REVIEW: Percents and Fractions

Skill Examples

1. 40% = \frac{40}{100} = \frac{20 \cdot 2}{20 \cdot 5} = \frac{2}{5}
2. 50% = \frac{50}{100} = \frac{50 \cdot 1}{50 \cdot 2} = \frac{1}{2}
3. 25% = \frac{25}{100} = \frac{25 \cdot 1}{25 \cdot 4} = \frac{1}{4}
4. 5% = \frac{5}{100} = \frac{5 \cdot 1}{5 \cdot 20} = \frac{1}{20}

Application Example

5. Your school’s softball team won 30% of its games. Did the team win more than one-fourth of its games?
   
   \[
   30\% = \frac{3}{10} \quad \text{and} \quad \frac{3}{10} > \frac{1}{4}
   \]
   
   Yes, the team won more than one-fourth of its games.

PRACTICE MAKES PURR-FECT™

Write the percent as a fraction in simplest form.

6. 20% = _____  7. 45% = _____  8. 7% = _____  9. 32.5% = _____
10. 15% = _____ 11. 1% = _____ 12. 150% = _____ 13. 33\frac{1}{3}% = _____

Write the fraction as a percent.

14. \frac{3}{20} = _____  15. \frac{6}{5} = _____  16. \frac{5}{8} = _____  17. \frac{3}{5} = _____

Write the fraction represented by the model as a percent.

18. _____  19. _____  20. _____

21. **SURVEY** Eighteen out of twenty people in a survey said that vanilla ice cream is their favorite flavor of ice cream. What percent is this? ______

22. **SPANISH LANGUAGE** Twelve of the 40 students in your class can speak Spanish. What percent is this? ______
REVIEW: Percents and Fractions

Key Concept and Vocabulary

Write percent as a fraction in simplest form.

\[ 35\% = \frac{35}{100} = \frac{35 \cdot 7}{20} = \frac{7}{20} \]

Skill Examples

1. \[ 40\% = \frac{40}{100} = \frac{40 \cdot 2}{20} = \frac{2}{5} \]
2. \[ 50\% = \frac{50}{100} = \frac{50 \cdot 1}{50} = \frac{1}{2} \]
3. \[ 25\% = \frac{25}{100} = \frac{25 \cdot 1}{25 \cdot 4} = \frac{1}{4} \]
4. \[ 5\% = \frac{5}{100} = \frac{5 \cdot 1}{5 \cdot 20} = \frac{1}{20} \]

Application Example

5. Your school’s softball team won 30% of its games. Did the team win more than one-fourth of its games?

\[ 30\% = \frac{3}{10} \]

\[ \frac{3}{10} > \frac{1}{4} \]

Yes, the team won more than one-fourth of its games.

PRACTICE MAKES PURR-FECT™

Write the percent as a fraction in simplest form.

6. \[ 20\% = \_\_\_\_\_\_\_ \]
7. \[ 45\% = \_\_\_\_\_\_\_ \]
8. \[ 7\% = \_\_\_\_\_\_\_ \]
9. \[ 32.5\% = \_\_\_\_\_\_\_ \]
10. \[ 15\% = \_\_\_\_\_\_\_ \]
11. \[ 1\% = \_\_\_\_\_\_\_ \]
12. \[ 150\% = \_\_\_\_\_\_\_ \]
13. \[ 33\frac{1}{3}\% = \_\_\_\_\_\_\_ \]

Write the fraction as a percent.

14. \[ \frac{3}{20} = \_\_\_\_\_\_\_ \]
15. \[ \frac{6}{5} = \_\_\_\_\_\_\_ \]
16. \[ \frac{5}{8} = \_\_\_\_\_\_\_ \]
17. \[ \frac{3}{5} = \_\_\_\_\_\_\_ \]

Write the fraction represented by the model as a percent.

18. \_\_\_\_\_\_
19. \_\_\_\_\_\_
20. \_\_\_\_\_\_

21. SURVEY Eighteen out of twenty people in a survey said that vanilla ice cream is their favorite flavor of ice cream. What percent is this? \_\_\_\_\_\_

22. SPANISH LANGUAGE Twelve of the 40 students in your class can speak Spanish. What percent is this? \_\_\_\_\_\_

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REVIEW: Percents and Decimals

Key Concept and Vocabulary

18% = 0.18

Percent to Decimal: Move decimal point to the left 2 places.

0.73 = 73%

Decimal to Percent: Move decimal point to the right 2 places.

Skill Examples

1. 18% = 0.18
2. 145% = 1.45
3. 0.005 = 0.5% (one-half of one percent)
4. 0.125 = 12.5%

Application Example

5. What percent of the circle graph is represented by the yellow region?

0.36 = 36%

The yellow region is 36%.

PRACTICE MAKES PURR-FECT™

Check your answers at BigIdeasMath.com.

Write the percent as a decimal.

6. 20% = ______
7. 45% = ______
8. 7% = ______
9. 32.5% = ______
10. 15% = ______
11. 1% = ______
12. 150% = ______
13. 0.2% = ______

Write the decimal as a percent.

14. 0.13 = ______
15. 1.4 = ______
16. 0.001 = ______
17. 2.5 = ______

What percent of the circle graph is represented by the yellow region?

18. ______
19. ______
20. ______

21. BUDGET You have set aside two twenty-fifths of your monthly budget for clothing. What percent is this? ______

22. SUMMER SCHOOL Eighty-seven percent of the students in your class do not plan to attend summer school. What percent of your class plans to attend summer school? ______
REVIEW: Perimeter

Key Concept and Vocabulary

Perimeter = 3 + 5 + 4 + 4 = 16

Skill Examples

1.  
   4.2
   6.1
   6.8
   6.4

   \[ P = 6.1 + 6.8 + 6.4 + 4.2 \]
   \[ = 23.5 \]

2.  
   \( \frac{3}{4} \)
   \( \frac{1}{2} \)
   \( \frac{5}{6} \)

   \[ P = \frac{1}{2} + \frac{5}{6} + \frac{3}{4} \]
   \[ = \frac{25}{12} \]

Application Example

3.  
   Find the length of fence needed to enclose the lot.

   \[ P = 2(80) + 2(120) \]
   \[ = 160 + 240 \]
   \[ = 400 \]

   You need 400 feet of fence.

PRACTICE MAKES PURR-FECT™

Find the perimeter of the figure.

4.  
   90 ft
   65 ft

   Perimeter = ________

5.  
   12.1 in.
   13.5 in.

   Perimeter = ________

6.  
   1 ft
   1/4 ft
   3/8 ft

   Perimeter = ________

7.  
   2.3 cm
   2.3 cm

   Perimeter = ________

8.  
   1 yd
   2 yd

   Perimeter = ________

9.  
   3 ft
   2 ft

   Perimeter = ________

10.  RIBBON  You are wrapping a ribbon around a rectangular box that is 18 inches long and 12 inches wide. What is the minimum amount of ribbon you need?  ________________

11.  COUNTY LINE  A county has the shape of a quadrilateral. The lengths of the four sides are 109 miles, 94 miles, 82 miles, and 109 miles. Find the perimeter of the county.  __________
REVIEW: Area

Key Concept and Vocabulary

Rectangle: \( A = bh \)
Parallelogram: \( A = bh \)
Triangle: \( A = \frac{1}{2}bh \)
Trapezoid: \( A = \frac{1}{2}(B + b)h \)

Skill Examples

1.  
   \[
   \begin{array}{c}
   \text{area} = \frac{1}{2}(1.6 + 1)(1) \\
   = 1.3 \text{ cm}^2
   \end{array}
   \]

2.  
   \[
   \begin{array}{c}
   \text{area} = \frac{1}{2}(3.8)(2.4) \\
   = 4.56 \text{ in}^2
   \end{array}
   \]

Application Example

3. Find the area of the apartment.
   \[
   A = 60 \cdot 40 \\
   = 2400 \text{ ft}^2
   \]
   The area is 2400 square feet.

PRACTICE MAKES PURR-FECT™

Find the area of the figure.

4.  
   \[
   \text{Area} = ________
   \]

5.  
   \[
   \text{Area} = ________
   \]

6.  
   \[
   \text{Area} = ________
   \]

7.  
   \[
   \text{Area} = ________
   \]

8.  
   \[
   \text{Area} = ________
   \]

9.  
   \[
   \text{Area} = ________
   \]

10. CARPET You are carpeting a rectangular room that is 3.5 yards by 4.5 yards. The carpet costs $15 per square yard. How much will it cost to carpet the room? ____________

11. COLORADO Colorado is approximately a rectangle that is 280 miles by 380 miles. Is the area of Colorado greater than or less than 100,000 square miles? Explain.

Name __________________________
**REVIEW: Circles and Circumference**

**Skill Examples**

1. \( r = 2.4 \text{ in.} \)
   
   \[
   C = 2\pi r = 2\pi(2.4) = 4.8\pi \approx 15.1 \text{ in.}
   \]

2. \( d = \frac{3}{4} \text{ ft} \)
   
   \[
   C = \pi d = \pi \left(\frac{3}{4}\right) \approx 2.4 \text{ ft}
   \]

**Application Example**

3. Find the distance around the soccer ball.
   
   \[
   C = \pi(22.3) \approx 70.0 \text{ cm}
   \]
   
   : The distance is about 70 centimeters.

**Visual Model**

Circumference of a Circle:

\[
C = 2\pi r = 2\pi(12) = 24\pi \approx 75.4
\]

**Key Concept and Vocabulary**

Circumference of a Circle:

\[
C = \pi d = \pi \left(\frac{3}{4}\right)
\]

\[
C \approx \frac{22}{7}
\]

**PRACTICE MAKES PURR-FECT™**

Find the circumference. Round your answer to the nearest tenth.

4. Circumference \( \approx \) 

5. Circumference \( \approx \) 

6. Circumference \( \approx \) 

7. Circumference \( \approx \)

8. Circumference \( \approx \)

9. Circumference \( \approx \)

10. **RACETRACK** A circular racetrack has a circumference of one mile. What is the diameter of the racetrack in feet? ________________

11. **OLD OAK TREE** You have 110 inches of yellow ribbon. The diameter of the old oak tree is 38 inches. Do you have enough yellow ribbon to wrap around the old oak tree? Explain.
**REVIEW: Surface Areas of Prisms**

**Key Concept and Vocabulary**

\[ S = 2lw + 2lh + 2wh \]

**Skill Example**

1. 
   \[ S = 2(4 \cdot 2) + 2(4 \cdot 3) + 2(2 \cdot 3) \]
   \[ = 16 + 24 + 12 \]
   \[ = 52 \text{ ft}^2 \]

**Application Example**

2. Find the surface area of the block.
   
   \[ S = 2\left(\frac{1}{2} \cdot 3 \cdot 4\right) + 4 \cdot 5 + 3 \cdot 4 + 4 \cdot 4 \]
   \[ = 12 + 20 + 12 + 16 \]
   \[ = 60 \text{ cm}^2 \]
   
   The area is 60 cm\(^2\).

**PRACTICE MAKES PURR-FECT™**

**Check your answers at BigIdeasMath.com.**

Find the surface area of the prism.

3. Rectangular Prism
   
   \[ S = \text{________} \]

4. Rectangular Prism
   
   \[ S = \text{________} \]

5. Rectangular Prism
   
   \[ S = \text{________} \]

6. Triangular Prism
   
   \[ S = \text{________} \]

7. Triangular Prism
   
   \[ S = \text{________} \]

8. Triangular Prism
   
   \[ S = \text{________} \]

9. **AQUARIUM** How much glass is used to make the four sides of the aquarium?

10. **AQUARIUM** How much glass is used to make the base of the aquarium?
REVIEW: Volumes of Prisms

Key Concept and Vocabulary

\[ V = Bh = \ell \cdot w \cdot h \]

Skill Example

1. Rectangular Prism
   \[ V = 5 \cdot 2 \cdot 3 = 30 \text{ ft}^3 \]

2. Find the volume of the block.
   \[ V = Bh = \left( \frac{1}{2} \cdot 3 \cdot 4 \right) \cdot 5 = 30 \text{ cm}^3 \]
   The volume is 30 cubic centimeters.

Application Example

2. Find the volume of the block.
   \[ V = Bh \]

PRACTICE MAKES PURR-FECT™

Find the volume of the prism.

3. Rectangular Prism
   \[ V = \text{__________} \]

4. Rectangular Prism
   \[ V = \text{__________} \]

5. Rectangular Prism
   \[ V = \text{__________} \]

6. Triangular Prism
   \[ V = \text{__________} \]

7. Triangular Prism
   \[ V = \text{__________} \]

8. Triangular Prism
   \[ V = \text{__________} \]

9. AQUARIUM How much water is needed to fill the aquarium? ______________________

10. AQUARIUM There are about 7.5 gallons in 1 cubic foot. How many gallons of water does the aquarium hold? ______________________

Check your answers at BigIdeasMath.com.
REVIEW: Similar Figures

Key Concept and Vocabulary

Corresponding angles

Corresponding sides

Similar Figures

Visual Model

Similar figures are the same shape, but not necessarily the same size.

Skill Example

1. Similar Triangles

\[
\frac{9}{6} = \frac{12}{8} = \frac{6}{4}
\]

Ratios of corresponding sides are equal.

Application Example

2. Are the two flags similar?

\[
\frac{60}{35} \neq \frac{100}{50}
\]

They are not similar.

PRACTICE MAKES PURR-FECT™

Check your answers at BigIdeasMath.com.

Decide whether the two figures are similar.

3. \[
\frac{15}{9} = \frac{6}{4}
\]

4. \[
\frac{80}{60} = \frac{60}{45}
\]

5. \[
\frac{90}{60} = \frac{60}{45}
\]

6. \[
\frac{6}{4} = \frac{8}{12}
\]

7. \[
\frac{4 \text{ m}}{8 \text{ m}} = \frac{10 \text{ m}}{20 \text{ m}}
\]

8. TENNIS COURTS Are the two tennis courts similar? Explain.

Singles

Doubles

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REVIEW: Mean, Median, and Mode

Key Concept and Vocabulary

mode = 1  median = 3.5

\[ \text{Mean} = \frac{1 + 1 + 1 + 3 + 4 + 5 + 6 + 7}{8} = 3.5 \]

Skill Example

1. mode = 1  median = 4

\[ \text{Mean} = \frac{1 + 1 + 1 + 3 + 4 + 5 + 6 + 7 + 17}{9} = 5 \]

Application Example

2. What is the mean weight of the bowling balls?

\[ 13 + 12 + 9 + 10 + 13 + 9 = 66 \]

\[ \text{Mean} = \frac{66}{6} = 11 \]

The mean is 11 pounds.

PRACTICE MAKES PURR-FECT™

Find the mean, median, and mode of the data.

3. 2, 6, 9, 10, 3, 4, 6, 12, 4, 13

\[ \text{Mean} = \text{Median} = \text{Mode} = \]

4. 30, 48, 32, 43, 45, 32

\[ \text{Mean} = \text{Median} = \text{Mode} = \]

5. 18, 12, 25, 18, 17, 19, 29, 20, 13, 18

\[ \text{Mean} = \text{Median} = \text{Mode} = \]

6. 6.8, 6.2, 6.3, 6.8, 5.9, 6.0, 6.1, 5.9

\[ \text{Mean} = \text{Median} = \text{Mode} = \]

7. −4, 5, 3, −2, 1, 0, −2

\[ \text{Mean} = \text{Median} = \text{Mode} = \]

8. 2, 5, 5, 0, 12, 5, 7, 8, 12, 9

\[ \text{Mean} = \text{Median} = \text{Mode} = \]

9. SALARIES The weekly salaries of six employees at a fast-food restaurant are $140, $220, $90, $180, $140, and $200. Find the mean, median, and mode of these salaries.

\[ \text{Mean} = \text{Median} = \text{Mode} = \]

10. PUPPIES A litter of puppies is 8 weeks old. Find the mean, median, and mode weights of the puppies.

\[ \text{Mean} = \text{Median} = \text{Mode} = \]
**REVIEW: Converting Customary Units**

**Key Concept and Vocabulary**

**Length**

1 ft = 12 in.
1 yd = 3 ft
1 mi = 5280 ft

**Weight**

1 lb = 16 oz
1 ton = 2000 lb

**Volume**

1 Tbsp = 3 tsp
1 fl oz = 2 Tbsp
1 cup = 16 Tbsp
1 pt = 2 cups
1 qt = 4 cups
1 gal = 4 qt

---

**Skill Examples**

1. \(3 \text{ ft} = 3 \text{ ft} \cdot \frac{12 \text{ in.}}{1 \text{ ft}} = 36 \text{ in.}\)

2. \(1.5 \text{ mi} = 1.5 \text{ mi} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} = 7920 \text{ ft}\)

3. \(2\frac{1}{4} \text{ lb} = 2\frac{1}{4} \text{ lb} \cdot \frac{16 \text{ oz}}{1 \text{ lb}} = 36 \text{ oz}\)

4. \(5 \text{ qt} = 5 \text{ qt} \cdot \frac{4 \text{ cups}}{1 \text{ qt}} = 20 \text{ cups}\)

---

**Application Example**

5. A typical SUV weighs about 2.5 tons. How many pounds is that?

\[
2.5 \text{ tons} = 2.5 \text{ tons} \cdot \frac{2000 \text{ lb}}{1 \text{ ton}} = 5000 \text{ pounds.}
\]

---

**Complete the unit conversion.**

6. \(3 \text{ mi} = \underline{______} \text{ ft}\)

7. \(3 \text{ in.} = \underline{______} \text{ ft}\)

8. \(\frac{1}{4} \text{ mi} = \underline{______} \text{ ft}\)

9. \(4 \text{ ft} = \underline{______} \text{ yd}\)

10. \(4 \text{ ft} = \underline{______} \text{ in.}\)

11. \(1760 \text{ yd} = \underline{______} \text{ mi}\)

12. \(32 \text{ oz} = \underline{______} \text{ lb}\)

13. \(\frac{3}{4} \text{ ton} = \underline{______} \text{ lb}\)

14. \(2.5 \text{ lb} = \underline{______} \text{ oz}\)

15. \(6 \text{ cups} = \underline{______} \text{ qt}\)

16. \(2 \text{ cups} = \underline{______} \text{ fl oz}\)

17. \(64 \text{ oz} = \underline{______} \text{ gal}\)

---

**Recipes**

Find the number of cups and the number of fluid ounces.

18. _____ cups = _____ fl oz

19. _____ cups = _____ fl oz

20. _____ cups = _____ fl oz

---

21. **SPEED** A parachutist falls at a speed of about 12 miles per hour. Find this speed in feet per second. ________________
REVIEW: Converting Metric Units

Key Concept and Vocabulary

<table>
<thead>
<tr>
<th>Length</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 cm = 10 mm</td>
<td>1 L = 1000 mL</td>
</tr>
<tr>
<td>1 m = 100 cm</td>
<td>1 L = 1000 mL</td>
</tr>
<tr>
<td>1 km = 1000 m</td>
<td>1 m³ = 1000 L</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weight (Mass)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 g = 1000 mg</td>
<td>1 L = 1000 mL</td>
</tr>
<tr>
<td>1 kg = 1000 g</td>
<td>1 m³ = 1,000,000 cm³</td>
</tr>
</tbody>
</table>

Skill Examples

1. 3 m = 3 m \cdot \frac{100 \text{ cm}}{1 \text{ m}} = 300 \text{ cm}
2. 0.75 \text{ km} = 0.75 \text{ km} \cdot \frac{1000 \text{ m}}{1 \text{ km}} = 750 \text{ m}
3. 50 \text{ mg} = 50 \text{ mg} \cdot \frac{1 \text{ g}}{1000 \text{ mg}} = 0.05 \text{ g}
4. 750 \text{ mL} = 750 \text{ mL} \cdot \frac{1 \text{ L}}{1000 \text{ mL}} = 0.75 \text{ L}

Application Example

5. A runner is running in a 100 meter dash. How many kilometers is that?

100 m = 100 m \cdot \frac{1 \text{ km}}{1000 \text{ m}} = 0.1 \text{ km}

It is one-tenth of a kilometer.

Complete the unit conversion.

6. 30 \text{ cm} = _____ \text{ m}
7. 30 \text{ cm} = _____ \text{ mm}
8. 0.5 \text{ km} = _____ \text{ m}
9. 2 \text{ m} = _____ \text{ cm}
10. 1500 \text{ cm} = _____ \text{ m}
11. 1000 \text{ mm} = _____ \text{ m}
12. 250 \text{ g} = _____ \text{ kg}
13. 0.75 \text{ kg} = _____ \text{ g}
14. 500 \text{ mg} = _____ \text{ g}
15. 2 \text{ L} = _____ \text{ mL}
16. 4000 \text{ mL} = _____ \text{ L}
17. 500 \text{ cm}³ = _____ \text{ mL}

METRIC AND CUSTOMARY CONVERSION

Use the conversion 1 in. ≈ 2.54 cm.

18. 4 in. 19. 8 cm 20. 6.5 in.

Salamander length ≈ _____ cm Flower length ≈ _____ in. Toy car length ≈ _____ cm

21. SPEED One mile is about 1.6 kilometers. What is the speed limit in kilometers per hour?

SPEED LIMIT 65 mph

Check your answers at BigIdeasMath.com.
**REVIEW: Simplifying Expressions**

**Skill Examples**

1. \(2x + 5x = 7x\)
2. \(1 + n + 4 = n + 5\)
3. \((2x + 3) - (x + 2) = x + 1\)
4. \(2(y - 1) + 3(y + 2) = 5y + 4\)

**Application Example**

5. The original cost of a shirt is \(x\) dollars. The shirt is on sale for 30% off. Write a simplified expression for the sale cost.

\[x - 0.3x = 0.7x\]

\(\boxed{\text{The sale cost is } 0.7x.}\)

**PRACTICE MAKES PURRFECT™**

Check your answers at BigIdeasMath.com.

**Simplify the expression. \((\text{Remove parentheses and combine like terms.})\)**

6. \(4x + 6x = \) ________
7. \(3n + 5 - 2n = \) ________
8. \(9x + 3 - 6x - 2 = \) ________
9. \(3(x + 2) = \) ________
10. \(7m - 2m + 5m = \) ________
11. \(2 - (x + 1) = \) ________
12. \((3x + 6) - x = \) ________
13. \(5 - (1 - n) = \) ________
14. \((x + 6) - (x + 6) = \) ________
15. \((4x - 2) + 3(x + 1) = \) ________
16. \((5x + 4) - 2(x + 1) = \) ________

**Write a simplified expression for the perimeter of the rectangle or triangle.**

18. \(\text{Perimeter} = \) ______
19. \(\text{Perimeter} = \) ______
20. \(\text{Perimeter} = \) ______

21. The original cost of a cell phone is \(x\) dollars. The phone is on sale for 35% off. Write a simplified expression for the sale cost. ________________
REVIEW: Rates

Key Concept and Vocabulary
You pay $12 for 4 hot dogs.

\[ \text{Rate} = \frac{12}{4 \text{ hot dogs}} \]

\[ \text{Unit Rate} = \frac{3}{1 \text{ hot dog}} \]

Skill Examples
1. You drive 100 miles in 2 hours.
   Your unit rate is 50 miles per hour.
2. You earn $40 in 5 hours.
   Your unit rate is $8 per hour.
3. You save $240 in 6 months.
   Your unit rate is $40 per month.

Application Example
4. Janice was 44 inches tall when she was 8 years old. She was 52 inches tall when she was 12 years old. What was her unit rate?
   
   \[ \frac{8}{4} = \frac{2}{1} \]
   
   Her unit rate is 2 inches per year.

PRACTICE MAKES PURR-FECT™

Write the unit rate in words and as a fraction for each situation.

5. You fly 2000 miles in 4 hours.

   \[ \text{Words} \quad \frac{500}{1 \text{ hour}} \]

6. You pay 15 dollars for 3 pizzas.

   \[ \text{Words} \quad \frac{5}{1 \text{ pizza}} \]

7. You pay $4 sales tax on a $50 purchase.

   \[ \text{Words} \quad \frac{0.08}{1 \text{ purchase}} \]

8. You earn $25 for mowing 5 lawns.

   \[ \text{Words} \quad \frac{5}{1 \text{ lawn}} \]

Circle the name of the person with the greater unit rate.

9. Maria saves $50 in 4 months.
   Ralph saves $60 in 5 months.

10. John rides his bicycle 36 miles in 3 hours.
    Randy rides his bicycle 30 miles in 2.5 hours.

11. Kim earns $400 for working 40 hours.
    Sam earns $540 for working 45 hours.

12. Arlene scores 450 points on 5 tests.
    Jolene scores 180 points on 2 tests.

Convert the unit rate.

13. \[ \frac{60 \text{ miles}}{1 \text{ hour}} = \quad \quad \frac{\text{feet}}{1 \text{ second}} \]

14. \[ \frac{2 \text{ gallons}}{1 \text{ hour}} = \quad \quad \frac{\text{cups}}{1 \text{ minute}} \]
**REVIEW: Proportions**

**Key Concept and Vocabulary**

Proportion: “2 is to 3 as 4 is to 6.”

![Proportion Dog Image]

2 \(\div\) 6 = 3 \(\div\) 4

Cross products are equal.

**Skill Examples**

1. \(\frac{3}{5} = \frac{12}{20}\) is a proportion because the cross products are equal.

2. \(\frac{1}{7} = \frac{7}{48}\) is not a proportion because the cross products are not equal.

3. \(\frac{10}{2} = \frac{5}{1}\) is a proportion because the cross products are equal.

**Application Example**

4. You spend $5 for 3 tennis balls. Your friend spends $6.25 for 4 tennis balls. Are the two rates proportional? $5 \div 3 \text{ balls} \neq \frac{5(4)}{3(6.25)}$

The rates are not proportional.

**PRACTICE MAKES PURR-FECT™**

Decide whether the statement is a proportion.

5. \(\frac{3}{7} = \frac{6}{14}\) \[\text{true/false}\]

6. \(\frac{1}{4} = \frac{4}{1}\) \[\text{true/false}\]

7. \(\frac{3}{2} = \frac{9}{4}\) \[\text{true/false}\]

8. \(\frac{1.25}{3} = \frac{5}{12}\) \[\text{true/false}\]

9. \(\frac{6}{18} = \frac{120}{360}\) \[\text{true/false}\]

10. \(\frac{4}{5} = \frac{4 + 4}{5 + 5}\) \[\text{true/false}\]

Complete the proportion.

11. \(\frac{2}{5} = \frac{\square}{10}\)

12. \(\frac{1}{6} = \frac{4}{\square}\)

13. \(\frac{\square}{3} = \frac{9}{24}\)

Write the proportion that compares the circumference to the radii of the two circles.

14. \(\text{Circumference : } r = 2\)

15. \(\text{Circumference : } r = 4\)

16. **COMPARING RATES** You spend $20 for 5 T-shirts. Your friend spends $15 for 3 T-shirts. Are the two rates proportional? ______________________________
**REVIEW: Direct Variation**

**Key Concept and Vocabulary**

- **Direct Variation**
  - $y$ is directly proportional to $x$.
  - $y = kx$

**Skill Example**

1. **Equation:** $y = 2x$
   - **Table:**
     | $x$ | 0  | 1  | 2  | 3  | 4  | 5  |
     |-----|----|----|----|----|----|----|
     | $y$ | 0  | 2  | 4  | 6  | 8  | 10 |
   - **Words:** $y$ is twice the value of $x$.

**Application Example**

2. The amount $y$ of gasoline a car uses is $\frac{1}{20}$ times the number $x$ of miles it travels.
   - Make a table to show this relationship.
     | $x$ | 0  | 20 | 40 | 60 | 80 | 100 |
     |-----|----|----|----|----|----|-----|
     | $y$ | 0  | 1  | 2  | 3  | 4  | 5   |
   - **Note:** $y$ is directly proportional to $x$.

**PRACTICE MAKES PURR-FECT™**

Complete the table. Then sketch the graph.

3. $y = 1.5x$
   - **Table:**
     | $x$ | 0  | 1  | 2  | 3  | 4  |
     |-----|----|----|----|----|----|
     | $y$ | 0  | 2  | 4  | 6  | 8  |

4. $y = \frac{2}{3}x$
   - **Table:**
     | $x$ | 0  | 1  | 2  | 3  | 4  |
     |-----|----|----|----|----|----|
     | $y$ | 0  | 0.4| 0.8| 1.2| 1.6|

**WRITING AN EQUATION**

Write a direct variation equation for the table.

5. $x$ | 0 | 1 | 2 | 3 | 4 |
    |----|----|----|----|----|
    | $y$ | 0 | 3 | 6 | 9 | 12 |

6. $x$ | 0 | 1 | 2 | 3 | 4 |
    |----|----|----|----|----|
    | $y$ | 0 | 0.4| 0.8| 1.2| 1.6|

7. **Walrus**
   - The amount $y$ that a walrus eats is directly proportional to its weight $x$. A 4000 pound walrus eats 20 pounds each day. How much does a 2000 pound walrus eat each day? **Answer:** ________
REVIEW: Prime and Composite Numbers

Key Concept and Vocabulary

A prime number has only 1 and itself as factors. The first 5 prime numbers are 2, 3, 5, 7, and 11.

\[24 = 2 \cdot 2 \cdot 2 \cdot 3\]

Skill Examples

Prime Factorization

1. \[30 = 2 \cdot 3 \cdot 5\]
2. \[42 = 2 \cdot 3 \cdot 7\]
3. \[81 = 3 \cdot 3 \cdot 3 \cdot 3\]
4. \[91 = 7 \cdot 13\]
5. \[89 = 89 \text{ (Prime)}\]

Application Example

6. You get a paycheck every 2 weeks. Your annual salary is $30,000. Can you get the same amount for each paycheck?

\[30,000 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 5 \cdot 5 \cdot 5\]

\[\because\] 30,000 is not divisible by 13, so you cannot have 26 paychecks of equal size.

PRACTICE MAKES PURR-FECT™

Write the prime factorization of the number.

7. \[45 = \underline{\hspace{2cm}}\]
8. \[100 = \underline{\hspace{2cm}}\]
9. \[63 = \underline{\hspace{2cm}}\]
10. \[256 = \underline{\hspace{2cm}}\]
11. \[54 = \underline{\hspace{2cm}}\]
12. \[55 = \underline{\hspace{2cm}}\]
13. \[121 = \underline{\hspace{2cm}}\]
14. \[98 = \underline{\hspace{2cm}}\]
15. \[113 = \underline{\hspace{2cm}}\]
16. Use a factor tree to find the prime factorization of 36.

17. EQUAL PAYCHECKS You get a paycheck every 2 weeks. Your annual salary is $39,000. Can you get the same amount for each paycheck? Explain why or why not.

18. LISTING PRIME NUMBERS List all the prime numbers that are less than 50.
**REVIEW: Sample Space**

**Key Concept and Vocabulary**

The set of all outcomes of an experiment is called the **sample space**. 

The sum of the probabilities of all outcomes in a sample space is 1.

---

**Skill Examples**

1. You flip a coin. The sample space of the experiment is Heads (H), Tails (T).

2. You roll a number cube. The sample space of the experiment is 1, 2, 3, 4, 5, 6.

3. You flip a coin and roll a number cube. The sample space of the experiment is H1, H2, H3, H4, H5, H6, T1, T2, T3, T4, T5, T6.

---

**Application Example**

4. A referee flips a coin twice. Find the sample space. Show that the sum of the probabilities of all outcomes is 1.

   The sample space is HH, HT, TH, TT.

   The probability of each outcome is $\frac{1}{4}$.

   

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

---

### PRACTICE MAKES PURR-FECT™

Find the sample space of the experiment.

5. Drawing a marble

6. Rolling a cube with letters of the word *sample*

7. Rolling a number cube twice

8. Flipping a coin and rolling the cube in Exercise 6

9. **BILLIARDS** The three balls shown are left on a billiards table. You choose a ball at random, set it aside, and then choose another ball. Find the sample space. Show that the sum of the probabilities of all outcomes is 1.
REVIEW: Commutative and Associative Properties

Key Concept and Vocabulary

Commutative Property

\[ 1 + 3 = 3 + 1 \quad (Addition) \]
\[ 2 + (3 + 5) = (2 + 3) + 5 \quad (Addition) \]

Associative Property

\[ 2 \cdot 5 = 5 \cdot 2 \quad (Multiplication) \]
\[ 2 \cdot (3 \cdot 5) = (2 \cdot 3) \cdot 5 \quad (Multiplication) \]

Skill Examples

1. \[ 3 + 6 = 6 + 3 \]
2. \[ 15 + (5 + 3) = (15 + 5) + 3 \]
3. \[ 4 \cdot 6 = 6 \cdot 4 \]
4. \[ 2 \cdot (3 \cdot 5) = (2 \cdot 3) \cdot 5 \]

Application Example

5. Use the above properties and mental math to find the sum: \[ 97 + 28 + 3 + 2. \]
   \[ 97 + 28 + 3 + 2 = (97 + 3) + (28 + 2) \]
   \[ = 100 + 30 \]
   \[ = 130 \]
   The sum is 130.

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Identify the property. Then find the sum or product.

6. \[ 11 + 36 = 36 + 11 \quad \text{__________________________} \]
7. \[ 10 \cdot 4 = 4 \cdot 10 \quad \text{__________________________} \]
8. \[ 5 \cdot (4 \cdot 2) = (5 \cdot 4) \cdot 2 \quad \text{__________________________} \]
9. \[ 2 + (3 + 5) = (2 + 3) + 5 \quad \text{__________________________} \]
10. \[ 2 + 3 + 4 = 2 + 4 + 3 \quad \text{__________________________} \]
11. \[ 5 \cdot 2 \cdot 3 = 2 \cdot 5 \cdot 3 \quad \text{__________________________} \]

Show how you can use the Commutative and Associative Properties to find the sum or product using mental math.

12. \[ 34 + 47 + 16 = \quad \text{__________________________} \]
13. \[ 5 \cdot 13 \cdot 2 = \quad \text{__________________________} \]
14. \[ 15 + 13 + 27 + 35 = \quad \text{__________________________} \]
15. \[ 9 \cdot 5 \cdot 3 \cdot 2 = \quad \text{__________________________} \]

16. COMMUTATIVITY  Describe two real-life activities that are not commutative. In other words, you get different results if you switch the order in which the activities are performed.
Key Concept and Vocabulary

Distributive Property

Distribute.

\[ 3(4 + 6) = 3 \cdot 4 + 3 \cdot 6 \]
\[ 4(7 - 2) = 4 \cdot 7 - 4 \cdot 2 \]

Skill Examples

1. \[3(9 + 4) = 3 \cdot 9 + 3 \cdot 4\]
2. \[7(10 - 3) = 7 \cdot 10 - 7 \cdot 3\]
3. \[6 \cdot 8 + 6 \cdot 7 = 6(8 + 7)\]
4. \[12 \cdot 9 - 12 \cdot 2 = 12(9 - 2)\]
5. \[5(2 + 5 + 3) = 5 \cdot 2 + 5 \cdot 5 + 5 \cdot 3\]

Application Example

6. You buy 3 hot dogs for $1.25 each and 3 sodas for $0.75 each. Find the total cost.

\[3(1.25) + 3(0.75) = 3(1.25 + 0.75)\]
\[= 3(2.00)\]
\[= 6\]

\[\text{The total cost is$6.00.}\]

Mental Math

You buy 5 hot dogs for $1.29 each and 5 sodas for $0.71 each. Show how you can use mental math to find the total cost.

18.** EXTENSION** Does the Distributive Property apply to a combination of addition and subtraction? Decide using the expression \(3(7 + 5 - 4)\).
REVIEW: Comparing, Ordering, and Graphing Integers

**Key Concept and Vocabulary**

- **zero**: ...
- **negative integers**: ...
- **positive integers**: ...

**Skill Examples**

1. \(0 \leq 4\) “0 is less than or equal to 4”
2. \(-1 > -3\) “−1 is greater than −3”
3. \(-2 < -1\) “−2 is less than −1”
4. \(2 > -2\) “2 is greater than −2”
5. \(3 \geq 2\) “3 is greater than or equal to 2”

**Application Example**

6. The temperature in Seattle is 4°F.
The temperature in Denver is −6°F.
Which temperature is greater?

\(-6 < 4\) “−6 is less than 4”

The temperature is greater in Seattle.

**Graph the two numbers. Then compare them using < or >.**

- **7.** \(-3 \square 2\)
- **9.** \(-1 \square -4\)
- **11.** \(0 \square 2\)
- **8.** \(-1 \square 0\)
- **10.** \(1 \square 3\)
- **12.** \(3 \square -1\)

**Order the temperatures from least to greatest.**

- **13.** −5°F, 13°F, 0°F, 5°F, 2°F, 20°F
- **14.** 7°C, −4°C, −11°C, 0°C, 8°C, −12°C

**Use an integer to describe the real-life situation.**

- **15.** A profit of $5
- **16.** A depth of 8 ft
- **17.** A decrease of 5°F

- A loss of $5
- A height of 4 ft
- An increase of 8°F

**18. BUSINESS LOSS** During its first week, a business had a loss that was greater than $4, but less than $6. Circle each integer that could represent this loss.

−$7, −$6, −$5, −$4, −$3, −$2, −$1, $0, $1, $2, $3, $4, $5, $6, $7
REVIEW: Coordinate Plane

Key Concept and Vocabulary

ordered pair

(x, y)

x-coordinate

y-coordinate

Skill Examples

1. \( A(−1, 2) \) (Quadrant II)
2. \( B(0, 0) \) (origin)
3. \( C(−3, −4) \) (Quadrant III)
4. \( D(2, −3) \) (Quadrant IV)
5. \( E(4, 3) \) (Quadrant I)

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Write the ordered pair that represents the point in the coordinate plane.

6. \( F \) ________________
7. \( G \) ________________
8. \( H \) ________________
9. \( I \) ________________
10. \( J \) ________________

Plot the ordered pair in the coordinate plane. Name the quadrant for the point.

11. \( K(−3, 5) \) ________________
12. \( L(−3, 0) \) ________________
13. \( M(2, 5) \) ________________
14. \( N(4, −2) \) ________________
15. \( P(−2, −4) \) ________________
**REVIEW: Adding and Subtracting Integers**

**Key Concept and Vocabulary**

- **terms**
  - $6 + (-2) = 4$
  - $7 - (-3) = 10$

- **sum**
  - $-2 + 4 = 2$
  - $-3 - (-2) = -3 + 2 = -1$
  - $8 - (-3) = 8 + 3 = 11$

- **difference**
  - $2$
  - $-1$
  - $11$

**Skill Examples**

1. $5 + (-3) = 5 - 3 = 2$
2. $5 - (-2) = 5 + 2 = 7$
3. $-2 + 4 = 2$
4. $-3 - (-2) = -3 + 2 = -1$
5. $8 - (-3) = 8 + 3 = 11$

**Application Example**

6. The temperature is $8^\circ F$ in the morning and drops to $-5^\circ F$ in the evening. What is the difference between these temperatures?

$$8 - (-5) = 8 + 5 = 13$$

The difference is 13 degrees.

**PRACTICE MAKES PURR-FECT™**

Find the sum or difference.

7. $-2 + 3 = ____$
8. $-4 - 5 = ____$
9. $8 - 2 = ____$
10. $8 - (-2) = ____$
11. $-4 - (-1) = ____$
12. $-5 + (-5) = ____$
13. $4 - (-8) = ____$
14. $4 - 8 = ____$
15. $-4 + (-6) = ____$
16. $-4 - (-6) = ____$
17. $10 - 13 = ____$
18. $13 - (-10) = ____$

Write the addition or subtraction shown by the number line.

19.

20.

21. **TEMPERATURE** The temperature is $16^\circ F$ in the morning and drops to $-15^\circ F$ in the evening. What is the difference between these temperatures? ________________

22. **SUBMARINE** A submarine is 450 feet below sea level. It descends 300 feet. What is its new position? Show your work.

______________________________________________
REVIEW: Multiplying and Dividing Integers

**Key Concept and Vocabulary**

- **factors**
- **product**
- **dividend**
- **divisor**
- **quotient**

**Skill Examples**

1. \(-3 \times (-4) = 12\)
2. \(-36 \div (-6) = 6\)
3. \(-7 \times 0 = 0\)
4. \(-10 \div 5 = -2\)
5. \(-5 \times 6 = -30\)

**Application Example**

6. Each of your six friends owes you $5. Use integer multiplication to represent the total amount your friends owe you.
   
   \[6 \times (-5) = -30\]

   ✳️ The total amount owed is $30.

**PRACTICE MAKES PURR-FECT™**

Find the product or quotient.

7. \(-3 \times (-5) = \) 8. \(7 \times (-3) = \) 9. \(0 \times (-5) = \) 10. \((-5) \times (-7) = \)
   
   11. \(-8 \times 2 = \) 12. \((-5)^2 = \) 13. \((-3)^3 = \) 14. \(4 \times (-2) \times (-3) = \)
   
   15. \(-16 \div 4 = \) 16. \(-20 \div (-5) = \) 17. \(\frac{-9}{3} = \) 18. \(\frac{-20}{-10} = \)

Complete the multiplication or division equation.

19. \(-15 \div \) 20. \(45 \div \) 21. \(\) \(-20) = 5
   
   22. \(8 \times \) 23. \(\times (-9) = 27\)
   
   24. \(-12 \times \)

25. **TOTAL OWED** Each of your eight friends owes you $10. Use integer multiplication to represent the total amount your friends owe you. _________________________________

26. **TEMPERATURE** The low temperatures for a week in Edmonton, Alberta are \(-15°C\), \(-12°C\), \(-10°C\), \(-12°C\), \(-18°C\), \(-20°C\), and \(-25°C\). What is the mean low temperature for the week? Show your work.

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REVIEW: Simplifying Fractions

Key Concept and Vocabulary

$$\frac{8}{12} = \frac{2 \cdot 4}{3 \cdot 4} = \frac{2}{3}$$

Divide numerator and denominator by common factor.

Skill Examples

1. $$\frac{2}{4} = \frac{1 \cdot 2}{2 \cdot 2} = \frac{1}{2}$$
2. $$\frac{3}{6} = \frac{1 \cdot 3}{2 \cdot 3} = \frac{1}{2}$$
3. $$\frac{15}{20} = \frac{3 \cdot 5}{4 \cdot 5} = \frac{3}{4}$$
4. $$\frac{80}{100} = \frac{4 \cdot 20}{5 \cdot 20} = \frac{4}{5}$$

Application Example

5. Five of the 25 students in your class have a Facebook account. Write this fraction in simplified form.

$$\frac{5}{25} = \frac{1 \cdot 5}{5 \cdot 5} = \frac{1}{5}$$

One-fifth of your class has a Facebook account.

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Check your answers at BigIdeasMath.com.

Simplify the fraction.

6. $$\frac{16}{18} = \frac{8}{9}$$
7. $$\frac{10}{12} = \frac{5}{6}$$
8. $$\frac{6}{8} = \frac{3}{4}$$
9. $$\frac{15}{45} = \frac{1}{3}$$
10. $$\frac{12}{40} = \frac{3}{10}$$
11. $$\frac{14}{21} = \frac{2}{3}$$
12. $$\frac{6}{2} = 3$$
13. $$\frac{20}{50} = \frac{2}{5}$$
14. $$\frac{12}{30} = \frac{2}{5}$$
15. $$\frac{20}{15} = \frac{4}{3}$$
16. $$\frac{75}{85} = \frac{15}{17}$$
17. $$\frac{21}{35} = \frac{3}{5}$$

Shade the model so that the fraction is simplified.

18. [Model Image]
19. [Model Image]

20. FACEBOOK Eight of the 24 students in your class have a Facebook account. Write this fraction in simplified form. ____

21. SIMPLIFYING Write five different fractions that each simplify to two-fifths.
**Skill Examples**

1. \(\frac{1}{2} > \frac{5}{11}\) because \(1 \cdot 11 > 2 \cdot 5\).
2. \(\frac{3}{6} = \frac{1}{2}\) because \(3 \cdot 2 = 6 \cdot 1\).
3. \(\frac{3}{8} < \frac{2}{5}\) because \(3 \cdot 5 < 8 \cdot 2\).
4. \(\frac{4}{9} > \frac{3}{7}\) because \(4 \cdot 7 > 9 \cdot 3\).

**Application Example**

5. You run seven-eighths mile. Your friend runs eight-tenths mile. Who runs farther?

\[
\frac{7}{8} > \frac{8}{10} \quad \text{because} \quad 7 \cdot 10 > 8 \cdot 8.
\]

\(\therefore\) You run farther.

**PRACTICE MAKES PURR-FECT™**

**Comparing Fractions**

Compare the fractions using <, >, or =.

6. \(\frac{4}{5} \underline{\phantom{\frac{1}{2}}} \frac{8}{11}\)
7. \(\frac{6}{7} \underline{\phantom{\frac{1}{2}}} \frac{5}{6}\)
8. \(\frac{6}{7} \underline{\phantom{\frac{1}{2}}} \frac{7}{8}\)
9. \(\frac{3}{11} \underline{\phantom{\frac{1}{2}}} \frac{6}{22}\)
10. \(\frac{9}{2} \underline{\phantom{\frac{1}{2}}} \frac{14}{3}\)
11. \(\frac{3}{9} \underline{\phantom{\frac{1}{2}}} \frac{1}{3}\)
12. \(\frac{4}{9} \underline{\phantom{\frac{1}{2}}} \frac{9}{20}\)
13. \(\frac{7}{12} \underline{\phantom{\frac{1}{2}}} \frac{4}{7}\)
14. \(\frac{2}{9} \underline{\phantom{\frac{1}{2}}} \frac{4}{18}\)
15. \(\frac{3}{8} \underline{\phantom{\frac{1}{2}}} \frac{4}{11}\)
16. \(\frac{7}{5} \underline{\phantom{\frac{1}{2}}} \frac{13}{9}\)
17. \(\frac{6}{5} \underline{\phantom{\frac{1}{2}}} \frac{11}{10}\)

Compare the fractions models using <, >, or =.

18. \[
\begin{array}{cccccccccccc}
\blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare \\
\end{array}
\]
\[
\begin{array}{cccccccccccc}
\blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare \\
\end{array}
\]

19. \[
\begin{array}{cccccccccccc}
\blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare \\
\end{array}
\]
\[
\begin{array}{cccccccccccc}
\blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare & \blacksquare \\
\end{array}
\]

20. **MILK** You drink six-eighths of a quart of milk. Your friend pours a quart of milk into four 8-fluid ounce glasses and drinks three of them. Who drinks more?

21. **ORDERING FRACTIONS** Order the fractions from least to greatest and graph them on a number line: \(\frac{3}{8}, \frac{1}{4}, \frac{1}{3}\), and \(\frac{2}{5}\).
REVIEW: Adding and Subtracting Fractions with Like Denominators

Key Concept and Vocabulary

Add or subtract numerators.

\[
\frac{2}{5} + \frac{1}{5} = \frac{2+1}{5} = \frac{3}{5}
\]

\[
\frac{2}{5} - \frac{1}{5} = \frac{2-1}{5} = \frac{1}{5}
\]

Skill Examples

1. \[\frac{3}{8} + \frac{3}{8} = \frac{3+3}{8} = \frac{6}{8} = \frac{3}{4}\]
2. \[\frac{3}{4} + \frac{1}{4} = \frac{3+1}{4} = \frac{4}{4} = 1\]
3. \[\frac{7}{10} - \frac{4}{10} = \frac{7-4}{10} = \frac{3}{10}\]
4. \[\frac{13}{25} - \frac{8}{25} = \frac{13-8}{25} = \frac{5}{25} = \frac{1}{5}\]

Application Example

5. On Monday, you painted two-fifths of a house. On Tuesday, you painted the same amount. How much is left?

\[
\frac{5}{5} - \left(\frac{2}{5} + \frac{2}{5}\right) = \frac{5}{5} - \frac{4}{5} = \frac{1}{5}
\]

You have one-fifth left to paint.

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Find the sum or difference. Write your answer in simplified form.

6. \[\frac{1}{9} + \frac{2}{9} = \frac{3}{9} = \frac{1}{3}\]
7. \[\frac{6}{11} + \frac{5}{11} = \frac{11}{11} = 1\]
8. \[\frac{1}{10} + \frac{3}{10} = \frac{4}{10} = \frac{2}{5}\]
9. \[\frac{3}{4} + \frac{2}{4} = \frac{5}{4} = 1\frac{1}{4}\]
10. \[\frac{3}{8} + \frac{1}{8} = \frac{4}{8} = \frac{1}{2}\]
11. \[\frac{1}{5} + \frac{2}{5} + \frac{2}{5} = \frac{5}{5} = 1\]
12. \[\frac{5}{8} - \frac{1}{8} = \frac{4}{8} = \frac{1}{2}\]
13. \[\frac{6}{7} - \frac{3}{7} = \frac{3}{7}\]
14. \[\frac{7}{9} - \frac{4}{9} = \frac{3}{9} = \frac{1}{3}\]
15. \[\frac{9}{10} - \frac{7}{10} = \frac{2}{10} = \frac{1}{5}\]
16. \[\frac{5}{6} - \frac{2}{6} = \frac{3}{6} = \frac{1}{2}\]
17. \[\frac{6}{6} - \left(\frac{1}{6} + \frac{2}{6}\right) = \frac{6}{6} - \frac{3}{6} = \frac{3}{6} = \frac{1}{2}\]

Find the perimeter of the rectangle or triangle.

18. (Rectangle)
   Perimeter = \[\frac{1}{4} + \frac{2}{4} + \frac{3}{5} + \frac{3}{5} = \frac{4}{4} + \frac{6}{5} = \frac{10}{5} + \frac{6}{5} = \frac{16}{5} = 3\frac{1}{5}\]

19. (Square)
   Perimeter = \[\frac{3}{5} + \frac{3}{5} + \frac{3}{5} + \frac{3}{5} = \frac{12}{5} = 2\frac{2}{5}\]

20. (Triangle)
   Perimeter = \[\frac{2}{5} + \frac{2}{5} + \frac{2}{5} = \frac{6}{5} = 1\frac{1}{5}\]

21. (Triangle)
   Perimeter = \[\frac{2}{10} + \frac{2}{10} + \frac{3}{10} = \frac{7}{10} = 0\frac{7}{10}\]

22. REACHING YOUR GOAL
You have a savings goal. In January, you saved \[\frac{2}{10}\] of your goal.
   In February, you saved \[\frac{3}{10}\] more. How much of your goal remains? Explain.
### REVIEW: Adding and Subtracting Fractions with Unlike Denominators

#### Key Concept and Vocabulary

**Find products.**

\[
\begin{align*}
\frac{2}{3} \times \frac{1}{4} &= \frac{2 \times 1}{3 \times 4} = \frac{2}{12} \\
\frac{2}{3} \times \frac{4}{3} &= \frac{2 \times 4}{3 \times 3} = \frac{8}{9}
\end{align*}
\]

#### Skill Examples

1. \(\frac{1}{5} + \frac{2}{3} = \frac{1 \times 3 + 2 \times 5}{5 \times 3} = \frac{13}{15}\)
2. \(\frac{1}{2} + \frac{1}{4} = \frac{1 \times 4 + 2 \times 1}{2 \times 4} = \frac{6}{8} = \frac{3}{4}\)
3. \(\frac{1}{3} - \frac{1}{4} = \frac{1 \times 4 - 3 \times 1}{3 \times 4} = \frac{1}{12}\)
4. \(\frac{3}{7} - \frac{2}{5} = \frac{3 \times 5 - 7 \times 2}{7 \times 5} = \frac{1}{35}\)

#### Application Example

5. You ride your bike \(\frac{3}{8}\) mile to the store. Then you ride \(\frac{1}{6}\) mile to school. How far do you ride altogether?

\[
\frac{3}{8} + \frac{1}{6} = \frac{3 \times 6 + 8 \times 1}{8 \times 6} = \frac{26}{48} = \frac{13}{24}
\]

You ride \(\frac{13}{24}\) mile.

#### Practice Makes PURR-FECT™

Find the sum or difference. Write your answer in simplified form.

6. \(\frac{1}{3} + \frac{1}{8} = \frac{13}{24}\)
7. \(\frac{2}{3} + \frac{1}{5} = \frac{13}{15}\)
8. \(\frac{3}{10} + \frac{1}{4} = \frac{13}{20}\)
9. \(\frac{1}{2} + \frac{2}{5} = \frac{9}{10}\)
10. \(\frac{3}{7} + \frac{1}{3} = \frac{16}{21}\)
11. \(\frac{1}{8} + \frac{2}{5} = \frac{13}{40}\)
12. \(\frac{5}{8} - \frac{1}{3} = \frac{7}{24}\)
13. \(\frac{5}{6} - \frac{3}{5} = \frac{13}{30}\)
14. \(\frac{5}{9} - \frac{2}{5} = \frac{13}{45}\)
15. \(\frac{7}{10} - \frac{1}{4} = \frac{9}{20}\)

Find the total distance from House A to House B and then to House C.

18. \(\frac{5}{8}\) mi 19. \(\frac{3}{5}\) mi

20. **WEASEL LENGTH** Find the total length of the weasel. ______

21. **IMPROVING YOUR SPEED** You swim at a rate of \(\frac{3}{8}\) mile per hour in March. You swim at a rate of \(\frac{3}{7}\) mile per hour in April. How much faster did you swim in April? ______
REVIEW: Multiplying Fractions

**Key Concept and Vocabulary**

- Multiply numerators.
- Multiply denominators.

**Skill Examples**

1. \(\frac{2}{3} \cdot \frac{1}{4} = \frac{2 \cdot 1}{3 \cdot 4} = \frac{2}{12} = \frac{1}{6}\)
2. \(\frac{3}{8} \cdot \frac{2}{9} = \frac{3 \cdot 2}{8 \cdot 9} = \frac{6}{72} = \frac{1}{12}\)
3. \(\left(\frac{2}{5}\right) \left(\frac{1}{4}\right) = \frac{2 \cdot 1}{5 \cdot 4} = \frac{2}{20} = \frac{1}{10}\)
4. \(\frac{1}{7} \cdot \frac{3}{5} = \frac{1 \cdot 3}{7 \cdot 5} = \frac{3}{35}\)

**Application Example**

5. A recipe calls for three-fourths cup of flour. You want to make one-half of the recipe. How much flour should you use?

\[\frac{1}{2} \cdot \frac{3}{4} = \frac{1 \cdot 3}{2 \cdot 4} = \frac{3}{8}\]

You should use \(\frac{3}{8}\) cup flour.

**PRACTICE makes PURR-FECT™**

Find the product. Write your answer in simplified form.

6. \(\frac{1}{3} \cdot \frac{2}{7} = \)  
7. \(\frac{1}{2} \times \frac{1}{4} = \)  
8. \(\frac{1}{10} \cdot \frac{3}{10} = \)  
9. \(\frac{3}{2} \cdot \frac{2}{5} = \)

10. \(\frac{3}{8} \times \frac{1}{2} = \)  
11. \(\left(\frac{1}{5}\right) \left(\frac{2}{3}\right) = \)  
12. \(\frac{2}{3} \cdot \frac{2}{3} = \)  
13. \(\frac{3}{2} \cdot \frac{2}{3} = \)

14. \(\left(\frac{3}{1}\right) \left(\frac{1}{3}\right) = \)  
15. \(\frac{2}{1} \cdot \frac{1}{4} = \)

16. \(3 \times \frac{3}{4} = \)  
17. \(\frac{1}{3} \cdot \frac{3}{4} \cdot \frac{4}{5} = \)

Find the area of the rectangle or parallelogram.

18. \(\frac{1}{2} \text{ ft} \times \frac{1}{2} \text{ ft} = \)  
19. \(\frac{3}{10} \text{ cm} \times \frac{1}{2} \text{ cm} = \)  
20. \(\frac{3}{8} \text{ in.} \times \frac{5}{8} \text{ in.} = \)  
21. \(\frac{2}{5} \text{ m} \times \frac{3}{5} \text{ m} = \)

Area =  
Area =  
Area =  
Area = 

22. **OPEN-ENDED** Find three different pairs of fractions that have the same product.
**REVIEW: Dividing Fractions**

**Key Concept and Vocabulary**

\[
\frac{2}{3} \div \frac{1}{2} = \frac{2 \cdot 2}{3 \cdot 1} = \frac{4}{3} = 1 \frac{1}{3}
\]

**Divide fractions.**

Invert and multiply.

**Skill Examples**

1. \[
\frac{2}{5} \div \frac{1}{5} = \frac{2 \cdot 5}{5 \cdot 1} = \frac{2}{1} = 2
\]

2. \[
\frac{2}{5} \div \frac{5}{5} = \frac{2 \cdot 1}{5 \cdot 5} = \frac{2}{25}
\]

3. \[
\frac{9}{4} \div \frac{3}{4} = \frac{9 \cdot 4}{4 \cdot 4} = \frac{9}{1} = 9
\]

4. \[
6 \div \frac{1}{2} = \frac{6 \cdot 2}{1 \cdot 1} = 12
\]

**Application Example**

5. You drive 25 miles in one-half hour. What is your average rate?

\[
25 \div \frac{1}{2} = \frac{25 \cdot 2}{1 \cdot 1} = 50 \text{ mi/h}
\]

\[
r = \frac{d}{t}
\]

Your average rate is 50 miles per hour.

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Find the quotient. Write your answer in simplified form.

6. \[
\frac{3}{5} \div \frac{1}{5} = \frac{3}{5} \cdot \frac{5}{1} = \frac{3}{1} = 3
\]

7. \[
4 \div \frac{1}{2} = 4 \cdot \frac{2}{1} = 8
\]

8. \[
\frac{2}{3} \div \frac{1}{6} = \frac{2 \cdot 6}{3 \cdot 1} = \frac{4}{1} = 4
\]

9. \[
\frac{1}{6} \div \frac{2}{3} = \frac{1 \cdot 3}{6 \cdot 2} = \frac{3}{12} = \frac{1}{4}
\]

10. \[
\frac{2}{3} \div 2 = \frac{2 \cdot 1}{3 \cdot 2} = \frac{2}{6} = \frac{1}{3}
\]

11. \[
\frac{3}{4} \div 4 = \frac{3 \cdot 1}{4 \cdot 4} = \frac{3}{16}
\]

12. \[
\frac{3}{7} \div \frac{3}{7} = \frac{3 \cdot 7}{7 \cdot 3} = \frac{1}{1} = 1
\]

13. \[
\frac{3}{7} \div \frac{7}{3} = \frac{3 \cdot 3}{7 \cdot 7} = \frac{9}{49}
\]

14. \[
\frac{5}{2} \div \frac{1}{2} = \frac{5 \cdot 2}{2 \cdot 1} = 5
\]

15. \[
\frac{9}{4} \div \frac{1}{4} = \frac{9 \cdot 4}{4 \cdot 1} = 9
\]

16. \[
\frac{1}{4} \div \frac{1}{2} = \frac{1 \cdot 2}{4 \cdot 1} = \frac{1}{2}
\]

17. \[
\frac{3}{11} \div 11 = \frac{3 \cdot 1}{11 \cdot 11} = \frac{3}{121}
\]

Find the height of the rectangle or parallelogram.

18. \[
\text{ft} \quad \frac{1}{2} \text{ ft}
\]

Find the area.

Area = \[\frac{1}{4} \text{ ft}^2\]

19. \[
\text{cm} \quad \frac{2}{5} \text{ cm}
\]

Area = \[\frac{2}{25} \text{ cm}^2\]

20. \[
\text{in.} \quad \frac{3}{8} \text{ in.}
\]

Area = \[\frac{3}{16} \text{ in.}^2\]

21. \[
\text{m} \quad \frac{1}{10} \text{ m}
\]

Area = \[\frac{1}{50} \text{ m}^2\]

22. **SPEED** You drive 15 miles in one-fourth hour. What is your average speed? 

\[
\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{15 \text{ miles}}{\frac{1}{4} \text{ hour}} = 60 \text{ miles/hour}
\]

23. **MAGNETIC TAPE** A refrigerator magnet uses \[\frac{5}{8}\] inch of magnetic tape. How many refrigerator magnets can you make with 10 inches of magnetic tape? Explain.

\[
\text{Magnets} = \frac{\text{Total Tape}}{\text{Tape per Magnet}} = \frac{10 \text{ inches}}{\frac{5}{8} \text{ inch}} = 16
\]
REVIEW: Simplifying Complex Fractions

Key Concept and Vocabulary

A complex fraction is a fraction that contains a fraction in its numerator, denominator, or both. To simplify a complex fraction, divide its numerator by its denominator.

Algebra: \( \frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c} \), where \( b, c, d \neq 0 \)

Numbers: \( \frac{2}{3} \div \frac{5}{6} = \frac{2}{3} \cdot \frac{6}{5} = \frac{4}{5} \)

Skill Examples

1. \( \frac{5}{8} \div \frac{3}{4} = \frac{5}{8} \cdot \frac{4}{3} = \frac{5}{3} \)
2. \( \frac{15}{9} \div \frac{5}{10} = \frac{15}{9} \cdot \frac{10}{5} = \frac{50}{3} \)
3. \( \frac{1}{3} \div \frac{5}{7} = \frac{1}{3} \cdot \frac{7}{5} = \frac{7}{15} \)
4. \( \frac{9}{16} \div \frac{3}{8} = \frac{9}{16} \cdot \frac{8}{3} = \frac{3}{2} \)

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Simplify the complex fraction.

5. \( \frac{3}{2} \div \frac{6}{5} = \frac{3}{2} \cdot \frac{5}{6} = \frac{5}{4} \)
6. \( \frac{20}{4} \div \frac{5}{5} = \frac{20}{4} \cdot \frac{5}{5} = \frac{5}{1} \)
7. \( \frac{9}{12} \div \frac{7}{7} = \frac{9}{12} \cdot \frac{7}{7} = \frac{7}{12} \)
8. \( \frac{10}{9} \div \frac{20}{20} = \frac{10}{9} \cdot \frac{20}{20} = \frac{2}{9} \)

9. \( \frac{3}{16} \div \frac{27}{27} = \frac{3}{16} \cdot \frac{27}{27} = \frac{9}{10} \)
10. \( \frac{5}{7} \div \frac{10}{10} = \frac{5}{7} \cdot \frac{10}{10} = \frac{1}{2} \)

11. \( \frac{12}{17} \div \frac{8}{8} = \frac{12}{17} \cdot \frac{8}{8} = \frac{3}{14} \)
12. \( \frac{14}{13} \div \frac{49}{49} = \frac{14}{13} \cdot \frac{49}{49} = \frac{2}{1} \)

13. \( \frac{27}{32} \div \frac{7}{7} = \frac{27}{32} \cdot \frac{7}{7} = \frac{9}{10} \)
14. \( \frac{10}{3} \div \frac{10}{10} = \frac{10}{3} \cdot \frac{10}{10} = \frac{10}{3} \)

15. \( \frac{6}{1} \div \frac{22}{22} = \frac{6}{1} \cdot \frac{22}{22} = \frac{3}{1} \)
16. \( \frac{5}{25} \div \frac{5}{5} = \frac{5}{25} \cdot \frac{5}{5} = \frac{1}{5} \)

17. \( \frac{24}{7} \div \frac{18}{18} = \frac{24}{7} \cdot \frac{18}{18} = \frac{4}{3} \)
18. \( \frac{1}{4} \div \frac{1}{10} = \frac{1}{4} \cdot \frac{10}{1} = \frac{5}{2} \)

19. \( \frac{5}{16} \div \frac{16}{16} = \frac{5}{16} \cdot \frac{16}{16} = \frac{5}{16} \)
20. \( \frac{21}{8} \div \frac{8}{9} = \frac{21}{8} \cdot \frac{9}{8} = \frac{21}{64} \)
**REVIEW: Comparing and Ordering Decimals**

**Skill Examples**

1. \(34.07 > 30.47\)
2. \(12.35 < 12.351\)
3. \(17,056.4 > 17,055.9\)
4. \(0.004 < 0.030\)
5. \(0.1003 > 0.0999\)

**Application Example**

6. Order the weights from least to greatest:
   - 12.3 lb, 11.9 lb, 12.0 lb, 13.1 lb.

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Graph the two numbers. Then compare them using <, >, or =.

7. \(1.6 \boxed{<} 1.7\)
8. \(130.5 \boxed{<} 103.5\)
9. \(9.2 \boxed{<} 9.02\)
10. \(203.7 \boxed{<} 207.3\)
11. \(0.32 \boxed{<} 0.132\)
12. \(427.8 \boxed{<} 428.3\)

Order the lengths from least to greatest.

13. 32.5 ft, 29.9 ft, 32.3 ft, 31.7 ft, 31.75 ft
14. 0.5 mi, 0.05 mi, 0.47 mi, 1.02 mi, 0.08 mi

Is the scale balanced correctly?

15. 1.22 lb
16. 18.03 oz
17. 0.05 kg

18. **NUMBER LINE** On the number line, shade all values of \(x\) for which \(x \leq 3.2\) and \(x \geq 2.9\).
**REVIEW: Fractions and Decimals**

**Key Concept and Vocabulary**

\[
\begin{align*}
\frac{1}{10} &= 0.1 & \frac{1}{5} &= 0.2 & \frac{2}{5} &= 0.4 \\
\frac{1}{4} &= 0.25 & \frac{1}{2} &= 0.5 & \frac{3}{4} &= 0.75 \\
\frac{1}{8} &= 0.125 & \frac{3}{8} &= 0.375 & \frac{5}{8} &= 0.625
\end{align*}
\]

**Skill Examples**

1. \( \frac{3}{10} = \frac{6}{10} = \frac{3}{5} \)
2. \( \frac{4}{5} = \frac{4 \cdot 2}{5 \cdot 2} = \frac{8}{10} = 0.8 \)
3. \( \frac{875}{1000} = \frac{7 \cdot 125}{8 \cdot 125} = \frac{7}{8} \)
4. \( \frac{1}{3} = 0.333\ldots = \frac{3}{9} = \frac{0.333\ldots}{3.10000\ldots} \)

**Application Example**

5. You put 16.75 gallons of gas in your car. Write this decimal as a mixed number.

\[
16.75 = 16 + 0.75 = 16\frac{3}{4}
\]

6. You put 16\(\frac{3}{4}\) gallons of gas in your car.

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**Write the fraction as a decimal.**

6. \( \frac{3}{4} = \) _____
7. \( \frac{7}{10} = \) _____
8. \( \frac{3}{25} = \) _____
9. \( \frac{7}{20} = \) _____
10. \( \frac{19}{100} = \) _____
11. \( \frac{11}{50} = \) _____
12. \( \frac{2}{3} = \) _____
13. \( \frac{1}{6} = \) _____

**Write the decimal as a fraction.**

14. \( 0.4 = \) _____
15. \( 0.35 = \) _____
16. \( 0.6 = \) _____
17. \( 1.5 = \) _____

**Write the number represented by the model as a decimal and as a simplified fraction.**

18. _____ = _____
19. _____ = _____
20. _____ = _____

21. **GAS** You put 9.25 gallons of gas in your car. Write this decimal as a mixed number. _____

22. **MULTIPLE FORMS** Write the decimal 0.35 in two ways. One with a denominator of 100 and one with a denominator of 1000. _____________
REVIEW: Rounding Decimals

Key Concept and Vocabulary

Round up.
Decision digit is 5, 6, 7, 8, or 9.

Round down.
Decision digit is 0, 1, 2, 3, or 4.

Skill Examples
1. To the nearest tenth:
   4.78 rounds to 4.8. Round up.
2. To the nearest hundredth:
   0.143 rounds to 0.14. Round down.
3. To the nearest thousandth:
   0.0029 rounds to 0.003. Round up.

Application Example
4. Gasoline costs $2.899 per gallon. Round this price to the nearest cent.
   To the nearest cent: 2.899 rounds to 2.90.
   The gasoline costs about $2.90 per gallon.

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Round to the nearest tenth. (The symbol ≈ means “is approximately to.”)
5. 0.16 ≈ ____ 6. 0.038 ≈ ____ 7. 1.05 ≈ ____ 8. 10.049 ≈ ____

Round to the nearest hundredth.
9. 0.0123 ≈ ____ 10. 2.406 ≈ ____ 11. 0.463 ≈ ____ 12. 12.006 ≈ ____

Round to the nearest thousandth.
13. 0.0456 ≈ ____ 14. 4.5062 ≈ ____ 15. 1.0043 ≈ ____ 16. 0.6666 ≈ ____

Round the butterfly’s weight to the nearest hundredth of a gram.
17. 0.034 g ≈ ____ 18. 0.107 g ≈ ____ 19. 0.008 g ≈ ____

20. PRICE OF GAS Gasoline costs $2.379 per gallon. Round this price to the nearest cent. _______

21. BUTTERFLY WEIGHTS All species of butterflies weigh between 0.003 gram and 3 grams. Explain why it would not make sense to round some butterfly weights to the nearest hundredth of a gram.
   ________________________________  ________________________________  ________________________________