Study Guide Review

Vocabulary Development

Integrating the ELPS
Encourage English learners to refer to their notes and the illustrated, bilingual glossary as they review the unit content.

c.4.E  Read linguistically accommodated content area material with a decreasing need for linguistic accommodations as more English is learned.

MODULE 1  Rational Numbers

7.2, 7.3.A, 7.3.B

Key Concepts
• A number that can be written as a terminating decimal or a repeating decimal is a rational number. (Lesson 1.1)
• A subset is a set of numbers contained in a larger set. (Lesson 1.2)
• To subtract a number, add its opposite. (Lesson 1.4)
• The product of two numbers with different signs is negative. The product of two numbers with the same signs is positive. (Lesson 1.5)
• The quotient of two numbers with different signs is negative. The quotient of two numbers with the same signs is positive. (Lesson 1.6)
EXAMPLE 1
Eddie walked $1\ 2_3$ miles on a hiking trail. Write $1\ 2_3$ as a decimal.

Use the decimal to classify $1\ 2_3$ by naming the set or sets to which it belongs.

A. Find each sum or difference.

EXAMPLE 2

Find each product or quotient.

EXAMPLE 3

Find the product: $3\left(-\frac{1}{6}\right)$

The quotient is negative because the signs are different.

EXERCISES

Write each mixed number as a whole number or decimal. Classify each number by naming the set or sets to which it belongs: rational numbers, integers, or whole numbers. (Lessons 1.1, 1.2) 4; whole number, integer, or whole number.

1. $\frac{1}{4}$, rational number
2. $\frac{8}{2}$, rational number
3. $\frac{11}{3}$, rational number
4. $\frac{25}{3}$, rational number

Find each sum or difference. (Lessons 1.3, 1.4)

5. $-5 + 9.5, 4.5$
6. $\frac{5}{12} + (-\frac{1}{8}) = -\frac{2}{3}$
7. $-0.5 + (-8.5) = -9$
8. $-3 - (-8) = 5$
9. $5.6 - (-3.1) = 8.7$
10. $3\frac{1}{2} - 2\frac{1}{8} = 1\frac{1}{4}$

Find each product or quotient. (Lessons 1.5, 1.6)

11. $-9 \times (-5) = 45$
12. $0 \times (-7) = 0$
13. $-8 \times 8 = -64$
14. $\frac{56}{8} = -7$
15. $-\frac{130}{-5} = 26$
16. $\frac{345}{15} = 23$
17. $-\frac{21}{4} \div \left(-\frac{7}{6}\right) = -\frac{3}{2}$
18. $\left\{\frac{1}{3}\right\} \div \left(-\frac{1}{2}\right) = -\frac{2}{3}$
19. Lei withdrew $50 from her bank account every day for a week. What was the change in her account in that week?

$-50 \times 7 = -350; -$350

20. In 5 minutes, a seal descended 24 feet. What was the average rate of change in the seal's elevation per minute?

$\frac{-24}{5} = -4.8; -4.8$ feet per minute
Study Guide Review

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ELPS c.4.F Use visual and contextual support . . . to read grade-appropriate content area text . . . and develop vocabulary . . . to comprehend increasingly challenging language.

MODULE 2 Rates and Proportionality

Key Concepts
- A rate is a comparison of two quantities with different units. A unit rate is a rate with a denominator of 1 unit. (Lesson 2.1)
- Two quantities, x and y, have a proportional relationship in which the constant ratio is k if you can describe the relationship using the equation \( \frac{y}{x} = k \). (Lesson 2.2)
- A graph represents a proportional relationship if it is a line that goes through the origin. (Lesson 2.3)

MODULE 3 Proportions and Percent

Key Concepts
- A conversion factor, or a ratio of two equivalent measurements, can be used to convert measurements from one system of measurement to another. (Lesson 3.1)
- To find a percent of change, subtract the greater value from the lesser value and divide the answer by the original value. (Lesson 3.2)
- A percent increase is also known as a markup, and a percent decrease is also known as a markdown. (Lesson 3.3)
**UNIT 2** Ratios and Proportional Relationships

**Study Guide Review**

**MODULE 4 Proportionality in Geometry**

**TEKS** 7.5.A, 7.5.B, 7.5.C

**Key Concepts**

- Similar polygons are identified by verifying that all corresponding angles are congruent and all corresponding side lengths are proportional. *(Lesson 4.1)*
- Indirect measurement is a method of using proportions to find an unknown length or distance in similar figures. *(Lesson 4.2)*
- In a scale drawing, the dimensions of an object are related to the dimensions of the actual object by a ratio called the scale factor. *(Lesson 4.3)*
UNIT 2 Study Guide Review

MODULE 2 Rates and Proportionality

ESSENTIAL QUESTION How can you use rates and proportionality to solve real-world problems?

EXAMPLE 1 A store sells onions by the pound. Is the relationship between the cost of an amount of onions and the number of pounds proportional? If so, write an equation for the relationship, and represent the relationship on a graph.

<table>
<thead>
<tr>
<th>Number of pounds</th>
<th>2</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost ($)</td>
<td>3.00</td>
<td>7.50</td>
<td>9.00</td>
</tr>
</tbody>
</table>

Write the rates.

\[
\text{cost} = \frac{\text{number of pounds}}{\text{1 pound}}
\]

\[
\begin{align*}
\text{2 pounds} & : \text{1 pound} \\
\text{2.5 pounds} & : \text{1 pound} \\
\text{6 pounds} & : \text{1 pound}
\end{align*}
\]

The rates are constant, so the relationship is proportional.

The constant rate of change is \$1.50 per pound, so the constant of proportionality is 1.5. Let \(x\) represent the number of pounds and \(y\) represent the cost.

The equation for the relationship is \(y = 1.5x\).

Plot the ordered pairs (pounds, cost): (2, 3), (5, 7.5), and (6, 9).

Connect the points with a line.

EXERCISES

1. Steve uses \(\frac{5}{2}\) gallon of paint to paint 4 identical birdhouses. How many gallons of paint does he use for each birdhouse? (Lesson 2.1)

2. Ron walks 0.5 mile on the track in 10 minutes. Stevie walks 0.25 mile on the track in 6 minutes. Find the unit rate for each walker in miles per hour. Who is the faster walker? (Lesson 2.1)

Example 2

EXAMPLE 2 Donata had a 25-minute commute from home to work. Her company moved, and now her commute to work is 33 minutes long. Does this situation represent an increase or a decrease? Find the percent increase or decrease in her commute to work.

This situation represents an increase. Find the percent increase.

\[
\text{percent increase} = \frac{\text{amount of change}}{\text{original amount}}
\]

\[
\begin{align*}
\text{Donata's commute increased by} & \quad \frac{8}{25} = 32\% \\
\end{align*}
\]

Donata's commute increased by 32%.

MODULE 3 Proportions and Percent

ESSENTIAL QUESTION How can you use proportions and percent to solve real-world problems?

EXAMPLE 1 June's garden is in the shape of a rectangle with a width of 20 yards and a length of 40 yards. She plans to fence it in, using fencing that costs $30 per meter. What will be the total cost of the fencing?

Convert each measurement to meters. Use 1 yard \(\approx 0.9144\) meter.

\[
\begin{align*}
\text{Length} & : 1 \text{ yard} \approx 0.9144 \text{ meter} \\
\text{Width} & : 1 \text{ yard} = 0.9144 \text{ meter} \\
\end{align*}
\]

Find the perimeter \(P = 2l + 2w = 2(36.56) + 2(18.28) = 109.68\) meters

The total cost of the fencing is $30(109.68) \approx $3,290.40.

EXAMPLE 2 The table below shows the proportional relationship between Juan’s pay and the hours he works. Complete the table. Plot the data and connect the points with a line. (Lessons 2.2, 2.3)

<table>
<thead>
<tr>
<th>Hours worked</th>
<th>2</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pay ($)</td>
<td>40</td>
<td>80</td>
<td>100</td>
<td>120</td>
</tr>
</tbody>
</table>

Key Vocabulary
- complex fraction
- constant of proportionality
- proportion (proporción)
- proportional relationship
- rate of change
- unit rate
- conversion factor
- percent decrease
- percent increase
- percent decrease (disminución)
- percent increase (aumento)
- simple interest
- principal
- simple interest (interés simple)
EXERCISES

Convert each measurement. (Lesson 3.1)

1. 7 centimeters \(\approx\) \(\frac{2.76}{\text{inches}}\)
2. 10,000 centimeters \(\approx\) \(\frac{6.21}{\text{miles}}\)
3. 24 kilometers \(\approx\) \(\frac{14.91}{\text{miles}}\)
4. 12 quarts \(\approx\) \(\frac{11.35}{\text{liters}}\)
5. Michelle purchased 25 audio files in January. In February she purchased 40 audio files. Find the percent increase. (Lesson 3.2) \(60\%\) increase
6. Sam’s dog weighs 72 pounds. The vet suggests that for the dog’s health, its weight should decrease by 12.5 percent. According to the vet, what is a healthy weight for the dog? (Lesson 3.2) \(63\) pounds
7. The original price of a barbecue grill is \$795.00. The grill is marked down 15%. What is the sale price of the grill? (Lesson 3.3) \$67.58
8. A sporting goods store marks up the cost of soccer balls by 250%. Write an expression that represents the retail cost of the soccer balls. The store buys soccer balls for \$5.00 each. What is the retail price of the soccer balls? (Lesson 3.5) \(3.5\) s; \$17.50

Proportionality in Geometry

How can you use proportionality in geometry to solve real-world problems?

EXAMPLE 1

\(\triangle NOP \sim \triangle QRS\). Find the unknown measures.

A. Find the unknown side \(x\).

Write a proportion using corresponding sides \(NO\) and \(QR\), \(NP\) and \(QS\).

\[
\frac{NO}{QR} = \frac{NP}{QS}
\]

Substitute the known lengths of the sides.

\[
\frac{8}{14} = \frac{x}{7}
\]

Simplify \(\frac{4}{7}\) to find a factor of 14.

\(x = 7\) cm

B. Find the unknown angle measure \(y\).

\(y = 35^\circ\) \(\angle S\) and \(\angle P\) are corresponding angles.

EXERCISES

Use the scale drawing to find the perimeter of Tim’s yard.

\(2\) cm : \(15\) ft
\(1\) cm : \(12\) ft
\(2\) cm : \(14\) ft
\(1\) cm : \(9\) ft

Perimeter is twice the sum of the length and the width. So the perimeter of Tim’s yard is \(2(10\frac{2}{3}) = 2(13\frac{1}{3})\) or 266 ft.

EXERCISES

Determine if the shapes are similar. (Lesson 4.1)

1. Are the four-sided shapes similar? Explain.

No; Corresponding angles do not have the same measures.

Also, corresponding sides are not proportional. For example, angles \(N\) and \(R\) do not have the same measure, and

\[
\frac{MN}{QR} \neq \frac{\frac{2}{3}}{\frac{1}{2}} \text{ or } \frac{\frac{3}{4}}{\frac{2}{3}} \text{ but } \frac{JO}{OA} = \frac{4}{6} = \frac{2}{3}.
\]

2. \(\triangle NZ \sim \triangle KOA\). Find the unknown measures. (Lesson 4.2)

\[
\begin{align*}
x &= 8.5 \\
y &= 17 \\
r &= 28^\circ \\
s &= 62^\circ \\
\end{align*}
\]
3. In the scale drawing of a park, the scale is 1 cm: 10 m. Find the area of the actual park.
   (Lesson 4.3) 450 m²

4. The circumference of the larger circle is 15.7 yards. Find the circumference of the smaller circle.
   (Lesson 4.4) 12.56 yd
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**MODULE 5 Experimental Probability**

Key Concepts
- The probability of an event, or \[\frac{\text{number of favorable outcomes}}{\text{total number of possible outcomes}}\], measures the likelihood that the event will occur. *(Lesson 5.1)*
- The probability of an event can be from 0 to 1, inclusive. *(Lesson 5.1)*
- The experimental probability of an event can be found by comparing the number of times an event occurs to the total number of trials. *(Lesson 5.2)*
- A compound event is an event that includes two or more simple events. *(Lesson 5.3)*

**MODULE 6 Experimental Probability**

Key Concepts
- Theoretical probability is the probability that an event occurs when all the outcomes of the experiment are equally likely. *(Lesson 6.1)*
- To find the theoretical probability, compare the number of ways the event can occur by the total number of equally likely outcomes. *(Lesson 6.1)*
- The event with the higher probability, experimental or theoretical, is more likely to occur. *(Lesson 6.3)*
**ESSENTIAL QUESTION**

How can you use experimental probability to solve real-world problems?

**EXAMPLE 1**

What is the probability of picking a red marble from a jar with 5 green marbles and 2 red marbles?

\[
P(\text{picking a red marble}) = \frac{\text{number of red marbles}}{\text{total number of marbles}} = \frac{2}{7}
\]

The total number of marbles is 7.

**EXERCISES**

Find the probability of each event. (Lesson 5.1)

1. Rolling a 5 on a fair number cube.
   
   \[
P = \frac{1}{6}
\]

2. Picking a 7 from a standard deck of 52 cards. A standard deck includes 4 cards of each number from 1 to 13.
   
   \[
P = \frac{4}{52} = \frac{1}{13}
\]

3. Picking a blue marble from a bag of 4 red marbles, 6 blue marbles, and 1 white marble.
   
   \[
P = \frac{6}{11}
\]

4. Rolling a number greater than 7 on a 12-sided number cube.
   
   \[
P = \frac{5}{12}
\]

**EXAMPLE 2**

For one month, a doctor recorded information about new patients as shown in the table.

<table>
<thead>
<tr>
<th></th>
<th>Senior</th>
<th>Adult</th>
<th>Young</th>
<th>Child</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>5</td>
<td>8</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>Male</td>
<td>3</td>
<td>10</td>
<td>1</td>
<td>17</td>
</tr>
</tbody>
</table>

What is the experimental probability that his next new patient is a female adult?

\[
P(\text{new patient is a female adult}) = \frac{\text{number of female adults}}{\text{total number of patients}} = \frac{8}{60} = \frac{2}{15}
\]

What is the experimental probability that his next new patient is a child?

\[
P(\text{new patient is a child}) = \frac{\text{number of children}}{\text{total number of patients}} = \frac{31}{60}
\]

**MODULE 6**

**ESSENTIAL QUESTION**

How can you use theoretical probability to solve real-world problems?

**EXAMPLE 1**

A. Lola rolls two fair number cubes. What is the probability that the two numbers Lola rolls include at least one 4 and have a product of 16 or more?umper.

There are 5 pairs of numbers that include 4 and have a product of at least 16:

(4, 4), (4, 5), (4, 6), (5, 4), (6, 4)

Find the probability.

\[
P = \frac{\text{number of possible ways}}{\text{total number of possible outcomes}} = \frac{5}{36}
\]

B. Suppose Lola rolls the two number cubes 180 times. Predict how many times she will roll two numbers that include a pair of numbers like the ones described above.

One way to answer is to write and solve an equation.

\[
\frac{5}{36} \times 180 = x
\]

Multiply the probability by the total number of rolls.

\[
25 = x
\]

Solve for x.

Lola can expect to roll two numbers that include at least one 4 and have a product of 16 or more about 25 times.
EXAMPLE 2

A store has a sale bin of soup cans. There are 6 cans of chicken noodle soup, 8 cans of split pea soup, 8 cans of minestrone, and 13 cans of vegetable soup. Find the probability of picking each type of soup at random. Then predict what kind of soup a customer is most likely to pick.

\[ P(\text{chicken noodle}) = \frac{6}{35} \quad P(\text{split pea}) = \frac{8}{35} \quad P(\text{minestrone}) = \frac{8}{35} \quad P(\text{vegetable}) = \frac{13}{35} \]

The customer is most likely to pick vegetable soup. That is the event that has the greatest probability.

EXERCISES

Find the probability of each event. (Lessons 6.1, 6.2)

1. Graciela picks a white mouse at random from a bin of 8 white mice, 2 gray mice, and 2 brown mice.
   \[ P = \frac{4}{12} = \frac{2}{3} \]

2. Theo spins a spinner that has 12 equal sections marked 1 through 12. It does not land on 1.
   \[ P = \frac{11}{12} \]

3. Tania flips a coin three times. The coin lands on heads twice and on tails once, not necessarily in that order.
   \[ P = \frac{3}{8} \]

4. Students are randomly assigned two-digit codes. Each digit is either 1, 2, 3, or 4. Guy is given the number 11.
   \[ P = \frac{1}{16} \]

5. Patty tosses a coin and rolls a number cube. (Lesson 6.3)
   a. Find the probability that the coin lands on heads and the cube lands on an even number.
      \[ P = \frac{1}{4} \]
   b. Patty tosses the coin and rolls the number cube 60 times. Predict how many times the coin will land on heads and the cube will land on an even number.
      \[ 15 \text{ times} \]

6. Rajan’s school is having a raffle. The school sold raffle tickets with 3-digit numbers. Each digit is either 1, 2, or 3. The school also sold 2 tickets with the number 000. Which number is more likely to be picked, 123 or 000? (Lesson 6.5)
   \[ 000 \]

7. Suppose you know that over the last 10 years, the probability that your town would have at least one major storm was 40%. Describe a simulation that you could use to find the experimental probability that your town will have at least one major storm in at least 3 of the next 5 years. (Lesson 6.4)
   Sample answer: Use whole numbers from 1 to 5. Let 1 and 2 represent a year with a major storm and 3, 4, and 5 represent a year without a major storm. Perform 10 trials by randomly generating 10 sets of 5 numbers. Count the sets that model 3 or more storms and divide by 10.
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**MODULE 7 Linear Relationships**

**TEKS** 7.7

**Key Concepts**
- In a linear relationship, as one quantity changes by a constant amount, the other quantity also changes by a constant amount. *(Lesson 7.1)*
- One way to describe a linear relationship is to write an equation in the form of $y = mx + b$, where $m$ is the rate of change and $b$ is the value of $y$ when $x$ is 0. *(Lesson 7.2)*

**MODULE 8 Equations and Inequalities**


**Key Concepts**
- To solve a two-step equation or inequality, use inverse operations. *(Lessons 8.1, 8.3)*
- Use substitution to check if a given value is a solution of an equation or inequality. *(Lessons 8.2, 8.4)*
**Essential Question**
How can you use linear relationships to solve real-world problems?

**Example**
Ross earns a set rate of $10 for babysitting, plus $6 per hour. Represent the relationship using a table, an equation, and a graph of the linear relationship.

<table>
<thead>
<tr>
<th>Hours</th>
<th>Amount ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$10</td>
</tr>
<tr>
<td>1</td>
<td>$16</td>
</tr>
<tr>
<td>2</td>
<td>$22</td>
</tr>
<tr>
<td>3</td>
<td>$28</td>
</tr>
<tr>
<td>4</td>
<td>$34</td>
</tr>
</tbody>
</table>

Write an equation for the amount $y$ in dollars earned for $x$ hours.

$y = 10 + 6x$

**Exercises**

1. The cost of a box of cupcakes is $1.50 per cupcake plus $3. Complete the table to represent the linear relationship. (Lesson 7.1)

<table>
<thead>
<tr>
<th>Number of cupcakes</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of cupcakes ($)</td>
<td>$4.50</td>
<td>$6.00</td>
<td>$7.50</td>
<td>$9.00</td>
</tr>
</tbody>
</table>

2. The score a student receives on a standardized test based on the number of correct answer is shown in the table. Use the table to give a verbal description of the relationship between correct answers and score. (Lesson 7.1)

<table>
<thead>
<tr>
<th>Correct answers</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td>210</td>
<td>220</td>
<td>230</td>
<td>240</td>
<td>250</td>
</tr>
</tbody>
</table>

A student’s score is 200 plus 2 points per correct answer.

**Module 8**

**Essential Question**
How can you use equations and inequalities to solve real-world problems?

**Example 1**
A clothing store sells clothing for 2 times the wholesale cost plus $10. The store sells a pair of pants for $48. How much did the store pay for the pants? Represent the solution on a number line.

Let $w$ represent the wholesale cost of the pants, or the price paid by the store.

$2w + 10 = 48$  
$2w = 38$  
$w = 19$

The store paid $19 for the pants.

**Example 2**
Determine which, if any, of these values makes the inequality $-7x + 42 \leq 28$ true: $x = -1, x = 2, x = 5$.

Substitute each value for $x$ in the inequality and evaluate the expression to see if a true inequality results.

$-7(-1) + 42 \leq 28$  
$-7(2) + 42 \leq 28$  
$-7(5) + 42 \leq 28$

$x = 2$ and $x = 5$
EXERCISES

1. The cost of a ticket to an amusement park is $42 per person. For groups of up to 8 people, the cost per ticket decreases by $3 for each person in the group. Marcos's ticket cost $30. Write and solve an equation to find the number of people in Marcos's group. 
   \[(\text{Lessons } 8.1, 8.2)\]
   \[42 - 3n = 30; n = 4\]

Solve each equation. Graph the solution on a number line. 
   \[(\text{Lesson } 8.2)\]

2. \[8x - 28 = 44\]
   \[x = 9\]

3. \[-5z + 4 = 34\]
   \[z = -6\]

4. Prudie needs $90 or more to be able to take her family out to dinner. She has already saved $30 and wants to take her family out to eat in 4 days. \[(\text{Lesson } 8.3)\]
   \[a. \text{ Suppose that Prudie earns the same each day. Write an inequality to find how much she needs to earn each day.} \]
   \[30 + 4x \geq 90\]
   \[b. \text{ Suppose that Prudie earns }$18\text{ each day. Will she have enough money to take her family to dinner in 4 days? Explain.} \]
   \[\text{Yes, } x = 18 \text{ is a solution of the inequality.}\]

Solve each inequality. Graph and check the solution. \[(\text{Lesson } 8.4)\]

5. \[15 + 5y > 45\]
   \[y > 6\]

6. \[7x - 2 \leq 61\]
   \[x \leq 9\]
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\textbf{MODULE 9 Applications of Geometry Concepts}

\textbf{Key Concepts}

\begin{itemize}
  \item The sum of the measures of a pair of complementary angles is 90°, and the sum of the measures of a pair of supplementary angles is 180°. \textit{(Lesson 9.1)}
  \item Vertical angles are the opposite angles formed by two intersecting lines which are congruent. \textit{(Lesson 9.1)}
  \item To find the circumference of a circle, or the distance around the circle, use the formula \(C = \pi d\) or \(C = 2\pi r\). \textit{(Lesson 9.2)}
  \item To find the area of a circle, use the formula \(A = \pi r^2\). \textit{(Lesson 9.3)}
\end{itemize}

\textbf{MODULE 10 Volume and Surface Area}

\textbf{Key Concepts}

\begin{itemize}
  \item To find the volume of a prism, use the formula \(V = Bh\), where \(B\) is the area of the base. \textit{(Lessons 10.1, 10.2)}
  \item To find the volume of a pyramid, use the formula \(V = \frac{1}{3}Bh\), where \(B\) is the area of the base. \textit{(Lessons 10.1, 10.2)}
  \item The lateral surface area of a figure is the area of all the lateral, or side, faces of the figure. \textit{(Lesson 10.3)}
  \item The total surface area of a figure is the area of all the faces of the figure. \textit{(Lesson 10.3)}
\end{itemize}
UNIT 5
Study Guide Review

MODULE 9
Applications of Geometry Concepts

ESSENTIAL QUESTION

- How can you apply geometry concepts to solve real-world problems?

EXAMPLE 1

Find (a) the value of x and (b) the measure of ∠APY.

a. ∠XPB and ∠YPB are supplementary.
   \[3x + 78° = 180°\]
   \[3x = 102°\]
   \[x = 34°\]

b. ∠APY and ∠XPB are vertical angles.
   \[m\angle APY = m\angle XPB = 3x = 102°\]

EXAMPLE 2

Find the area of the composite figure. It consists of a semicircle and a rectangle.

Area of semicircle = \(0.5 \times 3.14 \times 6^2\) cm²
   \[= 0.5 \times 3.14 \times 36\]
   \[= 56.52\] cm²

Area of rectangle = \(lw\)
   \[= 10 \times 6\]
   \[= 60\] cm²

The area of the composite figure is approximately 99.25 square centimeters.

EXERCISES

1. Find the value of \(y\) and the measure of ∠YPS (Lesson 9.1)
   \[y = 8°\]
   \[m\angle YPS = 40°\]

MODULE 10
Volume and Surface Area

ESSENTIAL QUESTION

- How can you use volume and surface area to solve real-world problems?

EXAMPLE

The height of the figure whose net is shown is 8 feet. Identify the figure. Then find its volume, lateral area, and total surface area.

The figure is a rectangular pyramid.

Volume = \(\frac{1}{3}lh\)
Lateral Area = \(4 \times \left(\frac{1}{2}\right) \times 8\)
Total Surface Area = \(192 + 12 + 192 + 144\)
   \[= 384\]
   \[= 336\]

The volume of the rectangular pyramid is 384 cubic feet, the lateral surface area is 192 square feet, and the total surface area is 336 square feet.

EXERCISES

1. Identify the figure represented by the net. Then find its lateral area and total surface area. (Lesson 10.3)
   - Triangular prism
     - Lateral area = 468 ft²
     - Total surface area = 618 ft²

Find the circumference and area of each circle. Round to the nearest hundredth. (Lessons 9.2, 9.3)

2. \(r = 22\) m
   \[C = 69.08\] in., \(A = 379.94\) in²

3. \(r = 4.5\) m
   \[C = 28.26\] m, \(A = 63.59\) m²

Find the area of each composite figure. Round to the nearest hundredth if necessary. (Lesson 9.4)

4.
   \[
   \begin{array}{c}
   \text{Area} = 99\text{ in}^2 \\
   \text{Area} = 420.48\text{ cm}^2
   \end{array}
   \]

5.
   \[
   \begin{array}{c}
   \text{Area} \\
   \text{Area}
   \end{array}
   \]

Key Vocabulary
- Adjacent angles (ángulos adyacentes)
- Complementary angles (ángulos complementarios)
- Congruent angles (ángulos congruentes)
- Supplementary angles (ángulos suplementarios)
- Vertical angles (ángulos opuestos por el vértice)
- Lateral area (área lateral)
- Net (planta)
- Pyramid (pirámide)
- Total surface area (área de superficie total)
Find the volume of each figure. (Lessons 10.1, 10.2)

2. \[ \text{Volume} = 420 \text{ in}^3 \]

3. \[ \text{Volume} = 36 \text{ m}^3 \]

4. The volume of a rectangular pyramid is 1.32 cubic inches. The height of the pyramid is 1.1 inches and the length of the base is 1.2 inches.
   Find the width of the base of the pyramid. (Lesson 10.1) \[ 3 \text{ in.} \]

5. The volume of a triangular prism is 264 cubic feet. The area of a base of the prism is 48 square feet. Find the height of the prism. (Lesson 10.3) \[ 5.5 \text{ ft} \]
Study Guide Review

Vocabulary Development

Integrating the ELPS
Encourage English learners to refer to their notes and the illustrated, bilingual glossary as they review the unit content.

ELPS  c.4.E  Read linguistically accommodated content area material with a decreasing need for linguistic accommodations as more English is learned.

MODULE 11  Analyzing and Comparing Data

TEKS  7.6.G, 7.12.A

Key Concepts
- Circle graphs and bar graphs represent data by showing portions of a set of data grouped by categories.  (Lesson 11.1)
- To compare dot plots, look at the shape, center, and spread of the dot plots.  (Lesson 11.2)
- To compare box plots, look at the median, interquartile range, and shape of the box plots.  (Lesson 11.3)
MODULE 12 Random Samples and Populations

Key Concepts
- A random sample is a sample in which every member of your population has an equal chance at being selected. If a sample is not random, it is called a biased sample. *(Lesson 12.1)*
- Dot plots and box plots can be used to represent data from a random sample and to make inferences about data from a random sample. *(Lesson 12.2)*
- Random samples from two or more populations can be compared by comparing the dot and box plots representing the data. *(Lesson 12.3)*
EXERCISES

1. Five candidates are running for the position of School Superintendent. Find the percent of votes that each candidate received. (Lesson 11.1)
   - Candidate A: 16.5%
   - Candidate B: 21%
   - Candidate C: 20%
   - Candidate D: 20.5%
   - Candidate E: 22%

   The dot plots show the number of hours a group of students spend online each week, and how many hours they spend reading. Compare the dot plots visually. (Lesson 11.2)

2. Compare the shapes, centers, and spreads of the dot plots.
   - **Shape:** Online: The data are clustered to the right. Reading: The data have two clusters, one at the left and one at the right.
   - **Center:** Online: The data have a single peak at 6. Reading: The data have two peaks, at 0 and 6.
   - **Spread:** Online: The data are spread from 0 to 6 with an outlier at 0. Reading: The data are spread from 0 to 6 with a gap from 3 to 4.

3. Calculate the medians of the dot plots. Online: 6; Reading: 5

4. Calculate the ranges of the dot plots. Online: 7; Reading: 6

5. The box plots show the math and reading scores on a standardized test for a group of students. Use the box plots shown to answer the following questions. (Lesson 11.3)

   - **Math Scores:**
     - The interquartile range of the math scores is 14 – 6 = 8.
   - **Reading Scores:**
     - The interquartile range of the reading scores is 18 – 10 = 8.

6. Compare the maximum and minimum values of the box plots.
   - The maximum value of both plots is 14, and the maximum of both plots is 20.
   - The minimum value of both plots is 6.
Random Samples and Populations

**Essential Question**
How can you use random samples and populations to solve real-world problems?

**Example**
An engineer at a lightbulb factory chooses a random sample of 100 lightbulbs from a shipment of 2,500 and finds that 2 of them are defective. How many lightbulbs in the shipment are likely to be defective?

<table>
<thead>
<tr>
<th>defective lightbulbs</th>
<th>defective lightbulbs in population</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2,500</td>
</tr>
<tr>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>x = 50</td>
</tr>
</tbody>
</table>

In a shipment of 2,500 lightbulbs, 50 are likely to be defective.

**Exercises**

1. Molly uses the school directory to select at random 25 students from her school for a survey on which sports people like to watch on television. She calls the students and asks them, "Do you think basketball is the best sport to watch on television?" (Lesson 12.1)
   a. Did Molly survey a random sample or a biased sample of the students at her school?
   **Random**
   b. Was the question she asked an unbiased question? Explain your answer.
   **No. Sample answer: It assumes the person watches basketball on television.**

2. There are 2,300 licensed dogs in Clarkson. A random sample of 50 of the dogs in Clarkson shows that 8 have ID microchips implanted. How many dogs in Clarkson are likely to have ID microchips implanted? (Lesson 12.2)
   **368 dogs**

3. Mr. Puccia teaches Algebra 1 and Geometry. He randomly selected 10 students from each class. He asked the students how many hours they spend on math homework in a week. He recorded each set of data in a list. (Lesson 12.3)
   - **Algebra 1:** 4, 0, 5, 3, 6, 3, 2, 1, 1, 4
   - **Geometry:** 7, 3, 5, 6, 3, 5, 3, 6, 5
   a. Make a dot plot for Algebra 1. Then find the mean and the range for Algebra 1.
      **Mean = 2.9, Range = 6 - 0 = 6**
   b. Make a dot plot for Geometry. Then find the mean and the range for Geometry.
      **Mean = 4.8, Range = 7 - 3 = 4**
   c. What can you infer about the students in the Algebra 1 class compared to the students in the Geometry class?
      **Sample answer: The students in the Geometry class spend more time on math homework than the students in the Algebra class.**
### Vocabulary Development

**Integrating the ELPS**
Encourage English learners to refer to their notes and the illustrated, bilingual glossary as they review the unit content.

**c.4.E** Read linguistically accommodated content area material with a decreasing need for linguistic accommodations as more English is learned.

### MODULE 13 Taxes, Interest, and Incentives


**Key Concepts**
- To find the tax on an item, multiply the amount of tax, written as a decimal, by the price of the item. *(Lesson 13.1)*
- To calculate compound interest, use the formula $A = P(1 + r)^t$. *(Lesson 13.2)*
- Interest paid only on the principal is simple interest, while compound interest is interest paid on the principal and interest the account has earned. *(Lesson 13.2)*

### MODULE 14 Planning Your Future


**Key Concepts**
- A budget is a plan to help you reach your financial goals and should consider fixed expenses and variable expenses. *(Lessons 14.1, 14.2)*
- To calculate net worth, subtract liabilities, or debts you owe, from assets, or things you own. *(Lesson 14.3)*
EXAMPLE 1
Samuel puts $5,000 into a savings account that earns simple interest at an annual rate of 1.2% for 5 years. Tinos puts the same amount into a savings account that earns interest at an annual rate of 1.2% compounded annually for 5 years. Which account will earn more interest after 5 years?

Samuel
Use the formula for simple interest.
\[ I = P \times r \times t \]
\[ I = 5,000 \times 0.012 \times 5 = 300 \]
Samuel earns $300 in interest.

Tinos
Use the formula for compound interest.
\[ A = P \left(1 + \frac{r}{n}\right)^{nt} \]
\[ A = 5,000 \left(1 + \frac{0.012}{1}\right)^{1 \times 5} = 5,307.29 \]
Tinos earns $5,307.29 − $5,000 = $307.29.

Tinos’s account will earn more interest than Samuel’s account.

EXERCISES
1. Find the sales tax for each product, using a sales tax rate of 8.5%. Then find the product’s total price and the total for the entire purchase. Round to the nearest hundredth. (Lesson 13.1)

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit Price ($)</th>
<th>Number</th>
<th>Subtotal ($)</th>
<th>Tax ($)</th>
<th>Total ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basketball</td>
<td>8.95</td>
<td>3</td>
<td>26.85</td>
<td>2.28</td>
<td>29.13</td>
</tr>
<tr>
<td>Tennis balls (3 pack)</td>
<td>3.88</td>
<td>5</td>
<td>19.40</td>
<td>1.65</td>
<td>21.05</td>
</tr>
<tr>
<td>Gross Pay</td>
<td></td>
<td></td>
<td>$2,900</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxes</td>
<td></td>
<td></td>
<td>$371.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal Income Tax</td>
<td></td>
<td></td>
<td>$179.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Security</td>
<td></td>
<td></td>
<td>$42.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicare</td>
<td></td>
<td></td>
<td>$42.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Pay</td>
<td></td>
<td></td>
<td>$2,306.95</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Claire earns a monthly paycheck of $2,900. Federal withholding is 12.8% of her gross pay. Complete the table. (Lesson 13.1)

3. Bette has $10,000 to put into savings accounts. She puts half into an account that earns simple interest at an annual rate of 3.1%. She puts the other half into an account that earns interest at an annual rate of 2.4% compounded annually. After 10 years, which account will earn more money? How much more? (Lesson 13.2)

4. Barack can buy a four pack of mangos for $2.76 or a six pack of mangos for $4.32. Which is the better buy? Explain. (Lesson 13.5)

Planning Your Future

EXAMPLE 1
The circle graph shows the Morales family’s monthly budget. Their fixed expenses are housing, savings, and an emergency fund. Use the graph to find the amount the family spends on fixed expenses.

Key Vocabulary
assets (activos)
budget (presupuesto)
fixed expenses (gastos fijos)
income (ingreso)
liabilities (pasivo)
net worth (patrimonio neto)
planned savings (ahorros previstos)
savings (ahorros)
variable expense (gasto variable)

<table>
<thead>
<tr>
<th>Budget for Morales Family / Net Monthly Income = $5,200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing cost</td>
</tr>
<tr>
<td>32%</td>
</tr>
<tr>
<td>$1,664</td>
</tr>
<tr>
<td>Savings</td>
</tr>
<tr>
<td>10%</td>
</tr>
<tr>
<td>$520</td>
</tr>
<tr>
<td>Emergency fund</td>
</tr>
<tr>
<td>5%</td>
</tr>
<tr>
<td>$260</td>
</tr>
</tbody>
</table>
EXERCISES

For 1-3, use the graph from the Example. (Lessons 14.1)

1. How much money does the Morales family spend on clothing each month? $312

2. How much more money does the Morales family spend on food than on entertainment? $572 per month

3. The air conditioning in the Morales’s house is broken. The repair service estimated that the cost of repairing it is $1,040. How many months of emergency funds will the family use to fix the air conditioning? 4 months

4. Mr. and Mrs. Clark have two children. They live in Waco, Texas. They may move to Austin to be closer to their parents. Their employers pay for 100% of one parent’s health insurance premium and 50% of the premium for other family members. Use an online family budget estimator to estimate to the nearest dollar, the following for the Clark family in Waco and in Austin. (Lesson 14.2)

   Answers may vary according to the online family estimator used.

<table>
<thead>
<tr>
<th>Item</th>
<th>Monthly Estimated Budget for Waco ($)</th>
<th>Monthly Estimated Budget for Austin ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>$629</td>
<td>$836</td>
</tr>
<tr>
<td>Food</td>
<td>$491</td>
<td>$491</td>
</tr>
<tr>
<td>Child Care</td>
<td>$635</td>
<td>$841</td>
</tr>
<tr>
<td>Medical Insurance</td>
<td>$301</td>
<td>$309</td>
</tr>
<tr>
<td>Medical Out-of-pocket</td>
<td>$118</td>
<td>$118</td>
</tr>
<tr>
<td>Transportation</td>
<td>$395</td>
<td>$482</td>
</tr>
<tr>
<td>Other Necessities</td>
<td>$309</td>
<td>$360</td>
</tr>
<tr>
<td><strong>Total monthly expenses</strong></td>
<td><strong>$2,878</strong></td>
<td><strong>$3,437</strong></td>
</tr>
<tr>
<td>Total Federal Tax Impact</td>
<td>$698</td>
<td>$200</td>
</tr>
<tr>
<td>Necessary monthly income</td>
<td><strong>$2,859</strong></td>
<td><strong>$3,637</strong></td>
</tr>
<tr>
<td>Household Hourly Wage</td>
<td>$17</td>
<td>$22</td>
</tr>
</tbody>
</table>

5. Rashid paid off his car, which is worth $6,500. He has a credit card balance of $325. He has $4,250 in his savings account and $672 in his checking account. He owes $3,600 in student loans. He lives with his parents. What is Rashid’s net worth? (Lesson 14.3)

   $7,497