California Mathematics 5

Chapter 9 Resource Masters

Includes:

Chapter Resources
- Graphic Organizer
- Student-Built Glossary
- Family Letter
- Anticipation Guide
- Game

Leveled Lesson Resources
- Reteach
- Skills Practice
- Homework Practice
- Problem-Solving Practice
- Enrich

Assessment Resources
- Individual Progress Checklist
- Chapter Diagnostic Test
- Chapter Pretest
- 3 Quizzes
- Mid-Chapter Test
- Vocabulary Test
- Oral Assessment
- Chapter Project Rubric
- Foldables Rubric
- 6 Chapter Tests
- Extended Response Test
- Student Recording Sheet
- Cumulative Standardized Test Practice
- Answer Pages
- Chapter 9 Assessment Line-up
- Answer Keys

All Answers Included
Lesson 9–1 Percents and Fractions
Reteach ................................................................. 8
Skills Practice ...................................................... 9
Homework Practice ............................................ 10
Problem-Solving Practice ................................ 11
Enrich ............................................................... 12

Lesson 9–2 Circle Graphs
Reteach .................................................................. 13
Skills Practice ...................................................... 14
Homework Practice ............................................ 15
Problem-Solving Practice ................................ 16
Enrich ............................................................... 17

Lesson 9–3 Percents and Decimals
Reteach .................................................................. 18
Skills Practice ...................................................... 19
Homework Practice ............................................ 20
Problem-Solving Practice ................................ 21
Enrich ............................................................... 22

Lesson 9–4 Problem-Solving Strategy: Solve a Simpler Problem
Reteach .................................................................. 23
Skills Practice ...................................................... 25
Homework Practice ............................................ 26
Enrich ............................................................... 27

Lesson 9–5 Estimating with Percents
Reteach .................................................................. 28
Skills Practice ...................................................... 29
Homework Practice ............................................ 30
Problem-Solving Practice ................................ 31
Enrich ............................................................... 32

Lesson 9–6 Percent of a Number
Reteach .................................................................. 33
Skills Practice ...................................................... 34
Homework Practice ............................................ 35
Problem-Solving Practice ................................ 36
Enrich ............................................................... 37

Lesson 9–7 Problem-Solving Investigation: Choose the Best Strategy
Reteach ................................................................. 38
Skills Practice ...................................................... 40
Homework Practice ............................................ 41
Enrich ............................................................... 42

Lesson 9–8 Probability
Reteach .................................................................. 43
Skills Practice ...................................................... 44
Homework Practice ............................................ 45
Problem-Solving Practice ................................ 46
Enrich ............................................................... 47

Lesson 9–9 Sample Spaces
Reteach .................................................................. 48
Skills Practice ...................................................... 49
Homework Practice ............................................ 50
Problem-Solving Practice ................................ 51
Enrich ............................................................... 52

Lesson 9–10 Making Predictions
Reteach .................................................................. 53
Skills Practice ...................................................... 54
Homework Practice ............................................ 55
Problem-Solving Practice ................................ 56
Enrich ............................................................... 57
Individual Progress Checklist ......................... 58

Chapter Tests:
Chapter Diagnostic Assessment ..................... 59
Chapter Pretest .................................................. 60
Quiz 1 ............................................................... 61
Quiz 2 ............................................................... 62
Quiz 3 ............................................................... 63
Mid-Chapter Review ......................................... 64
Vocabulary Test ............................................... 65
Oral Assessment ............................................... 66
Chapter Project Rubric ...................................... 68
Foldables Rubric ............................................... 69
Test Form 1 ...................................................... 70
Test Form 2 ...................................................... 72
Test Form 2A .................................................. 72
Test Form 2B .................................................. 74
Test Form 2C .................................................. 76
Test Form 2D .................................................. 78
Test Form 3 ...................................................... 80
Extended-Response Test ................................ 82

Student Recording Sheet .................................. 83
Cumulative Standardized Test Practice ............ 84
Answer Pages .................................................. A1
The Chapter 9 Resource Masters includes the core materials needed for Chapter 9. These materials include worksheets, extensions, and assessment options. The answers for these pages appear at the back of this booklet.

All of the materials found in this booklet are included for viewing and printing on the TeacherWorks Plus™ CD-ROM.

**Chapter Resources**

**Graphic Organizer** (page 1) This master is a tool designed to assist students with comprehension of grade-level concepts. While the content and layout of these tools vary, their goal is to assist students by providing a visual representation from which they can learn new concepts.

**Student-Built Glossary** (page 2) This master is a study tool that presents the key vocabulary terms from the chapter. You may suggest that students highlight or star the terms they do not understand. Give this list to students before beginning Lesson 9–1. Remind them to add these pages to their mathematics study notebooks.

**Anticipation Guide** (page 6) This master is a survey designed for use before beginning the chapter. You can use this survey to highlight what students may or may not know about the concepts in the chapter. There is space for recording how well students answer the questions before they complete the chapter. You may find it helpful to interview students a second time, after completing the chapter, to determine their progress.

**Game** (page 7) A game is provided to reinforce chapter concepts and may be used at appropriate times throughout the chapter.

**Resources for Computational Lessons**

**Reteach** Each lesson has an associated Reteach worksheet. In general, the Reteach worksheet focuses on the same lesson content but uses a different approach, learning style, or modality than that used in the Student Edition. The Reteach worksheet closes with computational practice of the concept.

**Skills Practice** The Skills Practice worksheet for each lesson focuses on the computational aspect of the lesson. The Skills Practice worksheet may be helpful in providing additional practice of the skill taught in the lesson.

**Homework Practice** The Homework Practice worksheet provides an opportunity for additional computational practice. The Homework Practice worksheet includes word problems that address the skill taught in the lesson.

**Problem-Solving Practice** The Problem-Solving Practice worksheet presents additional reinforcement in solving word problems that apply both the concepts of the lesson and some review concepts.

**Enrich** The Enrich worksheet presents activities that extend the concepts of the lesson. Some Enrich materials are designed to widen students’ perspectives on the mathematics they are learning. These worksheets are written for use with all levels of students.

**Resources for Problem-Solving Strategy and Problem-Solving Investigation Lessons** In recognition of the importance of problem-solving strategies, worksheets for problem-solving lessons follow a slightly different format. For problem-solving lessons, a two-page Reteach worksheet offers a complete model for choosing a problem-solving strategy. For each Problem-Solving Strategy lesson, Reteach and Homework Practice worksheets offer reinforcement of the strategy taught in the Student Edition lesson. In contrast, the Problem-Solving
Investigation worksheets include a model strategy on the Reteach worksheets and provide problems requiring several alternate strategies on the Homework Practice and Skills Practice worksheets.

Assessment Options The assessment masters in the Chapter 9 Resource Masters offer a wide variety of assessment tools for monitoring progress as well as final assessment.

Individual Progress Checklist This checklist explains the chapter’s goals or objectives. Teachers can record whether a student’s mastery of each objective is beginning (B), developing (D), or mastered (M). The checklist includes space to record notes to parents as well as other pertinent observations.

Chapter Diagnostic Assessment This one-page test assesses students’ grasp of skills that are needed for success in the chapter.

Chapter Pretest This one-page quick check of the chapter’s concepts is useful for determining pacing. Performance on the pretest can help you determine which concepts can be covered quickly and which specific concepts may need additional time.

Quizzes Three free-response quizzes offer quick assessment opportunities at appropriate intervals in the chapter.

Mid-Chapter Review This one-page chapter test provides an option to assess the first half of the chapter. It includes both multiple-choice and free-response questions.

Vocabulary Test This one-page test focuses on chapter vocabulary. It is suitable for all students. It includes a list of vocabulary words and questions to assess students’ knowledge of the words.

Oral Assessment This two-page test consists of one page for teacher directions and questions and a second page for recording responses. Although this assessment is designed to be used with all students, the interview format focuses on assessing chapter content assimilated by ELL students.

Chapter Project Rubric This one-page rubric is designed for use in assessing the chapter project. You may want to distribute copies of the rubric when you assign the project and use the rubric to record each student’s chapter project score.

Foldables Rubric This one-page rubric is designed to assess the Foldables graphic organizer. The rubric is written to the students, telling them what you will be looking for as you evaluate their completed Foldables graphic organizer.

Leveled Chapter Tests

- **Form 1** assesses basic chapter concepts through multiple-choice questions.
- **Form 2A** is primarily for those who may have missed the Form 1 test. It may be used as a retest for students who received additional instruction following the Form 1 test.
- **Form 2B** is designed for students with a below-level command of the English language.
- **Form 2C** is a free-response test.
- **Form 2D** is written for students with a below-level command of the English language.
- **Form 3** is a free-response test.
- **Extended-Response Test** is an extended response test.

Student Recording Sheet This one-page recording sheet is for the standardized test in the Student Edition.

Cumulative Standardized Test Practice This three-page test, aimed at on-level students, offers multiple-choice questions and free-response questions.

Answers

The answers for the Anticipation Guide and Lesson Resources are provided as reduced pages with answers appearing in black. Full size line-up answer keys are provided for the Assessment Masters.
Use this graphic organizer to take notes on **Chapter 9: Percent**. Fill in the missing information.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>percent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>probability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>simple event</td>
<td></td>
<td></td>
</tr>
<tr>
<td>complementary events</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sample space</td>
<td></td>
<td></td>
</tr>
<tr>
<td>survey</td>
<td></td>
<td></td>
</tr>
<tr>
<td>population</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sample</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This is an alphabetical list of new vocabulary terms you will learn in **Chapter 9: Percent**. As you study the chapter, complete each term’s definition or description. Remember to add the page number where you found the term. Add this page to your math study notebook to review vocabulary at the end of the chapter.

<table>
<thead>
<tr>
<th>Vocabulary Term</th>
<th>Found on Page</th>
<th>Definition/Description/Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>circle graph</td>
<td></td>
<td></td>
</tr>
<tr>
<td>complementary events</td>
<td></td>
<td></td>
</tr>
<tr>
<td>experimental probability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>outcome</td>
<td></td>
<td></td>
</tr>
<tr>
<td>percent</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Student-Built Glossary (continued)

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>population</td>
<td></td>
</tr>
<tr>
<td>probability</td>
<td></td>
</tr>
<tr>
<td>random</td>
<td></td>
</tr>
<tr>
<td>sample</td>
<td></td>
</tr>
<tr>
<td>sample space</td>
<td></td>
</tr>
<tr>
<td>simple event</td>
<td></td>
</tr>
<tr>
<td>survey</td>
<td></td>
</tr>
<tr>
<td>theoretical probability</td>
<td></td>
</tr>
<tr>
<td>tree diagram</td>
<td></td>
</tr>
</tbody>
</table>
Dear Family,

Today my class started **Chapter 9: Percent**. I will be learning to express percents as fractions and decimals, and express fractions and decimals as percents. I will sketch and analyze circle graphs, and I will learn how to estimate and find the percent of a number. Here are my vocabulary words and an activity that we can do together.

Sincerely, ______________________

**Key Vocabulary**

**Percent:** A special ratio that compares a number to 100 using the symbol %. The word percent means hundredths or out of 100. Example: 60% means 60 out of 100.

**Probability:** A number between 0 and 1 that measures the likelihood of an event happening.

**Sample space:** The set of all possible outcomes in a probability experiment.

**Tree diagram:** A diagram of all the possible outcomes of an event or series of events or experiments.

**Circle graph:** A graph in the shape of a circle in which data are represented by parts of a circle. In the shape of the circle these parts look like pieces of a pie. Also called a pie graph or a pie chart.

**Outcome:** A possible result of an experiment.

**Simple event:** One outcome or a collection of outcomes.

**Random:** Equally likely to occur.

**Survey:** A method of collecting data.

**Population:** The group being studied in a survey.

**Activity**

Place two jars on a table. Fill one jar with a total of 100 coins, 10 being dimes. Fill the other jar with a total of 100 coins, 20 being dimes. Which jar has the higher percentage of dimes? Repeat the activity changing the percentage of dimes each time.

**Books to Readw**

*Piece-Part-Portion*  
by Scott Gifford

*How Many Feet? How Many Tails?*  
by Marilyn Burns

*Hannah’s Collections*  
by Marthe Jocelyn
Estimada familia:

Hoy mi clase comenzó el Capítulo 9: Los porcentajes. Aprenderé a expresar porcentajes en forma de fracciones y de decimales; y a expresar fracciones y decimales en forma de porcentajes. Trazaré y analizaremos gráficas circulares y aprenderé a estimar y a calcular el porcentaje de un número. A continuación, están mis palabras del vocabulario y una actividad que podemos realizar juntos.

Sinceramente, ________________

Vocabulario clave

Porcentaje: Razón especial que compara un número con 100 usando el símbolo %. La palabra porcentaje significa centésimas o de 100. Ejemplo: 60% significa 60 de 100.

Probabilidad: Número entre 0 y 1 que mide la posibilidad de que ocurra un evento.

Espacio muestral: Conjunto de todos los resultados posibles en un experimento probabilístico.

Diagrama de árbol: Diagrama de todos los resultados posibles de un evento o serie de eventos o experimentos.

Gráfica circular: Gráfica con forma de círculo en que los datos se representan mediante partes de un círculo.

Resultado: Un posible resultado de un experimento.

Evento simple: Un resultado o una colección de resultados.

Aleatorio: Que tiene la misma posibilidad de ocurrir.

Encuesta: Método para reunir datos.

Población: Grupo que se estudia en una encuesta.

Actividad

Coloquen dos frascos sobre la mesa. Llenen un frasco con un total de 100 monedas, de las cuales 10 deben ser de diez centavos. Llenen el otro frasco con un total de 100 monedas, de las cuales 20 deben ser de diez centavos. ¿Qué frasco tiene el mayor porcentaje de monedas de diez centavos? Repitan la actividad y cambien cada vez el porcentaje de las monedas de diez centavos.

Libros recomendados

Piece-Part-Portion
de Scott Gifford

How Many Feet? How Many Tails?
de Marilyn Burns

Hannah's Collections
de Marthe Jocelyn
Anticipation Guide
Percent

STEP 1
Before you begin Chapter 9

• Read each statement.
• Decide whether you agree (A) or disagree (D) with the statement.
• Write A or D in the first column OR if you are not sure whether you agree or disagree, write NS (not sure).

<table>
<thead>
<tr>
<th>STEP 1 A, D, or NS</th>
<th>Statement</th>
<th>STEP 2 A or D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>A percent is a special ratio that compares a number to 100 using the symbol %.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>The word percent means hundredths or out of 100.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>60 out of 100 = 60%.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>75 out of 100 = 80%.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Probability is a number between 0 and 1 that measures the likelihood of an event happening.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Sample space is the set of all possible outcomes in a probability experiment.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>A tree diagram is a diagram of all the possible outcomes of an event or series of events or experiments.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>A circle graph is a graph in the shape of a circle in which data are represented by parts of a circle.</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>A circle graph is also called a pie graph or a pie chart.</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>20 of 100 = 80%.</td>
<td></td>
</tr>
</tbody>
</table>

STEP 2
After you complete Chapter 9

• Reread each statement and complete the last column by entering an A (agree) or a D (disagree).
• Did any of your opinions about the statements change from the first column?
• For those statements that you mark with a D, use a separate sheet of paper to explain why you disagree. Use examples, if possible.
Game

You Will Need:
- Deck of cards
- Paper and pencil

Set
Shuffle the cards and place them face down in a pile.

GO!
1. Make a prediction of what card you are going to randomly choose from the deck, such as “I predict I am going to choose an ace” or “I predict that I am going to choose a red card.”

2. Write your prediction down on the sheet of paper.

3. Determine the probability that you will randomly choose the card you predicted. Write the probability next to your prediction on the paper.

4. Randomly choose a card without looking. If you predicted the card correctly, you get a point. If you did not correctly predict the card, the next player takes a turn.

5. Replace the card in the deck. All other players follow steps 1–4. Players may not use a prediction more than once. The player with the most points at the end of 10 rounds is the winner.
You can think of a percent as the numerator of a fraction with 100 as the denominator.  

This grid contains 100 small squares. Each square represents 1%. 76 small squares are shaded.

Percent: 76 parts of 100, or 76%
Fraction: 76 parts of 100, or \( \frac{76}{100} \). In simplest form, that’s \( \frac{19}{25} \).

Write a percent and a fraction to show the shaded part of each grid. For each fraction, use simplest form.

1. ______ shaded parts
   ______ total parts
   Percent: ______
   Fraction: ______

2. ______ shaded parts
   ______ total parts
   Percent: ______
   Fraction: ______

3. ______ shaded parts
   ______ total parts
   Percent: ______
   Fraction: ______

4. ______ shaded parts
   ______ total parts
   Percent: ______
   Fraction: ______
Skills Practice

Percents and Fractions

Write a fraction and a percent to show the shaded part of each grid. For each fraction, use simplest form.

1. __________

2. __________

3. __________

Write each percent as a fraction or mixed number in simplest form.

4. 67% ______

5. 8% ______

6. 243% ______

7. 32% ______

8. 81% ______

9. 148% ______

Write each fraction as a percent.

10. \( \frac{1}{4} \) ______

11. \( \frac{3}{10} \) ______

12. \( \frac{1}{2} \) ______

13. \( \frac{2}{5} \) ______

14. \( \frac{3}{25} \) ______

15. \( \frac{3}{50} \) ______

16. \( \frac{23}{100} \) ______

17. \( \frac{1}{10} \) ______

18. \( \frac{19}{100} \) ______

19. \( \frac{99}{100} \) ______

20. \( \frac{7}{100} \) ______

21. \( \frac{1}{10} \) ______

Solve.

22. Three fourths of the shirts a store stocks are extra large. What percent of the shirts are extra large?

23. Of the 100 shirts a store sold on Saturday, 82 had the logo of a sports team on them. What percent of the shirts had a logo?
Write each percent as a fraction or mixed number in simplest form.

1. 22% ______
2. 7% ______
3. 146% ______
4. 465% ______

Write each fraction or mixed number as a percent.

5. \( \frac{8}{10} \) ______
6. \( \frac{5}{20} \) ______
7. \( 1 \frac{4}{5} \) ______
8. \( 2 \frac{2}{5} \) ______

Write a percent to represent the shaded portion of each model.

9. [Pie chart]

10. [Pie chart]

Spiral Review

Use the following information for Exercises 11–13. (Lesson 8–8)

A squirrel eats at the rate of 2 pounds of acorns each day.

11. Make a table to show the relationship between the number of pounds of acorns eaten, \( a \), by a squirrel in \( d \) days.

12. Write an equation to find \( a \), the number of pounds of acorns a squirrel eats in \( d \) days.

13. How many pounds of acorns will a squirrel eat in 7 days?
Problem-Solving Practice
Percents and Fractions

Solve.

1. The shaded part shows the percent of Tina’s class who are left-handed. Write the percent.

2. In William’s school, 60% of the students are girls. Write 60% as a fraction in simplest form.

3. Edward found that \(\frac{35}{100}\) of the students in his school bring their own lunch to school. Write this fraction as a percent.

4. Lindsey drew a 10-by-10 grid and colored 42 squares red. She colored the rest of the squares green. What percent of the grid is colored red? What percent is colored green?

5. Kory used yellow, green, blue, and red markers to color all the squares of a 10-by-10 grid. He colored 12 squares blue, then colored twice as many red. There are three times as many red squares as yellow squares. If the rest of the squares are green, is more than half the grid colored green? What percent of the grid is not colored yellow or green?

6. Linda is making a design using a 10-by-10 grid. She drew stars in 50% of the squares. In half of the remaining squares, she drew triangles. Half the squares containing stars were colored yellow. What fraction of the grid is not colored and does contain a star or triangle?
Stores have sales to attract people to buy their merchandise or to sell off seasonal merchandise at the end of a season. They may advertise 20% off the regular price of an item or $\frac{1}{2}$ off the regular price. Sometimes, stores will offer an extra sale on top of the sale price.

Stores usually advertise the sale price as a percentage or a fraction off the original price. Savvy shoppers know how percentages and fractions compare to know which is a better deal.

Write a fraction representing how much off the regular price the store is offering.

1. 25% off all kitchen items!
2. 50% off ELECTRONICS
3. 20% off all outerwear

Write each fraction as a percent.

4. Sale Today $\frac{1}{2}$ off
5. $\frac{1}{5}$ off with your Rewards Card
6. $\frac{1}{4}$ off all winter jackets

Which is the better deal?

7. Sale Today $\frac{1}{3}$ off all shoes!
   Save 40% on all shoes!
Reteach

Circle Graphs

The table shows the results of a survey of 160 students. You can also display this data in a circle graph. Circle graphs are used to compare parts of a whole.

- Write a fraction for each percent.
  
  Cycling: \( \frac{25}{100} \) or \( \frac{1}{4} \)
  
  Bowling: \( \frac{40}{100} \) or \( \frac{2}{5} \)
  
  In-line skating: \( \frac{35}{100} \) or \( \frac{7}{20} \)

- Since \( \frac{25}{100} = \frac{1}{4} \), shade \( \frac{1}{4} \) of the circle for “Cycling.”
  
  Since \( \frac{40}{100} \) is a little less than \( \frac{50}{100} = \frac{1}{2} \), shade a little less than \( \frac{1}{2} \) of the circle for “Bowling.” The remaining section is for “In-line skating.”

- Label each section of the graph.

1. Sketch a circle graph for the data from the table at the right.

<table>
<thead>
<tr>
<th>Favorite Family Sport</th>
<th>Percent of Total Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycling</td>
<td>25%</td>
</tr>
<tr>
<td>Bowling</td>
<td>40%</td>
</tr>
<tr>
<td>In-line skating</td>
<td>35%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Favorite Team Sport</th>
<th>Percent of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basketball</td>
<td>60%</td>
</tr>
<tr>
<td>Baseball</td>
<td>25%</td>
</tr>
<tr>
<td>Soccer</td>
<td>15%</td>
</tr>
</tbody>
</table>
Skills Practice

Circle Graphs

Use data from the circle graph for Exercises 1 and 2.

1. List the activities from favorite to least favorite.

________________________________________________________________________

2. What fraction of the total votes went to in-line skating?

________________________________________________________________________

Use data from the table for Exercises 3–5.

3. Write a fraction for each percent.

Baseball: ______

Basketball: ______

Football: ______

Soccer: ______

4. Make a circle graph at the right to show the data.
1. Sketch a circle graph beside the table that shows the number of students who went on the following field trips.

<table>
<thead>
<tr>
<th>Field Trip Location</th>
<th>Percent of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquarium</td>
<td>27</td>
</tr>
<tr>
<td>Museum</td>
<td>19</td>
</tr>
<tr>
<td>Science Center</td>
<td>9</td>
</tr>
<tr>
<td>Zoo</td>
<td>15</td>
</tr>
<tr>
<td>Water Park</td>
<td>18</td>
</tr>
<tr>
<td>Mountain Hike</td>
<td>12</td>
</tr>
</tbody>
</table>

2. Which field trip location had the most students?

3. Which two field trips made up about half of the total students?

Spiral Review

Write each percent as a fraction or mixed number. (Lesson 9–1)

4. 15% ______

5. 117% ______

Write each fraction or mixed number as a percent.

6. $\frac{3}{20}$ ______

7. $\frac{70}{100}$ ______
1. Luis drew a circle graph of the food types he likes best. If fruit makes up 40% of the graph, fruit makes up what fraction of his favorite foods?

2. Casey found out that chocolate ice cream is preferred by 12% of the students in his class. About what fraction of a circle graph would be used for chocolate ice cream on a circle graph that shows favorite ice cream flavors?

3. Randy knows that 36% of the adults in his neighborhood work in a nearby city. About what fraction of a circle graph would show adults who work in a nearby city?

4. Kathy works at a fast-food restaurant. Twenty-five percent of the food they sell is hamburgers, 35% is chicken, 18% is French fries, and the remainder is salads. About what fraction of a circle graph would represent the salads sold?

5. Stacy took a test that included 10 multiple-choice questions, 12 true-false questions, 14 short-answer questions, and 4 essay questions. If she used a circle graph to show the question types on the test, about what part of the circle graph would represent the number of short-answer questions?

6. Heather looked at a circle graph that showed age groups of the people in her small town. On the graph 17% is used for ages 0 to 4, 14% for ages 5 to 12, 20% for ages 13 to 20, 22% for ages 21 to 50, and 12% for ages 51 to 65. The remainder of the graph represents people who are older than 65. What percent of the people in her town are older than 65?
The circle graph below was drawn to show the leading causes of fire in the United States. However, all the labels except one have mysteriously disappeared.

Use the clues below to decide what the labels should be and where they belong. Then complete the graph. (Remember: Each label must include a word or phrase and a percent.)

**Clue 1**
Most fires are caused by *heating equipment*.

**Clue 2**
Fires caused by *electrical wiring* and fires caused by *heating equipment* together make up 46% of all fires.

**Clue 3**
The percent of fires caused by *children playing* is 12% less than the percent of fires caused by *cooking*.

**Clue 4**
The percent of fires caused by *open flames* is equal to the percent of fires caused by *children playing*.

**Clue 5**
The percent of the fires caused by *cooking* and the percent of fires caused by *arson* are together just 1% less than the percent of fires caused by *heating equipment*.

**Clue 6**
The percent of the fires caused by *electrical wiring* is 15% greater than the percent caused by *children playing*.

**Clue 7**
Fires caused by *smoking* and fires caused by *arson* together make up 17% of all fires.

**Clue 8**
Fires that result from other causes are listed in a category called *other*.
Reteach

Percents and Decimals

You can write percents as decimals.

First, write 35% as a fraction with a denominator of 100.

\[ 35\% = \frac{35}{100} \]

Then, read the fraction and write the decimal.

\[ \frac{35}{100} = 35 \text{ hundredths} = 0.35 \]

So, \(35\% = 0.35\).

You can also write decimals as percents.

Write 0.64 as a fraction.

\[ 0.64 = 64 \text{ hundredths} = \frac{64}{100} \]

Then, write the numerator of the fraction with a percent sign.

\[ \frac{64}{100} = 64\% \]

So, \(0.64 = 64\%\).

Write the percent as a decimal.

1. \(25\% = \frac{25}{100} = \) _____
2. \(40\% = \frac{40}{100} = \) _____
3. \(56\% = \frac{56}{100} = \) _____
4. \(70\% = \frac{70}{100} = \) _____
5. \(93\% = \frac{93}{100} = \) _____
6. \(3\% = \frac{3}{100} = \) _____

Write the decimal as a percent.

7. \(0.25 = \frac{0.25}{100} = \) _____
8. \(0.9 = \frac{0.9}{100} = \) _____
9. \(0.55 = \frac{0.55}{100} = \) _____
10. \(0.95 = \frac{0.95}{100} = \) _____
11. \(0.51 = \frac{0.51}{100} = \) _____
12. \(0.04 = \frac{0.04}{100} = \) _____

Copyright © Macmillan/McGraw-Hill, a division of The McGraw-Hill Companies, Inc.
Skills Practice

Percents and Decimals

Write each percent as a decimal.

1. 34% ______
2. 70% ______
3. 48% ______
4. 25% ______
5. 7% ______
6. 45% ______
7. 12% ______
8. 54% ______
9. 91% ______
10. 95% ______
11. 32% ______
12. 82% ______
13. 157% ______
14. 24% ______
15. 30% ______
16. 18% ______
17. 72% ______
18. 188% ______
19. 60% ______
20. 122% ______
21. 96% ______

Write each decimal as a percent.

22. 0.75 ______
23. 0.4 ______
24. 0.5 ______
25. 1.28 ______
26. 1.22 ______
27. 0.10 ______
28. 0.85 ______
29. 0.6 ______
30. 0.75 ______
31. 0.2 ______
32. 0.88 ______
33. 0.03 ______

Find each missing number.

34. 29% = \frac{s}{100}
35. 80% = \frac{w}{5}
36. 44% = \frac{c}{25}
37. 90% = \frac{a}{10}

s = ______  w = ______  c = ______  a = ______
Write each percent as a decimal.

1. 23% _____
2. 37% _____
3. 3% _____
4. 105% _____

Write each decimal as a percent.

5. 0.7 _____
6. 0.44 _____
7. 0.64 _____
8. 1.08 _____

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

9. 3.4 341% _____
10. 0.2 18% _____

Spiral Review

For Exercises 11–12, use the graph below. (Lesson 9–2)

11. The circle graph shows Favorite Family Sports. What percent of the families prefer in-line skating or cycling?

12. What percent of the families prefer bowling?
Solve.

1. The Park High Panthers won 25% of their basketball games this year. Write the percent as a fraction in simplest form.

2. In Culver City, 45% of the roads need repair. Write the percent as a decimal.

3. In Joseph’s neighborhood, 32% of the homes have the local newspaper delivered. Write the percent as a decimal and as a fraction in simplest form.

4. George has read 18 of the 50 books in his bookcase. What percent of the books has George read? Write the percent as a decimal and as a fraction in simplest form.

5. Mr. Simons gave his history students three quizzes. On the first quiz, Ryan got 12 of the 15 questions correct. On the second quiz, he got 15 of the 20 questions correct, and on the third, 21 of 25 questions were correct. On which quiz did he score the highest percent?

6. The Raiders won 8 of their football games this season. They played a total of 12 games, and had the same number of losses as ties. The Spartans won 10 of their 15 games, and had one less tie than loss. Which team had the higher percent of games lost?
A percent is a ratio that compares a number to 100.

\[ \frac{83}{100} = 83 \text{ percent} = 83\% = 0.83 \]

A ratio that compares a number to 1,000 is called a per mill. Just like percent, the ratio per mill has a special symbol, \( \‰ \).

\[ \frac{83}{1000} = 83 \text{ per mill} = 83 \‰ = 0.083 \]

Throughout the world, the ratio that is used most commonly is percent. However, in some countries, you will find both ratios in use.

Express per mill as a decimal.

1. 325‰
2. 71‰
3. 6‰
4. 900‰
5. 20‰
6. 100‰

Express each per mill as a fraction in simplest form.

7. 47‰
8. 400‰
9. 100‰
10. 25‰
11. 150‰
12. 30‰

Express each fraction as a per mill.

13. \( \frac{729}{1000} \)
14. \( \frac{58}{100} \)
15. \( \frac{1}{2} \)
16. \( \frac{3}{4} \)
17. \( \frac{17}{20} \)
18. \( \frac{1}{3} \)

19. **CHALLENGE** In the United States, you will sometimes find the mill used as a monetary unit. What amount of money do you think is represented by 1 mill?
**Reteach**

**Problem-Solving Strategy**

**Solve a simpler problem.**

Last year, Jeff made 70% of his attempted free throws in basketball. If he attempted 70 free throws, how many did he make?

<table>
<thead>
<tr>
<th>Step 1</th>
<th><strong>Understand</strong></th>
<th><strong>Be sure you understand the problem.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>What do you know? You know the percent of free throws that Jeff made last year. You also know the number of free throws he attempted.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>What do you need to find? You need to find the number of free throws Jeff made.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 2</th>
<th><strong>Plan</strong></th>
<th><strong>Make a plan.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Solve a simpler problem by finding 10% of Jeff’s attempted free throws. Use the result to find 70% of his attempted free throws.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 3</th>
<th><strong>Solve</strong></th>
<th><strong>Carry out your plan.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Since $10% = \frac{10}{100} = \frac{1}{10}$, 10% of Jeff’s attempted free throws is $70 \div 10$, which is 7. Since there are seven groups of 10% in 70%, multiply 7 by 7. So, Jeff made 49 free throws.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 4</th>
<th><strong>Check</strong></th>
<th><strong>Check your answer.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>You know that $30% + 70% = 100%$. Find $30%$ of 70, and add it to 49 to see if the total is 70. To find three groups of 10%, multiply 3 by 7 = 21. 21 + 49 = 70.</td>
</tr>
</tbody>
</table>

**Solve. Use the solve a simpler problem strategy.**

1. Eight chefs can cook 40 meals in 3 hours. How many meals can 25 chefs cook in 6 hours?

2. An airplane flies at a speed of 500 miles per hour. If a train travels at 25% of that speed, how much faster does the plane travel than the train?
3. Carla’s alarm rings every 20 minutes for one hour each morning. How many times does it ring each week?

4. Your brother has $60. He offers you either 40% or three-sixths of it. What amount should you take if you want to get the most money?

5. Ricky polled his classmates and found that 40% of them named spinach as their favorite vegetable. $\frac{30}{100}$ of the class liked broccoli best and 1 out of 10 liked carrots best. Which vegetable does most of Ricky’s classmates prefer?

6. There are a total of 500 students at Mary’s elementary school. Of that total, 40% of the students have a sibling who also attends the school. How many students have siblings at the school?

7. At the pancake breakfast at Jenny’s school, 250 people attended. Of those 250 people, 60% were students. How many students attended?

8. Jeremy can cut two lawns in 2 hours. If Jeremy and his friend Nate work at the same speed, how many lawns can they cut in 5 hours?
Solve. Use the solve a simpler problem strategy.

1. Monica plays forward on her soccer team. Last year, 30% of her shots scored goals. This year, she made 16 goals out of 40. Did Monica improve her record this year? Explain.

2. Brian plays tournament table tennis. Last year, he won 72 percent of his games. This year, he has won 15 of his 20 games. Has Brian improved his record? Explain.

3. Jessica swims on a swim team. Last year, she placed first 12 times out of 20 in the breaststroke. This year, she has placed first 55 percent of the time. Was Jessica’s record of winning better last year or this year? Explain.

4. Peter’s class takes timed division tests. Last month, Peter completed 66 percent of the problems correctly. This month, he has completed 60 out of 80 problems correctly. Has Peter improved his score? Explain.
Solve. Use the *solve a simpler problem* strategy.

1. Sawa spent $28.95 on her meal, and she wanted to leave a 15% tip. If she paid $35.00 and received $1.71 back in change, how much did she leave for a tip? If she left a 20% tip and paid $35.00, how much change would she get back?

2. Sam has a piece of string 40 inches long. He needs to cut it into 4-inch long pieces. How many cuts will he make if he uses all 40 inches?

3. **Bus Line**

<table>
<thead>
<tr>
<th>Route</th>
<th>Number of Passengers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northeast</td>
<td>2,800</td>
</tr>
<tr>
<td>Northwest</td>
<td>2,300</td>
</tr>
<tr>
<td>North</td>
<td>2,400</td>
</tr>
</tbody>
</table>

There are 3 routes on the bus line. About how many total passengers are there? Which route is the most traveled?

**Spiral Review**

Write each percent as a decimal. (Lesson 9–3)

4. 45% ______

5. 32% ______

6. 164% ______
Solve. Use the *solve a simpler problem* strategy.

1. There are 400 students in Tiffany’s soccer league. Tiffany did a survey of a random sample of 80 students. If 58 of the 80 said they preferred water to juice at halftime, how many students out of 400 would be likely to say the same response?

2. There are 280 families who are members at the Recreation Center. Sheldon conducted a survey of a random sample of 40 families. Of the 40 families, 25 said they would like extended pool hours. Sheldon used the survey to predict that 125 families would prefer extended pool hours. Is his prediction correct? Explain.

3. There are 98 sixth graders at Carter Middle School. A teacher conducted a survey of a random sample of 18 sixth graders to find out how many spend more than one hour a week reading. Of the 18 students, 14 said that they spend more than one hour a week reading. The teacher used the survey to predict that 72 sixth graders at the school spend more than one hour a week reading. Is her prediction correct? Explain.

4. There are 200 members of a chess club. Alfonso conducted a survey of a random sample of 60 members. Of the 60 members, 45 said they would like matches scheduled once a month. Alfonso used the survey to predict that 100 members would like monthly matches. Is his prediction correct? Explain.
Estimating with Percents

When you estimate the percent of a number, you are solving a simpler problem.

Estimate the percent of a number.

Estimate 48% of 197.

48% is close to 50% or $\frac{1}{2}$. Round 197 to 200.

$\frac{1}{2}$ of 200 is 100. $\frac{1}{2}$ or half means to divide by 2.

So, 48% of 197 is about 100.

Check your answer by using the related multiplication fact.

$100 \times 2 = 200$, which is correct!

Estimate each percent.

1. 22% of 98 ______
2. 46% of 257 ______
3. 18% of 192 ______
4. 67% of 99 ______
5. 29% of 208 ______
6. 79% of 305 ______

Estimate the percent that is shaded.

7. 

8. 

9. You buy a shirt that is priced at $25. It is on sale for 25% off. About how much money will you save?
Estimate each percent.

1. 29% of 190 ______
2. 18% of 48 ______
3. 87% of 155 ______
4. 44% of 205 ______
5. 74% of 99 ______
6. 52% of 295 ______
7. 38% of 248 ______

Estimate the percent that is shaded.

8. [Diagram of a pie chart with some sections shaded.]

Estimate your percentage of correct answers.


11. If you see a sweatshirt on sale for 15% off, and the sweater is $19.99, estimate the discount.
Estimate each percent.

1. 32% of 99 ______
2. 23% of 149 ______
3. 9% of 248 ______
4. 49% of 202 ______

Estimate the percent that is shaded.

5. ______
6. ______

7. If you see a hat on sale for 45% off, and the hat is $24.99, estimate the discount. ______

Solve. Use the solve a simpler problem strategy. (Lesson 9-4)

8. If your dog needs to be walked 5 times a day, how many times does it need to be walked in a week? ______

9. Jamie’s mom wants to leave a 25% tip for a $38.50 restaurant bill. About how much money should she leave? ______
Estimate each shaded area and write your answer as a percent.

1.

2.

Estimate.

3. Savannah wants to save 30% of her allowance. If her allowance is $35 a month, about how much should she save per month?

4. According to a recent survey, about 42% of kids say they don’t get enough sleep. Out of a school with 978 kids, predict the number who would say they do get enough sleep.

5. There are about 10 percent more boys born for every girl born in the world. Predict the number of boys that will be born if the number of girls born is 98,877.

6. You buy a jacket that is priced at $125. It is on sale for 45% off. About how much will you pay for the jacket?
Using 100%, 10%, and 1%

Many people think of 100%, 10%, and 1% as key percents.

100% is the whole. 100% of 24 = 1 × 24, or 24.
10% is one tenth of the whole. 10% of 24 = 0.1 × 24, or 2.4.
1% is one hundredth of the whole. 1% of 24 = 0.01 × 24, or 0.24.

Find the percent of each number.

1. 100% of 8,000 ______
2. 10% of 8,000 ______
3. 1% of 8,000 ______
4. 10% of 640 ______
5. 100% of 720 ______
6. 1% of 290 ______
7. 1% of 50 ______
8. 100% of 33 ______
9. 10% of 14 ______
10. 1% of 9 ______

This is how you can use the key percents to make some computations easier.

3% of 610 = ______. 5% of 24 = ______.
1% of 610 = 6.1, 10% of 24 = 2.4,
so 3% of 610 = 3 × 6.1, or 18.3. so 5% of 24 = \frac{1}{2} of 2.4, or 1.2.

Find the percent of each number.

11. 2% of 140 ______
12. 8% of 2,100 ______
13. 20% of 233 ______
14. 70% of 90 ______
15. 30% of 4,110 ______
16. 5% of 38 ______
17. 50% of 612 ______
18. 25% of 168 ______
19. 2.5% of 320 ______
20. 2.5% of 28 ______
Reteach

Percent of a Number

To find the percent of a number, write the percent as a fraction or decimal and multiply. Remember, “of” means “times.”

**Find 40% of 20.**

\[
40\% = \frac{40}{100} = \frac{2}{5}
\]
\[
\frac{2}{5} \times 20 = 8
\]
40% of 20 = 8

**Find 60% of $9.00.**

\[
60\% = \frac{60}{100} = 0.60, \text{ or } 0.6
\]
\[
0.6 \times $9.00 = $5.40
\]
60% of $9.00 = $5.40

**Find 140% of 20.**

\[
140\% = \frac{140}{100} = \frac{7}{5}
\]
\[
\frac{7}{5} \times 20 = 28
\]
140% of 20 = 28

**Find 160% of $9.00**

\[
160\% = \frac{160}{100} = 1 \frac{60}{100} = 1.60, \text{ or } 1.6
\]
\[
1.6 \times $9.00 = $14.40
\]
160% of $9.00 = $14.40

Find the percent of each number.

1. 25% of 24

\[
25\% = \underline{______} = \underline{______}
\]
\[
\underline{______} \times 24 = \underline{______}
\]

2. 150% of 38

\[
150\% = \underline{______} = \underline{______}
\]
\[
\underline{______} \times 38 = \underline{______}
\]

3. 50% of $8.00

\[
50\% = \underline{______} = \underline{______}
\]
\[
0. \underline{______} \times $8.00 = \underline{______}
\]

4. 120% of $20.00

\[
120\% = \underline{______} = \underline{______}
\]
\[
\underline{______} \times $20.00 = \underline{______}
\]

5. 140% of 40

6. 80% of $14.00
Skills Practice

Percent of a Number

Find the percent of each number.

1. 25% of 48 _____
2. 30% of 50 _____
3. 10% of 50 _____
4. 45% of 40 _____
5. 50% of 64 _____
6. 20% of 85 _____
7. 40% of 60 _____
8. 95% of 80 _____
9. 65% of 60 _____
10. 120% of 50 _____
11. 150% of 64 _____
12. 125% of 60 _____
13. 190% of 70 _____
14. 140% of $8 _____
15. 120% of $7 _____
16. 180% of $5 _____
17. 225% of 84 _____
18. 55% of $7 _____
19. 10% of 90 _____
20. 20% of 10 _____
21. 20% of 60 _____

Solve.

22. A football team wins 80% of the 10 games it played. A basketball team wins 45% of 20 games. Which team has won more games? Explain.
Find the percent of each number.

1. 20% of 160 ______ 2. 9% of 27 ______
3. 110% of 80 ______ 4. 55% of 150 ______

Solve.

5. You are shopping and see a 70% off clearance sale. If the original price on the sweatshirt is $27.50, what is the discount?

6. The sale price of a pair of shorts is $8.50. If the sales tax is 6%, what is the amount of tax for the pair of shorts?

Estimate each percent. (Lesson 9–5)

7. 19% of 98 ______ 8. 75% of 31 ______
9. 34% of $91 ______ 10. 78% of 345 ______
11. Estimate the area of your yard if it is 31 feet by 19 feet.
Problem-Solving Practice
Percent of a Number

Solve.

1. Noah bought a shirt that was on sale for 80% of its regular price of $20.99. To the nearest cent, what was the sale price?

2. Roberto took a test that contained 25 questions. He received an 88% on the test. How many questions did he answer correctly?

3. Hillary uses propane as a fuel to heat her home. When the gas company comes to fill the 500-gallon tank, they add propane until the tank is 85% full. After a delivery, how many gallons of propane are in the tank?

4. Barbara’s class was investigating methods used to heat homes in her town. She reported that 35% of the homes are heated by electricity. If there are 546 homes in her town, how many homes are heated by electricity? Round off your answer to the nearest whole number.

5. Shanta shopped for new clothes. She found the best deal at Gillian’s Department store, where clothes were 90% of their original cost. A few days later these new prices were reduced by another 10%. How much did she pay for a jacket that originally cost $115.00? Write your answer to the nearest penny.

6. Chelsea plays on a softball team that has won 75% of its games. Her sister Catrina plays on a softball team that has won 80% of its games. If Chelsea’s team has played 28 games, and Catrina’s team has played 25 games, which team won more games? How many more games did they win?
Find the Percent One Number Is of Another

Find the answers, then put the corresponding letter above each answer at the bottom of the page. Not all letters will be used.

T. 12 is what percent of 60? ______
A. What percent of 2 is 8? ______
P. What percent of 800 is 4? ______
M. 16 is what percent of 400? ______
L. What percent of 55 is 33? ______
J. 121 is what percent of 968? ______
H. 36 is what percent of 16? ______
V. What percent of 72 is 27? ______
M. What percent of 40 is 9? ______
A. 52 is what percent of 78? ______
S. 1 is what percent of 250? ______
O. What percent of 64 is 288? ______
R. What percent of 240 is 80? ______
A. 98 is what percent of 140? ______

What is the largest desert in the world?

0.4% 70% 225% 400% 33\(\frac{1}{3}\)% 66\(\frac{2}{3}\)%

How can you determine if an answer will be greater than 100%?
Choose a Strategy

Philip and his family caught a lot of fish over a one-week period when they were on vacation.

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Number of Fish Caught

Philip fished on Monday, Wednesday, Friday, and Saturday. His sister, Nancy, fished on Tuesday, Thursday, Friday, and Sunday. What percent of the total fish Philip caught did he catch on Saturday?

**Step 1**
Understand

Be sure you understand the problem.

Philip fished on Monday, Wednesday, Friday, and Saturday.

Nancy fished on Tuesday, Thursday, Friday, and Sunday.

**Step 2**
Plan

Make a plan.

Choose a strategy.

You can use a four-step plan. Decide what facts you know. Plan what you will do and in what order. Use your plan to solve the problem. Then check your solution to make sure it makes sense.

- Work backward.
- Look for a pattern.
- Solve a simpler problem.

**Step 3**
Solve

Carry out your plan.

Count the number of fish Philip caught.

Philip caught $3 + 1 + 0 + 4 = 8$

On Saturday, Philip caught 4 fish.

To find the percent, divide 4 by 8.

$4 \div 8 = 0.5$ or 50%

Philip caught 50% of his fish on Saturday.
Reteach

Problem-Solving Investigation  (continued)

Step 4
Check

Is the solution reasonable?

Reread the problem.

How can you check your answers?

______________________________

______________________________

Use any strategy shown below to solve.

• Look for a pattern.  • Work backward.  • Solve a simpler problem.

1. Aisha read 24 books over the summer. Jamil read half that many. Taye read twice as many as Aisha. Zina read three times as many as Jamil. Shawon read a third of the number of books that Zina read. Which two students read the same number of books?

2. Hugo spent some money on school supplies. He received $5 back from the cashier. If he spent $95, how much money did he give the cashier?
Choose the Best Strategy

Use any strategy shown below to solve.

• Look for a pattern.   • Work backward.  • Solve a simpler problem.

1. Digna packed up 10 dinners to deliver from the food shelter. Isabel packed twice as many dinners as Digna. Rosa packed up $\frac{1}{4}$ the amount of meals as Isabel. Juanita packed up three times as many dinners as Rosa. How many dinners in all did the girls prepare? Who prepared the most dinners? Who prepared the least number of dinners?

2. Refer back to question number 1. If it takes the girls 1 hour to deliver 5 meals, in how many hours will they deliver all of the meals? If they break up into two groups, with 2 girls in each group and work at the same rate, how long will it take them to deliver the meals?

3. The Perez family matches the amount of money each of their children puts into their own savings account by 50%. If Luisa put $40 a week into her savings account, how much will she have saved up at the end of the month?

4. Keshia bought a new outfit. She chooses a top that cost $48.95 and leather boots that were twice as much as the top. The pants were one third of the price of the boots. If she received $20.52 back in change, how much money did she give to the cashier?
Choose the Best Strategy
Use any strategy shown below to solve.
• Look for a pattern.
• Work backward.
• Solve a simpler problem.

Use the following Venn diagram to answer questions 1–3.

1. How many total people played soccer?

2. How many people played only soccer and baseball?

3. How many swam and played baseball only?

4. How many played baseball, swam, and played soccer?

5. How many people only swam and played soccer?

Spiral Review

Find the percent of each number. (Lesson 9–6)

6. 6% of 56

7. 60% of 60

Solve.

8. What is 20% of 465?

9. 36% of 234 is what number?
Bargain Betty loves to get a good deal. She will not buy anything unless it is on sale. So, she decided to go to Bobby's Bargain Basement where everything is on sale. The sales tax rate is 6.5%.

<table>
<thead>
<tr>
<th>Bobby's Bargain Basement</th>
</tr>
</thead>
<tbody>
<tr>
<td>skirts $26.50 x 40% off</td>
</tr>
<tr>
<td>shirts $24.00 x 25% off</td>
</tr>
<tr>
<td>shoes $28.60 x 15% off</td>
</tr>
<tr>
<td>socks $7.20 x 35% off</td>
</tr>
<tr>
<td>pants $27.40 x 30% off</td>
</tr>
<tr>
<td>coats $34.00 x 45% off</td>
</tr>
</tbody>
</table>

Answer the following questions using Bobby’s price list. Then find the answers at the bottom of the page. Put the corresponding letter above the answer to find two words describing Betty.

- **R.** What is the discount on shoes?  
- **I.** What is the sale price of boots?  
- **R.** What is the sale price of a pair of socks?  
- **A.** What is the sale price for a pair of pants?  
- **T.** What is the discount on shirts?  
- **L.** What is the discount on coats?  
- **F.** What is the discount on robes?  
- **F.** What is the sale price for a sweater?  
- **U.** What is the discount on jeans?  
- **T.** What is the discount on dresses?  
- **H.** What is the total price of a robe including the sales tax?  
- **G.** What is the total price of a dress and a skirt including the sales tax?  

<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$25.92</td>
<td>$4.29</td>
<td>$1.85</td>
<td>$11.04</td>
<td>$19.18</td>
<td>$15.30</td>
<td>$33.92</td>
<td></td>
</tr>
<tr>
<td>$6.00</td>
<td>$28.53</td>
<td>$4.68</td>
<td>$26.40</td>
<td>$1.41</td>
<td>$15.95</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Grade 5  
42  
Chapter 9
If you were to spin this spinner, it could land on A, B, or C. A, B, and C are the possible outcomes.

\[ P(\text{event}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}} \]

\[ P(A) = \frac{4}{7} \rightarrow \text{There are 4 regions marked “A”.} \]

\[ P(A) = \frac{4}{7} \rightarrow \text{There are 7 regions.} \]

Remember to simplify fractions when necessary.

---

**Use the spinner at the right for problems 1–3.**

1. \( P(X) = \) ______

2. \( P(Z) = \) ______

3. \( P(X \text{ or } Z) = \) ______

**Use the spinner at the right for problems 4–6.**

4. \( P(P) = \) ______

5. \( P(Q) = \) ______

6. \( P(P \text{ or } R) = \) ______
Skills Practice

Probability

Use the spinner for problems 1–3.

1. \( P(\text{striped}) = \) _____

2. \( P(\text{speckled}) = \) _____

3. \( P(\text{speckled or white}) = \) _____

Use the bag of cubes for problems 4–6.

4. \( P(\text{dots}) = \) _____

5. \( P(\text{not stripes}) = \) _____

6. \( P(\text{stars or stripes}) = \) _____
The bag of cubes that is shown contains 4 stars, 2 fives, and 1 striped cube. You will pick only one cube. Find each probability. Write the answer as a fraction and a percent rounded to the nearest whole number.

1. \( P(\text{star}) \)

2. \( P(\text{stripe}) \)

3. \( P(\text{not a dot}) \)

4. \( P(\text{star or dot}) \)

Spiral Review

Use any strategy shown below to solve. (Lesson 9–7)

- Look for a pattern.
- Work backward.
- Solve a simpler problem.

5. The softball team has won 4 times as many games as they lost. If they lost 6 games, how many games did they play?
Problem-Solving Practice

Probability

Solve.

1. What is the probability that Lindy will roll a number divisible by 3 on a number cube with numbers 1 through 6?

2. How would you describe the probability that Adrian will roll the number 7 on a number cube?

3. Wayne went to a banquet. At the end of the meal, equal numbers of pieces of blueberry, apple, and cherry pie were passed out randomly to the dinner guests. What is the probability that Wayne will receive apple pie? What is the probability that he will receive either apple or cherry pie?

4. Lavonne’s mother has brown eyes, and her father has blue eyes. Lavonne has brown eyes, and her husband has blue eyes. She knows that her children are equally likely to have brown or blue eyes. What is the probability that her first child will have blue eyes? If her first child has brown eyes, what is the probability that the second child will have blue eyes?

5. Sara has a spinner divided into 12 sections. Each section is numbered, starting with 1 and ending with 12. Sara spins the spinner. What is the probability that she will spin a prime number? What is the probability that she will spin an odd number? What is the probability that she will spin a number divisible by 5? What is the probability that she will spin a multiple of 3? What is the probability that she will spin a multiple of 4 or 5?

6. Eduardo cleaned out his school locker. At the bottom of the locker, he found 5 pencils with erasers, 1 pencil missing its eraser, 2 red pens, 3 black pens, and 4 blue pens. He placed all these items in a box and mixed them up. If he closes his eyes and picks one item out of the box, what is the probability that it is a pencil? What is the probability that it is a pen? What is the probability that it is a pencil with an eraser or a black pen?
Working Forward with Probabilities

Suppose that you are given this information about rolling a number cube.

\[ P(1) = \frac{1}{2} \quad P(3) = \frac{1}{3} \quad P(5) = \frac{1}{6} \]

Can you tell what numbers are marked on the faces of the cube? Work backward. Since a cube has six faces, express each probability as a fraction whose denominator is 6.

\[ P(1) = \frac{3}{6} \quad P(3) = \frac{2}{6} \quad P(5) = \frac{1}{6} \]

So, the cube must have three faces marked with the number 1, two faces marked 3, and one face marked 5.

Each set of probabilities is associated with rolling a number cube.

What numbers are marked on the faces of each cube?

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

2. \( P(1) = \frac{1}{6} \)  
   \( P(4) = \frac{1}{6} \)  
   \( P(2 \text{ or } 3) = \frac{2}{3} \)  

3. \( P(1 \text{ or } 2) = \frac{5}{6} \)  
   \( P(\text{factor of } 4) = 1 \)  
   \( P(1, 2, \text{ or } 3) = 1 \)  

Each set of probabilities is associated with the spinner shown at the right. How many sections of each color are there?

4. \( P(\text{red}) = \frac{1}{2} \)  
   \( P(\text{blue}) = \frac{1}{4} \)  
   \( P(\text{green}) = \frac{1}{8} \)  
   \( P(\text{black}) = \frac{1}{8} \)  

5. \( P(\text{yellow}) = \frac{5}{8} \)  
   \( P(\text{purple}) = \frac{1}{8} \)  
   \( P(\text{green}) = 0 \)  
   \( P(\text{white}) = \frac{1}{4} \)
The set of all possible outcomes is called a sample space. There are several ways to find the sample space of different situations.

**Use a List to Find Sample Space**

At the fair you decide to go on the bumper cars, the carousel, and the roller coaster. List all the different orders that you can go on each ride, one time each.

Make an organized list. Use B for bumper cars, C for carousel, and R for roller coaster. Use each letter exactly once.

BCR  BRC  CBR  CRB  RBC  RCB

So there are 6 different orders you can go on each of the rides.

**Use a Tree Diagram to Find Probability**

Use a tree diagram to find how many pizzas are possible from a choice of thin or thick pizza crust and a choice of pepperoni, mushrooms, or green peppers.

List each crust type. Then pair each crust choice with each topping choice.

<table>
<thead>
<tr>
<th>Crust</th>
<th>Topping</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>thin crust (N)</td>
<td>pepperoni (P)</td>
<td>NP</td>
</tr>
<tr>
<td></td>
<td>mushrooms (M)</td>
<td>NM</td>
</tr>
<tr>
<td></td>
<td>green pepper (G)</td>
<td>NG</td>
</tr>
<tr>
<td>thick crust (K)</td>
<td>pepperoni (P)</td>
<td>KP</td>
</tr>
<tr>
<td></td>
<td>mushrooms (M)</td>
<td>KM</td>
</tr>
<tr>
<td></td>
<td>green pepper (G)</td>
<td>KG</td>
</tr>
</tbody>
</table>

There are six possible pizzas.

Make an organized list or draw a tree diagram to show the sample space for each situation.

1. How many sandwich and fruit combinations can be made if you can choose from a turkey sandwich or ham sandwich with an apple, orange, or banana?
2. In how many ways can Kelly read 4 books, assuming she reads each book once?
Skills Practice

Sample Spaces

Make an organized list or tree diagram to show the sample space.

1. How many choices do you have for your lunch if you pick either an orange or apple and pretzels or carrots to go with your sandwich?

2. You have a friend over to play. You decide to play cards, have a snack, and then watch a movie. How many different ways can you complete your choices?

3. You are getting ready for school and you only have a choice of a white, purple, or blue shirt and either a pair of jeans, shorts, or a skirt. How many possible outfits can you have?

For the following exercises, toss a number cube and spin the spinner shown.

4. Find the number of possible outcomes.

5. Find the $P(4, \text{less than } 3)$.

6. What is $P(1, 3)$?

7. $P(\text{even, less than } 5)$
Make an organized list or tree diagram to show the sample space.

1. How many choices do you have for your lunch if you pick either ham or roast beef with cheese, tomatoes, or onions to go on your sandwich?

2. You go to a playground. You decide to climb across the monkey bars, go down the slide, and climb the rock wall. How many different ways can you complete your choices?

3. You are getting ready for school, and you only have a choice of white, black, or yellow shoes and either a pair of jeans or shorts. How many possible combinations can you have?

Spiral Review

(Lesson 9–8)

Use the spinner below to answer questions 4 and 5. Find each probability. Write the answer as a fraction and a percent rounded off to the nearest whole number.

4. \( P(X) \)  

5. \( P(Z) \)
Problem-Solving Practice

Sample Spaces

Use the spinners below for Exercises 1–5. Spin each only once.

1. How many outcomes are possible for spinning both spinners?

2. \( P(1, A) \)

3. \( P(\text{even number, consonant}) \)

4. \( P(\text{not 3, vowel}) \)

5. \( P(1 \text{ or } 6, A) \)
Suppose that you spin the two spinners below. What is the probability that the sum of the numbers you spin is 5?

To find this probability, you first need to count the outcomes. One way to do this is to use a table of sums like the one at the right. From the table, it is easy to see that there are 24 outcomes. It is also easy to see that in 4 of these outcomes, the sum of the numbers is 5. So, the probability that the sum of the numbers is 5 is \( \frac{4}{24} \); or \( \frac{1}{6} \).

Use the spinners and the table above. Find each probability.

1. \( P(\text{sum is 8}) \) _________
2. \( P(\text{sum is greater than 6}) \) _________
3. \( P(\text{sum is 12}) \) _________
4. \( P(\text{sum is less than or equal to 10}) \) _________

Suppose you toss two number cubes. Each cube is marked with 1, 2, 3, 4, 5, and 6 on its faces. Find each probability. \( \text{(Hint: On a separate sheet of paper, make a table like the one above.)} \)

5. \( P(\text{sum is a prime number}) \) _________
6. \( P(\text{sum is a factor of 12}) \) _________
7. \( P(\text{sum is greater than 12}) \) _________
8. \( P(\text{sum is less than 6}) \) _________

9. CHALLENGE Here is a set of probabilities associated with two spinners.

\[
P(\text{sum is 4}) = \frac{1}{6} \quad P(\text{sum is 6}) = \frac{1}{3} \\
P(\text{sum is 8}) = \frac{1}{3} \quad P(\text{sum is 10}) = \frac{1}{6}
\]

In the space at the right, sketch the two spinners.
Every sixth student who walked into the school was asked how he or she got to school.

1. What is the probability that a student at the school rode a bike to school?

\[ P(\text{ride bike}) = \frac{\text{number of students who rode a bike}}{\text{number of students surveyed}} \]

\[ = \frac{10}{40} = \frac{1}{4} \]

So, \( P(\text{ride bike}) = \frac{1}{4} \), 0.25, or 25%.

2. There are 360 students at the school. Predict how many bike to school.

Write equivalent ratios. Let \( s = \) number of students who will ride a bike.

\[ \frac{10}{40} = \frac{s}{360} \]

Since \( s = 90 \), 90 students will ride a bike to school.

**Use the following information and the table shown. Every tenth student entering the school was asked which one of the four subjects was his or her favorite.**

1. Find the probability that any student attending school prefers science.

2. There are 400 students at the school. Predict how many students would prefer science.
For Exercises 1–2, use the following information.

250 people were asked to name their favorite vacation spot.

1. Find the probability that a person chose an amusement park.

2. What is the probability that the next person will choose the beach?

For Exercises 3–4, use the following information.

Shoppers at a grocery store are asked whether or not they own a pet.

3. How many people were surveyed?

4. What is the probability that a person owns a pet?

For Exercises 5–8, use the table and the following information. A survey of students’ favorite sports was taken from a random sample of students in a school. The results are shown in the table.

5. What is the size of the sample?

6. There are 550 students in the school. Predict how many students at the school prefer track and field.

7. What is the probability that a student will prefer volleyball?

8. What is the probability that a student will prefer soccer?
For Exercises 1 and 2, use the following information.

On a quiz show, a contestant correctly answered 9 of the last 12 questions.

1. Find the probability of the contestant correctly answering the next question.

2. Suppose the contestant continues on the show and tries to correctly answer 24 questions. About how many questions would you predict the contestant to correctly answer?

Spiral Review  (Lesson 9–9)

Use the spinners below to answer questions 3–6. Use a tree diagram to find each probability. Write the answer as a fraction and a percent rounded to the nearest whole number.

3. \( P(\text{red, 2 or 3}) \)

4. \( P(\text{green, odd number}) \)

5. \( P(\text{blue, less than 5}) \)

6. \( P(\text{not green, greater than 4}) \)
Problem-Solving Practice

Making Predictions

For Exercises 1–3, use the table of results of Jeremy’s survey of favorite kinds of movies.

<table>
<thead>
<tr>
<th>Favorite Movie Type</th>
<th>Type</th>
<th>People</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drama</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Foreign</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Comedy</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Action</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

1. How many people did Jeremy use for his sample?

2. If Jeremy were to ask any person to name his or her favorite type of movie, what is the probability that it would be comedy?

3. If Jeremy were to survey 250 people, how many would you predict would name comedy?

For Exercises 4–7, use the table of results of the Better Sleep Council’s survey of Americans to find the most important factors for good sleep.

<table>
<thead>
<tr>
<th>Most Important Factors for Good Sleep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good Mattress</td>
</tr>
<tr>
<td>Daily Exercise</td>
</tr>
<tr>
<td>Good Pillows</td>
</tr>
<tr>
<td>Healthy Diet</td>
</tr>
<tr>
<td>Other Factors</td>
</tr>
</tbody>
</table>

4. Predict how many people out of 400 would say that a good mattress is the most important factor.

5. What is the probability that any person chosen at random would not say that a healthy diet is the most important factor?

6. Suppose 250 people were chosen at random. Predict the number of people that would say good pillows are the most important factor.

7. What is the probability that any person chosen at random would say that daily exercise is the most important factor for good sleep?
People who play games of chance often talk about **odds**. You can find the **odds in favor** of an event by using this formula.

\[
\text{odds in favor} = \frac{\text{number of ways an event can occur}}{\text{number of ways the event cannot occur}}
\]

With the spinner shown at the right, for example, this is how you would find the odds in favor of the event **prime number**.

There are four prime numbers \((2, 3, 5, 7)\). → \(\frac{4}{6} = \frac{2}{3}\)

Six numbers are not prime \((1, 4, 6, 8, 9, 10)\). → \(\frac{6}{2} = \frac{3}{1}\)

The odds in favor of the event **prime number** are \(\frac{2}{3}\) or 2 to 3.

**Suppose that you spin the spinner shown above. Find the odds in favor of each event.**

1. number greater than 3 ______
2. number less than or equal to 6 ______
3. even number ______
4. odd number ______
5. multiple of 3 ______
6. factor of 10 ______

To find the **odds against** an event, you use this formula.

\[
\text{odds against} = \frac{\text{number of ways an event cannot occur}}{\text{number of ways the event can occur}}
\]

**Suppose that you roll a number cube with 1, 2, 3, 4, 5, and 6 marked on its faces. Find the odds against each event.**

7. number less than 5 ______
8. number greater than or equal to 2 ______
9. even number ______
10. odd number ______
11. number divisible by 3 ______
12. factor of 12 ______
## Individual Progress Checklist

<table>
<thead>
<tr>
<th>B</th>
<th>D</th>
<th>M</th>
<th>Goal</th>
<th>Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>express percents as fractions and fractions as percents</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>sketch and analyze circle graphs</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>express percents as decimals and decimals as percents</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>estimate and find the percent of a number</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>solve problems by solving a simpler problem</td>
<td></td>
</tr>
</tbody>
</table>

### Notes

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
Write each fraction in simplest form. If the fraction is already in simplest form, write simplest form.

1. \(\frac{50}{100}\)
2. \(\frac{1}{7}\)
3. \(\frac{8}{24}\)
4. \(\frac{15}{27}\)

Solve.

5. \(\frac{1}{a} = \frac{2}{12}\)
6. \(\frac{2}{15} = \frac{4}{f}\)
7. \(\frac{3}{12} = \frac{y}{48}\)
8. \(\frac{5}{10} = \frac{b}{20}\)
9. \(\frac{9}{10} = \frac{27}{w}\)
10. \(\frac{4}{8} = \frac{24}{w}\)

11. If baking 1 enchilada casserole requires 2 cups of cheese, how many cups of cheese are needed to bake 5 enchilada casseroles?

Round each number to the nearest ten.

12. 51
13. 67
14. 23
15. 46
16. 89
17. 18

18. Katie has saved $42 dollars towards her new camera. To the nearest ten, how much has she saved?
Write as a fraction or a percent.

1. 52%
2. \(\frac{17}{20}\)

Write as a decimal or a percent.

3. 123%
4. 0.67

Refer to the circle graph and answer questions 5–7.

5. According to the circle graph, what is the least favorite spectator sport?
6. Which two sports are the most favorite?
7. Which sport was chosen by \(\frac{1}{5}\) of the spectators as their favorite?

Find each probability.

8. A number cube is rolled. What is \(P(\text{odd})\)? Write the number as a percent.

Estimate each percent.

9. 50% of 158
10. 18% of 102
Write each percent as a fraction.

1. 78%  
2. 53%  
3. 8%  
4. 24%  
5. 31%

Write each fraction or mixed number as a percent.

6. \(\frac{23}{100}\)  
7. \(\frac{6}{10}\)  
8. \(\frac{88}{100}\)  
9. \(3\frac{4}{10}\)  
10. \(2\frac{5}{10}\)

Write each percent as a decimal or each decimal as a percent.

11. 62%  
12. 88%  
13. 125%  
14. 0.28  
15. 0.54  
16. You and your team are choosing a new color for your uniforms. Using the circle graph below, tell what the majority would like.

   **Favorite Color of Uniform**

   - Red
   - Green
   - Blue

   1.  
   2.  
   3.  
   4.  
   5.  
   6.  
   7.  
   8.  
   9.  
   10.  
   11.  
   12.  
   13.  
   14.  
   15.  
   16.  

Copyright © Macmillan/McGraw-Hill, a division of The McGraw-Hill Companies, Inc.
Solve. Use the *solve a simpler problem* strategy.

1. 8 people can make 16 hats in 30 minutes. How many hats can 32 people make in one hour?

Estimate each percent.

2. 43% of 220
3. 8% of 129
4. 13% of 175
5. 45% of 230

Find the percent of each number.

6. 7% of 40
7. 17% of 90
8. 135% of 70
9. If you play 12 games and you win 75% of them, how many games did you win?

10. A national park is 75,000 square miles. If it is 85% trees, how many square miles of it is *not* trees?

11. You scored 80% on a test that had 40 questions. How many did you answer correctly?
Quiz 3 (Lessons 9–7 through 9–10)

Solve.

For exercises 1–4, use the spinner below. Find each probability. Write each answer as a fraction and percent rounded to the nearest whole number.

1. \( P(\text{triangle}) \)
2. \( P(\text{circle}) \)
3. \( P(\text{square}) \)
4. \( P(\text{heptagon}) \)

5. If you play 15 games and you win 60% of them, how many games did you win?

6. A field is 25,000 square miles. If it is 15% trees, how many square miles of it is without trees?

7. What is the total number of errors you had on a test if you received a score of 82% out of 50 questions?

8. Suppose you have a choice of going to the movies, a baseball game, or a concert on either Friday night or Saturday night. How many outcomes are possible?

9. Using the spinner above, how many times would you expect to land on a triangle if you spin the spinner 30 times?
Write each percent as a fraction or mixed number and as a decimal.

1. 34%
2. 27%
3. 159%

Use the circle graphs below to answer questions 4–5.

4. Look at the circle graphs for Group A and Group B. Which is the most popular place for a vacation for Group A? Which is the most popular for Group B?

5. What two vacation spots make up 50% in Group A? Group B?

Write each decimal as a percent.

6. 0.74
7. 0.2
8. 0.38
9. Estimate 51% of 197.

Solve.

10. Your alarm rings every day. How many times does it ring in 6 months if each of the months has 30 days?
Match each word to its definition. Write your answers on the lines provided.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. percent</td>
<td><strong>A.</strong> a diagram of all the possible outcomes of an event or series of events or experiments</td>
<td></td>
</tr>
<tr>
<td>2. probability</td>
<td><strong>B.</strong> a graph in the shape of a circle in which data are represented by parts of a circle</td>
<td></td>
</tr>
<tr>
<td>3. sample space</td>
<td><strong>C.</strong> a possible result of an experiment</td>
<td></td>
</tr>
<tr>
<td>4. tree diagram</td>
<td><strong>D.</strong> a special ratio that compares a number to 100 using the symbol %</td>
<td></td>
</tr>
<tr>
<td>5. circle graph</td>
<td><strong>E.</strong> a number between 0 and 1 that measures the likelihood of an event happening</td>
<td></td>
</tr>
<tr>
<td>6. outcome</td>
<td><strong>F.</strong> the set of all possible outcomes in a probability experiment</td>
<td></td>
</tr>
<tr>
<td>7. simple event</td>
<td><strong>G.</strong> probability based on what should happen under perfect conditions</td>
<td></td>
</tr>
<tr>
<td>8. random</td>
<td><strong>H.</strong> equally likely to occur</td>
<td></td>
</tr>
<tr>
<td>9. complementary events</td>
<td><strong>I.</strong> probability based on what actually happens in an experiment</td>
<td></td>
</tr>
<tr>
<td>10. theoretical probability</td>
<td><strong>J.</strong> the group being studied in a survey</td>
<td></td>
</tr>
<tr>
<td>11. experimental probability</td>
<td><strong>K.</strong> one outcome or a collection of outcomes</td>
<td></td>
</tr>
<tr>
<td>12. survey</td>
<td><strong>L.</strong> a part of a population used in a survey to represent the whole population</td>
<td></td>
</tr>
<tr>
<td>13. population</td>
<td><strong>M.</strong> two events that are the only ones that can happen</td>
<td></td>
</tr>
<tr>
<td>14. sample</td>
<td><strong>N.</strong> a method of collecting data</td>
<td></td>
</tr>
</tbody>
</table>
Collect 20 paper clips, 10 erasers, and 3 jars. In the first jar, put 3 erasers and 7 paper clips. In the second jar, put 5 erasers and 5 paper clips. Finally, in the third jar, put 2 erasers and 8 paper clips.

Read each question aloud to the student. Then write the student’s answers on the lines below the question.

1. Which jar has the highest percentage of paper clips?

2. Which jar has the lowest percentage of paper clips?

3. If you added the percentages of paper clips for each jar, would it equal 100%?

4. Tell how you got your answer.

5. If you added the two highest percentages of paper clips, what percentage would you have?

6. Tell how you got your answer.
7. On the chalkboard or a piece of paper, draw a circle graph that represents the following survey results for a survey titled “What is Your Favorite Sport to Play”: Golf 9%, Baseball 24%, Soccer 16%, Football 31%, Basketball 14% and Ice Hockey 6%.

8. If 450 youth responded to the survey, how many of them said baseball was their favorite sport to play?

9. Tell how you got your answer.

10. If 450 youth responded to the survey, how many of them said soccer was their favorite sport to play?

11. If you add the percentage for golf with the percentage for baseball, what percent do you get?

12. Tell how you got your answer.
# Chapter Project Rubric

<table>
<thead>
<tr>
<th>Score</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| 3     | Student successfully completed the chapter project.  
      | Student demonstrated appropriate use of chapter information in completing the chapter project. |
| 2     | Student completed the chapter project with partial success.  
      | Student partially demonstrated appropriate use of chapter information in completing the chapter project. |
| 1     | Student did not complete the chapter project or completed it with little success.  
      | Student demonstrated very little appropriate use of chapter information in completing the chapter project. |
| 0     | Student did not complete the chapter project.  
      | Student demonstrated inappropriate use of chapter information in completing the chapter project. |
### Foldables Rubric

**Percent**

<table>
<thead>
<tr>
<th>Score</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| 3     | Student properly assembled Foldables graphic organizer according to instructions.  
        Student recorded information related to the chapter in the manner directed by the Foldables graphic organizer.  
        Student used the Foldables graphic organizer as a study guide and organizational tool. |
| 2     | Student exhibited partial understanding of proper Foldables graphic organizer assembly.  
        Student recorded most but not all information related to the chapter in the manner directed by the Foldables graphic organizer.  
        Student demonstrated partial use of the Foldables graphic organizer as a study guide and organizational tool. |
| 1     | Student showed little understanding of proper Foldables graphic organizer assembly.  
        Student recorded only some information related to the chapter in the manner directed by the Foldables graphic organizer.  
        Student demonstrated little use of the Foldables graphic organizer as a study guide and organizational tool. |
| 0     | Student did not assemble Foldables graphic organizer according to instructions.  
        Student recorded little or no information related to the chapter in the manner directed by the Foldables graphic organizer.  
        Student did not use the Foldables graphic organizer as a study guide and organizational tool. |
Chapter Test, Form 1

Read each question carefully. Write your answer on the line provided.

1. Find the percent for the shaded part.
   - A. 93%  
   - B. 61%  
   - C. 41%  
   - D. 39%  
   1. _____

2. Write 0.15 as a percent.
   - F. 0.15%  
   - G. 1.5%  
   - H. 15%  
   - J. 85%  
   2. _____

3. Write 525% as a mixed number.
   - A. $5\frac{1}{4}$  
   - B. $5\frac{1}{3}$  
   - C. $5\frac{1}{2}$  
   - D. $5\frac{3}{4}$  
   3. _____

4. Write 3% as a fraction.
   - F. $\frac{3}{1,000}$  
   - G. $\frac{3}{100}$  
   - H. $\frac{30}{100}$  
   - J. $\frac{300}{10}$  
   4. _____

5. Write 0.7 as a percent.
   - A. 0.7%  
   - B. 7%  
   - C. 70%  
   - D. 700%  
   5. _____

6. Estimate 54% of 412.
   - F. 100  
   - G. 200  
   - H. 300  
   - J. 400  
   6. _____

Find the percent of each number.

7. 20% of 80
   - A. 4  
   - B. 8  
   - C. 16  
   - D. 1.6  
   7. _____

8. 170% of 70
   - F. 17  
   - G. 119  
   - H. 170  
   - J. 1,190  
   8. _____
Questions 9–11 are about a six-sided number cube with the numbers 1, 2, 3, 4, 5, and 6 on the faces.

9. What is the probability of tossing an even number?
   A. \( \frac{1}{6} \)   B. \( \frac{1}{3} \)   C. \( \frac{1}{2} \)   D. \( \frac{5}{6} \)   9. _____

10. What is the probability of tossing a 1 or a 4?
    F. \( \frac{1}{3} \)   G. \( \frac{1}{2} \)   H. \( \frac{2}{3} \)   J. \( \frac{5}{6} \)   10. _____

11. If you toss the number cube 100 times, how many times do you predict you will toss a number greater than 4?
    A. about 22 times   C. about 55 times
    B. about 33 times   D. about 66 times   11. _____

Use the following information for Exercises 12–14.

For lunch, students can choose a taco, salad, or hot dog for their meals. They can drink milk, orange juice, or apple juice.

12. How many possible outcomes are there for choosing one meal and one drink?
    F. 6   G. 9   H. 12   J. 18   12. _____

13. Find \( P(\text{taco, apple juice}) \)
    A. \( \frac{1}{3} \)   B. \( \frac{1}{6} \)   C. \( \frac{1}{9} \)   D. \( \frac{2}{9} \)   13. _____

14. Find \( P(\text{salad or hot dog, apple juice}) \)
    F. \( \frac{1}{3} \)   G. \( \frac{2}{3} \)   H. \( \frac{4}{9} \)   J. \( \frac{2}{9} \)   14. _____

Solve.

15. From last year’s scores, Tamar’s soccer team improved by 125 percent. Find the mixed number in simplest form for 125 percent.
    A. \( 1 \frac{1}{2} \)   B. \( 1 \frac{1}{4} \)   C. \( 1 \frac{1}{6} \)   D. \( 1 \frac{1}{8} \)   15. _____

16. Of 320 students at Jamie’s school, only \( \frac{1}{4} \) walk to school. The rest take the bus. What percent of students take the bus?
    F. 25%   G. 50%   H. 75%   J. 80%   16. _____
Chapter Test, Form 2A

Read each question carefully. Write your answer on the line provided.

1. Find the percent for the shaded part.
   A. 22%       C. 68%
   B. 32%       D. 78%

2. Estimate 48% of 612.
   F. 200       G. 300       H. 400       J. 500

3. Write 0.2 as a percent.
   A. 0.2%       B. 2%       C. 20%       D. 200%

4. Write 371% as a decimal.
   F. 37.1       G. 3.71       H. 0.371       J. 0.0371

5. Write 175% as a mixed number.
   A. 1 7/8       B. 1 3/4       C. 1 1/3       D. 1 1/4

6. Write 90% as a fraction in simplest form.
   F. 9/100       G. 90/100       H. 9/10       J. 900/10

Use the following information for Exercises 7–9.

<table>
<thead>
<tr>
<th>Smoothie Menu</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flavors</strong></td>
</tr>
<tr>
<td>Strawberry</td>
</tr>
<tr>
<td>Blueberry</td>
</tr>
<tr>
<td>Mango</td>
</tr>
<tr>
<td>Banana</td>
</tr>
</tbody>
</table>

7. How many possible outcomes are there for choosing one flavor and one topping?
   A. 6       B. 9       C. 12       D. 24

8. Find \( P(\text{strawberry, fruit}) \)
   F. \( \frac{1}{3} \)       G. \( \frac{1}{6} \)       H. \( \frac{1}{8} \)       J. \( \frac{1}{12} \)

9. Find \( P(\text{mango, granola or nuts}) \)
   A. \( \frac{1}{3} \)       B. \( \frac{1}{4} \)       C. \( \frac{1}{6} \)       D. \( \frac{1}{10} \)
Find the percent of each number.

10. 30% of 150
   F. 30  G. 35  H. 45  J. 50

11. 130% of 30
   A. 390  B. 130  C. 39  D. 13

Use the circle graph for questions 12–14.

Amara asked 40 students about their favorite type of book. She made this circle graph to show what they said.

12. Which type of book was named the least often?
   F. history  G. adventure  H. humor  J. science fiction

13. How did adventure compare to humor?
   A. Humor was chosen the same number of times as adventure.
   B. Students chose adventure less often than they chose humor.
   C. Students chose adventure more often than they chose humor.
   D. Students chose humor more often than they chose adventure.

14. How many students chose history?
   F. 4  G. 10  H. 16  J. 25

15. Of 440 students at Angel’s school, \( \frac{1}{5} \) were in the school play. What percent of students were not in the school play?
   A. 20%  B. 50%  C. 80%  D. 95%

16. From last year’s scores, Paula’s swim team improved by 110 percent. Find the mixed number in simplest form for 110 percent.
   F. \( 10 \frac{1}{10} \)  G. \( 1 \frac{1}{10} \)  H. \( 1 \frac{1}{100} \)  J. \( 10 \frac{1}{100} \)
1. Find the percent for the shaded part.
   A. 32%  
   B. 68%  
   C. 78%  

2. Write 90% as a fraction in simplest form.
   F. \( \frac{9}{100} \)  
   G. \( \frac{90}{100} \)  
   H. \( \frac{9}{10} \)  

3. Write 175% as a mixed number.
   A. \( 1 \frac{7}{8} \)  
   B. \( 1 \frac{3}{4} \)  
   C. \( 1 \frac{1}{4} \)  

4. Estimate 48% of 612.
   F. 300  
   G. 400  
   H. 500  

5. Write 0.2 as a percent.
   A. 0.2%  
   B. 2%  
   C. 20%  

6. Write 371% as a decimal.
   F. 37.1  
   G. 3.71  
   H. 0.371  

Use the circle graph for questions 7–9.

Amara asked 40 students what type of book they like best.
7. How many students liked history best?
   A. 4  B. 10  C. 16

8. Students liked adventure books ______ comic books.
   F. more than  G. less than  H. the same as

9. Which type of book did students like least?
   A. adventure  B. comic  C. science

Find the percent of each number.

10. 130% of 30
    F. 39  G. 130  H. 13

11. 30% of 150
    A. 30  B. 45  C. 50

Solve.

12. A dinner bill is $44.48. You give a 20% tip. About how much money
    is the tip?
    F. $9  G. $8  H. $5

13. Paula’s swim team improved by 110%. Find the mixed number in
    simplest form for 110%.
    A. $10\frac{1}{10}$  B. $1\frac{1}{10}$  C. $1\frac{1}{100}$

14. $\frac{1}{5}$ of the students play hockey. What percent of students do not
    play hockey?
    F. 20%  G. 50%  H. 80%
Read each question carefully. Write your answer on the line provided.

1. Find the percent for the shaded part.

2. Write 175% as a mixed number.

3. Write 371% as a decimal.

4. Write 0.2 as a percent.

5. Write 90% as a fraction in simplest form.

6. Estimate 48% of 612.

Find the percent of each number.

7. 130% of 30

8. 30% of 150

Use the circle graph for questions 9–11.

Amara asked 40 students about their favorite type of book. She made this circle graph to show what they said.
9. How did adventure compare to humor?
10. Which type of book was named the least often?
11. How many students chose history?

Exercises 12–14 are about a six-sided number cube with the numbers 1, 2, 3, 4, 5, and 6 on the faces.

12. What is the probability of tossing an odd number?
13. What is the probability of tossing a number less than 3?
14. If you toss the number cube 24 times, how many times do you predict you will toss a 1?

Solve.

15. Of 440 students at Angel’s school, $\frac{1}{5}$ were in the school play. What percent of students were not in the school play?

16. Matt and his family go out to dinner. Their bill is $44.48, and they want to leave a 20% tip. About how much money should Matt and his family leave as a tip?

17. From last year’s scores, Paula’s swim team improved by 110 percent. Find the mixed number in simplest form for 110 percent.
Read each question carefully. Write your answer on the line provided.

1. Find the percent for the shaded part.

2. Write 371% as a decimal.

3. Write 175% as a mixed number.

4. Estimate 48% of 612.

5. Write 90% as a fraction in simplest form.

6. Write 0.2 as a percent.

Questions 7–9 use a number cube with the numbers 1, 2, 3, 4, 5, and 6 on the sides.

7. Find \( P(\text{tossing a number less than 3}) \)

8. Find \( P(\text{tossing an odd number}) \)

9. If you toss the cube 24 times, predict how many times you will toss a 1.

Use the circle graph for questions 10–12.

Amara asked 40 students what type of book they like best.
10. Which type of book did students like least?

11. Students liked adventure books _____ comic books.

12. How many students liked history best?

Find the percent of each number.

13. 130% of 30

14. 30% of 150

Solve.

15. A dinner bill is $44.48. You give a 20% tip. About how much money is the tip?

16. Paula’s swim team improved by 110%. Find the mixed number in simplest form for 110%.

17. \( \frac{1}{5} \) of the students play hockey. What percent of students do not play hockey?


Chapter Test, Form 3

Read each question carefully.
Write your answer on the line provided.

1. What percent of the grid is not shaded?

2. Express 288% as a mixed number in simplest form.

3. Write 0.63 as a percent.

4. Express 0.7 as a percent.

5. Express 85% as a fraction in simplest form.

6. Estimate 27% of 383.

7. 6 is what percent of 120?

8. Order from least to greatest.
   \( 4\frac{2}{5}, 460\%, 0.046, 4.64\% \)

Use the circle graph for questions 9–11.

Emma surveyed 60 students about their favorite genre of literature. The circle graph below displayed her results.

9. Which genre was least popular?

10. How did mystery compare to humor?

11. How many students chose nonfiction as their favorite genre of literature?
Questions 12–14 are based on a six-sided number cube with faces labeled 1, 2, 3, 4, 5, and 6.

12. What is the probability of tossing a 3 or a 6?
13. What is the probability of tossing a number less than 5 and greater than 1?
14. If you toss the number cube 200 times, about how many times do you predict you will toss a number greater than 4?

Solve.

15. Of 400 students at Angelo’s school, 20% take the bus. The rest walk to school. How many students walk to Angelo’s school?
16. Charlie and his family go out to a restaurant. Their bill is $41.79, and they want to leave an 18% tip. About how much money should Charlie and his family leave as a tip?
17. Last year Dan made 50 percent of 40 foul shots. This year he made 30 of 40 foul shots. How many more foul shots did Dan make this year?
Chapter Extended-Response Test

Demonstrate your knowledge by giving a clear, concise solution to each problem. Be sure to include all relevant drawings and justify your answers. You may show your solution in more than one way or investigate beyond the requirements of the problem. If necessary, record your answer on another piece of paper.

1. A group of students was asked to name their favorite after-school activity. Forty percent said in-line skating, 25 percent said basketball, 20 percent said cycling and 15 percent said jumping rope.
   
a. Draw a circle graph of the data.

b. Referring to your circle graph, which is the students’ favorite after-school activity?

c. How does cycling compare to in-line skating as a favorite activity? Explain your answer using your circle graph.

d. Express the popularity of jumping rope as a fraction. Explain your work.

2. A new juice bar makes smoothies using fresh fruit and yogurt. Customers can choose either plain or vanilla yogurt and blend it with a choice of fresh bananas, strawberries, or raspberries.

a. What is the sample space in this situation?

b. Draw a tree diagram to illustrate the sample space.

c. To promote business at the juice bar, it holds “Random Day.” Once a week, two bowls are set up on the counter. In one bowl, there are two pieces of paper, each with a yogurt flavor written on it. In the other bowl, there are three pieces of paper, each with a type of fruit written on it. Customers who agree to pick a yogurt and fruit flavor at random from the bowls will get that blend of smoothie for free. What is the probability that a customer will randomly pick a smoothie with vanilla yogurt? Express your answer as a fraction, a decimal, and a percent.

3. According to a recent survey, about 42% of kids say they don’t get enough sleep. Out of a school with 978 kids, estimate the number who would say they do get enough sleep.
Use this recording sheet with pages 524–525 of the Student Edition.

Read each question. Then fill in the correct answer.

1. A B C D

2. F G H J

3. A B C D

4. F G H J

5. A B C D

6. F G H J

7. A B C D

8. F G H J

9. A B C D

10. F G H J
Test Example

Sixteen people at the band concert wore red shoes. If there were 200 people at the concert, what percent of the people at the concert wore red shoes?

A. 2%  B. 4%  C. 6%  D. 8%

Read the Item.

You are asked to find what percent of the people at the concert wore red shoes.

Solve the Item.

Since \( \frac{16}{200} \) people wore red shoes, write \( \frac{16}{200} \) as a percent.

\[
\frac{16}{200} = \frac{n}{100}
\]

Write equivalent fractions.

\[
\frac{16}{200} = \frac{8}{100}
\]  Since \( 200 \div 2 = 100 \), divide 16 by 2 to find \( n \).

So, \( \frac{16}{200} = \frac{8}{100} \) or 8%.

The answer is D.

Read each question carefully. Write your answer on the line provided.

1. The Rogers Park Market received its weekly fruit shipment on Monday. The manager determined that 40% of the fruit was citrus fruit. What fraction of the fruit was citrus fruit?

A. \( \frac{7}{8} \)  B. \( \frac{2}{5} \)  C. \( \frac{3}{4} \)  D. \( \frac{1}{3} \)  1. _______
2. In a basket, there are 7 apples, 4 bananas, 3 watermelons, and 6 avocados. If you draw a piece of fruit at random from the basket, what is the probability that you will not draw an apple?

F. 65%  
G. 30%  
H. 20%  
J. 15%  
2. _____

3. A student in Marta’s math study group chose a letter at random from the letter cards shown below. What is the probability that the letter chosen was a consonant?

U I A L P O  
M E E G O U

A. \( \frac{2}{3} \)  
B. \( \frac{1}{3} \)  
C. \( \frac{1}{2} \)  
D. \( \frac{1}{4} \)  
3. _____

4. Calid can select one drink, one piece of fruit, and one granola bar from the following snack menu. How many different snacks can he make?

<table>
<thead>
<tr>
<th>Drink</th>
<th>Fruit</th>
<th>Granola Bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>milk</td>
<td>melon</td>
<td>almond</td>
</tr>
<tr>
<td>orange juice</td>
<td>apple</td>
<td>chocolate chip</td>
</tr>
<tr>
<td>apple juice</td>
<td>pear</td>
<td>peanut butter</td>
</tr>
<tr>
<td>iced tea</td>
<td>banana</td>
<td>raisin</td>
</tr>
</tbody>
</table>

F. 4  
G. 16  
H. 48  
J. 64  
4. _____
5. Jacintha watered 5 flowerpots in 4 minutes. About how many flowers can Jacintha water in 20 minutes?
   A. 15       B. 20       C. 25       D. 30

6. \( \frac{\frac{1}{6}}{\frac{3}{4}} \) =
   F. \( \frac{11}{12} \)       G. \( \frac{2}{3} \)       H. \( \frac{3}{8} \)       J. \( \frac{21}{24} \)

7. Los Angeles has a population of 3,844,829. What is this value rounded to the nearest ten thousand?
   A. 3,844,000       B. 3,850,000       C. 3,840,000       D. 3,800,000

Solve.

8. The Chic Shop received a shipment of sweaters. The manager determined that 45% of the sweaters were pullovers. What fraction of the sweaters were pullovers?

9. In a basket there are 3 apricots, 7 oranges, 6 guavas, and 4 lemons. If you draw a piece of fruit at random from the basket, what is the probability that you will not draw a piece of guava?

10. Ray picked up 7 pieces of trash in 3 minutes. About how many pieces of trash can Ray pick up in 18 minutes?
Answers

**Graphic Organizer**

Use this graphic organizer to take notes on Chapter 9: Percent. Fill in the missing information.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>percent</td>
<td>a ratio that compares a number to 100 using the symbol %</td>
<td>65% = 65/100</td>
</tr>
<tr>
<td>probability</td>
<td>the chance that some event will occur; a ratio that compares the number of favorable outcomes to the number of possible outcomes</td>
<td>P(rain tomorrow) = 40/100  = 0.40 = 40%</td>
</tr>
<tr>
<td>simple event</td>
<td>one outcome or a collection of outcomes</td>
<td>drawing a red king of diamonds from a deck of cards</td>
</tr>
<tr>
<td>complementary events</td>
<td>two events in which either one or the other must happen, but they cannot happen at the same time</td>
<td>in a coin toss, landing on heads or landing on tails</td>
</tr>
<tr>
<td>sample space</td>
<td>the set of all possible outcomes</td>
<td>The sample space in rolling a number cube is (1, 2, 3, 4, 5, 6).</td>
</tr>
<tr>
<td>survey</td>
<td>a method of collecting information</td>
<td>a questionnaire mailed to voters asking opinions on political issues</td>
</tr>
<tr>
<td>population</td>
<td>the group being studied in a survey</td>
<td>all voters in the state</td>
</tr>
<tr>
<td>sample</td>
<td>a part of a population used in a survey to represent the whole population</td>
<td>1,000 state voters selected at random</td>
</tr>
</tbody>
</table>

**Anticipation Guide**

**Percent**

**STEP 1** Before you begin Chapter 9

- Read each statement.
- Decide whether you agree (A) or disagree (D) with the statement.
- Write A or D in the first column OR if you are not sure whether you agree or disagree, write NS (not sure).

<table>
<thead>
<tr>
<th>Statement</th>
<th>A or D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A percent is a special ratio that compares a number to 100 using the symbol %.</td>
<td>A</td>
</tr>
<tr>
<td>2. The word percent means hundredths or out of 100.</td>
<td>A</td>
</tr>
<tr>
<td>3. 60 out of 100 = 60%.</td>
<td>A</td>
</tr>
<tr>
<td>4. 75 out of 100 = 80%.</td>
<td>D</td>
</tr>
<tr>
<td>5. Probability is a number between 0 and 1 that measures the likelihood of an event happening.</td>
<td>A</td>
</tr>
<tr>
<td>6. Sample space is the set of all possible outcomes in a probability experiment.</td>
<td>A</td>
</tr>
<tr>
<td>7. A tree diagram is a diagram of all the possible outcomes of an event or series of events or experiments.</td>
<td>A</td>
</tr>
<tr>
<td>8. A circle graph is a graph in the shape of a circle in which data are represented by parts of a circle.</td>
<td>A</td>
</tr>
<tr>
<td>9. A circle graph is also called a pie graph or a pie chart.</td>
<td>A</td>
</tr>
<tr>
<td>10. 20 of 100 = 80%.</td>
<td>D</td>
</tr>
</tbody>
</table>

**STEP 2** After you complete Chapter 9

- Reread each statement and complete the last column by entering an A (agree) or a D (disagree).
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a separate sheet of paper to explain why you disagree. Use examples, if possible.
**Reteach**

**Percents and Fractions**

You can think of a percent as the numerator of a fraction with 100 as the denominator.

This grid contains 100 small squares. Each square represents 1%. 76 small squares are shaded.

Percent: 76 parts of 100, or 76%
Fraction: 76 parts of 100, or \(\frac{76}{100}\). In simplest form, that's \(\frac{19}{25}\).

Write a percent and a fraction to show the shaded part of each grid. For each fraction, use simplest form.

1. Percent: \(\frac{32}{100}\) or 32%
   Fraction: \(\frac{8}{25}\)
2. Percent: \(\frac{20}{100}\) or 20%
   Fraction: \(\frac{1}{5}\)
3. Percent: \(\frac{10}{100}\) or 10%
   Fraction: \(\frac{1}{10}\)

**Skills Practice**

**Percents and Fractions**

Write a fraction and a percent to show the shaded part of each grid. For each fraction, use simplest form.

1. \(\frac{1}{2}\) or 50%
2. \(\frac{7}{20}\) or 35%
3. \(\frac{9}{10}\) or 90%

Write each percent as a fraction or mixed number in simplest form.
4. \(67\% = \frac{67}{100}\)
5. \(8\% = \frac{2}{25}\)
6. \(243\% = \frac{243}{100}\)
7. \(32\% = \frac{8}{25}\)
8. \(81\% = \frac{81}{100}\)
9. \(148\% = \frac{112}{75}\)

Write each fraction as a percent.
10. \(\frac{1}{4} = 25\%\)
11. \(\frac{3}{10} = 30\%\)
12. \(\frac{1}{5} = 20\%\)
13. \(\frac{2}{3} = 66\frac{2}{3}\%\)
14. \(\frac{3}{25} = 12\%\)
15. \(\frac{2}{5} = 40\%\)
16. \(\frac{3}{10} = 30\%\)
17. \(\frac{1}{2} = 50\%\)
18. \(\frac{19}{100} = 19\%\)
19. \(\frac{99}{100} = 99\%\)
20. \(\frac{7}{100} = 7\%\)
21. \(\frac{1}{10} = 10\%\)

Solve.
22. Three fourths of the shirts a store stocks are extra large. What percent of the shirts are extra large?
    \(75\%\)
23. Of the 100 shirts a store sold on Saturday, 82 had the logo of a sports team on them. What percent of the shirts had a logo?
    \(82\%\)
9-1

Homework Practice

Percents and Fractions

Write each percent as a fraction or mixed number in simplest form.

1. \(22\% = \frac{11}{50}\)
2. \(7\% = \frac{7}{100}\)
3. \(146\% = \frac{23}{50}\)
4. \(465\% = \frac{93}{20}\)

Write each fraction or mixed number as a percent.

5. \(\frac{8}{10} = 80\%\)
6. \(\frac{5}{20} = 25\%\)
7. \(\frac{3}{5} = 180\%\)
8. \(\frac{3}{2} = 150\%\)

Write a percent to represent the shaded portion of each model.

9. \(60\%\)
10. \(70\%\)

Problem-Solving Practice

Percents and Fractions

Solve.

1. The shaded part shows the percent of Tina’s class who are left-handed. Write the percent.
2. In William’s school, 60% of the students are girls. Write 60% as a fraction in simplest form.
3. Edward found that \(\frac{3}{10}\) of the students in his school bring their own lunch to school. Write this fraction as a percent.
4. Lindsey drew a 10-by-10 grid and colored 42 squares red. She colored the rest of the squares green. What percent of the grid is colored red?
5. Kory used yellow, green, blue, and red markers to color all the squares of a 10-by-10 grid. He colored 12 squares blue, then colored twice as many red. There are three times as many red squares as yellow squares. If the rest of the squares are green, is more than half the grid colored green? What percent of the grid is not colored yellow or green?
6. Linda is making a design using a 10-by-10 grid. She drew stars in 50% of the squares. In half of the remaining squares, she drew triangles. Half the squares containing stars were colored yellow. What fraction of the grid is not colored and does contain a star or triangle?
Stores have sales to attract people to buy their merchandise or to sell off seasonal merchandise at the end of a season. They may advertise 20% off the regular price of an item or \( \frac{1}{2} \) off the regular price. Sometimes, stores will offer an extra sale on top of the Sale price.

Stores usually advertise the sale price as a percentage or a fraction off the original price. Savvy shoppers know how percentages and fractions compare to know which is a better deal.

Write a fraction representing how much off the regular price the store is offering.

1. 25% off all kitchen items! \( \frac{1}{4} \)
2. 50% off ELECTRONICS \( \frac{1}{2} \)
3. 20% off all outerwear \( \frac{1}{5} \)

Write each fraction as a percent.

4. Sale Today \( \frac{1}{2} \) off \( 50\% \)
5. \( \frac{1}{3} \) off with your Rewards Card \( 20\% \)
6. \( \frac{1}{4} \) off all winter jackets \( 25\% \)

Which is the better deal?

7. Sale Today \( \frac{1}{3} \) off all shoes! \( 40\% \)
   
   Save 40% on all shoes!

The table shows the results of a survey of 160 students. You can also display this data in a circle graph. Circle graphs are used to compare parts of a whole.

- Write a fraction for each percent.
  Cycling: \( \frac{25}{100} = \frac{1}{4} \)
  Bowling: \( \frac{40}{100} = \frac{2}{5} \)
  In-line skating: \( \frac{35}{100} = \frac{7}{20} \)

- Since \( \frac{25}{100} = \frac{1}{4} \), shade \( \frac{1}{4} \) of the circle for “Cycling.”
- Since \( \frac{40}{100} = \frac{2}{5} \) is a little less than \( \frac{1}{2} \), shade a little less than \( \frac{1}{2} \) of the circle for “Bowling.” The remaining section is for “In-line skating.”

- Label each section of the graph.

1. Sketch a circle graph for the data from the table at the right.
Use data from the circle graph for Exercises 1 and 2.

1. List the activities from favorite to least favorite.
   **In-line skating, basketball, cycling, jumping rope**

2. What fraction of the total votes went to in-line skating?
   $\frac{2}{5}$

Use data from the table for Exercises 3–5.

3. Write a fraction for each percent.
   - Baseball: $\frac{7}{20}$
   - Basketball: $\frac{3}{10}$
   - Football: $\frac{3}{20}$
   - Soccer: $\frac{1}{5}$

4. Make a circle graph at the right to show the data.

5. Write each fraction or mixed number as a percent.
   - $\frac{3}{20} = 15\%$
   - $\frac{70}{100} = 70\%$

6. Write each percent as a fraction or mixed number. (Lesson 9–1)
   - $15\% = \frac{3}{20}$
   - $117\% = \frac{117}{100}$

**Spiral Review**

1. Sketch a circle graph beside the table that shows the number of students who went on the following field trips.

<table>
<thead>
<tr>
<th>Field Trip Location</th>
<th>Percent of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquarium</td>
<td>27</td>
</tr>
<tr>
<td>Museum</td>
<td>19</td>
</tr>
<tr>
<td>Science Center</td>
<td>9</td>
</tr>
<tr>
<td>Zoo</td>
<td>15</td>
</tr>
<tr>
<td>Water Park</td>
<td>18</td>
</tr>
<tr>
<td>Mountain Hike</td>
<td>12</td>
</tr>
</tbody>
</table>

2. Which field trip location had the most students?
   **Aquarium**

3. Which two field trips made up about half of the total students?
   **The aquarium and the museum**

4. Which two field trips made up about half of the total students?
   **Aquarium and museum**

5. Which two field trips made up about half of the total students?
   **Aquarium and museum**

6. Which two field trips made up about half of the total students?
   **Aquarium and museum**

7. Which two field trips made up about half of the total students?
   **Aquarium and museum**

**Name ____________________ Date ___________**
1. Luis drew a circle graph of the foods he likes best. If fruit makes up 40% of the graph, how much of his favorite foods?

\[ \frac{2}{5} \]

2. Casey found out that chocolate ice cream is preferred by 12% of the students in his class. About what fraction of a circle graph would be used for chocolate ice cream on a circle graph that shows favorite ice cream flavors?

\[ \text{about } \frac{1}{10} \]

3. Randy knows that 36% of the adults in his neighborhood work in a nearby city. About what fraction of a circle graph would show adults who work in a nearby city?

\[ \text{about } \frac{1}{3} \]

4. Kathy works at a fast-food restaurant. Twenty-five percent of the food they sell is hamburgers, 35% is chicken, 18% is French fries, and the remainder is salads. About what fraction of a circle graph would represent the salads sold?

\[ \text{about } \frac{1}{5} \]

5. Stacy took a test that included 10 multiple-choice questions, 12 true-false questions, 14 short-answer questions, and 4 essay questions. If she used a circle graph to show the question types on the test, about what part of the circle graph would represent the number of short-answer questions?

\[ \text{about } \frac{1}{3} \]

6. Heather looked at a circle graph that showed age groups of the people in her small town. On the graph, 17% is used for ages 0 to 4, 14% for ages 5 to 12, 20% for ages 13 to 20, 22% for ages 21 to 50, and 12% for ages 51 to 65. The remainder of the graph represents people who are older than 65. What percent of the people in her town are older than 65?

15%
9–3
Reteach
Percents and Decimals

You can write percents as decimals.

First, write 35% as a fraction with a denominator of 100.

\[ \frac{35}{100} \]

Then, read the fraction and write the decimal.

So, \( 0.35 \) is the decimal equivalent of 35%.

You can also write decimals as percents.

Write 0.64 as a fraction.

\[ \frac{64}{100} \]

Then, write the numerator of the fraction with a percent sign.

So, 0.64 = 64%.

Write the percent as a decimal.

1. 25% = \( \frac{25}{100} \) = 0.25
2. 40% = \( \frac{40}{100} \) = 0.40
3. 56% = \( \frac{56}{100} \) = 0.56
4. 70% = \( \frac{70}{100} \) = 0.70
5. 93% = \( \frac{93}{100} \) = 0.93
6. 3% = \( \frac{3}{100} \) = 0.03
7. 0.25 = \( \frac{25}{100} \) = 25%
8. 0.9 = \( \frac{90}{100} \) = 90%
9. 0.55 = \( \frac{55}{100} \) = 55%
10. 0.95 = \( \frac{95}{100} \) = 95%
11. 0.51 = \( \frac{51}{100} \) = 51%
12. 0.04 = \( \frac{4}{100} \) = 4%

Write the decimal as a percent.

22. 0.75 = 75%
23. 0.4 = 40%
24. 0.5 = 50%
25. 1.28 = 128%
26. 1.22 = 122%
27. 0.10 = 10%
28. 0.85 = 85%
29. 0.6 = 60%
30. 0.75 = 75%
31. 0.2 = 20%
32. 0.88 = 88%
33. 0.03 = 3%

Find each missing number.

34. 29 = \( \frac{s}{100} \)
35. 80% = \( \frac{w}{5} \)
36. 44% = \( \frac{c}{25} \)
37. 90% = \( \frac{d}{10} \)

\[ s = 29 \]
\[ w = 4 \]
\[ c = 11 \]
\[ d = 9 \]
### Problem-Solving Practice

#### Percents and Decimals

**Solve.**

1. The Park High Panthers won 25% of their basketball games this year. Write the percent as a fraction in simplest form.
   - \( \frac{1}{4} \)

2. In Culver City, 45% of the roads need repair. Write the percent as a decimal.
   - 0.45

3. In Joseph's neighborhood, 32% of the homes have the local newspaper delivered. Write the percent as a decimal and as a fraction in simplest form.
   - 0.32; \( \frac{8}{25} \)

4. George has read 18 of the 50 books in his bookcase. What percent of the books has George read? Write the percent as a decimal and as a fraction in simplest form.
   - 36%; \( \frac{9}{25} \)

5. Mr. Simons gave his history students three quizzes. On the first quiz, Ryan got 12 of the 15 questions correct. On the second quiz, he got 15 of the 20 questions correct. On the third, 21 of 25 questions were correct. On which quiz did he score the highest percent?
   - He scored the highest on the third quiz; he answered 84% correctly

6. The Raiders won 8 of their football games this season. They played a total of 12 games, and had the same number of losses as ties. The Spartans won 10 of their 15 games, and had one less tie than loss. Which team had the higher percent of games lost?
   - The Spartans; 20%

---

### Spiral Review

For Exercises 11–12, use the graph below. (Lesson 9–2)

- **In-Line skating**: 35%
- **Cycling**: 25%
- **Bowling**: 40%

11. The circle graph shows Favorite Family Sports. What percent of the families prefer in-line skating or cycling?
   - 60%

12. What percent of the families prefer bowling?
   - 40%
Chapter 9

Solve a simpler problem.

Last year, Jeff made 70% of his attempted free throws in basketball. If he attempted 70 free throws, how many did he make?

Step 1 Understand

What do you know? You know the percent of free throws that Jeff made last year. You also know the number of free throws he attempted.

What do you need to find? You need to find the number of free throws Jeff made.

Step 2 Plan

Make a plan.

Solve a simpler problem by finding 10% of Jeff’s attempted free throws. Use the result to find 70% of his attempted free throws.

Step 3 Solve

Carry out your plan.

Since \( \frac{10}{100} = \frac{1}{10} \), 10% of Jeff’s attempted free throws is \( \frac{70}{10} = 7 \). Since there are seven groups of 10% in 70%, multiply 7 by 7. So, Jeff made 49 free throws.

Step 4 Check

Check your answer.

You know that 30% + 70% = 100%. Find 30% of 70, and add it to 49 to see if the total is 70. To find three groups of 10%, multiply 3 by 7 = 21. 21 + 49 = 70.

Solve. Use the solve a simpler problem strategy.

1. Eight chefs can cook 40 meals in 3 hours. How many meals can 25 chefs cook in 6 hours?

2. An airplane flies at a speed of 500 miles per hour. If a train travels at 25% of that speed, how much faster does the plane travel than the train?

250 meals

375 miles an hour faster
Reteach
Problem-Solving Strategy (continued)

3. Carla's alarm rings every 20 minutes for one hour each morning. How many times does it ring each week?

21 times

4. Your brother has $60. He offers you either 40% or three-sixths of it. What amount should you take if you want to get the most money?

3/6 translates to one half, or 50%.

5. Ricky polled his classmates and found that 40% of them named spinach as their favorite vegetable. 30/100 of the class liked broccoli best and 1 out of 10 liked carrots best. Which vegetable does most of Ricky's classmates prefer?

spinach

6. There are a total of 500 students at Mary's elementary school. Of that total, 40% of the students have a sibling who also attends the school. How many students have siblings at the school?

200 students

7. At the pancake breakfast at Jenny's school, 250 people attended. Of those 250 people, 60% were students. How many students attended?

150 students

8. Jeremy can cut two lawns in 2 hours. If Jeremy and his friend Nate work at the same speed, how many lawns can they cut in 5 hours?

10 lawns

Skills Practice
Problem-Solving Strategy

Solve. Use the solve a simpler problem strategy.

1. Monica plays forward on her soccer team. Last year, 30% of her shots scored goals. This year, she made 16 goals out of 40. Did Monica improve her record this year? Explain.

Yes; 16 out of 40 is 0.40 and 0.40 is better than 0.30.

2. Brian plays tournament table tennis. Last year, he won 72 percent of his games. This year, he has won 15 of his 20 games. Has Brian improved his record? Explain.

Yes; 15/20 = 75% and 75% is better than 72%.

3. Jessica swims on a swim team. Last year, she placed first 12 times out of 20 in the breaststroke. This year, she has placed first 55 percent of the time. Was Jessica's record of winning better last year or this year? Explain.

Last year; 12 out of 20 = 60% and 60% > 55%, so Jessica's record was better last year.

4. Peter's class takes timed division tests. Last month, Peter completed 66 percent of the problems correctly. This month, he has completed 60 out of 80 problems correctly. Has Peter improved his score? Explain.

Yes; 60 out of 80 = 75%, so his score is improving.
Solve. Use the solve a simpler problem strategy.

1. Sawa spent $28.95 on her meal, and she wanted to leave a 15% tip. If she paid $35.00 and received $1.71 back in change, how much did she leave for a tip? If she left a 20% tip and paid $35.00, how much change would she get back?

$4.34; $0.26

2. Sam has a piece of string 40 inches long. He needs to cut it into 4-inch long pieces. How many cuts will he make if he uses all 40 inches?

9 cuts

3. Bus Line

<table>
<thead>
<tr>
<th>Route</th>
<th>Number of Passengers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northeast</td>
<td>2,800</td>
</tr>
<tr>
<td>Northwest</td>
<td>2,300</td>
</tr>
<tr>
<td>North</td>
<td>2,400</td>
</tr>
</tbody>
</table>

There are 3 routes on the bus line. About how many total passengers are there? Which route is the most traveled?

7,500; Northeast route

Spiral Review

Write each percent as a decimal. (Lesson 9–3)

4. 45% 0.45

5. 32% 0.32

6. 164% 1.64

Enrich

Problem Solving Strategy

Solve. Use the solve a simpler problem strategy.

1. There are 400 students in Tiffany’s soccer league. Tiffany did a survey of a random sample of 80 students. If 58 of the 80 said they preferred water to juice at halftime, how many students out of 400 would be likely to say the same response?

290 students

2. There are 280 families who are members at the Recreation Center. Sheldon conducted a survey of a random sample of 40 families. Of the 40 families, 25 said they would like extended pool hours. Sheldon used the survey to predict that 125 families would prefer extended pool hours. Is his prediction correct? Explain.

No, around 175 families are likely to prefer extended pool hours.

3. There are 98 sixth graders at Carter Middle School. A teacher conducted a survey of a random sample of 18 sixth graders to find out how many spend more than one hour a week reading. Of the 18 students, 14 said that they spend more than one hour a week reading. The teacher used the survey to predict that 72 sixth graders at the school spend more than one hour a week reading. Is her prediction correct? Explain.

No, around 76 sixth graders spend more than one hour a week reading.

4. There are 200 members of a chess club. Alfonso conducted a survey of a random sample of 60 members. Of the 60 members, 45 said they would like matches scheduled once a month. Alfonso used the survey to predict that 100 members would like monthly matches. Is his prediction correct? Explain.

No, around 150, or 75%, are likely to want monthly chess matches.
Name ___________________________ Date __________________

Reaching with Percents

When you estimate the percent of a number, you are solving a simpler problem.

Estimate the percent of a number.

Estimate 48% of 197.

48% is close to 50% or \( \frac{1}{2} \). Round 197 to 200.

\( \frac{1}{2} \) of 200 is 100. \( \frac{1}{2} \) or half means to divide by 2.

So, 48% of 197 is about 100.

Check your answer by using the related multiplication fact.

100 \times 2 = 200, which is correct!

Estimate each percent.

1. 22% of 98 __________
2. 46% of 257 __________
3. 18% of 192 __________
4. 67% of 99 __________
5. 29% of 208 __________
6. 79% of 305 __________

Estimate the percent that is shaded.

7. __________
8. __________
9. __________

You buy a shirt that is priced at $25. It is on sale for 25% off. About how much money will you save?

$6.00

Sample answers given.

1. 29% of 190 60
2. 18% of 48 10
3. 87% of 155 135
4. 44% of 205 90
5. 74% of 99 75
6. 52% of 295 150

Estimate the percent that is shaded.

8. __________
9. __________

You answered 4 out of 25 problems incorrectly on a test. Estimate your percentage of correct answers.

\( \frac{4}{5} \) of 25; 20 correct answers

11. If you see a sweatshirt on sale for 15% off, and the sweater is $19.99, estimate the discount.

15% of $20; $3
Problem-Solving Practice
Estimating with Percents
Sample answers given.

Estimate each shaded area and write your answer as a percent.

1. 50%
2. 20%
3. 30%
4. 75%

Estimate the percent that is shaded.

5. 25%
6. 75%

3. Savannah wants to save 30% of her allowance. If her allowance is $35 a month, about how much should she save per month?

4. According to a recent survey, about 42% of kids say they don’t get enough sleep. Out of a school with 978 kids, predict the number who would say they do get enough sleep.

5. There are about 10 percent more boys born for every girl born in the world. Predict the number of boys that will be born if the number of girls born is 98,877.

6. You buy a jacket that is priced at $125. It is on sale for 45% off. About how much will you pay for the jacket?
Percent of a Number

To find the percent of a number, write the percent as a fraction or decimal and multiply. Remember, “of” means “times.”

40% of 20

\[
40\% = \frac{40}{100} = \frac{2}{5}
\]

\[
\frac{2}{5} \times 20 = 8
\]

60% of $9.00

\[
60\% = \frac{60}{100} = 0.60
\]

\[
0.6 \times $9.00 = $5.40
\]

Find 140% of 20

\[
140\% = \frac{140}{100} = \frac{7}{5}
\]

\[
\frac{7}{5} \times 20 = 28
\]

160% of $9.00

\[
160\% = \frac{160}{100} = 1.60
\]

\[
1.6 \times $9.00 = $14.40
\]

Find the percent of each number.

1. 25% of 24

\[
25\% = \frac{25}{100} = \frac{1}{4}
\]

\[
\frac{1}{4} \times 24 = 6
\]

2. 150% of 38

\[
150\% = \frac{150}{100} = \frac{3}{2}
\]

\[
\frac{3}{2} \times 38 = 57
\]

3. 50% of $8.00

\[
50\% = \frac{50}{100} = 0.50
\]

\[
0.5 \times $8.00 = $4.00
\]

4. 120% of $20.00

\[
120\% = \frac{120}{100} = 1.2
\]

\[
1.2 \times $20.00 = $24.00
\]

5. 140% of 56

\[
140\% = \frac{140}{100} = 1.4
\]

\[
1.4 \times 56 = 78.4
\]

6. 80% of $14.00

\[
80\% = \frac{80}{100} = 0.80
\]

\[
0.8 \times $14.00 = $11.20
\]
9-6 Skills Practice

Percent of a Number

Find the percent of each number.

1. 25% of 48 12
2. 30% of 50 15
3. 10% of 50 5
4. 45% of 40 18
5. 50% of 64 32
6. 20% of 85 17
7. 40% of 60 24
8. 95% of 80 76
9. 65% of 60 39
10. 120% of 50 60
11. 150% of 64 96
12. 125% of 60 75
13. 190% of 70 133
14. 140% of $8 11.20
15. 120% of $7 8.40
16. 180% of $5 9.00
17. 225% of 84 189
18. 55% of $7 3.85
19. 10% of 90 9
20. 20% of 10 2
21. 20% of 60 12

Solve.

22. A football team wins 80% of the 10 games it played. A basketball team wins 45% of 20 games. Which team has won more games? Explain.

The basketball team; 80% of 10 = 8; 45% of 20 = 9

9-6 Homework Practice

Percent of a Number

Find the percent of each number.

1. 20% of 160 32
2. 9% of 27 2.43
3. 110% of 80 88
4. 55% of 150 82.5

Solve.

5. You are shopping and see a 70% off clearance sale. If the original price on the sweatshirt is $27.50, what is the discount?

$19.25

6. The sale price of a pair of shorts is $8.50. If the sales tax is 6%, what is the amount of tax for the pair of shorts?

$0.51

Spiral Review

Estimate each percent. (Lesson 9-5)

Sample answers given.

7. 19% of 98 20
8. 75% of 31 24
9. 34% of $91 $30
10. 78% of 345 270

11. Estimate the area of your yard if it is 31 feet by 19 feet.

600 ft²
Solve.

1. Noah bought a shirt that was on sale for 80% of its regular price of $20.99. To the nearest cent, what was the sale price?

   $16.79

2. Roberto took a test that contained 25 questions. He received an 88% on the test. How many questions did he answer correctly?

   22 questions

3. Hillary uses propane as a fuel to heat her home. When the gas company comes to fill the 500-gallon tank, they add propane until the tank is 85% full. After a delivery, how many gallons of propane are in the tank?

   425 gallons

4. Barbara’s class was investigating methods used to heat homes in her town. She reported that 35% of the homes are heated by electricity. If there are 546 homes in her town, how many homes are heated by electricity? Round off your answer to the nearest whole number.

   191 homes

5. Shanta shopped for new clothes. She found the best deal at Gillian’s Department store, where clothes were 90% of their original cost. A few days later these new prices were reduced by another 10%. How much did she pay for a jacket that originally cost $115.00? Write your answer to the nearest penny.

   $93.15

6. Chelsea plays on a softball team that has won 75% of its games. Her sister Catrina plays on a softball team that has won 80% of its games. If Chelsea’s team has played 28 games, and Catrina’s team has played 25 games, which team won more games? How many more games did they win?

   Chelsea’s team won one more game.

Find the Percent One Number Is of Another

Find the answers, then put the corresponding letter above each answer at the bottom of the page. Not all letters will be used.

T. 12 is what percent of 60? 20%
A. What percent of 2 is 8? 400%
P. What percent of 800 is 4? 0.5%
M. 16 is what percent of 400? 4%
L. What percent of 55 is 33? 60%
J. 121 is what percent of 968? 12.5%
H. 36 is what percent of 16? 225%
V. What percent of 72 is 22? 37.5%
M. What percent of 40 is 9? 22.5%
A. 52 is what percent of 78? 66\(\frac{2}{3}\)%
S. 1 is what percent of 250? 0.4%
O. What percent of 64 is 288? 450%
R. What percent of 240 is 80? 33\(\frac{1}{3}\)%
A. 98 is what percent of 140? 70%

What is the largest desert in the world?

<table>
<thead>
<tr>
<th>S</th>
<th>A</th>
<th>H</th>
<th>A</th>
<th>R</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.4%</td>
<td>70%</td>
<td>225%</td>
<td>400%</td>
<td>33(\frac{1}{3})%</td>
<td>66(\frac{2}{3})%</td>
</tr>
</tbody>
</table>

How can you determine if an answer will be greater than 100%?

If the total number is smaller than the number that is a percent of it, the answer will be greater than 100%.
Choose a Strategy

Philip and his family caught a lot of fish over a one-week period when they were on vacation.

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

Philip fished on Monday, Wednesday, Friday, and Saturday. His sister, Nancy, fished on Tuesday, Thursday, Friday, and Sunday. What percent of the total fish Philip caught did he catch on Saturday?

Step 1
Understand Be sure you understand the problem.
Philip fished on Monday, Wednesday, Friday, and Saturday.
Nancy fished on Tuesday, Thursday, Friday, and Sunday.

Step 2
Plan Make a plan.
• Work backward.
• Look for a pattern.
• Solve a simpler problem.
Choose a strategy.
You can use a four-step plan. Decide what facts you know. Plan what you will do and in what order. Use your plan to solve the problem. Then check your solution to make sure it makes sense.

Step 3
Solve Carry out your plan.
Count the number of fish Philip caught.
Philip caught 3 + 1 + 0 + 4 = 8
On Saturday, Philip caught 4 fish.
To find the percent, divide 4 by 8.
4 ÷ 8 = 0.5 or 50%
Philip caught 50% of his fish on Saturday.

Step 4
Check Is the solution reasonable?
Reread the problem.
How can you check your answers?

Use any strategy shown below to solve.

1. Aisha read 24 books over the summer. Jamil read half that many. Taye read twice as many as Aisha. Zina read three times as many as Jamil. Shawon read a third of the number of books that Zina read. Which two students read the same number of books?

2. Hugo spent some money on school supplies. He received $5 back from the cashier. If he spent $95, how much money did he give the cashier?

$100
Choose the Best Strategy
Use any strategy shown below to solve.

• Look for a pattern.  • Work backward.  • Solve a simpler problem.

1. Digna packed up 10 dinners to deliver from the food shelter. Isabel packed twice as many dinners as Digna. Rosa packed up \( \frac{1}{4} \) the amount of meals as Isabel. Juanita packed up three times as many dinners as Rosa. How many dinners in all did the girls prepare? Who prepared the most dinners? Who prepared the least number of dinners?

**50 total dinners; Isabel packed the most dinners; Rosa packed the least number of dinners.**

2. Refer back to question number 1. If it takes the girls 1 hour to deliver 5 meals, in how many hours will they deliver all of the meals? If they break up into two groups, with 2 girls in each group and work at the same rate, how long will it take them to deliver the meals?

**10 hours; 5 hours**

3. The Perez family matches the amount of money each of their children puts into their own savings account by 50%. If Luisa put $40 a week into her savings account, how much will she have saved up at the end of the month?

$240

4. Keshia bought a new outfit. She chooses a top that cost $48.95 and leather boots that were twice as much as the top. The pants were one third of the price of the boots. If she received $20.52 back in change, how much money did she give to the cashier?

$200

---

Find the percent of each number. (Lesson 9–6)

5. 6% of 56

**3.36**

6. 60% of 60

**36**

Solve.

7. What is 20% of 465?

93

8. 36% of 234 is what number?

84.24

9. 36% of 234 is what number?
Enrich

Sales Tax and Discounts

Bargain Betty loves to get a good deal. She will not buy anything unless it is on sale. So, she decided to go to Bobby’s Bargain Basement where everything is on sale. The sales tax rate is 6.5%.

<table>
<thead>
<tr>
<th>Bobby’s Bargain Basement</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>skirts $26.50 x 40% off</td>
<td>sweaters $32.40 x 20% off</td>
</tr>
<tr>
<td>shirts $24.00 x 25% off</td>
<td>jeans $18.50 x 10% off</td>
</tr>
<tr>
<td>shoes $28.60 x 15% off</td>
<td>boots $30.00 x 12% off</td>
</tr>
<tr>
<td>socks $7.20 x 35% off</td>
<td>dresses $31.90 x 50% off</td>
</tr>
<tr>
<td>pants $27.40 x 30% off</td>
<td>belts $12.00 x 8% off</td>
</tr>
<tr>
<td>coats $34.00 x 45% off</td>
<td>robes $28.20 x 5% off</td>
</tr>
</tbody>
</table>

Answer the following questions using Bobby’s price list. Then find the answer at the bottom of the page. Put the corresponding letter above the answer to find two words describing Betty.

R. What is the discount on shoes? $4.29
I. What is the sale price of boots? $26.40
R. What is the sale price of a pair of socks? $19.18
A. What is the sale price for a pair of pants? $6.00
T. What is the discount on shirts? $15.30
L. What is the discount on coats? $1.41
F. What is the discount on robes? $25.92
F. What is the sale price for a sweater? $1.85
U. What is the discount on jeans? $15.95
T. What is the discount on dresses? $11.04
H. What is the total price of a robe including the sales tax? $28.53
G. What is the sale price for a belt? $11.04
Y. What is the total price of a dress and a skirt including the sales tax? $33.92
Skills Practice
Probability

Use the spinner for problems 1–3.

1. \( P(\text{striped}) = \frac{2}{3} \)
2. \( P(\text{speckled}) = \frac{2}{9} \)
3. \( P(\text{speckled or white}) = \frac{1}{3} \)

Use the bag of cubes for problems 4–6.

4. \( P(\text{dots}) = \frac{2}{7} \)
5. \( P(\text{not stripes}) = \frac{6}{7} \)
6. \( P(\text{stars or stripes}) = \frac{5}{7} \)

Homework Practice
Probability

The bag of cubes that is shown contains 4 stars, 2 fives, and 1 striped cube. You will pick only one cube. Find each probability. Write the answer as a fraction and a percent rounded to the nearest whole number.

1. \( P(\text{star}) \) \( \frac{4}{7} \) \( 57\% \)
2. \( P(\text{stripe}) \) \( \frac{1}{7} \) \( 14\% \)
3. \( P(\text{not a dot}) \) \( \frac{5}{7} \) \( 71\% \)
4. \( P(\text{star or dots}) \) \( \frac{6}{7} \) \( 86\% \)

Spiral Review

Use any strategy shown below to solve. (Lesson 9–7)

- Look for a pattern.
- Work backward.
- Solve a simpler problem.

5. The softball team has won 4 times as many games as they lost. If they lost 6 games, how many games did they play?

30 games
Problem-Solving Practice

Probability

1. What is the probability that Lindy will roll a number divisible by 3 on a number cube with numbers 1 through 6?

\[ P(3) = \frac{1}{6} \]

2. How would you describe the probability that Adrian will roll the number 7 on a number cube?

impossible, or zero

3. Wayne went to a banquet. At the end of the meal, equal numbers of pieces of blueberry, apple, and cherry pie were passed out randomly to the dinner guests. What is the probability that Wayne will receive apple pie?

\[ P(\text{apple}) = \frac{1}{3} \]

4. Lavonne’s mother has brown eyes, and her father has blue eyes. Lavonne has brown eyes, and her husband has blue eyes. She knows that her children will have blue eyes? What is the probability that her first child will have blue eyes? If her first child has brown eyes, what is the probability that the second child will have blue eyes?

impossible, or zero

5. Sara has a spinner divided into 12 sections. Each section is numbered, starting with 1 and ending with 12. Sara spins the spinner. What is the probability that she will spin a prime number? What is the probability that she will spin an odd number? What is the probability that she will spin a number divisible by 3? What is the probability that she will spin a multiple of 3? What is the probability that she will spin a multiple of 4 or 5? What is the probability that she will spin an even number?

- Prime numbers: \(\frac{2}{12} = \frac{1}{6}\)
- Odd numbers: \(\frac{6}{12} = \frac{1}{2}\)
- Numbers divisible by 3: \(\frac{4}{12} = \frac{1}{3}\)
- Multiples of 3: \(\frac{3}{12} = \frac{1}{4}\)
- Even numbers: \(\frac{6}{12} = \frac{1}{2}\)

6. Eduardo cleaned out his school locker. At the bottom of the locker, he found 5 pencils with erasers, 1 pencil missing its eraser, 2 red pens, 3 black pens, and 4 blue pens. He placed all these items in a box and mixed them up. If he closes his eyes and picks one item out of the box, what is the probability that it is a pencil with an eraser or a black pen?

\[ P(\text{pencil with eraser or black pen}) = \frac{5}{12} + \frac{3}{12} = \frac{8}{12} = \frac{2}{3} \]

Enrich

Working Backward with Probabilities

Suppose that you are given this information about rolling a number cube.

\[ P(1) = \frac{1}{2}, \quad P(3) = \frac{1}{3}, \quad P(5) = \frac{1}{6} \]

Can you tell what numbers are marked on the faces of the cube? Work backward. Since a cube has six faces, express each probability as a fraction whose denominator is 6.

\[ P(1) = \frac{3}{6}, \quad P(3) = \frac{2}{6}, \quad P(5) = \frac{1}{6} \]

So, the cube must have three faces marked with the number 1, two faces marked 3, and one face marked 5.

Each set of probabilities is associated with rolling a number cube. What numbers are marked on the faces of each cube?

1. P(2) = \(\frac{1}{3}\)
2. P(1) = \(\frac{1}{6}\)
3. P(1 or 2) = \(\frac{5}{6}\)
4. P(4) = \(\frac{1}{3}\)
5. P(4) = \(\frac{1}{6}\)
6. P(2 or 3) = \(\frac{2}{3}\)
7. P(6) = \(\frac{1}{3}\)
8. P(factor of 4) = \(\frac{1}{2}\)
9. P(1, 2, or 3) = \(\frac{1}{2}\)

Each set of probabilities is associated with the spinner shown at the right. How many sections of each color are there?

4. P(red) = \(\frac{2}{6}\), 4 red
5. P(yellow) = \(\frac{5}{6}\), 5 yellow
6. P(blue) = \(\frac{2}{6}\), 2 blue
7. P(purple) = \(\frac{1}{6}\), 1 purple
8. P(green) = \(\frac{3}{6}\), 2 green
9. P(green) = \(\frac{0}{6}\), 0 green
10. P(black) = \(\frac{1}{6}\), 1 black
11. P(black) = \(\frac{2}{6}\), 2 black

Copyright © Macmillan/McGraw-Hill, a division of The McGraw-Hill Companies, Inc.
Answers (Lesson 9–9)

Make an organized list or tree diagram to show the sample space.

1. How many choices do you have for your lunch if you pick either an orange or apple and pretzels or carrots to go with your sandwich?

2. You have a friend over to play. You decide to play cards, have a snack, and then watch a movie. How many different ways can you complete your choices?

3. You are getting ready for school and you only have a choice of a white, purple, or blue shirt and either a pair of jeans, shorts, or a skirt. How many possible outfits can you have?

4. Find the number of possible outcomes.

5. Find the \( P(4, \text{less than 3}) \).

6. What is \( P(1, 3) \)?

7. Please, less than 9.

Sample Spaces

The set of all possible outcomes is called a sample space. There are several ways to find the sample space of different situations.

Use a List to Find Sample Space

At the fair you decide to go on the bumper cars, the carousel, and the roller coaster. List all the different orders that you can go on each ride, one time each.

Make an organized list. Use B for bumper cars, C for carousel, and R for roller coaster.

BCR  BRC  CBR  CRB  RBC  RCB

So there are 6 different orders you can go on each of the rides.

Use a Tree Diagram to Find Sample Space

Use a tree diagram to find how many pizzas are possible from a choice of thin or thick crust and a choice of pepperoni, mushrooms, or green peppers.

List each crust type. Then pair each crust choice with each topping choice.

<table>
<thead>
<tr>
<th>Crust</th>
<th>Topping</th>
</tr>
</thead>
<tbody>
<tr>
<td>thin</td>
<td>pepperoni (P)</td>
</tr>
<tr>
<td></td>
<td>mushrooms (M)</td>
</tr>
<tr>
<td></td>
<td>green pepper (G)</td>
</tr>
<tr>
<td>thick</td>
<td>pepperoni (P)</td>
</tr>
<tr>
<td></td>
<td>mushrooms (M)</td>
</tr>
<tr>
<td></td>
<td>green pepper (G)</td>
</tr>
</tbody>
</table>

There are six possible pizzas.

Make an organized list or draw a tree diagram to show the sample space for each situation.

1. How many sandwich and fruit combinations can be made if you can choose from a turkey sandwich or ham sandwich with an apple, orange, or banana?

2. In how many ways can Kelly read 4 books, assuming she reads each book once?

30 combinations

For the following exercises, toss a number cube and spin the spinner shown.

6 SDAP3.1

4. Find the number of possible outcomes.

5. Find the \( P(4, \text{less than 3}) \).

6. What is \( P(1, 3) \)?

7. Please, less than 9.

Copyright © Macmillan/McGraw-Hill, a division of The McGraw-Hill Companies, Inc.
Use the spinners below for Exercises 1–5. Spin each only once.

1. How many outcomes are possible for spinning both spinners?

2. \( P(1, A) \)

3. \( P(\text{even number, consonant}) \)

4. \( P(\text{not 3, vowel}) \)

5. \( P(1 \text{ or } 6, A) \)

9–9 Problem-Solving Practice

Sample Spaces

1. How many choices do you have for your lunch if you pick either ham or roast beef with cheese, tomatoes, or onions to go on your sandwich?

2. You go to a playground. You decide to climb across the monkey bars, go down the slide, and climb the rock wall. How many different ways can you complete your choices?

3. You are getting ready for school, and you only have a choice of white, black, or yellow shoes and either a pair of jeans or shorts. How many possible combinations can you have?

9–9 Homework Practice

Sample Spaces

Use the spinner below to answer questions 4 and 5. Find each probability. Write the answer as a fraction and a percent rounded off to the nearest whole number.

4. \( P(X) \quad 2\overset{2}{\div}3\quad 67\% \)

5. \( P(Z) \quad 1\overset{1}{\div}3\quad 33\% \)
**Making Predictions**

Every sixth student who walked into the school was asked how he or she got to school.

1. What is the probability that a student at the school rode a bike to school?

\[ P(\text{ride bike}) = \frac{\text{number of students who rode a bike}}{\text{number of students surveyed}} = \frac{10}{40} = \frac{1}{4} \text{, or } 0.25, \text{ or } 25\%. \]

2. There are 360 students at the school. Predict how many bike to school.

Write equivalent ratios. Let \( s \) = number of students who will ride a bike.

\[
\frac{10}{40} = \frac{s}{360} 
\]

Since \( s = 90 \), 90 students will ride a bike to school.

---

**Listing Outcomes in a Table**

Suppose you spin the two spinners below. What is the probability that the sum of the numbers you spin is 5?

- **First Spinner**:
  - 1
  - 2
  - 3
  - 4
- **Second Spinner**:
  - 1
  - 2
  - 3
  - 4

To find this probability, you first need to count the outcomes. One way to do this is to use a table of sums like the one at the right. From the table, it is easy to see that there are 24 outcomes. It is also easy to see that in 4 of these outcomes, the sum of the numbers is 5. So, the probability that the sum of the numbers is 5 is \( \frac{5}{24} \), or \( \frac{1}{6} \).

Use the spinners and the table above. Find each probability.

1. \( P(\text{sum is 8}) \) \( \frac{1}{8} \)
2. \( P(\text{sum is greater than 6}) \) \( \frac{5}{12} \)
3. \( P(\text{sum is 12}) \) 0
4. \( P(\text{sum is less than or equal to 10}) \) 1

Suppose you toss two number cubes. Each cube is marked with 1, 2, 3, 4, 5, and 6 on its faces. Find each probability. (Hint: On a separate sheet of paper, make a table like the one above.)

5. \( P(\text{sum is a prime number}) \) \( \frac{5}{12} \)
6. \( P(\text{sum is a factor of 12}) \) \( \frac{1}{3} \)
7. \( P(\text{sum is greater than 12}) \) 0
8. \( P(\text{sum is less than 6}) \) \( \frac{5}{18} \)

9. CHALLENGE Here is a set of probabilities associated with two spinners.

\[
\begin{align*}
P(\text{sum is 4}) &= \frac{1}{6} & P(\text{sum is 6}) &= \frac{1}{3} \\
P(\text{sum is 8}) &= \frac{1}{3} & P(\text{sum is 10}) &= \frac{1}{6}
\end{align*}
\]

In the space at the right, sketch the two spinners.

---

**Making Predictions**

A survey is a method of collecting information. The group being surveyed is the population. To save time and money, part of the group, called a sample, is surveyed.

A good sample is:
- selected at random, or without preference,
- representative of the population, and
- large enough to provide accurate data.

Every sixth student who walked into the school was asked how he or she got to school.

1. What is the probability that a student at the school rode a bike to school?

\[ P(\text{ride bike}) = \frac{\text{number of students who rode a bike}}{\text{number of students surveyed}} = \frac{10}{40} = \frac{1}{4} \text{, or } 0.25, \text{ or } 25\%. \]

2. There are 360 students at the school. Predict how many bike to school.

Write equivalent ratios. Let \( s \) = number of students who will ride a bike.

\[
\frac{10}{40} = \frac{s}{360} 
\]

Since \( s = 90 \), 90 students will ride a bike to school.

---

**Listing Outcomes in a Table**

A survey is a method of collecting information. The group being surveyed is the population. To save time and money, part of the group, called a sample, is surveyed.

A good sample is:
- selected at random, or without preference,
- representative of the population, and
- large enough to provide accurate data.

Every sixth student who walked into the school was asked how he or she got to school.

1. What is the probability that a student at the school rode a bike to school?

\[ P(\text{ride bike}) = \frac{\text{number of students who rode a bike}}{\text{number of students surveyed}} = \frac{10}{40} = \frac{1}{4} \text{, or } 0.25, \text{ or } 25\%. \]

2. There are 360 students at the school. Predict how many bike to school.

Write equivalent ratios. Let \( s \) = number of students who will ride a bike.

\[
\frac{10}{40} = \frac{s}{360} 
\]

Since \( s = 90 \), 90 students will ride a bike to school.
For Exercises 1–2, use the following information.

On a quiz show, a contestant correctly answered 9 of the last 12 questions.

1. Find the probability of the contestant correctly answering the next question. 
   \[ \frac{9}{12} = \frac{3}{4}, 0.75, 	ext{ or } 75\% \]

2. Suppose the contestant continues on the show and tries to correctly answer 24 questions. About how many questions would you predict the contestant to correctly answer?
   about 18 questions

For Exercises 3–6, use the spinners below to answer questions 3–6. Use a tree diagram to find each probability. Write the answer as a fraction and a percent rounded to the nearest whole number.

3. \( P(\text{red, 2 or 3}) \) 
   \[ \frac{1}{4}, 0.25, 	ext{ or } 25\% \]

4. \( P(\text{green, odd number}) \) 
   \[ \frac{1}{2}, 0.4, 	ext{ or } 40\% \]

5. \( P(\text{blue, less than 3}) \) 
   \[ \frac{1}{6}, 17\% \]

6. \( P(\text{not green, greater than 3}) \) 
   \[ \frac{5}{12}, 42\% \]

For Exercises 1–2, use the following information.

Shoppers at a grocery store are asked whether or not they own a pet.

3. How many people were surveyed?
   100 people

4. What is the probability that a person owns a pet?
   \[ \frac{13}{25} \]

Shoppers at a grocery store are asked whether or not they own a pet.

3. How many people were surveyed?
   100 people

4. What is the probability that a person owns a pet?
   \[ \frac{13}{25} \]

For Exercises 1–2, use the following information.

250 people were asked to name their favorite vacation spot.

1. Find the probability that a person chose an amusement park.
   \[ \frac{7}{25} \]

2. What is the probability that the next person will choose the beach?
   \[ \frac{3}{5} \]
**Problem-Solving Practice**

**Making Predictions**

For Exercises 1–3, use the table of results of Jeremy's survey of favorite kinds of movies.

<table>
<thead>
<tr>
<th>Favorite Movie Type</th>
<th>People</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drama</td>
<td>12</td>
</tr>
<tr>
<td>Foreign</td>
<td>3</td>
</tr>
<tr>
<td>Comedy</td>
<td>20</td>
</tr>
<tr>
<td>Action</td>
<td>15</td>
</tr>
</tbody>
</table>

1. How many people did Jeremy use for his sample?
   - **50 people**

2. If Jeremy were to ask any person to name his favorite type of movie, what is the probability that it would be comedy?
   - **\( \frac{2}{5}, 0.4, \text{ or } 40\% \)**

3. If Jeremy were to survey 250 people, how many would you predict would name comedy?
   - **100 people**

For Exercises 4–7, use the table of results of the Better Sleep Council's survey of Americans to find the most important factors for good sleep.

<table>
<thead>
<tr>
<th>Most Important Factors for Good Sleep</th>
<th>People</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good Mattress</td>
<td>32</td>
</tr>
<tr>
<td>Daily Exercise</td>
<td>20</td>
</tr>
<tr>
<td>Good Pillows</td>
<td>8</td>
</tr>
<tr>
<td>Healthy Diet</td>
<td>11</td>
</tr>
<tr>
<td>Other Factors</td>
<td>29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Most Important Factors for Good Sleep</th>
<th>People</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good Mattress</td>
<td>32</td>
</tr>
<tr>
<td>Daily Exercise</td>
<td>20</td>
</tr>
<tr>
<td>Good Pillows</td>
<td>8</td>
</tr>
<tr>
<td>Healthy Diet</td>
<td>11</td>
</tr>
<tr>
<td>Other Factors</td>
<td>29</td>
</tr>
</tbody>
</table>

4. Predict how many people out of 400 would say that a good mattress is the most important factor.
   - **128 people**

5. What is the probability that any person chosen at random would say that a healthy diet is the most important factor?
   - **\( \frac{89}{100}, 0.89, \text{ or } 89\% \)**

6. Suppose 250 people were chosen at random. Predict the number of people that would say good pillows are the most important factor.
   - **20 people**

7. What is the probability that any person chosen at random would say that daily exercise is the most important factor for good sleep?
   - **\( \frac{1}{5}, 0.2, \text{ or } 20\% \)**

**Enrich**

**Odds**

People who play games of chance often talk about odds. You can find the odds in favor of an event by using this formula.

\[
\text{odds in favor} = \frac{\text{number of ways an event can occur}}{\text{number of ways the event cannot occur}}
\]

With the spinner shown at the right, for example, this is how you would find the odds in favor of the event prime number.

- There are four prime numbers (2, 3, 5, 7).
- Six numbers are not prime (1, 4, 6, 8, 9, 10).

\[
\text{odds in favor} = \frac{4}{6} = \frac{2}{3}
\]

The odds in favor of the event prime number are **\( \frac{2}{3} \)** or **2 to 3**.

Suppose that you spin the spinner shown above. Find the odds in favor of each event.

1. number greater than 3: **7 to 3**
2. number less than or equal to 6: **3 to 2**
3. even number: **1 to 1**
4. odd number: **1 to 1**
5. multiple of 3: **3 to 7**
6. factor of 10: **2 to 3**

To find the odds against an event, you use this formula.

\[
\text{odds against} = \frac{\text{number of ways an event cannot occur}}{\text{number of ways the event can occur}}
\]

Suppose that you roll a number cube with 1, 2, 3, 4, 5, and 6 marked on its faces. Find the odds against each event.

7. number less than 5: **1 to 2**
8. number greater than or equal to 2: **1 to 5**
9. even number: **1 to 1**
10. odd number: **1 to 1**
11. number divisible by 3: **2 to 1**
12. factor of 12: **1 to 5**

Answers (Lesson 9–10)
Match each word to its definition. Write your answers on the lines provided.

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. percent</td>
<td>D. a diagram of all the possible outcomes of an event or series of events or experiments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. probability</td>
<td>E. a graph in the shape of a circle in which data are represented by parts of a circle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. sample space</td>
<td>F. a possible result of an experiment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. tree diagram</td>
<td>A. a special ratio that compares a number to 100 using the symbol %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. circle graph</td>
<td>B. a possible result of an experiment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. outcome</td>
<td>C. the set of all possible outcomes in a probability experiment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. simple event</td>
<td>K. probability based on what should happen under perfect conditions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. random</td>
<td>H. equally likely to occur</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. complementary events</td>
<td>M. probability based on what actually happens in an experiment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. theoretical probability</td>
<td>G. the group being studied in a survey</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. experimental probability</td>
<td>I. one outcome or a collection of outcomes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. survey</td>
<td>N. a part of a population used in a survey to represent the whole population</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. population</td>
<td>J. two events that are the only ones that can happen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. sample</td>
<td>L. a method of collecting data</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Vocabulary Test**

**Oral Assessment**

Collect 20 paper clips, 10 erasers, and 3 jars. In the first jar, put 5 erasers and 7 paper clips. In the second jar, put 5 erasers and 5 paper clips. Finally, in the third jar, put 2 erasers and 8 paper clips.

Read each question aloud to the student. Then write the student’s answers on the lines below the question.

1. Which jar has the highest percentage of paper clips?
   - **the third jar**

2. Which jar has the lowest percentage of paper clips?
   - **second jar**

3. If you added the percentages of paper clips for each jar, would it equal 100%?
   - **No**

4. Tell how you got your answer.
   - **Answers will vary; accept reasonable answers.**

5. If you added the two highest percentages of paper clips, what percentage would you have?
   - **150%**

6. Tell how you got your answer.
   - **Answers will vary; accept reasonable answers.**
7. On the chalkboard or a piece of paper, draw a circle graph that represents the following survey results for a survey titled “What is Your Favorite Sport to Play”: Golf 9%, Baseball 24%, Soccer 16%, Football 31%, Basketball 14% and Ice Hockey 6%.

**Answers will vary:**

Accept reasonable answers.

8. If 450 youth responded to the survey, how many of them said baseball was their favorite sport to play?

108 youth

9. Tell how you got your answer.

**Answers will vary:**

Accept reasonable answers.

10. If 450 youth responded to the survey, how many of them said soccer was their favorite sport to play?

72

11. If you add the percentage for golf with the percentage for baseball, what percent do you get?

33%

12. Tell how you got your answer.

**Answers will vary:**

Accept reasonable answers.
### Chapter 9 Assessment Answer Key

#### Diagnostic Assessment

**Page 59**

1. \( \frac{1}{2} \)
2. **simplest form**
3. \( \frac{1}{3} \)
4. \( \frac{5}{9} \)
5. \( a = 6 \)
6. \( f = 30 \)
7. \( y = 12 \)
8. \( b = 10 \)
9. \( w = 30 \)
10. \( w = 48 \)
11. \( 10 \)
12. \( 50 \)
13. \( 70 \)
14. \( 20 \)
15. \( 50 \)
16. \( 90 \)
17. \( 20 \)
18. \( $40 \)

#### Chapter Pretest

**Page 60**

1. \( \frac{13}{25} \)
2. **85%**
3. **1.23**
4. **67%**
5. **football**
6. **baseball and basketball**
7. **soccer**
8. **50%**
9. **80**
10. **20**

#### Quiz 1 (9–1 through 9–3)

**Page 61**

1. \( \frac{39}{50} \)
2. \( \frac{53}{100} \)
3. \( \frac{2}{25} \)
4. \( \frac{6}{25} \)
5. \( \frac{31}{100} \)
6. **23%**
7. **60%**
8. **88%**
9. **340%**
10. **250%**
11. **.62**
12. **.88**
13. **1.25**
14. **28%**
15. **54%**
16. **green uniforms**
Chapter 9 Assessment Answer Key

Quiz 2 (9–4 through 9–6) Page 62

1. **128 hats**

2. **90**

3. **13**

4. **18**

5. **100**

6. **2.8**

7. **15.3**

8. **94.5**

9. **9**

10. **11,250 sq. mi.**

11. **32**

Quiz 3 (9–7 through 9–10) Page 63

1. **$\frac{1}{3}; \text{33\%}$**

2. **$\frac{5}{12}; \text{42\%}$**

3. **$\frac{1}{6}; \text{17\%}$**

4. **$\frac{1}{12}; \text{8\%}$**

5. **9**

6. **21,250 sq. mi.**

7. **9**

8. **6**

9. **10 times**

10. **180 times**

Mid-Chapter Review Page 64

1. **$\frac{17}{50}; 0.34$**

2. **$\frac{27}{100}; 0.27$**

3. **$\frac{59}{100}; 1.59$**

Group A:
- Theme park
- and museum

Group B:
- foreign country
- and theme park

4. theme park

5. foreign country

6. **74\%**

7. **20\%**

8. **38\%**

9. **100**

10. **180 times**
Chapter 9 Assessment Answer Key

Chapter Test, Form 1
Page 70

1. D
2. H
3. A
4. G
5. C
6. G
7. C
8. G
9. C
10. F
11. B
12. G
13. C
14. J
15. B
16. H

Chapter Test, Form 2A
Page 71

1. C
2. G
3. C
4. G
5. B
6. H
7. C
8. J
9. C

(continued on the next page)
Chapter 9 Assessment Answer Key

Chapter Test, Form 2A
Page 73

10. H
11. C
12. J
13. C
14. G
15. C
16. G

Chapter Test, Form 2B
Page 74

1. H
2. H
3. B
4. F
5. C
6. G
7. B
8. F
9. C
10. F
11. B
12. F
13. B
14. H

Page 75
### Chapter 9 Assessment Answer Key

<table>
<thead>
<tr>
<th>Chapter Test, Form 2C</th>
<th>Chapter Test, Form 2D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Page 76</td>
<td>Page 77</td>
</tr>
<tr>
<td>Page 78</td>
<td></td>
</tr>
</tbody>
</table>

#### 1.
68%

#### 2.
1 $\frac{3}{4}$

#### 3.
3.71

#### 4.
20%

#### 5.
$\frac{9}{10}$

#### 6.
300

#### 7.
39

#### 8.
45

#### 9.
Students chose adventure more often than they said humor.

#### 10.
science fiction

#### 11.
10 students

#### 12.
$\frac{1}{2}$

#### 13.
$\frac{1}{3}$

#### 14.
about 4 times

#### 15.
80%

#### 16.
$9$

#### 17.
$1\frac{1}{10}$

#### 1.
68%

#### 2.
3.71

#### 3.
$1\frac{3}{4}$

#### 4.
300

#### 5.
$\frac{9}{10}$

#### 6.
20%

#### 7.
$\frac{1}{3}$

#### 8.
$\frac{1}{2}$

#### 9.
about 4 times

(continued on the next page)
Chapter 9 Assessment Answer Key

Chapter Test, Form 2D
Page 79

10. science
11. more than
12. 10 students

13. 39
14. 45

15. $9
16. 1 \frac{1}{10}
17. 80%

Chapter Test, Form 3
Page 80

1. 32%
2. \frac{22}{25}
3. 63%
4. 70%
5. \frac{17}{20}
6. 100
7. 5%
8. 0.046, 4.64%, 4 \frac{2}{5}, 460%

12. \frac{1}{3}
13. \frac{1}{2}
14. about 67 times
15. 320 students
16. $7.50
17. 10 more

Chapter Test, Form 3
Page 81

9. science fiction

Students chose mystery less often than they said humor.
10. 18 students
11. 18 students
## Chapter 9 Assessment Answer Key

Page 82, Extended-Response Test

Scoring Rubric

<table>
<thead>
<tr>
<th>Level</th>
<th>Specific Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>The student demonstrates a <strong>thorough understanding</strong> of the mathematics concepts and/or procedures embodied in the task. The student has responded correctly to the task, used mathematically sound procedures, and provided clear and complete explanations and interpretations. The response may contain minor flaws that do not detract from the demonstration of a thorough understanding.</td>
</tr>
<tr>
<td>3</td>
<td>The student demonstrates an <strong>understanding</strong> of the mathematics concepts and/or procedures embodied in the task. The student’s response to the task is essentially correct with the mathematical procedures used and the explanations and interpretations provided demonstrating an essential but less than thorough understanding. The response may contain minor errors that reflect inattentive execution of the mathematical procedures or indications of some misunderstanding of the underlying mathematics concepts and/or procedures.</td>
</tr>
<tr>
<td>2</td>
<td>The student has demonstrated only a <strong>partial understanding</strong> of the mathematics concepts and/or procedures embodied in the task. Although the student may have used the correct approach to obtaining a solution or may have provided a correct solution, the student’s work lacks an essential understanding of the underlying mathematical concepts. The response contains errors related to misunderstanding important aspects of the task, misuse of mathematical procedures, or faulty interpretations of results.</td>
</tr>
<tr>
<td>1</td>
<td>The student has demonstrated a <strong>very limited understanding</strong> of the mathematics concepts and/or procedures embodied in the task. The student’s response to the task is incomplete and exhibits many flaws. Although the student has addressed some of the conditions of the task, the student reached an inadequate conclusion and/or provided reasoning that was faulty or incomplete. The response exhibits many errors or may be incomplete.</td>
</tr>
<tr>
<td>0</td>
<td>The student has provided a <strong>completely incorrect</strong> solution or uninterpretable response, or no response at all.</td>
</tr>
</tbody>
</table>
Chapter 9 Assessment Answer Key

Page 82, Extended-Response Test
Sample Answers

In addition to the scoring rubric found on page A35, the following sample answers may be used as guidance in evaluating open-ended assessment items.

1. **a. Favorite After-School Activity**

   ![Pie Chart]

   - Jumping rope: 15%
   - In-line skating: 40%
   - Basketball: 25%
   - Cycling: 20%

   **b.** The largest segment of the circle is “In-line skating,” so that is the students’ favorite after-school activity.

   **c.** The segment labeled “In-line skating” is twice as large as the segment labeled “cycling,” so that means that twice as many students prefer in-line skating as cycling.

   **d.** Fifteen percent of the students said jumping rope was their favorite after-school activity. To write a percent as a fraction, write it with a denominator of 100 and simplify: \(\frac{15}{100}\) simplifies to \(\frac{3}{20}\). The popularity of jumping rope is \(\frac{3}{20}\) among the students.

2. **a.** A sample space is the set of all possible outcomes. In this scenario, it is the set of all possible fruit and yogurt combinations that can be ordered at the juice bar.

   **b. Yogurt**
   - plain (P)
   - strawberries (S)
   - raspberries (R)
   - banana (B)
   - vanilla (V)

   **Fresh Fruit**
   - bananas (B)
   - strawberries (S)
   - raspberries (R)
   - vanilla (V)

   **Outcome**
   - PB
   - PS
   - PR
   - VB
   - VS
   - VR

   **c.** There are 6 possible combinations of yogurt and fruit. There are 3 combinations that include vanilla yogurt: VB, VS, and VR. So the probability of picking a smoothie with vanilla yogurt is \(\frac{3}{6}\) or \(\frac{1}{2}\), 0.50, or 50%. This means that the probability of a customer randomly choosing a smoothie with vanilla yogurt is 1 in 2.

3. To solve the problem, first round up the number of kids in the school to 1,000. Round down the number of kids who say they don’t get enough sleep to 40%. Subtract 40% from 100% to find what percent of students say they do get enough sleep: \(100 - 40 = 60\). Write a proportion to solve for \(s\), where \(s\) is the number of kids who say they do get enough sleep: \(\frac{60}{100} = \frac{s}{1,000}\). Since 1,000 is a multiple of 10, multiply 60 by 10, so \(s = 600\). Out of a school with 978 kids, about 600 would say they do get enough sleep.
Chapter 9 Assessment Answer Key

Cumulative Standardized Test Practice

Page 84

1. \text{BB}

2. \text{F}

3. \text{B}

4. \text{J}

5. \text{C}

6. \text{F}

7. \text{C}

8. \frac{9}{20}

9. \frac{7}{10} or 70%

10. 42 pieces