frac{3}{\cancel{4}_{1}} \cdot \frac{\cancel{8}^{2}}{5}$ Divide 4 and 8 by their GCF, 4.

$= \frac{6}{5}$ or $1\frac{1}{5}$ Simplify.

Algebraic fractions are fractions which contain one or more variables. You can divide algebraic fractions just as you would divide numerical fractions.

Example 2 Find $\frac{4}{qrs} \div \frac{10}{qs}$. Write in simplest form.

$\frac{4}{qrs} \div \frac{10}{qs} = \frac{4}{qrs} \cdot \frac{qs}{10}$ Multiply by the reciprocal of $\frac{10}{qs}$, $\frac{qs}{10}$.

$= \frac{\cancel{4}^{2}}{\cancel{q}_{1}\cancel{r}\cancel{s}_{1}} \cdot \frac{\cancel{qs}^{1}}{\cancel{10}_{5}}$ Divide out common factors.

$= \frac{2}{5r}$ Simplify.

Exercises

Find each quotient. Write in simplest form.

1. $\frac{5}{16} \div \frac{5}{8}$ $\mathbf{\frac{1}{2}}$
2. $\frac{7}{9} \div \frac{2}{3}$ $\mathbf{1\frac{1}{6}}$
3. $\frac{16}{21} \div \left(-\frac{2}{7}\right)$ $\mathbf{-2\frac{2}{3}}$
4. $-\frac{4}{5} \div \frac{3}{10}$ $\mathbf{-2\frac{2}{3}}$
5. $\frac{18}{21} \div 3$ $\mathbf{\frac{2}{7}}$
6. $-4\frac{5}{8} \div \left(-3\frac{1}{3}\right)$ $\mathbf{1\frac{31}{80}}$
7. $\frac{2x}{y} \div \frac{3}{y}$ $\mathbf{\frac{2x}{3}}$
8. $\frac{c}{4d} \div \frac{3}{8d}$ $\mathbf{\frac{2c}{3}}$
9. $\frac{4a}{b} \div \frac{2ac}{b}$ $\mathbf{\frac{2}{c}}$
10. $\frac{m}{9} \div \frac{mn^2}{3}$ $\mathbf{\frac{1}{3n^2}}$
11. $\frac{ab}{9} \div \frac{bc}{12}$ $\mathbf{\frac{4a}{3c}}$
12. $\frac{2st}{q} \div \frac{4t}{q}$ $\mathbf{\frac{s}{2}}$
13. $\frac{15yz}{6x} \div \frac{10z}{3x}$ $\mathbf{\frac{3y}{4}}$
14. $\frac{de}{20f} \div \frac{e}{2f}$ $\mathbf{\frac{d}{10}}$
15. $\frac{6i}{5gh} \div \frac{8i}{3h}$ $\mathbf{\frac{9}{20g}}$

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NAME _____ DATE _____ PERIOD _____

Lesson 5 Reteach

Adding and Subtracting Like Fractions

To add fractions with the same denominators, called **like denominators**, add the numerators and write the sum over the denominator.
So, $\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$, where $c \neq 0$.

Example 1 **Find $\frac{3}{8} + \left(-\frac{7}{8}\right)$. Write in simplest form.**

$\frac{3}{8} + \left(-\frac{7}{8}\right) = \frac{3 + (-7)}{8}$ The denominators are the same. Add the numerators.

$= \frac{-4}{8}$ or $-\frac{1}{2}$ Simplify.

Example 2 **Find $1\frac{2}{9} + 3\frac{4}{9}$. Write in simplest form.**

$1\frac{2}{9} + 3\frac{4}{9} = (1 + 3) + \left(\frac{2}{9} + \frac{4}{9}\right)$ Add the whole numbers and fractions separately or write as improper fractions.

$= 4 + \frac{2+4}{9}$ Add the numerators.

$= 4\frac{6}{9}$ or $4\frac{2}{3}$ Simplify.

To subtract fractions with like denominators, subtract the numerators and write the difference over the denominator. So, $\frac{a}{c} - \frac{b}{c} = \frac{a-b}{c}$, where $c \neq 0$.

Example 3 **Find $\frac{3}{8} - \frac{5}{8}$. Write in simplest form.**

$\frac{3}{8} - \frac{5}{8} = \frac{3-5}{8}$ The denominators are the same. Subtract the numerators.

$= -\frac{2}{8}$ or $-\frac{1}{4}$ Simplify.

Exercises

Find each sum. Write in simplest form.

1. $\frac{11}{12} + \frac{9}{12}$

2. $\frac{13}{15} + \frac{9}{15}$

3. $\frac{4}{9} + \frac{8}{9}$

4. $-6\frac{7}{12} + \left(-8\frac{11}{12}\right)$

5. $-4\frac{9}{14} + 3\frac{5}{14}$

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

Find each difference. Write in simplest form.

7. $\frac{19}{20} - \frac{17}{20}$

8. $\frac{23}{25} - \frac{8}{25}$

9. $\frac{5}{9} - \frac{2}{9}$

10. $\frac{3}{7} - \frac{5}{7}$

11. $\frac{4}{12} - \frac{7}{12}$

12. $\frac{14}{15} - \frac{9}{15}$

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Lesson 5 Reteach

Adding and Subtracting Like Fractions

To add fractions with the same denominators, called **like denominators**, add the numerators and write the sum over the denominator.
So, $\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$, where $c \neq 0$.

Example 1 **Find $\frac{3}{8} + \left(-\frac{7}{8}\right)$. Write in simplest form.**

$\frac{3}{8} + \left(-\frac{7}{8}\right) = \frac{3 + (-7)}{8}$ The denominators are the same. Add the numerators.

$= \frac{-4}{8}$ or $-\frac{1}{2}$ Simplify.

Example 2 **Find $1\frac{2}{9} + 3\frac{4}{9}$. Write in simplest form.**

$1\frac{2}{9} + 3\frac{4}{9} = (1 + 3) + \left(\frac{2}{9} + \frac{4}{9}\right)$ Add the whole numbers and fractions separately or write as improper fractions.

$= 4 + \frac{2+4}{9}$ Add the numerators.

$= 4\frac{6}{9}$ or $4\frac{2}{3}$ Simplify.

To subtract fractions with like denominators, subtract the numerators and write the difference over the denominator. So, $\frac{a}{c} - \frac{b}{c} = \frac{a-b}{c}$, where $c \neq 0$.

Example 3 **Find $\frac{3}{8} - \frac{5}{8}$. Write in simplest form.**

$\frac{3}{8} - \frac{5}{8} = \frac{3-5}{8}$ The denominators are the same. Subtract the numerators.

$= -\frac{2}{8}$ or $-\frac{1}{4}$ Simplify.

Exercises

Find each sum. Write in simplest form.

1. $\frac{11}{12} + \frac{9}{12}$ $\mathbf{1\frac{2}{3}}$
2. $\frac{13}{15} + \frac{9}{15}$ $\mathbf{1\frac{7}{15}}$
3. $\frac{4}{9} + \frac{8}{9}$ $\mathbf{1\frac{1}{3}}$
4. $-6\frac{7}{12} + \left(-8\frac{11}{12}\right)$ $\mathbf{-15\frac{1}{2}}$
5. $-4\frac{9}{14} + 3\frac{5}{14}$ $\mathbf{-1\frac{2}{7}}$
6. $2\frac{3}{5} + \left(-\frac{1}{5}\right)$ $\mathbf{2\frac{2}{5}}$

Find each difference. Write in simplest form.

7. $\frac{19}{20} - \frac{17}{20}$ $\mathbf{\frac{1}{10}}$
8. $\frac{23}{25} - \frac{8}{25}$ $\mathbf{\frac{3}{5}}$
9. $\frac{5}{9} - \frac{2}{9}$ $\mathbf{\frac{1}{3}}$
10. $\frac{3}{7} - \frac{5}{7}$ $\mathbf{-\frac{2}{7}}$
11. $\frac{4}{12} - \frac{7}{12}$ $\mathbf{-\frac{1}{4}}$
12. $\frac{14}{15} - \frac{9}{15}$ $\mathbf{\frac{1}{3}}$

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Lesson 6 Reteach

Adding and Subtracting Unlike Fractions

Fractions with different denominators are called **unlike fractions.** To add fractions with unlike denominators, rename the fractions with a common denominator. Then add and simplify.

Example 1 Find $\frac{4}{7} + \frac{1}{3}$. Write in simplest form.

$\frac{4}{7} + \frac{1}{3} = \frac{4}{7} \cdot \frac{3}{3} + \frac{1}{3} \cdot \frac{7}{7}$ Use 7 • 3 or 21 as the common denominator.

$= \frac{12}{21} + \frac{7}{21}$ Rename each fraction with the common denominator.

$= \frac{19}{21}$ Add the numerators.

To subtract fractions with unlike denominators, rename the fractions with a common denominator. Then subtract and simplify.

Example 2 Find $9\frac{2}{9} - 8\frac{5}{6}$. Write in simplest form.

$9\frac{2}{9} - 8\frac{5}{6} = \frac{83}{9} - \frac{53}{6}$ Write the mixed numbers as improper fractions.

$= \frac{83}{9} \cdot \frac{2}{2} - \frac{53}{6} \cdot \frac{3}{3}$ Rename fractions using the LCD, 18.

$= \frac{166}{18} - \frac{159}{18}$ Simplify.

$= \frac{7}{18}$ Subtract the numerators.

Exercises

Find each sum. Write in simplest form.

1. $\frac{8}{9} + \frac{2}{5}$

2. $-\frac{2}{3} + \frac{1}{4}$

3. $\frac{7}{8} + \frac{1}{4}$

4. $7\frac{4}{9} + 9\frac{1}{6}$

5. $-7\frac{1}{2} + \left(-3\frac{2}{9}\right)$

6. $-10\frac{1}{7} + 6\frac{1}{4}$

Find each difference. Write in simplest form.

7. $\frac{3}{8} - \frac{1}{12}$

8. $-\frac{7}{9} - \frac{4}{5}$

9. $\frac{5}{12} - \left(-\frac{3}{8}\right)$

10. $5\frac{1}{10} - 3\frac{2}{3}$

11. $-6\frac{3}{5} - \left(-2\frac{1}{4}\right)$

12. $10\frac{5}{6} - \left(-5\frac{2}{3}\right)$

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$\frac{4}{7} + \frac{1}{3} = \frac{4}{7} \cdot \frac{3}{3} + \frac{1}{3} \cdot \frac{7}{7}$ Use 7 • 3 or 21 as the common denominator.

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$= \frac{19}{21}$ Add the numerators.

To subtract fractions with unlike denominators, rename the fractions with a common denominator. Then subtract and simplify.

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$= \frac{166}{18} - \frac{159}{18}$ Simplify.

$= \frac{7}{18}$ Subtract the numerators.

Exercises

Find each sum. Write in simplest form.

1. $\frac{8}{9} + \frac{2}{5}$ $\mathbf{1\frac{13}{45}}$
2. $-\frac{2}{3} + \frac{1}{4}$ $\mathbf{-\frac{5}{12}}$
3. $\frac{7}{8} + \frac{1}{4}$ $\mathbf{1\frac{1}{8}}$
4. $7\frac{4}{9} + 9\frac{1}{6}$ $\mathbf{16\frac{11}{18}}$
5. $-7\frac{1}{2} + \left(-3\frac{2}{9}\right)$ $\mathbf{-10\frac{13}{18}}$
6. $-10\frac{1}{7} + 6\frac{1}{4}$ $\mathbf{-3\frac{25}{28}}$

Find each difference. Write in simplest form.

7. $\frac{3}{8} - \frac{1}{12}$ $\mathbf{\frac{7}{24}}$
8. $-\frac{7}{9} - \frac{4}{5}$ $\mathbf{-1\frac{26}{45}}$
9. $\frac{5}{12} - \left(-\frac{3}{8}\right)$ $\mathbf{\frac{19}{24}}$
10. $5\frac{1}{10} - 3\frac{2}{3}$ $\mathbf{1\frac{13}{30}}$
11. $-6\frac{3}{5} - \left(-2\frac{1}{4}\right)$ $\mathbf{-4\frac{7}{20}}$
12. $10\frac{5}{6} - \left(-5\frac{2}{3}\right)$ $\mathbf{16\frac{1}{2}}$

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