Dear families,

As our community works to understand and respond to the effects of COVID-19, the Mukilteo School District sincerely appreciates your patience as we navigate this period of unprecedented school closures.

Attached to this letter is a packet of materials to help you supplement your child’s education while away from the formal school environment. Please feel free to use the grade-level packets to review and practice previously taught skills in English/Language Arts, Mathematics and Science. They are not required, nor will they be graded. Answer keys are included in the packets so that your child can check their own work. Students are encouraged to skip around and find topics of interest and practice rather than complete them from beginning to end. If you find that your child’s grade level is too challenging, or not challenging enough, you are welcome to work outside of their current grade level.

It is highly encouraged that your child continues to review and practice previously taught skills and remain engaged in learning. We hope these packets add to what you are already doing to support your child in learning during this challenging time.

Sincerely,

The Curriculum and Instruction Department
Mukilteo School District
### REVIEW: Finding the Percent of a Number

#### Key Concept and Vocabulary
- 40% of 60 is 24.
  \[
  0.4 \times 60 = 24 \\
  \frac{2}{5} \times 60 = 24
  \]

#### Skill Examples
1. 30% of 50: \(0.3 \times 50 = 15\)
2. 45% of 80: \(0.45 \times 80 = 36\)
3. 110% of 40: \(1.1 \times 40 = 44\)
4. 25% of 240: \(0.25 \times 240 = 60\)

#### Application Example
5. 28% of the 200 people who answered a survey own a dog. How many of the 200 people in the survey own a dog?

\[
0.28 \times 200 = 56
\]

\[
\therefore \text{56 of the 200 people own a dog.}
\]

### PRACTICE MAKES PURR-FECT™

Find the percent of the number.

6. 25% of 40 = _____
7. 20% of 35 = _____
8. 65% of 110 = _____
9. 125% of 20 = _____
10. \(\frac{331}{3}\)% of 60 = _____
11. 95% of 400 = _____
12. 200% of 31 = _____
13. 18% of 90 = _____
14. 1% of 800 = _____
15. 60% of 60 = _____
16. 100% of 59 = _____
17. 1000% of 59 = _____

Write the question represented by the model. Then answer the question.

18.  
![Visual Model](image)

   Question: 
   Answer: 

19.  

   Question: 
   Answer: 

20. **ENDANGERED SPECIES**  Sixty percent of a species of butterfly died due to loss of habitat. Originally, there were 10,000 butterflies. How many are left? 

21. **SALES TAX**  You buy 4 breakfast sandwiches at $2.59 each, 4 hashbrowns at $1.10 each, and 4 bottles of orange juice at $1.25 each. The sales tax is 6%. Find the total cost of the 4 meals, including sales tax. 

REVIEW: Percents and Proportions

Key Concept and Vocabulary
To represent “a is p percent of w,” use a proportion.

Skill Examples

1. \[
\frac{36}{50} = \frac{p}{100}
\]
   \[100 \cdot \frac{36}{50} = 100 \cdot \frac{p}{100}\]
   \[72 = p\]
   \[
   \therefore \text{So, 36 is 72\% of 50.}
   \]

2. \[
\frac{a}{36} = \frac{20}{100}
\]
   \[36 \cdot \frac{a}{36} = 36 \cdot \frac{20}{100}\]
   \[a = 7.2\]
   \[
   \therefore \text{So, 7.2 is } 20\% \text{ of 36.}
   \]

PRACTICE MAKES PURR-FECT™

Write and solve a proportion to answer the question.

4. 68 is what percent of 80?

5. What number is 25\% of 116?

6. 36 is 16\% of what number?

7. 48 is what percent of 128?

8. What number is 64\% of 40?

9. 77 is 55\% of what number?

10. PLAY Students are auditioning for a play. Of the 60 students auditioning, 12 will get a part in the play. What percent of the students who audition will get a part in the play?

11. HOMEWORK You have completed 60\% of your English homework. The assignment has 25 questions. How many questions are left? 

Check your answers at BigIdeasMath.com.

Application Example

3. A basketball player makes 45\%, or 9 shots, of her attempted shots. How many shots did the basketball player attempt?

\[
\frac{9}{w} = \frac{45}{100}
\]
\[9 \cdot 100 = w \cdot 45\]
\[900 = 45w\]
\[\frac{900}{45} = \frac{45w}{45}\]
\[20 = w\]

\[
\therefore \text{The basketball player attempted 20 shots.}
\]
REVIEW: Estimating and Finding a Tip

To find the tip on a food bill at a restaurant, write the percent as a decimal or fraction and multiply it by the cost of the food bill.

Application Examples

1. Your food bill at a restaurant is $8.49. You leave a 15% tip.
   Estimate: Round 8.49 to 10.
   \[0.15 \times 10 = 1.5\]
   The estimate for the tip is $1.50.
   Actual: \[0.15 \times 8.49 = 1.27\]
   The actual tip is $1.27.

2. Your food bill at a restaurant is $15.83. You leave a 20% tip.
   Estimate: Round 15.83 to 16.
   \[0.2 \times 16 = 3.2\]
   The estimate for the tip is $3.20.
   Actual: \[0.2 \times 15.83 = 3.17\]
   The actual tip is $3.17.

PRACTICE MAKES PURR-FECT™

Check your answers at BigIdeasMath.com.

Estimate the tip. Then find the actual tip.

3. Food bill: $33.65; Tip: 15%

4. Food bill: $44.28; Tip: 20%

5. Food bill: $11.17; Tip: 15%

6. Food bill: $12.37; Tip: 20%

7. Food bill: $23.16; Tip: 15%

8. Food bill: $16.21; Tip: 20%

9. Food bill: $37.54; Tip: 25%

10. Food bill: $25.96; Tip: 20%

11. Food bill: $28.93; Tip: 15%

12. Food bill: $72.79; Tip: 25%

13. Food bill: $19.82; Tip: 23%

14. Food bill: $51.56; Tip: 30%
**REVIEW: Estimating and Finding a Sales Tax**

**Key Concept and Vocabulary**
To find the sales tax on an item, write the percent as a decimal or fraction and multiply it by the price of the item.

**Application Examples**

1. A DVD costs $20 before tax. The sales tax is 7%.
   **Estimate:** Round 7% to 5%.
   \[0.05 \times 20 = 1\]
   \[\therefore \text{The estimate for the sales tax is } \$1.\]
   **Actual:** \[0.07 \times 20 = 1.4\]
   \[\therefore \text{The actual sales tax is } \$1.40.\]

2. A bicycle costs $115 before tax. The sales tax is 9%.
   **Estimate:** Round 9% to 10% and 115 to 120.
   \[0.1 \times 120 = 12\]
   \[\therefore \text{The estimate for the sales tax is } \$12.\]
   **Actual:** \[0.09 \times 115 = 10.35\]
   \[\therefore \text{The actual sales tax is } \$10.35.\]

3. **BASEBALL CARDS** The pack of baseball cards costs $3.75 before tax. The sales tax is 4%.
   
   4. **TELEVISION** A television costs $400 before tax. The sales tax is 8%.
      
   5. **MP3 PLAYER** An MP3 player costs $89 before tax. The sales tax is 6%.
      
   6. **COUCH** A couch costs $675 before tax. The sales tax is 5%.
      
   7. **GUITAR** A guitar costs $299 before tax. The sales tax is 9%.
      
   8. **TABLE** A table costs $50 before tax. The sales tax is 4.5%.
      
   9. **JEANS** A pair of jeans costs $39 before tax. The sales tax is 5.5%.

**Visual Model**

Using a sales tax of 5%, the sales tax on a $25 shirt is $1.25.

<table>
<thead>
<tr>
<th>Sales Tax</th>
<th>0%</th>
<th>20%</th>
<th>40%</th>
<th>60%</th>
<th>80%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2.5</td>
<td>5</td>
<td>7.5</td>
<td>10</td>
<td>12.5</td>
<td>15</td>
</tr>
<tr>
<td>0</td>
<td>20</td>
<td>40</td>
<td>60</td>
<td>80</td>
<td>100</td>
<td>125</td>
</tr>
</tbody>
</table>

**PRACTICE MAKES PURRR-FECT™**

Check your answers at BigIdeasMath.com.
REVIEW: Estimating and Finding a Discount

**Key Concept and Vocabulary**
A discount is a decrease in the original price of an item. To find the discount, write the percent as a decimal or fraction and multiply it by the original price of the item.

**Application Examples**

1. The original price of a book is $18.79. The discount is 20%.
   
   **Estimate:** Round 18.79 to 20.
   
   \[
   0.2 \times 20 = 4
   \]
   
   The estimate for the discount is $4.

   **Actual:**
   \[
   0.2 \times 18.79 = 3.76
   \]
   
   The actual discount is $3.76.
   
   The sale price of the book is
   \[
   18.79 - 3.76 = 15.03
   \]

2. The original price of a pair of in-line skates is $209.99. The discount is 15%.

   **Estimate:** Round 209.99 to 200.
   
   \[
   0.15 \times 200 = 30
   \]
   
   The estimate for the discount is $30.

   **Actual:**
   \[
   0.15 \times 209.99 = 31.50
   \]
   
   The actual discount is $31.50.
   
   The sale price of the pair of in-line skates is
   \[
   209.99 - 31.50 = 178.49
   \]

**PRACTICE MAKES PURR-FECT™**

Estimate the discount. Then find the actual discount and the sale price.

3. **TRUMPET** The original price of a trumpet is $319.29. The discount is 25%.

4. **SHOES** The original price of a pair of shoes is $47.99. The discount is 40%.

5. **LAMP** The original price of a lamp is $17.09. The discount is 15%.

6. **RING** The original price of a ring is $96.75. The discount is 60%.

7. **ELECTRONICS** The original price of a home theater system is $243.89. The discount is 75%.

8. **BASEBALL** The original price of a baseball glove is $26.99. The discount is 30%.

9. **SEWING MACHINE** The original price of a sewing machine is $182.96. The discount is 20%.

Check your answers at BigIdeasMath.com.
REVIEW: Simple Interest

Key Concept and Vocabulary

$$I = Prt$$

$100 = (100)(0.05)(2)$

Skill Examples

1. $P = $200, $r = 0.10, t = 4$ years
   $$I = (200)(0.10)(4) = $80$$

2. $P = $250, $r = 0.04, t = 0.5$ year
   $$I = (250)(0.04)(0.5) = $5$$

3. $P = $2000, $r = 0.05, t = 20$ years
   $$I = (2000)(0.05)(20) = $2000$$

PRACTICE MAKES PURR-FECT™

Find the simple interest.

5. Principal: $400, Rate: 5%, Time: 3 years

6. Principal: $100, Rate: 3%, Time: 6 months

7. Principal: $1000, Rate: 2%, Time: 4 months

8. Principal: $250, Rate: 10%, Time: 6 months

9. Principal: $500, Rate: 8%, Time: 9 months

In which savings account do you earn more simple interest?

11. a. Deposit $200 at 6% for 3 years.
    b. Deposit $200 at 8% for 18 months.

12. a. Deposit $1000 at 4% for 5 years.
    b. Deposit $1000 at 5% for 4 years.

13. SAVINGS You deposited $600 in a savings account for 5 years. The account paid 4% simple interest. How much interest did you earn?

14. LOAN You borrowed $1000 for 2 years. You are charged 5% simple interest. How much interest do you owe?

Check your answers at BigIdeasMath.com.

Visual Model

<table>
<thead>
<tr>
<th>1 month</th>
<th>3 months</th>
<th>4 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>$t = \frac{1}{12}$</td>
<td>$t = \frac{1}{4}$</td>
<td>$t = \frac{1}{3}$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6 months</th>
<th>1 year</th>
<th>2 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>$t = \frac{1}{2}$</td>
<td>$t = 1$</td>
<td>$t = 2$</td>
</tr>
</tbody>
</table>

Application Example

4. You deposited $500 in a savings account for 10 years. The account paid 6% simple interest. How much interest did you earn?

$$P = $500, r = 0.06, t = 10$$ years

$$I = (500)(0.06)(10) = $300$$

::: You earned $300 in interest.
Operations with Rational Numbers

To add, subtract, multiply, or divide rational numbers, use the same rules for signs as you used for integers.

Example 1  Find (a) \(-\frac{5}{6} + \frac{2}{3}\) and (b) \(7.3 - (-4.8)\).

a. Write the fractions with the same denominator, then add.
\[
-\frac{5}{6} + \frac{2}{3} = -\frac{5}{6} + \frac{2 \cdot 2}{3 \cdot 2} = -\frac{5 + 4}{6} = -\frac{9}{6} = -\frac{3}{2}
\]
b. To subtract a rational number, add its opposite.
\[
7.3 - (-4.8) = 7.3 + 4.8 = 12.1
\]
The opposite of \(-4.8\) is \(4.8\).

Example 2  Find (a) \(2.25 \cdot 8\), (b) \(-2.25 \cdot (-8)\), and (c) \(-2.25 \cdot 8\).

a. \(2.25 \cdot 8 = 18\)

b. \(-2.25 \cdot (-8) = 18\)

c. \(-2.25 \cdot 8 = -18\)

Example 3  Find \(-\frac{4}{9} + \frac{3}{4}\).

To divide by a fraction, multiply by its reciprocal.
\[
-\frac{4}{9} + \frac{3}{4} = -\frac{4 \cdot 4}{9 \cdot 4} = -\frac{16}{36} = -\frac{4}{9} \cdot \frac{4}{3}
\]
The reciprocal of \(\frac{3}{4}\) is \(\frac{4}{3}\).

Practice

Add, subtract, multiply, or divide.

1. \(-7.5 + 3.8\)
2. \(-18.3 + (-6.7)\)
3. \(0.6 - 0.85\)
4. \(6.13 - (-2.82)\)

5. \(-6 \cdot 4.75\)
6. \(-3.2 \cdot (-4.8)\)
7. \(-1.8 \div (-9)\)
8. \(3.6 \div (-1.5)\)

9. \(-\frac{1}{6} + \frac{5}{6}\)
10. \(-\frac{7}{10} + \left(-\frac{3}{5}\right)\)
11. \(\frac{4}{9} - \frac{2}{3}\)
12. \(-\frac{5}{6} - \frac{1}{4}\)

13. \(-\frac{3}{2} \cdot \left(-\frac{1}{8}\right)\)
14. \(-\frac{3}{4} \cdot \frac{7}{12}\)
15. \(\frac{5}{8} \div \left(-\frac{1}{4}\right)\)
16. \(-\frac{4}{7} \div \frac{2}{5}\)

17. TEMPERATURE  The temperature at midnight is shown. The outside temperature decreases \(2.3^\circ C\) over the next two hours. What is the outside temperature at 2 a.m.?

18. SNOWFALL  In January, a city’s snowfall was \(\frac{5}{8}\) foot below the historical average. In February, the snowfall was \(\frac{3}{4}\) foot above the historical average. Was the city’s snowfall in the two-month period above or below the historical average? By how much?
**REVIEW: Writing and Graphing Inequalities**

**Key Concept and Vocabulary**
- \( x > 2 \): All numbers greater than 2
- \( x \geq 2 \): All numbers greater than or equal to 2
- \( x < 2 \): All numbers less than 2
- \( x \leq 2 \): All numbers less than or equal to 2

**Skill Examples**
1. \( x > 0 \): All positive numbers
2. \( x \geq 0 \): All nonnegative numbers
3. \( x < 0 \): All negative numbers
4. \( x \leq 0 \): All nonpositive numbers

**Application Example**
5. A sign at a clothing store reads “Savings up to 70%.” Let \( S \) represent the percent of savings. Write an inequality to describe \( S \).
   - \( S \) can be equal to 70%.
   - Or \( S \) can be less than 70%.
   - An inequality is \( S \leq 70\% \).

**PRACTICE MAKES PURR-FECT™**

Write an inequality for the statement.
6. All numbers that are less than 24

8. All numbers greater than 10

10. All numbers that are at least 11

Graph the inequality.
12. \( x > -1 \)

14. \( x \leq 3 \)

16. A sign at a shoe store reads “Savings up to 60%.” Let \( P \) represent the percent of savings. Write an inequality to describe \( P \).
REVIEW: Properties of Inequality

Key Concept and Vocabulary

Addition Properties of Inequality:
If \( a > b \), then \( a + c > b + c \).
If \( a < b \), then \( a + c < b + c \).

Subtraction Properties of Inequality:
If \( a > b \), then \( a - c > b - c \).
If \( a < b \), then \( a - c < b - c \).

Multiplication and Division Properties of Inequality when \( c > 0 \):
If \( a > b \), then \( a \cdot c > b \cdot c \).
If \( a < b \), then \( a \cdot c < b \cdot c \).
If \( a > b \), then \( \frac{a}{c} > \frac{b}{c} \).
If \( a < b \), then \( \frac{a}{c} < \frac{b}{c} \).

Multiplication and Division Properties of Inequality when \( c < 0 \):
If \( a > b \), then \( a \cdot c < b \cdot c \).
If \( a < b \), then \( a \cdot c > b \cdot c \).
If \( a > b \), then \( \frac{a}{c} < \frac{b}{c} \).
If \( a < b \), then \( \frac{a}{c} > \frac{b}{c} \).

Skill Examples

1. Solve \( \frac{x}{4} + 2 > 12 \).
   \[
   \frac{x}{4} + 2 > 12 \quad \text{Write the equation.}
   \]
   \[
   \frac{x}{4} > 10 \quad \text{Subtraction Property of Inequality}
   \]
   \[
   x > 40 \quad \text{Simplify.}
   \]

2. Solve \( -7v - 21 \leq 28 \).
   \[
   -7v - 21 \leq 28 \quad \text{Write the equation.}
   \]
   \[
   -7v \leq 49 \quad \text{Addition Property of Inequality}
   \]
   \[
   v \geq -7 \quad \text{Simplify.}
   \]

PRACTICE MAKES PURR-FECT™

Solve the equation. Identify the properties used.

3. \( 3x - 5 \geq 4 \)
   \[
   3x \quad \text{____________________}
   \]
   \[
   x \quad \text{____________________}
   \]

4. \( 1 - \frac{m}{2} < 3 \)
   \[
   1 - \frac{m}{2} \quad \text{____________________}
   \]
   \[
   \frac{m}{2} \quad \text{____________________}
   \]

Write and solve an inequality that represents the value of \( x \).

5. Area \( > 44 \text{ ft}^2 \)
   \[
   8 \text{ ft} \quad \text{____________________}
   \]
   \[
   x + 2 \quad \text{____________________}
   \]

6. Area \( \leq 64 \text{ m}^2 \)
   \[
   16 \text{ m} \quad \text{____________________}
   \]
   \[
   5 - x \quad \text{____________________}
   \]

Name ________________________________
**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.

   \[
   \text{The sample space is } HH, HT, TH, TT.
   \]

   \[
   \text{The probability of each outcome is } \frac{1}{4}. \\
   \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 1
   \]

---

**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.

---

Check your answers at BigIdeasMath.com.
**REVIEW: Tree Diagrams**

**Key Concept and Vocabulary**

Flip a coin 2 times.
4 possible outcomes: HH, HT, TH, TT

**Skill Example**

1. Draw 2 marbles from a sack containing:

   ![Tree Diagram](image)

   GG GR GG GR RG RG

**Application Example**

2. You are drawing 2 marbles from a sack that contains 3 marbles. In how many ways can you draw 2 green marbles?

   There are 2 GG’s in the tree diagram.

   There are 2 ways to draw 2 green marbles.

**PRACTICE MAKES PURR-FECT™**

Check your answers at BigIdeasMath.com.

Draw a tree diagram to show all the outcomes.

3. Flip a coin 3 times.

4. Draw 2 marbles from a sack with 2 marbles.

5. You flip a coin 3 times. In how many ways can you get 2 heads and 1 tail? ________

6. You draw 2 marbles from a sack with 3 marbles.
In how many ways can you draw 2 green marbles? ________

7. **CARDS** You draw 2 cards from the hand at the right.
In how many ways can you end up with a sum of 5? (For instance, A + 4 = 5.) ___________________
Review: Circles and Circumference

Key Concept and Vocabulary

C = \pi d
C = 2\pi r
\pi \approx 3.14
\pi \approx \frac{22}{7}

Skill Examples

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

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

Application Example

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

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: Areas of Circles

Key Concept and Vocabulary

$A = \pi r^2$

$\pi \approx 3.14$

$\pi \approx \frac{22}{7}$

Skill Examples

1. $r = 2.4 \text{ in.}$
   
   $A = \pi(2.4)^2$
   
   $\approx 18.1 \text{ in.}^2$

2. $d = 3 \text{ ft}$
   
   $A = \pi \left(\frac{3}{4}\right)^2$
   
   $\approx 0.4 \text{ ft}^2$

Application Example

3. Find the area of a dime.
   
   $A = \pi(0.9)^2$
   
   $\approx 2.5 \text{ cm}^2$

   The area is about 2.5 square centimeters.

PRACTICE MAKES PURR-FECT™

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

4. $4.6 \text{ in.}$
   
   Area $\approx ________$

5. $10.4 \text{ in.}$
   
   Area $\approx ________$

6. $2 \frac{7}{8} \text{ in.}$
   
   Area $\approx ________$

7. $4.1 \text{ cm}$
   
   Area $\approx ________$

8. $1.5 \text{ ft}$
   
   Area $\approx ________$

9. $1.5 \text{ ft}$
   
   Area $\approx ________$

10. BASKETBALL  Find the area of the center circle on a basketball court.  ________________

11. BASKETBALL  Find the area of a free throw region on a basketball court.  ________________
REVIEW: Area

**Key Concept and Vocabulary**

<table>
<thead>
<tr>
<th>Geometry</th>
<th>Area Formulas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectangle:</td>
<td>$A = bh$</td>
</tr>
<tr>
<td>Parallelogram:</td>
<td>$A = bh$</td>
</tr>
<tr>
<td>Triangle:</td>
<td>$A = \frac{1}{2}bh$</td>
</tr>
<tr>
<td>Trapezoid:</td>
<td>$A = \frac{1}{2}(B + b)h$</td>
</tr>
</tbody>
</table>

**Visual Model**

**Area of a Rectangle:**

- $A = bh$
- $= (12)(10)$
- $= 120$ square units

**Application Example**

3. Find the area of the apartment.

\[
A = 60 \cdot 40 \\
= 2400 \text{ ft}^2
\]

\[\therefore \text{ The area is 2400 square feet.}\]

**Skill Examples**

1. 

\[A = \frac{1}{2}(1.6 + 1)(1)\]
\[= 1.3 \text{ cm}^2\]

2. 

\[A = \frac{1}{2}(3.8)(2.4)\]
\[= 4.56 \text{ in.}^2\]

3. Find the area of the figure.

4. 

Area = ________

5. 

Area = ________

6. 

Area = ________

7. 

Area = ________

8. 

Area = ________

9. 

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.
REVIEW: Surface Areas of Prisms

**Key Concept and Vocabulary**

\[ S = 2\ell w + 2\ell h + 2wh \]

**Skill Example**

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

**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 cm².

**PRACTICE MAKES PURR-FECT™**

Find the surface area of the prism.

3. Rectangular Prism
   
   \[ S = \underline{\hphantom{0}} \]

4. Rectangular Prism
   
   \[ S = \underline{\hphantom{0}} \]

5. Rectangular Prism
   
   \[ S = \underline{\hphantom{0}} \]

6. Triangular Prism
   
   \[ S = \underline{\hphantom{0}} \]

7. Triangular Prism
   
   \[ S = \underline{\hphantom{0}} \]

8. Triangular Prism
   
   \[ S = \underline{\hphantom{0}} \]

9. **AQUARIUM** How much glass is used to make the four sides of the aquarium? \underline{\hphantom{0}}

10. **AQUARIUM** How much glass is used to make the base of the aquarium? \underline{\hphantom{0}}
REVIEW: Surface Areas of Cylinders

Key Concept and Vocabulary

\[ S = 2\pi r^2 + 2\pi rh \]

Skill Example

1. Circular Cylinder

\[ S = 2\pi \cdot 3^2 + 2\pi \cdot 3 \cdot 2 \]
\[ = 18\pi + 12\pi \]
\[ = 30\pi \text{ ft}^2 \]

Application Example

2. Find the surface area of the soup can.

\[ S = 2\pi \cdot 1.5^2 + 2\pi \cdot 1.5 \cdot 5 \]
\[ = 4.5\pi + 15\pi \]
\[ = 19.5\pi \text{ in}^2 \]

\[ \therefore \text{ The area is } 19.5\pi \text{ square inches.} \]

PRACTICE MAKES PURR-FECT™

Find the surface area of the circular cylinder.

3. Circular Cylinder

\[ S = \text{___________} \]

4. Circular Cylinder

\[ S = \text{___________} \]

5. Circular Cylinder

\[ S = \text{___________} \]

6. Circular Cylinder

\[ S = \text{___________} \]

7. Circular Cylinder

\[ S = \text{___________} \]

8. Circular Cylinder

\[ S = \text{___________} \]

9. Oil Tanker Truck

The truck's tank is a stainless steel cylinder. How many square feet of stainless steel are needed to make the tank? ____________

10. Oil Tanker Truck

What percent of the stainless steel in the tank is used to make the two ends? ____________

Check your answers at BigIdeasMath.com.
**REVIEW: Volumes of Prisms**

**Key Concept and Vocabulary**

*Volume of a Rectangular Prism*

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

**Skill Example**

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

**Application Example**

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

**PRACTICE MAKES Purr-fect™**

*Check your answers at BigIdeasMath.com.*

**Find the volume of the prism.**

3. **Rectangular Prism**
   \[ V = \underline{\hspace{2cm}} \]

4. **Rectangular Prism**
   \[ V = \underline{\hspace{2cm}} \]

5. **Rectangular Prism**
   \[ V = \underline{\hspace{2cm}} \]

6. **Triangular Prism**
   \[ V = \underline{\hspace{2cm}} \]

7. **Triangular Prism**
   \[ V = \underline{\hspace{2cm}} \]

8. **Triangular Prism**
   \[ V = \underline{\hspace{2cm}} \]

9. **AQUARIUM** How much water is needed to fill the aquarium? \underline{\hspace{2cm}}

10. **AQUARIUM** There are about 7.5 gallons in 1 cubic foot. How many gallons of water does the aquarium hold? \underline{\hspace{2cm}}
REVIEW: Volumes of Pyramids

Key Concept and Vocabulary

![Diagram of a pyramid with the formula $V = \frac{1}{3} Bh$]

Skill Example

1. Find the volume of the pyramid.

2. Find the volume of the square pyramid.

3. $V = ________$

4. $V = ________$

5. $V = ________$

6. $V = ________$

7. $V = ________$

8. $V = ________$

9. PYRAMID The pyramid has a volume of 2000 cubic feet. Find a set of possible dimensions for the pyramid.

   $w = _____, \ell = _____, h = _____$

Visual Model

The volume of a pyramid is one-third the volume of the prism that has the same base and height.

Application Example

2. Find the volume of the square pyramid.

   $V = \frac{1}{3} \cdot (40^2) \cdot 30$

   $= 16,000 \text{ m}^3$

   $\therefore$ The volume is 16,000 cubic meters.

PRACTICE MAKES PURR-FECT™

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REVIEW: Evaluating Expressions

**Key Concept and Vocabulary**

**Expression:** $2x^2 + 3x - 6$

Evaluate when $x = 2$.

$2(2^2) + 3(2) - 6 = 8 + 6 - 6 = 8$

**Skill Examples**

1. When $x = 5$, $3x + 4$ is $3(5) + 4 = 19$.
2. When $x = -1$, $5x + 7$ is $5(-1) + 7 = 2$.
3. When $x = 3$, $4x^2$ is $4(3^2) = 36$.
4. When $x = 4$, $x^3 + 1$ is $4^3 + 1 = 65$.

**Application Example**

5. For a Celsius temperature $C$ the Fahrenheit temperature $F$ is $\frac{9}{5}C + 32$. Find $F$ when $C = 25^\circ$.

$\frac{9}{5}C + 32 = \frac{9}{5}(25) + 32$

$= 45 + 32$

$= 77$

The Fahrenheit temperature is $77^\circ$.

**PRACTICE MAKES PURR-FECT™**

Check your answers at BigIdeasMath.com.

Evaluate the expression.

6. When $x = 2$, $3x - 1 = ________$.  
7. When $x = -1$, $3x + 9 = ________$.  
8. When $x = 4$, $x^2 - 5 = ________$.  
9. When $x = \frac{1}{2}$, $3x^2 = ________$.  
10. When $x = 3.1$, $5x + 0.5 = ________$.  
11. When $x = 0$, $4x^2 + 5 = ________$.  
12. When $x = 10$, $x^2 - 8x + 11 = ________$.  

Evaluate the perimeter when $x = 3$.

14. $P = ______$
15. $P = ______$

16. **CARDINAL** The weight of the cardinal (in ounces) is $0.6x + 11$ after it eats $x$ ounces of bird seed. How much does it weigh after it eats 2 ounces of bird seed? _______________
**REVIEW: Simplifying Expressions**

**Key Concept and Vocabulary**
- Combine variable terms.
- Combine numerical terms.

**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.
   \[x - 0.3x = 0.7x\]

   The sale cost is 0.7\(x\).

**PRACTICE MAKES PURR-FECT™**

*Check your answers at BigIdeasMath.com.*

**Simplify the expression. (Remove parentheses and combine like terms.)**

6. \(4x + 6x = \) \[\underline{10x}\]

7. \(3n + 5 - 2n = \) \[n + 5\]

8. \(9x + 3 - 6x - 2 = \) \[3x + 1\]

9. \(3(x + 2) = \) \[3x + 6\]

10. \(7m - 2m + 5m = \) \[10m\]

11. \(2 - (x + 1) = \) \[1 - x\]

12. \((3x + 6) - x = \) \[2x + 6\]

13. \(5 - (1 - n) = \) \[n + 4\]

14. \((x + 6) - (x + 6) = \) \[0\]

15. \((4x - 2) + 3(x + 1) = \) \[7x + 1\]

16. \((5x + 4) - 2(x + 1) = \) \[3x + 2\]

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

18. [Rectangle with sides 7x and 8x]
   Perimeter = \[15x\]

19. [Rectangle with sides 9n and 5n]
   Perimeter = \[14n\]

20. [Triangle with sides 18x, 18x, and 21x]
   Perimeter = \[57x\]

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.
   \[x - 0.35x = 0.65x\]
REVIEW: Writing Expressions and Equations

Key Concept and Vocabulary

Phrase: Two more than a number
Expression: $2 + n$
Sentence: Two more than a number is equal to six.
Equation: $2 + n = 6$

Skill Examples

1. Five times a number: $5n$
2. Six less than three times a number: $3n - 6$
3. The sum of a number and one: $n + 1$
4. A number divided by three: $n ÷ 3$

PRACTICE MAKES PURR-FECT™

Write the verbal phrase as a mathematical expression.

6. The product of a number and two

8. 19 less than twice a number

10. Five times the sum of a number and two

Write the sentence as an equation.

12. Three times a number equals nine.

14. Twelve divided by a number is four.

16. The volume of a cone is one-third the area of the base times the height. A cone has a volume of $20\pi$ cubic inches. Write an equation that can be used to solve for the height of the cone.

Visual Model

Application Example

5. Write an equation for the following.
“The price of $15 is the wholesale cost plus a markup of fifty percent.”

Let $C$ be the wholesale cost.
50% of $C$ is $0.5C$.

An equation is $15 = C + 0.5C$.

Check your answers at BigIdeasMath.com.
REVIEW: Properties of Equality

Key Concept and Vocabulary

Addition Property of Equality:
If \( a = b \), then \( a + c = b + c \).

Subtraction Property of Equality:
If \( a = b \), then \( a - c = b - c \).

Multiplication Property of Equality:
If \( a = b \), then \( a \cdot c = b \cdot c \).

Division Property of Equality:
If \( a = b \), then \( a \div c = b \div c \), \( c \neq 0 \).

Visual Model

If two sides of a scale weigh the same, the scale balances.

If you add or subtract the same amount on each side of the scale, the scale still balances.

Application Example

2. Ski rental is $45 for 3 hours and $10 for each additional hour. You pay $75. Write and solve an equation to find the number of additional hours you rented the skis.

\[
10h + 45 = 75 \\
10h = 30 \\
h = 3
\]

You rented the skis for 3 additional hours.

Skill Example

1. Solve \( \frac{x}{4} - 3 = 7 \).

\[
\frac{x}{4} - 3 = 7 \\
\frac{x}{4} = 10 \\
x = 40
\]

You added or subtracted the same amount on each side of the scale, the scale still balances.

PRACTICE MAKES PURR-FECT™

Solve the equation. Identify the properties used.

3. \( 2y + 9 = 13 \)

\[
2y = 4 \\
y = 2
\]

4. \( \frac{n}{4} - 2 = 10 \)

\[
\frac{n}{4} = 12 \\
n = 48
\]

5. COMPUTER You pay $87 to get your computer repaired. You are charged $37 for parts and $20 per hour of labor. Write and solve an equation to find the number of labor hours you were charged.

\[
37 + 20h = 87 \\
20h = 50 \\
h = 2.5
\]

Check your answers at BigIdeasMath.com.
Solving Linear Equations

To determine whether a value is a solution of an equation, substitute the value into the equation and simplify.

Example 1  
Determine whether (a) \( x = 1 \) or (b) \( x = -2 \) is a solution of \( 5x - 1 = 4 \).

\[ \begin{align*}
\text{a.} & \quad 5x - 1 = -2x + 6 \\
5(1) - 1 &= -2(1) + 6 \quad \text{Substitute.} \\
4 &= 4 \quad \checkmark \quad \text{Simplify.} \\
\text{So, } x = 1 \text{ is a solution.}
\end{align*} \]

\[ \begin{align*}
\text{b.} & \quad 5x - 1 = -2x + 6 \\
5(-2) - 1 &= -2(-2) + 6 \quad \text{Substitute.} \\
-11 &\neq 10 \quad \times \quad \text{Simplify.} \\
\text{So, } x = -2 \text{ is not a solution.}
\end{align*} \]

To solve a linear equation, isolate the variable.

Example 2  
Solve each equation. Check your solution.

\[ \begin{align*}
\text{a.} & \quad 4x - 3 &= 13 \\
4x - 3 + 3 &= 13 + 3 \quad \text{Add 3.} \\
4x &= 16 \quad \text{Simplify.} \\
\frac{4x}{4} &= \frac{16}{4} \quad \text{Divide by 4.} \\
x &= 4 \quad \text{Simplify.} \\
\checkmark & \quad 4x - 3 = 13 \\
4(4) - 3 &= ? \\
13 &= 13 \\
\end{align*} \]

\[ \begin{align*}
\text{b.} & \quad 2(y - 8) &= y + 6 \\
2y - 16 &= y + 6 \quad \text{Distributive Property} \\
2y - y &= 16 + 6 \\
y - 16 &= 22 \quad \text{Add 16.} \\
y &= 38 \quad \text{Simplify.} \\
\checkmark & \quad 2(y - 8) = y + 6 \\
2(22 - 8) &= ? \\
28 &= 28 \\
\end{align*} \]

Practice

Determine whether (a) \( x = -1 \) or (b) \( x = 3 \) is a solution of the equation.

1. \( 5x + 7 = 2 \)  
2. \( -4x + 8 = -4 \)  
3. \( 2x - 1 = 3x - 4 \)

Solve the equation. Check your solution.

4. \( x - 9 = 24 \)  
7. \( -\frac{5}{6}t = -15 \)  
10. \( x + 5 = 11x \)  
13. \( 6n + 3 = -4n + 7 \)  
16. \( \frac{w - 6}{5} = 8 \)  
19. \( (8r + 6) + (4r - 1) = 14 \)

5. \( n + 14 = 0 \)  
8. \( 81 = 46 - x \)  
11. \( 9(y - 3) = 45 \)  
14. \( 2c + 5 = 3(c - 8) \)  
17. \( \frac{15 + h}{3} = 10 \)  
20. \( \frac{2}{3}x - 3 = 9 \)

6. \( -16 = 4y \)  
9. \( 4x + 5 = 1 \)  
12. \( 6 = 7k + 8 - k \)  
15. \( 18m + 3(2m + 8) = 0 \)  
18. \( \frac{8 - 3x}{5} = x \)  
21. \( \frac{1}{2}x - \frac{3}{10} = \frac{5}{2}x + \frac{7}{10} \)

22. **MONEY**  
You have a total of $3.25 in change made up of 25 pennies, 6 nickels, 2 dimes, and \( x \) quarters. How many quarters do you have?
**REVIEW: Finding the Percent of a Number**

### Key Concept and Vocabulary

40% of 60 is 24.

\[
\frac{2}{5} \times 60 = 24
\]

**Finding a part:**

Write percent as decimal or fraction and multiply.

### Skill Examples

1. 30% of 50: \(0.3 \times 50 = 15\)
2. 45% of 80: \(0.45 \times 80 = 36\)
3. 110% of 40: \(1.1 \times 40 = 44\)
4. 25% of 240: \(0.25 \times 240 = 60\)

### Application Example

5. 28% of the 200 people who answered a survey own a dog. How many of the 200 people in the survey own a dog?

\[
0.28 \times 200 = 56
\]

\(\therefore\) 56 of the 200 people own a dog.

### Practice Makes Purr-fect™

Find the percent of the number.

6. 25% of 40 = ___ 10 ___
7. 20% of 35 = ___ 7 ___
8. 65% of 110 = ___ 71.5 ___
9. 125% of 20 = ___ 25 ___
10. \(33\frac{1}{3}\)% of 60 = ___ 20 ___
11. 95% of 400 = ___ 380 ___
12. 200% of 31 = ___ 62 ___
13. 18% of 90 = ___ 16.2 ___
14. 1% of 800 = ___ 8 ___
15. 60% of 60 = ___ 36 ___
16. 100% of 59 = ___ 59 ___
17. 1000% of 59 = ___ 590 ___

Write the question represented by the model. Then answer the question.

18. Question: What is 60% of 90?
Answer: ___ 54 ___

19. Question: What is 80% of 120?
Answer: ___ 96 ___

20. **ENDANGERED SPECIES** Sixty percent of a species of butterfly died due to loss of habitat. Originally, there were 10,000 butterflies. How many are left? ___ 4000 butterflies ___

21. **SALES TAX** You buy 4 breakfast sandwiches at $2.59 each, 4 hashbrowns at $1.10 each, and 4 bottles of orange juice at $1.25 each. The sales tax is 6%. Find the total cost of the 4 meals, including sales tax. ___ $20.95 ___
REVIEW: Percents and Proportions

Key Concept and Vocabulary

To represent “a is \( p \) percent of \( w \),” use a proportion.

\[
\frac{a}{w} = \frac{p}{100}
\]

Skill Examples

1. \( \frac{36}{50} = \frac{p}{100} \)
   
   \( 100 \cdot \frac{36}{50} = 100 \cdot \frac{p}{100} \)
   
   \( 72 = p \)
   
   So, 36 is 72% of 50.

2. \( \frac{a}{36} = \frac{20}{100} \)
   
   \( 36 \cdot \frac{a}{36} = 36 \cdot \frac{20}{100} \)
   
   \( a = 7.2 \)
   
   So, 7.2 is 20% of 36.

Application Example

3. A basketball player makes 45%, or 9 shots, of her attempted shots. How many shots did the basketball player attempt?

   \[
   \frac{9}{w} = \frac{45}{100}
   \]
   
   \( 9 \cdot 100 = w \cdot 45 \)
   
   \( 900 = 45w \)
   
   \( \frac{900}{45} = w \)
   
   \( 20 = w \)

   The basketball player attempted 20 shots.

PRACTICE MAKES PURR-FECT™

Write and solve a proportion to answer the question.

4. 68 is what percent of 80? \( \quad 85\% \)

5. What number is 25% of 116? \( \quad 29 \)

6. 36 is 16% of what number? \( \quad 225 \)

7. 48 is what percent of 128? \( \quad 37.5\% \)

8. What number is 64% of 40? \( \quad 25.6 \)

9. 77 is 55% of what number? \( \quad 140 \)

10. PLAY Students are auditioning for a play. Of the 60 students auditioning, 12 will get a part in the play. What percent of the students who audition will get a part in the play? \( \quad 20\% \)

11. HOMEWORK You have completed 60% of your English homework. The assignment has 25 questions. How many questions are left? \( \quad 10 \)
**REVIEW: Estimating and Finding a Tip**

**Key Concept and Vocabulary**
To find the tip on a food bill at a restaurant, write the percent as a decimal or fraction and multiply it by the cost of the food bill.

---

**Application Examples**

1. Your food bill at a restaurant is $8.49. You leave a 15% tip.
   - **Estimate:** Round 8.49 to 10.
     \[0.15 \times 10 = 1.5\]
   - The estimate for the tip is $1.50.
   - **Actual:** \[0.15 \times 8.49 \approx 1.27\]
   - The actual tip is $1.27.

2. Your food bill at a restaurant is $15.83. You leave a 20% tip.
   - **Estimate:** Round 15.83 to 16.
     \[0.2 \times 16 = 3.2\]
   - The estimate for the tip is $3.20.
   - **Actual:** \[0.2 \times 15.83 \approx 3.17\]
   - The actual tip is $3.17.

---

**PRACTICE MAKES PURR-FECT™**

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

**Estimate the tip. Then find the actual tip.**

3. Food bill: $33.65; Tip: 15% \[\text{Estimated Tip: } 4.50; \text{Actual Tip: } 5.05\]
4. Food bill: $44.28; Tip: 20% \[\text{Estimated Tip: } 9; \text{Actual Tip: } 8.86\]
5. Food bill: $11.17; Tip: 15% \[\text{Estimated Tip: } 1.50; \text{Actual Tip: } 1.68\]
6. Food bill: $12.37; Tip: 20% \[\text{Estimated Tip: } 2; \text{Actual Tip: } 2.47\]
7. Food bill: $23.16; Tip: 15% \[\text{Estimated Tip: } 3; \text{Actual Tip: } 3.47\]
8. Food bill: $16.21; Tip: 20% \[\text{Estimated Tip: } 4; \text{Actual Tip: } 3.24\]
9. Food bill: $37.54; Tip: 25% \[\text{Estimated Tip: } 10; \text{Actual Tip: } 9.39\]
10. Food bill: $25.96; Tip: 20% \[\text{Estimated Tip: } 5; \text{Actual Tip: } 5.19\]
11. Food bill: $28.93; Tip: 15% \[\text{Estimated Tip: } 4.50; \text{Actual Tip: } 4.34\]
12. Food bill: $72.79; Tip: 25% \[\text{Estimated Tip: } 20; \text{Actual Tip: } 18.20\]
13. Food bill: $19.82; Tip: 23% \[\text{Estimated Tip: } 4.60; \text{Actual Tip: } 4.56\]
14. Food bill: $51.56; Tip: 30% \[\text{Estimated Tip: } 15; \text{Actual Tip: } 15.47\]

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**REVIEW: Estimating and Finding a Sales Tax**

**Application Examples**

1. **A DVD costs $20 before tax. The sales tax is 7%.**
   - **Estimate:** Round 7% to 5%.
     \[0.05 \times 20 = 1\]
   - The estimate for the sales tax is $1.
   - **Actual:** \[0.07 \times 20 = 1.4\]
     - The actual sales tax is $1.40.

2. **A bicycle costs $115 before tax. The sales tax is 9%.**
   - **Estimate:** Round 9% to 10% and 115 to 120.
     \[0.1 \times 120 = 12\]
   - The estimate for the sales tax is $12.
   - **Actual:** \[0.09 \times 115 = 10.35\]
     - The actual sales tax is $10.35.

**PRACTICE MAKES PURR-FECT™**

Estimate the sales tax. Then find the actual sales tax.

3. **BASEBALL CARDS** The pack of baseball cards costs $3.75 before tax. The sales tax is 4%.
   \[0.20; \ 0.15\]

4. **TELEVISION** A television costs $400 before tax. The sales tax is 8%.
   \[40; \ 32\]

5. **MP3 PLAYER** An MP3 player costs $89 before tax. The sales tax is 6%.
   \[5; \ 5.34\]

6. **COUCH** A couch costs $675 before tax. The sales tax is 5%.
   \[35; \ 33.75\]

7. **GUITAR** A guitar costs $299 before tax. The sales tax is 9%.
   \[30; \ 26.91\]

8. **TABLE** A table costs $50 before tax. The sales tax is 4.5%.
   \[2.50; \ 2.25\]

9. **JEANS** A pair of jeans costs $39 before tax. The sales tax is 5.5%.
   \[2; \ 2.15\]
### REVIEW: Estimating and Finding a Discount

#### Key Concept and Vocabulary
A discount is a decrease in the original price of an item. To find the discount, write the percent as a decimal or fraction and multiply it by the original price of the item.

#### Application Examples

1. The original price of a book is $18.79. The discount is 20%.
   - **Estimate:** Round 18.79 to 20.
   - \(0.2 \times 20 = 4\)
   - The estimate for the discount is $4.
   - **Actual:** \(0.2 \times 18.79 = 3.76\)
   - The actual discount is $3.76.
   - The sale price of the book is $18.79 - $3.76 = $15.03.

2. The original price of a pair of in-line skates is $209.99. The discount is 15%.
   - **Estimate:** Round 209.99 to 200.
   - \(0.15 \times 200 = 30\)
   - The estimate for the discount is $30.
   - **Actual:** \(0.15 \times 209.99 = 31.50\)
   - The actual discount is $31.50.
   - The sale price of the pair of in-line skates is $209.99 - $31.50 = $178.49.

### PRACTICE MAKES PURR-FECT™

Estimate the discount. Then find the actual discount and the sale price.

<table>
<thead>
<tr>
<th>Item</th>
<th>Original Price</th>
<th>Discount</th>
<th>Sale Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRUMPET</td>
<td>$319.29</td>
<td>25%</td>
<td>$239.47</td>
</tr>
<tr>
<td>SHOES</td>
<td>$47.99</td>
<td>40%</td>
<td>$29.19</td>
</tr>
<tr>
<td>LAMP</td>
<td>$17.09</td>
<td>15%</td>
<td>$14.53</td>
</tr>
<tr>
<td>RING</td>
<td>$96.75</td>
<td>60%</td>
<td>$38.70</td>
</tr>
<tr>
<td>ELECTRONICS</td>
<td>$243.89</td>
<td>75%</td>
<td>$60.97</td>
</tr>
<tr>
<td>BASEBALL</td>
<td>$26.99</td>
<td>30%</td>
<td>$18.89</td>
</tr>
<tr>
<td>SEWING MACHINE</td>
<td>$182.96</td>
<td>20%</td>
<td>$146.37</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Original Price</th>
<th>Discount</th>
<th>Sale Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRUMPET</td>
<td>$319.29</td>
<td>25%</td>
<td>$239.47</td>
</tr>
<tr>
<td>SHOES</td>
<td>$47.99</td>
<td>40%</td>
<td>$29.19</td>
</tr>
<tr>
<td>LAMP</td>
<td>$17.09</td>
<td>15%</td>
<td>$14.53</td>
</tr>
<tr>
<td>RING</td>
<td>$96.75</td>
<td>60%</td>
<td>$38.70</td>
</tr>
<tr>
<td>ELECTRONICS</td>
<td>$243.89</td>
<td>75%</td>
<td>$60.97</td>
</tr>
<tr>
<td>BASEBALL</td>
<td>$26.99</td>
<td>30%</td>
<td>$18.89</td>
</tr>
<tr>
<td>SEWING MACHINE</td>
<td>$182.96</td>
<td>20%</td>
<td>$146.37</td>
</tr>
</tbody>
</table>

The sale price of a $75 necklace with a 60% discount is $75 - $45 = $30.
REVIEW: Simple Interest

Key Concept and Vocabulary

\[ I = Prt \]

\[
\begin{array}{c}
100 = (1000)(0.05)(2)
\end{array}
\]

Skill Examples

1. \( P = \$200, \ r = 0.10, \ t = 4 \text{ years} \)
   \[ I = (200)(0.10)(4) = \$80 \]
2. \( P = \$250, \ r = 0.04, \ t = 0.5 \text{ year} \)
   \[ I = (250)(0.04)(0.5) = \$5 \]
3. \( P = \$2000, \ r = 0.05, \ t = 20 \text{ years} \)
   \[ I = (2000)(0.05)(20) = \$2000 \]

Application Example

4. You deposited \$500 in a savings account for 10 years. The account paid 6% simple interest. How much interest did you earn?
   \[ P = \$500, \ r = 0.06, \ t = 10 \text{ years} \]
   \[ I = (500)(0.06)(10) = \$300 \]
   \[ \therefore \text{ You earned } \$300 \text{ in interest.} \]

PRACTICE MAKES PURR-FECT™

Find the simple interest.

5. Principal: \$400, Rate: 5%, Time: 3 years
   \[ I = \$60 \]

7. Principal: \$1000, Rate: 2%, Time: 4 months
   \[ I = \$6.67 \]

9. Principal: \$500, Rate: 8%, Time: 9 months
   \[ I = \$30 \]

In which savings account do you earn more simple interest?

11. a. Deposit \$200 at 6% for 3 years.
    b. Deposit \$200 at 8% for 18 months.
    a; \$36 > \$24

12. a. Deposit \$1000 at 4% for 5 years.
    b. Deposit \$1000 at 5% for 4 years.
    neither; \$200 = \$200

13. SAVINGS You deposited \$600 in a savings account for 5 years. The account paid 4% simple interest. How much interest did you earn? \$120

14. LOAN You borrowed \$1000 for 2 years. You are charged 5% simple interest. How much interest do you owe? \$100
Operations with Rational Numbers

To add, subtract, multiply, or divide rational numbers, use the same rules for signs as you used for integers.

Example 1  Find (a) $\frac{-5}{6} + \frac{2}{3}$ and (b) $7.3 - (-4.8)$.

a. Write the fractions with the same denominator, then add.

$$\frac{-5}{6} + \frac{2}{3} = \frac{-5 + 4}{6} = \frac{-1}{6} = \frac{-1}{6}$$

b. To subtract a rational number, add its opposite.

$$7.3 - (-4.8) = 7.3 + 4.8 = 12.1$$

The opposite of $-4.8$ is $4.8$.

Example 2  Find (a) $2.25 \times 8$, (b) $-2.25 \times (-8)$, and (c) $-2.25 \times 8$.

a. $2.25 \times 8 = 18$

b. $-2.25 \times (-8) = 18$

c. $-2.25 \times 8 = -18$

Example 3  Find $\frac{-4}{9} + \frac{3}{4}$

To divide by a fraction, multiply by its reciprocal.

$$\frac{-4}{9} + \frac{3}{4} = \frac{-4 \times 4}{9 \times 4} = \frac{-16}{27}$$

The reciprocal of $\frac{3}{4}$ is $\frac{4}{3}$.

Practice

Add, subtract, multiply, or divide.

1. $-7.5 + 3.8 - 3.7$
2. $-18.3 + (-6.7) - 25$
3. $0.6 - 0.85 - 0.25$
4. $6.13 - (-2.82)$

5. $-6 \times 4.75 - 28.5$
6. $-3.2 \times (-4.8)$
7. $-1.8 + (-9)$
8. $3.6 + (-1.5)$

9. $\frac{1}{6} + \frac{5}{6} \times \frac{2}{3}$
10. $-\frac{7}{10} + \left(-\frac{3}{5}\right) - \frac{1}{10}$
11. $\frac{4}{9} - \frac{2}{3} - \frac{2}{9}$
12. $\frac{5}{6} - \frac{1}{4} - \frac{1}{12}$

13. $\frac{3}{2} \times \left(-\frac{1}{8}\right)$
14. $\frac{3}{4} - \frac{7}{12} - \frac{7}{16}$
15. $\frac{5}{8} + \left(-\frac{1}{4}\right) - \frac{3}{2}$
16. $\frac{4}{7} - \frac{2}{5} - \frac{1}{7}$

17. TEMPERATURE  The temperature at midnight is shown. The outside temperature decreases $2.3^\circ$C over the next two hours. What is the outside temperature at 2 A.M.? $-33.2^\circ$C

18. SNOWFALL  In January, a city’s snowfall was $\frac{5}{8}$ foot below the historical average. In February, the snowfall was $\frac{3}{4}$ foot above the historical average. Was the city’s snowfall in the two-month period above or below the historical average? By how much?

above average: $\frac{1}{8}$ foot
**REVIEW: Writing and Graphing Inequalities**

### Key Concept and Vocabulary

- **$x > 2$:** All numbers greater than 2
- **$x \geq 2$:** All numbers greater than or equal to 2
- **$x < 2$:** All numbers less than 2
- **$x \leq 2$:** All numbers less than or equal to 2

### Skill Examples

1. $x > 0$: All positive numbers
2. $x \geq 0$: All nonnegative numbers
3. $x < 0$: All negative numbers
4. $x \leq 0$: All nonpositive numbers

### Application Example

5. A sign at a clothing store reads “Savings up to 70%.” Let $S$ represent the percent of savings. Write an inequality to describe $S$.

   - $S$ can be equal to 70%.
   - Or $S$ can be less than 70%.

   An inequality is $S \leq 70\%$.

### PRACTICE MAKES PURR-FECT™

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

Write an inequality for the statement.

6. All numbers that are less than 24
   
   $\boxed{x < 24}$

8. All numbers greater than 10
   
   $\boxed{x > 10}$

10. All numbers that are at least 11
    
    $\boxed{x \geq 11}$

Graph the inequality.

12. $x > -1$
   
   \[\text{Graph:}\]

14. $x \leq 3$
   
   \[\text{Graph:}\]

16. A sign at a shoe store reads “Savings up to 60%.” Let $P$ represent the percent of savings. Write an inequality to describe $P$.

   $\boxed{P \leq 60\%}$
REVIEW: Properties of Inequality

Key Concept and Vocabulary

Addition Properties of Inequality:
If \( a > b \), then \( a + c > b + c \).
If \( a < b \), then \( a + c < b + c \).

Subtraction Properties of Inequality:
If \( a > b \), then \( a - c > b - c \).
If \( a < b \), then \( a - c < b - c \).

Multiplication and Division Properties of Inequality when \( c > 0 \):
If \( a > b \), then \( a \cdot c > b \cdot c \).
If \( a < b \), then \( a \cdot c < b \cdot c \).
If \( a > b \), then \( \frac{a}{c} > \frac{b}{c} \).
If \( a < b \), then \( \frac{a}{c} < \frac{b}{c} \).

Multiplication and Division Properties of Inequality when \( c < 0 \):
If \( a > b \), then \( a \cdot c < b \cdot c \).
If \( a < b \), then \( a \cdot c > b \cdot c \).
If \( a > b \), then \( \frac{a}{c} < \frac{b}{c} \).
If \( a < b \), then \( \frac{a}{c} > \frac{b}{c} \).

Skill Examples

1. Solve \( \frac{x}{4} + 2 > 12 \).
   
   \[
   \frac{x}{4} + 2 > 12 \quad \text{Write the equation.} \\
   -2 -2 \quad \text{Subtraction Property of Inequality} \\
   \frac{x}{4} > 10 \quad \text{Simplify.} \\
   \frac{x}{4} \cdot 4 > 10 \cdot 4 \quad \text{Multiplication Property of Inequality} \\
   x > 40 \quad \text{Simplify.}
   \]

2. Solve \( -7v - 21 \leq 28 \).
   
   \[
   -7v - 21 \leq 28 \quad \text{Write the equation.} \\
   +21 +21 \quad \text{Addition Property of Inequality} \\
   -7v \leq 49 \quad \text{Simplify.} \\
   \frac{-7v}{-7} \geq \frac{49}{-7} \quad \text{Division Property of Inequality when } c < 0 \\
   v \geq -7 \quad \text{Simplify.}
   \]

PRACTICE MAKES PURR-FECT™

Solve the equation. Identify the properties used.

3. \( 3x - 5 \geq 4 \)
   
   \[
   3x \geq 9 \quad \text{Add. Prop. of Ineq.} \\
   x \geq 3 \quad \text{Div. Prop. of Ineq.}
   \]

4. \( 1 - \frac{m}{2} < 3 \)
   
   \[
   -\frac{m}{2} < 2 \quad \text{Subt. Prop. of Ineq.} \\
   \frac{m}{2} > -4 \quad \text{Mult. Prop. of Ineq.}
   \]

Write and solve an inequality that represents the value of \( x \).

5. Area > 44 ft\(^2\)
   
   \[
   \frac{1}{2} (x + 2)(8) > 44 \quad \frac{x}{2} > 9 \quad x > 9 \text{ feet}
   \]

6. Area \leq 64 m\(^2\)
   
   \[
   16(5 - x) \leq 64 \quad 5 - x \left(\frac{x}{5}\right) \leq 4 \quad x \geq 1 \text{ meter}
   \]
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.

Visual Model

A hat contains 3 tiles with the letters P, R, and O.

**Experiment:** Draw a tile.

**Sample Space:** P R O

**Probabilities:** \(\frac{1}{3}\) \(\frac{1}{3}\) \(\frac{1}{3}\)

**Sum of Probabilities:** \(\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 1\)

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.

\[\begin{align*}
\text{HH} & : \quad \text{HHT} \quad \text{HTH} \quad \text{THH} \\
\text{HT} & : \quad \text{HHT} \quad \text{HTH} \quad \text{THH} \\
\text{TT} & : \quad \text{HHT} \quad \text{HTH} \quad \text{THH}
\end{align*}\]

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

- green, yellow, purple, blue, red

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

- s, a, m, p, l, e

7. Rolling a number cube twice

- 1,1; 1,2; 1,3; 1,4; 1,5; 1,6; 2,1; 2,2; 2,3; 2,4; 2,5; 2,6;
- 3,1; 3,2; 3,3; 3,4; 3,5; 3,6; 4,1; 4,2; 4,3; 4,4; 4,5; 4,6;
- 5,1; 5,2; 5,3; 5,4; 5,5; 5,6; 6,1; 6,2; 6,3; 6,4; 6,5; 6,6

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

- Hs, Ha, Hm, Hp, Hl, He
- Ts, Ta, Tm, Tp, Tl, Te

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.

- 6,8; 6,10; 8,6; 8,10; 10,6; 10,8;

\[
\frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = 1
\]
REVIEW: Tree Diagrams

Key Concept and Vocabulary

Flip a coin 2 times.
4 possible outcomes: HH, HT, TH, TT

Skill Example

1. Draw 2 marbles from a sack containing:

<table>
<thead>
<tr>
<th>GG</th>
<th>GR</th>
<th>GG</th>
<th>GR</th>
<th>RG</th>
<th>RG</th>
</tr>
</thead>
</table>

Application Example

2. You are drawing 2 marbles from a sack that contains \( \heartsuit, \heartsuit, \heartsuit \). In how many ways can you draw 2 green marbles?

There are 2 GG's in the tree diagram.

There are 2 ways to draw 2 green marbles.

PRACTICE MAKES PURR-FECT™

Check your answers at BigIdeasMath.com.

Draw a tree diagram to show all the outcomes.

3. Flip a coin 3 times.

4. Draw 2 marbles from a sack with \( \heartsuit, \heartsuit \).

5. You flip a coin 3 times. In how many ways can you get 2 heads and 1 tail? 3

6. You draw 2 marbles from a sack with \( \heartsuit, \heartsuit \).

In how many ways can you draw 2 green marbles? 6

7. CARDS You draw 2 cards from the hand at the right.

In how many ways can you end up with a sum of 5? (For instance, \( A + 4 = 5 \)).

\( \spadesuit, \spadesuit, \spadesuit, \spadesuit, \spadesuit \)

4; \( A + 4, 2 + 3, 3 + 2, \) and \( 4 + A \)
### REVIEW: Circles and Circumference

**Key Concept and Vocabulary**

\[ C = \pi d \]
\[ C = 2\pi r \]
\[ \pi \approx 3.14 \]
\[ \pi \approx \frac{22}{7} \]

**Skill Examples**

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

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

**Application Example**

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

### PRACTICE MAKES PURR-FECT™

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

4. Circumference \( \approx 14.4 \text{ in.} \)

5. Circumference \( \approx 24,884.5 \text{ mi} \)

6. Circumference \( \approx 9.0 \text{ in.} \)

7. Circumference \( \approx 25.7 \text{ cm} \)

8. Circumference \( \approx 2.6 \text{ in.} \)

9. Circumference \( \approx 7.9 \text{ ft} \)

10. **RACETRACK** A circular racetrack has a circumference of one mile. What is the diameter of the racetrack in feet? **about 1681.5 ft**

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. **no; The circumference of the tree is \( \pi(38) \approx 119.3 > 110. \)**
**REVIEW: Areas of Circles**

**Key Concept and Vocabulary**

![Visual Model](image)  

\[ A = \pi r^2 \]

\[ \pi \approx 3.14 \]

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

**Skill Examples**

1. \[ r = 2.4 \text{ in.} \]
   
   \[ A = \pi (2.4)^2 \]
   
   \[ \approx 18.1 \text{ in.}^2 \]

2. \[ d = \frac{3}{4} \text{ ft} \]
   
   \[ A = \pi \left(\frac{3}{4}\right)^2 \]
   
   \[ \approx 0.4 \text{ ft}^2 \]

**Application Example**

3. Find the area of a dime.

   \[ A = \pi (0.9)^2 \]
   
   \[ \approx 2.5 \text{ cm}^2 \]
   
   The area is about 2.5 square centimeters.

**PRACTICE MAKES PURR-FECT™**

Check your answers at BigIdeasMath.com.

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

4. Area \( \approx 16.6 \text{ in.}^2 \)

5. Area \( \approx 84.9 \text{ in.}^2 \)

6. Area \( \approx 26.0 \text{ in.}^2 \)

7. Area \( \approx 52.8 \text{ cm}^2 \)

8. Area \( \approx 3.5 \text{ ft}^2 \)

9. Area \( \approx 8.0 \text{ ft}^2 \)

10. **BASKETBALL** Find the area of the center circle on a basketball court.  
    
    about 113.0 ft\(^2\)

11. **BASKETBALL** Find the area of a free throw region on a basketball court.  
    
    about 56.5 ft\(^2\)
**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. \[
\begin{align*}
\text{Area} &= \frac{1}{2}(1.6 + 1)(1) \\
&= 1.3 \text{ cm}^2 
\end{align*}
\]

2. \[
\begin{align*}
\text{Area} &= \frac{1}{2}(3.8)(2.4) \\
&= 4.56 \text{ in.}^2 
\end{align*}
\]

**Application Example**

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

**PRACTICE MAKES PURR-FECT™**

Find the area of the figure.

4. \[
\begin{align*}
\text{Area} &= 1500 \text{ ft}^2 
\end{align*}
\]

5. \[
\begin{align*}
\text{Area} &= 71.55 \text{ in.}^2 
\end{align*}
\]

6. \[
\begin{align*}
\text{Area} &= \frac{9}{64} \text{ ft}^2 
\end{align*}
\]

7. \[
\begin{align*}
\text{Area} &= 24.5 \text{ cm}^2 
\end{align*}
\]

8. \[
\begin{align*}
\text{Area} &= 64 \text{ yd}^2 
\end{align*}
\]

9. \[
\begin{align*}
\text{Area} &= \frac{61}{2} \text{ ft}^2 
\end{align*}
\]

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? \$236.25

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.

   \[ \text{greater than; Area} = 280(380) = 106,400 > 100,000 \]
REVIEW: Surface Areas of Prisms

Key Concept and Vocabulary

Surface Area

Skill Example

1. Rectangular Prism

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

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 cm².

PRACTICE MAKES PURR-FECT™

Find the surface area of the prism.

3. Rectangular Prism

\[ S = 130 \text{ ft}^2 \]

4. Rectangular Prism

\[ S = 198 \text{ cm}^2 \]

5. Rectangular Prism

\[ S = 94 \text{ in.}^2 \]

6. Triangular Prism

\[ S = 136 \text{ m}^2 \]

7. Triangular Prism

\[ S = 72 \text{ cm}^2 \]

8. Triangular Prism

\[ S = 57.1 \text{ mm}^2 \]

9. AQUARIUM How much glass is used to make the four sides of the aquarium? 22 ft²

10. AQUARIUM How much glass is used to make the base of the aquarium? 6 ft²
REVIEW: Surface Areas of Cylinders

Key Concept and Vocabulary

\[ S = 2\pi r^2 + 2\pi rh \]

Skill Example

1. Circular Cylinder
   
   \[ S = 2\pi \cdot 3^2 + 2\pi \cdot 3 \cdot 2 \]
   
   \[ = 18\pi + 12\pi \]
   
   \[ = 30\pi \text{ ft}^2 \]

Application Example

2. Find the surface area of the soup can.
   
   \[ S = 2\pi \cdot 1.5^2 + 2\pi \cdot 1.5 \cdot 5 \]
   
   \[ = 4.5\pi + 15\pi \]
   
   \[ = 19.5\pi \text{ in}^2 \]

   \[ \therefore \] The area is \( 19.5\pi \) square inches.

PRACTICE MAKES PURR-FECT™

Find the surface area of the circular cylinder.

3. Circular Cylinder
   
   \[ S = 28\pi \text{ mm}^2 \]

4. Circular Cylinder
   
   \[ S = 156\pi \text{ ft}^2 \]

5. Circular Cylinder
   
   \[ S = 90\pi \text{ cm}^2 \]

6. Circular Cylinder
   
   \[ S = 320\pi \text{ ft}^2 \]

7. Circular Cylinder
   
   \[ S = 104\pi \text{ in}^2 \]

8. Circular Cylinder
   
   \[ S = 126\pi \text{ m}^2 \]

9. OIL TANKER TRUCK

   The truck’s tank is a stainless steel cylinder. How many square feet of stainless steel are needed to make the tank? \( 432\pi \text{ ft}^2 \)

10. OIL TANKER TRUCK

    What percent of the stainless steel in the tank is used to make the two ends? \( \text{about } 7.4\% \)

Length = 50 ft
Radius = 4 ft

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REVIEW: Volumes of Prisms

Key Concept and Vocabulary

**Visual Model**
Volume of a Rectangular Prism

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

**Skill Example**
1. 
   \[
   V = 5 \cdot 2 \cdot 3 \\
   = 30 \text{ ft}^3
   \]

**Application Example**
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.

**PRACTICE MAKES PURR-FECT™**

Find the volume of the prism.

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

4. Rectangular Prism
   \[
   V = 5 \cdot 2 \cdot 3 \\
   = 162 \text{ cm}^3
   \]

5. Rectangular Prism
   \[
   V = 5 \cdot 2 \cdot 3 \\
   = 60 \text{ in}^3
   \]

6. Triangular Prism
   \[
   V = \frac{1}{2} \cdot 6 \cdot 7 \\
   = 84 \text{ m}^3
   \]

7. Triangular Prism
   \[
   V = \frac{1}{2} \cdot 6 \cdot 7 \\
   = 36 \text{ cm}^3
   \]

8. Triangular Prism
   \[
   V = \frac{1}{2} \cdot 6 \cdot 7 \\
   = 24 \text{ mm}^3
   \]

9. **AQUARIUM** How much water is needed to fill the aquarium? ________ 12 ft³

10. **AQUARIUM** There are about 7.5 gallons in 1 cubic foot. How many gallons of water does the aquarium hold? ________ 90 gal

Check your answers at BigIdeasMath.com.

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**REVIEW: Volumes of Pyramids**

**Key Concept and Vocabulary**

\[ V = \frac{1}{3} Bh \]

**Skill Example**

1. Find the volume of the pyramid.

\[ V = \frac{1}{3} Bh \]
\[ = \frac{1}{3} \cdot (8 \cdot 10) \cdot 7 \]
\[ = \frac{560}{3} \]
\[ = 186 \frac{2}{3} \text{ in}^3 \]

**Application Example**

2. Find the volume of the square pyramid.

\[ V = \frac{1}{3} \cdot (40^2) \cdot 30 \]
\[ = 16,000 \text{ m}^3 \]

\[ \therefore \text{ The volume is } 16,000 \text{ cubic meters.} \]

**PRACTICE MAKES PURRR-FECT™**

Find the volume of the pyramid.

3. \[ V = \frac{1}{3} \text{ ft}^3 \]

4. \[ V = 20 \text{ mm}^3 \]

5. \[ V = 80 \text{ in}^3 \]

6. \[ V = 10 \text{ cm}^3 \]

7. \[ V = 112 \text{ ft}^3 \]

8. \[ V = 700 \text{ mm}^3 \]

9. **PYRAMID** The pyramid has a volume of 2000 cubic feet. Find a set of possible dimensions for the pyramid.

   \[ w = 5 \text{ ft, } \ell = 40 \text{ ft, } h = 30 \text{ ft} \]
REVIEW: Evaluating Expressions

Key Concept and Vocabulary

Expression: \(2x^2 + 3x - 6\)
Evaluate when \(x = 2\).
\[2(2^2) + 3(2) - 6 = 8 + 6 - 6 = 8\]

Skill Examples
1. When \(x = 5\), \(3x + 4\) is \(3(5) + 4 = 19\).
2. When \(x = -1\), \(5x + 7\) is \(5(-1) + 7 = 2\).
3. When \(x = 3\), \(4x^2\) is \(4(3^2) = 36\).
4. When \(x = 4\), \(x^3 + 1\) is \(4^3 + 1 = 65\).

Application Example
5. For a Celsius temperature \(C\) the Fahrenheit temperature \(F\) is \(\frac{9}{5}C + 32\). Find \(F\) when \(C = 25\°\).
\[
\frac{9}{5}C + 32 = \frac{9}{5}(25) + 32
= 45 + 32
= 77
\]
\[
\text{The Fahrenheit temperature is 77°.}
\]

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Evaluate the expression.
6. When \(x = 2\), \(3x - 1\) = \(\underline{5}\).
7. When \(x = -1\), \(3x + 9\) = \(\underline{6}\).
8. When \(x = 4\), \(x^2 - 5\) = \(\underline{11}\).
9. When \(x = \frac{1}{2}\), \(3x^2\) = \(\underline{\frac{3}{4}}\).
10. When \(x = 3.1\), \(5x + 0.5\) = \(\underline{16}\).
11. When \(x = 0\), \(4x^2 + 5\) = \(\underline{5}\).
12. When \(x = 10\), \(x^2 - 8x + 11\) = \(\underline{31}\).

Evaluate the perimeter when \(x = 3\).
14. \(P = \underline{14}\)
15. \(P = \underline{17}\)

16. CARDINAL The weight of the cardinal (in ounces) is \(0.6x + 11\) after its eats \(x\) ounces of bird seed. How much does it weigh after it eats 2 ounces of bird seed? \(\underline{12.2\ oz}\)
REVIEW: Simplifying Expressions

Key Concept and Vocabulary

**Combine variable terms.**

\[ 2x + 4 + 3x - 1 = 5x + 3 \]

**Combine numerical terms.**

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.
   \[ x - 0.3x = 0.7x \]

\[ \therefore \] The sale cost is 0.7\( x \).

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**Simplify the expression.** (Remove parentheses and combine like terms.)

6. \( 4x + 6x = \underline{10x} \)
7. \( 3n + 5 - 2n = \underline{n + 5} \)
8. \( 9x + 3 - 6x - 2 = \underline{3x + 1} \)
9. \( 3(x + 2) = \underline{3x + 6} \)
10. \( 7m - 2m + 5m = \underline{10m} \)
11. \( 2 - (x + 1) = \underline{1 - x} \)
12. \( (3x + 6) - x = \underline{2x + 6} \)
13. \( 5 - (1 - n) = \underline{n + 4} \)
14. \( (x + 6) - (x + 6) = \underline{0} \)
15. \( (4x - 2) + 3(x + 1) = \underline{7x + 1} \)
16. \( (5x + 4) - 2(x + 1) = \underline{3x + 2} \)

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


\[ \text{Perimeter } = 30x \]
\[ \text{Perimeter } = 28n \]
\[ \text{Perimeter } = 57x \]

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. \( 0.65x \)
REVIEW: Writing Expressions and Equations

Key Concept and Vocabulary

Phrase: Two more than a number
Expression: $2 + n$
Sentence: Two more than a number is equal to six.
Equation: $2 + n = 6$

Skill Examples
1. Five times a number: $5n$
2. Six less than three times a number: $3n - 6$
3. The sum of a number and one: $n + 1$
4. A number divided by three: $n/3$

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Write the verbal phrase as a mathematical expression.

6. The product of a number and two  
   $2n$

8. 19 less than twice a number  
   $2n - 19$

10. Five times the sum of a number and two  
    $5(n + 2)$

Write the sentence as an equation.

12. Three times a number equals nine.  
    $3n = 9$

14. Twelve divided by a number is four.  
    $\frac{12}{n} = 4$

16. The volume of a cone is one-third the area of the base times the height. A cone has a volume of $20\pi$ cubic inches. Write an equation that can be used to solve for the height of the cone.  
   \[ 20\pi = \frac{1}{3} \cdot 4\pi \cdot h \]

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Visual Model

Application Example

5. Write an equation for the following.  
   “The price of $15 is the wholesale cost plus a markup of fifty percent.”

Let $C$ be the wholesale cost.
50% of $C$ is $0.5C$.

\[
\therefore \text{An equation is } 15 = C + 0.5C.
\]

Check your answers at BigIdeasMath.com.

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REVIEW: Properties of Equality

**Key Concept and Vocabulary**

**Addition Property of Equality:**
If \( a = b \), then \( a + c = b + c \).

**Subtraction Property of Equality:**
If \( a = b \), then \( a - c = b - c \).

**Multiplication Property of Equality:**
If \( a = b \), then \( a \cdot c = b \cdot c \).

**Division Property of Equality:**
If \( a = b \), then \( a \div c = b \div c \), \( c \neq 0 \).

---

**Skill Example**

1. Solve \( \frac{x}{4} - 3 = 7 \).

\[
\frac{x}{4} - 3 = 7 \\
+3 +3 \\
\frac{x}{4} = 10 \\
\frac{x \cdot 4}{4} = 10 \cdot 4 \\
x = 40
\]

**Application Example**

2. Ski rental is $45 for 3 hours and $10 for each additional hour. You pay $75. Write and solve an equation to find the number of additional hours you rented the skis.

\[
10h + 45 = 75 \\
-45 -45 \\
10h = 30 \\
\frac{10h}{10} = \frac{30}{10} \\
h = 3
\]

You rented the skis for 3 additional hours.

---

**PRACTICE MAKES PURR-FECT™**

Solve the equation. Identify the properties used.

3. \( 2y + 9 = 13 \)

\[
2y = \frac{4}{2} \quad \text{Subt. Prop. of Eq.} \\
y = \frac{2}{2} \quad \text{Div. Prop. of Eq.}
\]

4. \( \frac{n}{4} - 2 = 10 \)

\[
\frac{n}{4} = \frac{12}{4} \quad \text{Add. Prop. of Eq.} \\
n = \frac{48}{4} \quad \text{Mult. Prop. of Eq.}
\]

5. **COMPUTER** You pay $87 to get your computer repaired. You are charged $37 for parts and $20 per hour of labor. Write and solve an equation to find the number of labor hours you were charged.

\[
20h + 37 = 87; h = 2.5 \text{ hours}
\]
Solving Linear Equations

To determine whether a value is a solution of an equation, substitute the value into the equation and simplify.

Example 1  Determine whether (a) \( x = 1 \) or (b) \( x = -2 \) is a solution of \( 5x - 1 = 4 \).

a.  \( 5x - 1 = -2x + 6 \)

\[
5(1) - 1 = -2(1) + 6 \quad \text{Substitute.}
\]
\[
4 = 4 \quad \checkmark \quad \text{Simplify.}
\]

\( \blacktriangledown \) So, \( x = 1 \) is a solution.

b.  \( 5x - 1 = -2x + 6 \)

\[
5(-2) - 1 = -2(-2) + 6 \quad \text{Substitute.}
\]
\[
-11 \neq 10 \quad \times \quad \text{Simplify.}
\]

\( \blacktriangledown \) So, \( x = -2 \) is not a solution.

To solve a linear equation, isolate the variable.

Example 2  Solve each equation. Check your solution.

a.  \( 4x - 3 = 13 \)

\[
4x - 3 + 3 = 13 + 3 \quad \text{Add 3.}
\]
\[
4x = 16 \quad \text{Simplify.}
\]
\[
4x = 16 \quad \text{Divide by 4.}
\]
\[
\frac{4x}{4} = \frac{16}{4} \quad \text{Simplify.}
\]
\[
x = 4
\]

Check
\[
4x - 3 = 13
\]
\[
4(4) - 3 = \frac{7}{2}
\]
\[
13 = 13 \quad \checkmark
\]

b.  \( 2(y - 8) = y + 6 \)

\[
2(y - 8) = y + 6 \quad \text{Distributive Property}
\]
\[
2y - 16 = y + 6 \quad \text{Subtract y.}
\]
\[
y - 16 = 6 \quad \text{Simplify.}
\]
\[
y - 16 + 16 = 6 + 16 \quad \text{Add 16.}
\]
\[
y = 22 \quad \text{Simplify.}
\]

Check
\[
2(y - 8) = y + 6
\]
\[
2(22 - 8) = \frac{2}{22} + 6
\]
\[
28 = 28 \quad \checkmark
\]

Practice

Determine whether (a) \( x = -1 \) or (b) \( x = 3 \) is a solution of the equation.

1.  \( 5x + 7 = 2 \)  (a) yes (b) no
2.  \( -4x + 8 = -4 \)  (a) no (b) yes
3.  \( 2x - 1 = 3x - 4 \)  (a) no (b) yes

Solve the equation. Check your solution.

4.  \( x - 9 = 24 \quad x = 33 \)
5.  \( n + 14 = 0 \quad n = -14 \)
6.  \( -16 = 4y \quad y = -4 \)
7.  \( \frac{-5}{6}t = -15 \quad t = 18 \)
8.  \( 81 = 46 - x \quad x = -35 \)
9.  \( 4x + 5 = 1 \quad x = -1 \)
10. \( x + 5 = 11x \quad x = \frac{1}{2} \)
11. \( 9(y - 3) = 45 \quad y = 8 \)
12. \( 6 = 7k + 8 - k \quad k = -\frac{1}{3} \)
13. \( 6n + 3 = -4n + 7 \quad n = \frac{2}{5} \)
14. \( 2c + 5 = 3(c - 8) \quad c = 29 \)
15. \( 18m + 3(2m + 8) = 0 \quad m = -1 \)
16. \( \frac{w - 6}{5} = 8 \quad w = 46 \)
17. \( \frac{15 + h}{3} = 10 \quad h = 15 \)
18. \( \frac{8 - 3x}{5} = x \quad x = -1 \)
19. \( (8r + 6) + (4r - 1) = 14 \quad r = \frac{3}{4} \)
20. \( \frac{3y}{2} - 3 = 9 \quad y = 18 \)
21. \( \frac{1}{2}x - \frac{3}{10} = \frac{3}{2}x + \frac{7}{10} \quad x = -\frac{1}{2} \)

22. MONEY  You have a total of $3.25 in change made up of 25 pennies, 6 nickels, 2 dimes, and \( x \) quarters. How many quarters do you have? 10