7th Grade Learning Guide Math
What Your Student is Learning:

- Equivalent rates can be used to find percents. Using that knowledge, they will construct a percent proportion and use it to find an unknown part, whole or percent.
- Understand the relationship between proportional reasoning and percent in order to interpret real-life scenarios involving percents.
- Solve real-world problems involving percent change, markups, and markdowns.
- Understand and use simple interest.

Background and Context for Parents:

- This builds on the last topic having students apply their proportional thinking to percents.
- Percents are a way to show a part-whole relationship (percent means “out of every hundred”).

Percent and Proportion

- The Concept of Percent In Lesson 3-1, students build on their conceptual understanding of percent from Grade 6. In this lesson, students recognize that a percent can be greater than 100%, less than 1%, or a non-whole number.

- The Concept of Proportion In Lesson 3-2, students will examine the connection between proportions and percents by using proportional relationships to find percents of given quantities. In Lesson 3-3, students deepen their conceptual understanding of the relationship between percents and proportions by learning that a percent is a constant of proportionality that relates a part to the whole. Students use algebraic expressions and equations to solve real-world percent problems.

Represent the Percent Equation

- Percent Equation In Lesson 3-3, students apply proportional reasoning to solve a percent equation. As an algebraic representation they use the formula, part = percent • whole, to represent percent problems. They will identify given information and determine whether it is the percent, the part, or the whole and understand that quantities in the formula are in a proportional relationship.

- Percent Change In Lesson 3-4, students are challenged to determine whether a situation represents a percent increase or decrease, and to calculate the percent change. They continue to use algebraic representations and identify the whole, part, and percent in the context of the situation.
• **Percent Error** In Lesson 3-4, students also apply their prior knowledge of absolute value to solve percent error problems. They learn that percent error is a measure used to describe the accuracy of a measured or estimated value. Students apply the percent equation to find the percent error in real-world applications.

**Use the Percent Equation**

• **Interpret Percent Equation** In Lessons 3-5 and Lesson 3-6, students apply their understanding of the percent to interpret the percent equation as it relates to markup, markdown, sales tax, and simple interest.

• **Markup and Markdown** In Lesson 3-5, students utilize the percent equation and bar model diagrams to calculate percent markup and markdown. Students also apply their understanding of percent to solve the problems that involve calculating sales tax.

• **Simple Interest** In Lesson 3-6, students deepen their understanding of percents by using the percent equation to solve simple interest problems. Students model the interest earned over time, representing them on a double-number line diagram. They also use a table to demonstrate the proportional relationship that exists between \( t \) (number of years), \( p \) (principal), and \( r \) (interest).

**Conceptual Understanding**

• **Identify Percent** Students know that the percent describes a proportional relationship between the part and the whole. They recognize that a percent is a ratio out of 100, which shows the relationship between quantities. Any percent greater than 100% is a number greater than one, and any percent less than 1% is a number less than one-hundredth.

• **Represent a Proportional Relationship with a Percent Equation** Students deepen their conceptual understanding of proportional relationships to develop the percent equation. They use the formula, \( \text{part} = \text{percent} \times \text{whole} \), to solve percent problems, when given two out of the three terms. Students use a variety of models, such as bar diagram models, fraction representations, and algebraic models.

\[
\text{part} = \text{percent} \times \text{whole}
\]

\[
\frac{\text{part}}{\text{whole}} = \frac{p}{100}
\]

• **Understand Percent Change and Percent Error** Students extend their previous knowledge of absolute value when solving percent error problems. Students also understand that the equations for percent change and percent error are the same. Both of these percentages involve finding the following ratio: the difference between two values to one of those values.

**Ways to support your student:**

- Generate and discuss ways to find percents mentally. Here’s one article about it: (https://medium.com/i-math/how-to-tackle-difficult-percentages-mentally-b1f5f29eb503).
- Remember, the topic is about part-whole relationships so ask students what information they have and what they are looking for (part, whole, percent).
- Before giving your student the answer to their question or specific help, ask them “What have you tried so far?”, “What do you know?”, and “What might be a next step?”
- After your student has solved it, and before you tell them it’s correct or not, have them explain to you how they got their solution and if they think their answer makes sense.
- Watch the Kahn Academy videos (below) with your student and discuss what you notice/wonder about what being taught.
- Allow calculator usage.

**Online Resources for Students:**

- [https://www.khanacademy.org/math/cc-seventh-grade-math/cc-7th-fractions-decimals/cc-7th-percent-word-problems/v/solving-percent-problems](https://www.khanacademy.org/math/cc-seventh-grade-math/cc-7th-fractions-decimals/cc-7th-percent-word-problems/v/solving-percent-problems) - The whole unit.
- [https://www.mathplayground.com/mathatthemall2.html](https://www.mathplayground.com/mathatthemall2.html) - online shopping game
Learning Support for Mathematics

For students that are approaching grade level and have learning gaps/ differences in mathematics, provide numerous opportunities for explorations at the concrete (manipulatives) and representational (visual) levels before progressing to the abstract (numbers) level. Students that need learning supports should be provided with:

- Intensive Direct Instruction and daily guided practice
- scaffolded supports
- the use of visuals as models and aids
- numerous opportunities to think out loud
- support to help them understand the why
- use of manipulatives and tools to support understanding
- Bar Modeling Representations to decode word problems
- the use of mnemonics to enhance retention of skills
- daily practice with basic facts
- the presentation of content in varied contexts and varied levels
- opportunities to use diagrams and draw math concepts
- graph paper to support understanding
- numerous opportunities to draw pictures of word problems
- the use of smaller numbers to address number operations
- opportunities for success to build a growth mindset
- computer time to allow for needed practice
- opportunities to engage in metacognition (the building and reinforcing of thinking and reasoning) skills

See examples for each bulleted item on the following pages
· **Intensive Direct Instruction and daily guided practice**
(Intensive Direct Instruction means to explain the skill / concept to the student with several examples repeatedly to help them understand)

· **Scaffolded Supports**
(Scaffolded supports mean to introduce the skill one step at a time – allowing the student to understand one section part, before moving on to the next part) ex. 5+1=6, 9+1=10, 24+1=25- it is the same as “what number comes after 5, after 9, after 24
[https://youtu.be/5hWDbSx_kdo](https://youtu.be/5hWDbSx_kdo)

· **Visuals as models and aides**
(Pictures of objects that can be used to help students understand the math)

· **Thinking out loud**
(Allows students to talk and think about the skills they are learning, which allows them to better remember the skill)
[https://youtu.be/f-4N7OxSMok](https://youtu.be/f-4N7OxSMok)

· **Understanding the why**
(When students understand why a strategy works, they will apply it to other skills) ex. 5x = 5, 45x1= 45, 320x1=320

· **Manipulatives and Tools**
(Manipulatives can be counters, beans, blocks, etc. – Tools can be rulers, calculators, scales, etc.) [https://youtu.be/uWBZF-Lyq58](https://youtu.be/uWBZF-Lyq58)

· **Bar Modeling Representations**
(Bar Modeling Representations consist of visuals that help students understand the skill they are learning. Ex.

<table>
<thead>
<tr>
<th>70</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
</tr>
<tr>
<td>35</td>
</tr>
</tbody>
</table>

[https://youtu.be/TbayTZvS_bc](https://youtu.be/TbayTZvS_bc)
· **Mnemonics**
(Mnemonics consist of strategies to help students remember skills – ex.

https://youtu.be/dXvvGc9TIdY

· **Basic Facts**
(Basic facts include addition, subtraction, division, multiplication facts – ex. 8+2=10, 2+8=10, 10-2=8, 10-8=2 / 2x5=10, 5x2=10, 10/2=5, 10/5=2

https://youtu.be/TbayTZvS_bc

· **Content with varied contexts and varied levels**
Means to show student how to solve a problem different ways to allow them to use the skill that way they understand best

https://youtu.be/FVg9n0l0Gf0

· **Diagrams**
(Diagrams provide students with visuals / pictures that help them solve the problem and they help them read the problem with less words)

https://youtu.be/TbayTZvS_bc

· **Graph paper**
(Graph paper helps students to solve the problem by making it visual / easier to see the answer)

https://youtu.be/mX43cn3IASI

· **Drawing Pictures**
(Drawing pictures allow students to show they can solve the problem without using words that they may not know or be able to write)

https://youtu.be/TbayTZvS_bc
**Smaller Numbers**
(The use of smaller numbers can help students understand the process of a skill, so that when they move on to bigger numbers, they will see that the process is still the same, they acquire understanding of the skill) ex. 5x = 5, 45x1= 45, 320x1=320

**Growth Mindset**
(A growth mindset is a process that helps to improve intelligence (thinking), ability (skill) and performance (actions). This means that by helping students to develop a growth mindset, we can help them to learn to think and be problem solvers. This is a process that occurs over time by helping them improve by building success over time.
[https://studentsatthecenterhub.org/resource/helping-struggling-students-build-a-growth-min dset/](https://studentsatthecenterhub.org/resource/helping-struggling-students-build-a-growth-min dset/)

**Computer Time**
(Computer time allows students to use websites, games, activities that will help them learn math skills and concepts)
mathgametime.com, pbs.com, bestkidsolutions.com, firstinmath.com, helpingkidsrise.org

**Metacognition**
(Metacognition means to help students think about what they are thinking, the steps they are using, the words and numbers that they are using- It helps students to better focus on the skills they are using- it is a process that occurs over time) /  [https://youtu.be/HKFOhd5sMEc/](https://youtu.be/HKFOhd5sMEc/)  
1. Ade is baking mini-loaves of bread. How many mini-loaves could he make with 10 cups of flour?

<table>
<thead>
<tr>
<th>Cups of Flour</th>
<th>Number of Mini-Loaves</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>7.5</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

A 12.5  C 25  
B 15  D 50

2. Cameron has 75% as many shirts as her brother. How many shirts does Cameron have if her brother has 12 shirts?

A 3 shirts  C 12 shirts  
B 9 shirts  D 16 shirts

3. An elevator ascends at a rate of 29.6 feet per second. If a building is 1,450 feet tall, about how long would it take for the elevator to travel from the ground floor to the roof?

A 0.49 minute  C 4.9 minutes  
B 0.82 minute  D 8.2 minutes

4. Two fifths of the senior class earned a grade of B+ or higher on an advanced mathematics exam. If 42 seniors scored at least a B+, how many students are in the entire senior class?

A 70 students  C 105 students  
B 84 students  D 210 students

5. Roberto has run 16 of the 26.2 miles in a marathon. Rounded to the nearest whole number, what percent of the marathon has he completed?

A 16%  
B 26%  
C 50%  
D 61%

6. Tiffany’s allowance is reduced $1.25 every time she forgets to clean her room. If she forgets to clean her room 7 times this month, by how much money is Tiffany’s allowance reduced?

A $7.25  
B $8.75  
C $17.85  
D $18.75

7. If skim milk is 87% water, how much water is in 4 cups of skim milk?

A Fewer than 1 cup  
B Between 1 and 2 cups  
C Between 2 and 3 cups  
D Between 3 and 4 cups

8. Printer A prints 36 pages every 1.5 minutes. Printer B prints 114 pages every 3 minutes. Printer C prints 115 pages every 5 minutes. Which printer prints the fastest?

A Printer A  
B Printer B  
C Printer C  
D The rates are equal
9. Carrie can fold 20 shirts in two minutes. If she continues at this rate, how long will it take her to fold 50 shirts?
   A 2.5 minutes  
   B 4 minutes  
   C 4.5 minutes  
   D 5 minutes

10. Which number completes the ratio table?

<table>
<thead>
<tr>
<th></th>
<th>2</th>
<th>7</th>
<th>12</th>
<th>17</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td></td>
<td>96</td>
<td>136</td>
<td></td>
</tr>
</tbody>
</table>

   A 21  
   B 23  
   C 32  
   D 56

11. Which percent is equivalent to 0.3?
   A 0.003%  
   B 0.03%  
   C 3%  
   D 30%

12. A movie theater sells out 7 times per month. How many times will it sell out in the next 2 years?
   A 14  
   B 24  
   C 84  
   D 168

13. Find the unknown value in the proportion.
\[
\frac{5,280 \text{ feet}}{1 \text{ mile}} = \frac{6,600 \text{ feet}}{x}
\]
   A 0.25 mile  
   B 0.8 mile  
   C 1.25 miles  
   D 1320 miles

   A Elizabeth  
   B Jesse  
   C Reagan  
   D They all swim at the same speed.

15. The cafeteria at Local Middle School offers a choice of either a sandwich or soup every Thursday. Of 55 students who purchased lunch this Thursday, 30 chose a sandwich. What is the ratio of the number of students who chose a sandwich to all who purchased lunch this Thursday?
   A \(\frac{25}{30}\)  
   B \(\frac{25}{55}\)  
   C \(\frac{30}{55}\)  
   D \(\frac{35}{30}\)

16. Which ratio is equivalent to 9 : 180?
   A 5 : 200  
   B 12 : 240  
   C 10 : 400  
   D 8 : 560
Review What You Know!

Vocabulary
Choose the best term from the box. Write it on the blank.

1. A ____________ is a ratio in which the first term is compared to 100.

2. A ratio that relates two quantities with different units of measure is a ____________.

3. A statement that two ratios are equal is called a ____________.

4. The relationship “3 students out of 5 students” is an example of a ____________.

Fractions, Decimals, and Percents
Write each number in two equivalent forms as a fraction, decimal, or percent.

5. 0.29  
6. 35%  
7. \( \frac{2}{5} \)

Proportions
Find the unknown number in each proportion.

8. \( \frac{x \text{ days}}{4 \text{ years}} = \frac{365.25 \text{ days}}{1 \text{ year}} \)

9. \( \frac{33,264 \text{ feet}}{x \text{ miles}} = \frac{5,280 \text{ feet}}{1 \text{ mile}} \)

10. A cooking magazine shows a photo of a main dish on the front cover of 5 out of the 12 issues it publishes each year. Write and solve a proportion to determine how many times a photo of a main dish will be on the front cover during the next 5 years.
There are 80 animals at an animal shelter. Of those animals, 27.5% are dogs. How many dogs are at the shelter?

Use equivalent ratios to find 27.5% of 80.

\[
\frac{27.5}{100} = \frac{x}{80}
\]

\[
\frac{27.5 \cdot 80}{100} = \frac{x}{80} \cdot 80
\]

\[
x = 22
\]

There are 22 dogs at the shelter.

Josh and Daniel each want to save $600 to attend a sports camp. Josh has saved 60% of the amount. Daniel has saved $320. Who has saved more money? How much more?

1. Complete the equivalent ratios to find 60% of $600.

\[
\frac{\text{___}}{100} = \frac{x}{\text{___}}
\]

2. What number should you multiply both sides by to solve for x?

3. How much money has Josh saved?

4. Who has saved more money? How much more?

On the Back!

5. A total of 150 students voted for class president. Bianca received 43 votes, and Carlos received 38% of the votes. Which student received more votes? How many more?
Read the word problem below. Then answer the questions to identify the steps for solving the problem.

Aisha and David are reading a book that has 240 pages. Aisha has read 55% of the book. David has read 126 pages. Which student has read more pages so far? How many more pages has that student read?

1. Underline the two questions that you need to answer.

2. Circle the information in the problem about how many pages each student has read.

3. What information do you need to find before you can answer the questions asked in the problem?

4. Complete the diagram and write the equivalent ratios that can help you find the information you identified in Exercise 3.

5. After finding the information in Exercise 3, how will you answer the questions asked in the problem?
Use the list below to complete the sentences.

| percent | equivalent ratios | whole | part |

Three of the 25 students in an art class are left-handed. In other words, 12% of the students in the class are left-handed.

1. The number 3 represents _________________ of the class.

2. The number 25 represents the _________________ class.

3. You can write _________________ to represent this situation: \( \frac{3}{25} = \frac{12}{100} \).

4. You can also write the _________________ of the left-handed students in the class, which is 12%.

For each pair of ratios, circle equivalent ratios or not equivalent ratios.

5. \( \frac{2}{5} \) and \( \frac{20}{100} \) ____________________

6. \( \frac{3}{6} \) and \( \frac{50}{100} \) ____________________

7. \( \frac{150}{600} \) and \( \frac{40}{100} \) ____________________
Norah has read 72 pages, which is 45% of a book. How many pages are in the book?

**Step 1** Set up the proportion.

\[
\frac{\text{part}}{\text{whole}} = \frac{p}{100}
\]

\[
\frac{72}{w} = \frac{45}{100}
\]

**Step 2** Solve for the variable.

Write the proportion.

\[
\frac{72}{w} \cdot w = \frac{45}{100} \cdot w
\]

Multiply each side by \(w\).

\[
72 = \frac{45w}{100}
\]

Simplify.

\[
72 \cdot \frac{100}{45} = \frac{45w}{100} \cdot \frac{100}{45}
\]

Multiply by the reciprocal.

\[
w = 160
\]

Simplify.

There are 160 pages in Norah’s book.

Trevon made 24 of the 40 free throws he attempted last season. What percent of his attempted free throws did Trevon make?

1. Complete the proportion. Use a variable for the missing value.

\[
\frac{\square}{100}
\]

2. Multiply each side of the proportion by ________.

3. Write the equation you can use to solve for the variable.

4. What is the missing value in the proportion?

5. What percent of his attempted free throws did Trevon make?

**On the Back!**

6. Jason was asked 40 questions on a quiz show. He answered 85% of the questions correctly. How many questions did he answer correctly?
Review the Key Concept from the lesson. Then answer the questions to help you understand how to read a Key Concept.

**KEY CONCEPT**

You can use a bar diagram and a proportion to solve different types of percent problems. Use equivalent ratios in a proportion to compare the part to the whole.

\[
\frac{n}{w} = \frac{P}{100}
\]

<table>
<thead>
<tr>
<th>Type</th>
<th>Example</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Find the PERCENT.</td>
<td>What percent of 5 is 4?</td>
<td>[ \frac{4}{5} = \frac{P}{100} ]</td>
</tr>
<tr>
<td>Find the PART.</td>
<td>What number is 80% of 5?</td>
<td>[ \frac{n}{5} = \frac{80}{100} ]</td>
</tr>
<tr>
<td>Find the WHOLE.</td>
<td>4 is 80% of what number?</td>
<td>[ \frac{4}{\frac{80}{100}} = \frac{80}{100} ]</td>
</tr>
</tbody>
</table>

1. Circle the numerators in the proportion \( \frac{\text{part}}{\text{whole}} = \frac{P}{100} \). Then circle the corresponding parts of the bar diagram.

2. Draw a square around the denominators in the proportion \( \frac{\text{part}}{\text{whole}} = \frac{P}{100} \). Then draw squares around the corresponding parts in the bar diagram.

3. How is the bar diagram related to the proportion?

4. Look at the second example. Highlight the given values using different colors. Then highlight the corresponding values in the proportion the same color.

5. In all three examples, underline the word “of” and the value that follows it. What part of the proportion is the underlined value in all three examples?
Use the following terms to complete the descriptions below. Some terms may be used more than once.

<table>
<thead>
<tr>
<th>whole</th>
<th>part</th>
<th>proportion</th>
<th>variable</th>
</tr>
</thead>
</table>

1. 
Number
Percent

0%  
$p\%$  
100%

2. 
Number
Percent

0%  
100%  
$p\%$

3. In each bar diagram above, the ____________ corresponds to 100% and the ____________ corresponds to $p\%$.

4. When solving percent problems, set up a ______________.
   For example:

   $\boxed{\text{_____}} = \frac{p}{100}$

5. Use a ____________ to represent the value you need to find.
A ticket company charges a 4% service fee on all orders. How much is the service fee for a ticket that costs $65?

**Step 1** Write the percent equation.

\[ \text{part} = \text{percent} \times \text{whole} \]

**Step 2** Substitute the given values and use a variable for the missing value. Write the percent as a decimal.

\[ p = 0.04 \times 65 \]

**Step 3** Simplify.

\[ p = 2.6 \]

The service fee is $2.60.

Xavier downloaded 40 songs last week, including 14 jazz songs. What percent of Xavier’s downloads were jazz songs?

1. Complete the percent equation, using a variable for the missing value.

   \[ \square = \square \times \square \]

2. How can you solve the equation for the variable?

3. Solve for the variable.

4. What percent of Xavier’s downloads were jazz songs?

**On the Back!**

5. There are 65 students who walk to West Middle School each day. This is 12.5% of the total number of students at the school. How many students attend West Middle School?
Use each term from the list once to represent the item in each box.

<table>
<thead>
<tr>
<th>whole</th>
<th>equivalent ratios</th>
<th>decimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>part</td>
<td>commission</td>
<td>percent equation</td>
</tr>
</tbody>
</table>

1. \[ \frac{\text{part}}{\text{whole}} = \text{percent} \]
   \[ \text{part} = \text{percent} \times \text{whole} \]

2. 4% of $3,650 in sales

3. \[ \frac{4}{5} = \frac{80}{100} \]

4. 3 of 11

5. 0.03

6. 24 of 90
Name

Read the word problem below. Then answer the questions to identify the steps for solving the problem.

The bar diagram shows the amount of data Mara has used for her cell phone plan this month. What percent of the total data is still available for Mara use?

1. Underline the question that you need to answer.

2. What information is represented by the bar diagram?

3. Circle the part of the bar diagram that represents the unknown percent.

4. What information do you need to find before you can answer the question asked in the problem?

5. How can you find the information you identified in Exercise 4?

6. Once you have found the information in Exercise 4, what equation can you use to solve the problem?
**Percent change** describes an amount of change as a percent of the original value.

\[
\text{change} = \text{percent change} \cdot \text{original amount}
\]

Last year, Billy was 48 inches tall. This year, he is 54 inches tall. What is the percent increase in Billy’s height?

**Step 1** Find the amount of change.

\[
54 - 48 = 6
\]

**Step 2** Use the percent equation.

\[
6 = p \cdot 48
\]

\[
\frac{6}{48} = \frac{p \cdot 48}{48}
\]

\[
\frac{6}{48} = p
\]

\[
0.125 = p
\]

Rewrite the decimal as a percent. Billy’s height has increased by 12.5%.

**Percent error** describes the difference between an estimated value and the actual value as a percent of the actual value.

\[
\text{difference} = \text{percent error} \cdot \text{actual value}
\]

Jason predicted that 227 students would attend the school dance. The actual number was 250. What is the percent error of Jason’s prediction?

1. What is the difference between the predicted value and the actual value?

2. Complete the equation: \(\boxed{\quad} = p \cdot \boxed{\quad}\)

3. Solve the equation for \(p\).

4. What is the percent error?

**On the Back!**

5. Last week, there were 420 new subscribers to a Web site. This week, the number of new subscribers decreased by 5%. How many new subscribers are there this week?
Read the word problem below. Then answer the questions to identify the steps for solving the problem.

Last year, 625 students attended Diego’s school. This year, 590 students attend the school. What is the percent change?

1. Is the percent change an increase or a decrease? Explain.

2. To find the percent change, you can use the following equation:

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

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

   In the problem above, circle the original amount. Underline the new value.

3. Is the amount of change given in the problem? If so, draw a box around it. If not, describe how you can find it.

4. After solving the equation for percent change, what form will the answer be in? What additional step is needed to find the final answer?
Use each of these words once to complete the sentences.

percent change  percent error

1. A ________________ describes the accuracy of an estimated value as compared to an actual value.

2. The ________________ describes how much a quantity has changed when compared to its original amount.

Read each scenario. Then choose whether you would find the percent increase, percent decrease, or percent error.

3. Yesterday, I ran 5 miles. Today, I ran 3.7 miles.
   percent increase  percent decrease  percent error

4. The marching band had 304 students last year. This year, 322 students participate in band.
   percent increase  percent decrease  percent error

5. Tomas estimated there were 125 people in the audience. There were actually 137 people.
   percent increase  percent decrease  percent error

6. A town’s population was 36,067 in 2005. Ten years later, the population is 37,902.
   percent increase  percent decrease  percent error

7. A faulty scale displayed the weight of the package as 14 pounds 13 ounces. The exact weight was 13 pounds 6 ounces.
   percent increase  percent decrease  percent error
A tent that usually sells for $220 is on sale for 15% off. What is the sale price?

**Step 1** Find the markdown amount.

markdown = percent markdown \cdot original price

\[ m = 0.15 \cdot 220 \]
\[ m = 33 \]

**Step 2** Find the sale price.

sale price = original price – markdown

\[ s = 220 - 33 \]
\[ s = 187 \]

The sale price is $187.

Use similar reasoning to find a markup amount. The markup is the amount of increase from the original price to the selling price.  

\[ \text{markup} = \text{percent markup} \cdot \text{cost} \]

Marcy has $20. She wants to buy a book that is marked down 30% from its original price of $28. If the sales tax is 2.5%, does Marcy have enough money to buy the book?

1. Complete the percent equation to find the markdown.

\[ m = \underline{\quad} \cdot \underline{\quad} \]
\[ m = \underline{\quad} \]

2. Complete the equation to find the sale price.

\[ s = \underline{\quad} - \underline{\quad} \]
\[ s = \underline{\quad} \]

3. How much is the sales tax on the price you found in Exercise 2? Add the sale price and the sales tax to find the total cost of the book.

4. Does Marcy have enough money to buy the book? Explain.

**On the Back!**

5. The school store buys granola bars for $0.40 each and sells them for $0.65. What is the percent markup?
Name ________________________________

Read the word problem below. Then answer the questions to identify the steps for solving the problem.

A pair of shoes had an original price of $80. The shoes are now on sale for 35% off. What is the sale price of the shoes?

1. Circle the words in the problem that tell whether this is a markdown or markup.

2. Complete the bar diagram to represent this problem.

   [Diagram: Sale price [ ]]

3. Draw an arrow toward the part of the bar diagram that represents the answer to the problem.

4. After a sale of _____% off, the final price is _____% of the original price of the shoes.

5. What unit will the answer be in?

6. Describe a reasonable answer to this problem. Explain your reasoning.
The wholesale price is the amount a store pays for an item before selling that item to a customer. The diagram below shows the prices of a T-shirt. Use the list below to complete the sentences about these prices.

![Diagram showing the calculation of T-shirt prices: Wholesale Price = $10, 50% markup = $5, Regular Selling Price = $15, 20% markdown = $3, Discounted Sale Price = $12.]

<table>
<thead>
<tr>
<th>plus</th>
<th>discounted sale price</th>
<th>percent markdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>wholesale price</td>
<td></td>
<td>percent markup</td>
</tr>
<tr>
<td>markup amount</td>
<td></td>
<td>regular selling price</td>
</tr>
<tr>
<td></td>
<td></td>
<td>minus</td>
</tr>
</tbody>
</table>

1. The regular selling price includes a markup from the ________________.

2. If the wholesale price is $10, the 50% ________________ is $5.

3. The ________________ from the wholesale price to the regular selling price is 50%.

4. A customer’s cost for the T-shirt is the wholesale price ________________ the 50% markup.

5. During a sale, the T-shirt price is a markdown from the ________________.

6. The ________________ from the regular selling price to the discounted sale price is $3.

7. The ________________ from the regular selling price to the discounted sale price is 20%.

8. The discounted sale price for the T-shirt is the regular selling price ________________ the 20% markdown.

9. Marked down 20% from the regular selling price, the ________________ of the T-shirt is $12.
Darius deposits $600 into a simple interest savings account. After a year, the account balance will be $615. What is the interest rate?

**Step 1** Find the interest earned in one year.

\[ 615 - 600 = 15 \]

**Step 2** Use the percent equation.

\[ \text{interest amount} = \text{initial deposit} \cdot \text{interest rate} \]

\[ 15 = 600 \cdot r \quad \text{Substitute.} \]

\[ 15 = 600r \quad \text{Simplify.} \]

\[ \frac{15}{600} = \frac{600r}{600} \quad \text{Divide both sides by 600.} \]

\[ r = 0.025 \quad \text{Simplify to find the interest rate as a decimal.} \]

The simple interest rate is 2.5%.

Enrique earned $101.40 in interest over 6 years in a savings account that pays 1.3% simple interest per year. How much did Enrique originally deposit?

1. What was the amount of interest earned in one year? Explain how you found your answer.

2. Complete the percent equation below to find how much Enrique initially deposited. Use the interest amount you found in Exercise 1.

\[ \text{interest amount} = \_ \cdot \text{initial deposit} \]

\[ \_ = \_ \cdot \text{initial deposit} \]

\[ = \text{initial deposit} \]

**On the Back!**

3. Tony’s deposit earned $40.80 in simple interest over 3 years in an account with an interest rate of 1.7%. How much did Tony deposit?
Read the word problem below. Then answer the questions to identify the steps for solving the problem.

Vinnie’s savings account earns simple interest each year. His initial deposit was $800, and after 5 years, the balance is $848. What is the interest rate?

1. Underline the question that you need to answer. What form will the correct answer be in?

2. Highlight the information that you need to solve the problem.

3. The following steps that you can use to solve the problem are not in order. Write a number from 1 to 4 in each box to indicate the correct order of the steps.

   - Find the amount of interest earned each year.
   - Express the interest rate as a percent.
   - Find the interest rate as a decimal.
   - Find the total amount of interest earned.

4. Without doing any calculations, describe how to find the total amount of interest earned and the amount of interest earned each year.
Use the list to complete the table, equation, and sentences. Some terms might be used more than once.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>interest rate</td>
<td>The initial amount of money</td>
</tr>
<tr>
<td>principal</td>
<td>The amount of money that is earned on a deposit</td>
</tr>
<tr>
<td>interest</td>
<td>A percent used to calculate interest on a principal</td>
</tr>
</tbody>
</table>

Equation

\[
\text{principal} = \text{interest} \times \text{interest rate}
\]

Sentences

Owen deposits $300 in a savings account that earns 1.7% interest each year.

The _____________ of the savings account is $300.

The _____________ of the savings account is 1.7%.

The _____________ earned after the first year is \(0.017 \times 300 = 5.1\), or $5.10.

Match each interest rate with its decimal equivalent.

1. 3.5% \(\quad\) 0.035
2. 0.35% \(\quad\) 0.0305
3. 3.05% \(\quad\) 0.0035
Answer Keys
1. Ade is baking mini-loaves of bread. How many mini-loaves could he make with 10 cups of flour?

<table>
<thead>
<tr>
<th>Cups of Flour</th>
<th>Number of Mini-Loaves</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>7.5</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

A 12.5  B 15  C 25  D 50

2. Cameron has 75% as many shirts as her brother. How many shirts does Cameron have if her brother has 12 shirts?

A 3 shirts  B 9 shirts  C 12 shirts  D 16 shirts

3. An elevator ascends at a rate of 29.6 feet per second. If a building is 1,450 feet tall, about how long would it take for the elevator to travel from the ground floor to the roof?

A 0.49 minute  B 0.82 minute  C 4.9 minutes  D 8.2 minutes

4. Two fifths of the senior class earned a grade of B+ or higher on an advanced mathematics exam. If 42 seniors scored at least a B+, how many students are in the entire senior class?

A 70 students  B 84 students  C 105 students  D 210 students

5. Roberto has run 16 of the 26.2 miles in a marathon. Rounded to the nearest whole number, what percent of the marathon has he completed?

A 16%  B 26%  C 50%  D 61%

6. Tiffany’s allowance is reduced $1.25 every time she forgets to clean her room. If she forgets to clean her room 7 times this month, by how much money is Tiffany’s allowance reduced?

A $7.25  B $8.75  C $17.85  D $18.75

7. If skim milk is 87% water, how much water is in 4 cups of skim milk?

A Fewer than 1 cup  B Between 1 and 2 cups  C Between 2 and 3 cups  D Between 3 and 4 cups

8. Printer A prints 36 pages every 1.5 minutes. Printer B prints 114 pages every 3 minutes. Printer C prints 115 pages every 5 minutes. Which printer prints the fastest?

A Printer A  B Printer B  C Printer C  D The rates are equal
9. Carrie can fold 20 shirts in two minutes. If she continues at this rate, how long will it take her to fold 50 shirts?
   A 2.5 minutes
   B 4 minutes
   C 4.5 minutes
   D 5 minutes

10. Which number completes the ratio table?

<table>
<thead>
<tr>
<th></th>
<th>2</th>
<th>7</th>
<th>12</th>
<th>17</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td></td>
<td>96</td>
<td>136</td>
<td></td>
</tr>
</tbody>
</table>

   A 21
   B 23
   C 32
   D 56

11. Which percent is equivalent to 0.3?
   A 0.003%
   B 0.03%
   C 3%
   D 30%

12. A movie theater sells out 7 times per month. How many times will it sell out in the next 2 years?
   A 14
   B 24
   C 84
   D 168

13. Find the unknown value in the proportion.
   \[
   \frac{5,280 \text{ feet}}{1 \text{ mile}} = \frac{6,600 \text{ feet}}{x}
   \]
   A 0.25 mile
   B 0.8 mile
   C 1.25 miles
   D 1320 miles

   A Elizabeth
   B Jesse
   C Reagan
   D They all swim at the same speed.

15. The cafeteria at Local Middle School offers a choice of either a sandwich or soup every Thursday. Of 55 students who purchased lunch this Thursday, 30 chose a sandwich. What is the ratio of the number of students who chose a sandwich to all who purchased lunch this Thursday?
   A \(\frac{25}{30}\)
   B \(\frac{25}{55}\)
   C \(\frac{30}{55}\)
   D \(\frac{35}{30}\)

16. Which ratio is equivalent to 9 : 180?
   A 5 : 200
   B 12 : 240
   C 10 : 400
   D 8 : 560
There are 80 animals at an animal shelter. Of those animals, 27.5% are dogs. How many dogs are at the shelter?

Use equivalent ratios to find 27.5% of 80.

\[
\frac{27.5}{100} = \frac{x}{80}
\]

\[
27.5 \times 80 = x \times 80
\]

\[
x = 22
\]

There are 22 dogs at the shelter.

Josh and Daniel each want to save $600 to attend a sports camp. Josh has saved 60% of the amount. Daniel has saved $320. Who has saved more money? How much more?

1. Complete the equivalent ratios to find 60% of $600.

\[
\frac{60}{100} = \frac{x}{600}
\]

2. What number should you multiply both sides by to solve for x?

\[
600
\]

3. How much money has Josh saved?

\[
$360
\]

4. Who has saved more money? How much more?

Josh; $40

On the Back!

5. A total of 150 students voted for class president. Bianca received 43 votes, and Carlos received 38% of the votes. Which student received more votes? How many more?

Carlos; 14 more votes
Read the word problem below. Then answer the questions to identify the steps for solving the problem.

Aisha and David are reading a book that has 240 pages. Aisha has read 55% of the book. David has read 126 pages. Which student has read more pages so far? How many more pages has that student read?

1. Underline the two questions that you need to answer.
   **Check students’ work.**

2. Circle the information in the problem about how many pages each student has read.
   **Check students’ work.**

3. What information do you need to find before you can answer the questions asked in the problem?
   **The number of pages that Aisha has read**

4. Complete the diagram and write the equivalent ratios that can help you find the information you identified in Exercise 3.

```
<table>
<thead>
<tr>
<th>Pages</th>
<th>0</th>
<th>x</th>
<th>240</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent</td>
<td>0%</td>
<td>55%</td>
<td>100%</td>
</tr>
</tbody>
</table>
```

\[
\frac{55}{100} = \frac{x}{240}
\]

5. After finding the information in Exercise 3, how will you answer the questions asked in the problem?
   **Sample answer:** Compare the number of pages Aisha has read to the number of pages David has read, 126, to determine which student has read more pages. Subtract the lesser number from the greater number to determine the difference in the number of pages that the students have read.
Use the list below to complete the sentences.

| percent | equivalent ratios | whole | part |

Three of the 25 students in an art class are left-handed. In other words, 12% of the students in the class are left-handed.

1. The number 3 represents _______ part _______ of the class.

2. The number 25 represents the _______ whole _______ class.

3. You can write equivalent ratios to represent this situation: \( \frac{3}{25} = \frac{12}{100} \).

4. You can also write the _______ percent _______ of the left-handed students in the class, which is 12%.

For each pair of ratios, circle equivalent ratios or not equivalent ratios.

5. \( \frac{2}{5} \) and \( \frac{20}{100} \)  
   - equivalent ratios  
   - not equivalent ratios

6. \( \frac{3}{6} \) and \( \frac{50}{100} \)  
   - equivalent ratios  
   - not equivalent ratios

7. \( \frac{150}{600} \) and \( \frac{40}{100} \)  
   - equivalent ratios  
   - not equivalent ratios
Name

Norah has read 72 pages, which is 45% of a book. How many pages are in the book?

**Step 1** Set up the proportion.
\[
\frac{\text{part}}{\text{whole}} = \frac{p}{100}
\]
\[
\frac{72}{w} = \frac{45}{100}
\]

**Step 2** Solve for the variable.
\[
\frac{72}{w} \cdot w = \frac{45}{100} \cdot w
\]
\[
72 = \frac{45w}{100}
\]
Simplify.
\[
72 \cdot \frac{100}{45} = \frac{45w}{100} \cdot \frac{100}{45}
\]
Multiply by the reciprocal.
\[
w = 160
\]
Simplify.

There are 160 pages in Norah’s book.

Trevon made 24 of the 40 free throws he attempted last season. What percent of his attempted free throws did Trevon make?

1. Complete the proportion. Use a variable for the missing value.
\[
\frac{24}{40} = \frac{p}{100}
\]

2. Multiply each side of the proportion by 100.

3. Write the equation you can use to solve for the variable.
\[
\frac{24}{40} \cdot 100 = p
\]

4. What is the missing value in the proportion? 60

5. What percent of his attempted free throws did Trevon make? 60%

**On the Back!**

6. Jason was asked 40 questions on a quiz show. He answered 85% of the questions correctly. How many questions did he answer correctly?
34
Review the Key Concept from the lesson. Then answer the questions to help you understand how to read a Key Concept.

**KEY CONCEPT**

You can use a bar diagram and a proportion to solve different types of percent problems. Use equivalent ratios in a proportion to compare the part to the whole.

<table>
<thead>
<tr>
<th>Type</th>
<th>Example</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Find the PERCENT.</td>
<td>What percent of 5 is 4?</td>
<td>( \frac{4}{5} = \frac{p}{100} )</td>
</tr>
<tr>
<td>Find the PART.</td>
<td>What number is 80% of 5?</td>
<td>( \frac{4}{5} = 80 \frac{n}{100} )</td>
</tr>
<tr>
<td>Find the WHOLE.</td>
<td>4 is 80% of what number?</td>
<td>( \frac{n}{w} = \frac{80}{100} )</td>
</tr>
</tbody>
</table>

1. Circle the numerators in the proportion \( \frac{\text{part}}{\text{whole}} = \frac{p}{100} \). Then circle the corresponding parts of the bar diagram.

**Check students’ work.**

2. Draw a square around the denominators in the proportion \( \frac{\text{part}}{\text{whole}} = \frac{p}{100} \). Then draw squares around the corresponding parts in the bar diagram.

**Check students’ work.**

3. How is the bar diagram related to the proportion?

**Sample answer: Both show that the relationship between the part and the whole is equivalent to the relationship between the percent and 100%.**

4. Look at the second example. Highlight the given values using different colors. Then highlight the corresponding values in the proportion the same color.

**Check students’ work.**

5. In all three examples, underline the word “of” and the value that follows it. What part of the proportion is the underlined value in all three examples?

**Check students’ work. The underlined value is the whole.**
Use the following terms to complete the descriptions below. Some terms may be used more than once.

<table>
<thead>
<tr>
<th>whole</th>
<th>part</th>
<th>proportion</th>
<th>variable</th>
</tr>
</thead>
</table>

1.

<table>
<thead>
<tr>
<th>Number</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>part</td>
<td>whole</td>
<td></td>
</tr>
<tr>
<td>Percent</td>
<td>p%</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>whole</td>
<td>part</td>
<td></td>
</tr>
<tr>
<td>Percent</td>
<td>0%</td>
<td>p%</td>
<td></td>
</tr>
</tbody>
</table>

3. In each bar diagram above, the **whole** corresponds to 100% and the **part** corresponds to p%.

4. When solving percent problems, set up a **proportion**.
   For example:
   \[
   \frac{\text{part}}{\text{whole}} = \frac{p}{100}
   \]

5. Use a **variable** to represent the value you need to find.
A ticket company charges a 4% service fee on all orders. How much is the service fee for a ticket that costs $65?

**Step 1** Write the percent equation.

\[ \text{part} = \text{percent} \cdot \text{whole} \]

**Step 2** Substitute the given values and use a variable for the missing value.
Write the percent as a decimal.

\[ p = 0.04 \cdot 65 \]

**Step 3** Simplify.

\[ p = 2.6 \]

The service fee is $2.60.

Xavier downloaded 40 songs last week, including 14 jazz songs. What percent of Xavier’s downloads were jazz songs?

1. Complete the percent equation, using a variable for the missing value.

\[14 = p \cdot 40\]

2. How can you solve the equation for the variable?

Divide both sides by 40.

3. Solve for the variable.

\[0.35\]

4. What percent of Xavier’s downloads were jazz songs?

35%

**On the Back!**

5. There are 65 students who walk to West Middle School each day. This is 12.5% of the total number of students at the school. How many students attend West Middle School?

520 students
Read the word problem below. Then answer the questions to identify the steps for solving the problem.

The bar diagram shows the amount of data Mara has used for her cell phone plan this month. What percent of the total data is still available for Mara use?

1. Underline the question that you need to answer. **Check students’ work.**
2. What information is represented by the bar diagram? **Mara has used 5.8 GB out of a total of 8 GB of data.**

3. Circle the part of the bar diagram that represents the unknown percent. **Check students’ work.**
4. What information do you need to find before you can answer the question asked in the problem? **The number of GB of remaining data that is still available for Mara to use**

5. How can you find the information you identified in Exercise 4? **Subtract 5.8 from 8.**

6. Once you have found the information in Exercise 4, what equation can you use to solve the problem? **percent = \( \frac{\text{part}}{\text{whole}} \)**
Use each term from the list once to represent the item in each box.

<table>
<thead>
<tr>
<th>whole</th>
<th>equivalent ratios</th>
<th>decimal</th>
<th>percent equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>part</td>
<td>commission</td>
<td>percent</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. \( \frac{\text{part}}{\text{whole}} = \text{percent} \)
   \[
   \text{part} = \text{percent} \cdot \text{whole}
   \]
   
   percent equation

2. 4% of $3,650 in sales

3. \( \frac{4}{5} = \frac{80}{100} \)
   commission
   equivalent ratios

4. 3 of 11
   whole

5. 0.03
   decimal

6. 24 of 90
   part
Percent change describes an amount of change as a percent of the original value.

change = percent change \times original amount

Last year, Billy was 48 inches tall. This year, he is 54 inches tall. What is the percent increase in Billy's height?

**Step 1** Find the amount of change. \( 54 - 48 = 6 \)

**Step 2** Use the percent equation.

\[
\frac{6}{48} = \frac{p \times 48}{48}
\]

\[
\frac{6}{48} = p
\]

\[
0.125 = p
\]

Rewrite the decimal as a percent. Billy’s height has increased by 12.5%.

Percent error describes the difference between an estimated value and the actual value as a percent of the actual value.

difference = percent error \times actual value

Jason predicted that 227 students would attend the school dance. The actual number was 250. What is the percent error of Jason’s prediction?

1. What is the difference between the predicted value and the actual value?
   23

2. Complete the equation: \( 23 = p \times 250 \)

3. Solve the equation for \( p \).
   \( p = 0.092 \)

4. What is the percent error?
   9.2%

**On the Back!**

5. Last week, there were 420 new subscribers to a Web site. This week, the number of new subscribers decreased by 5%. How many new subscribers are there this week?
   399 subscribers
Name ________________________________

Read the word problem below. Then answer the questions to identify the steps for solving the problem.

Last year, 625 students attended Diego’s school. This year, 590 students attend the school. What is the percent change?

1. Is the percent change an increase or a decrease? Explain.
   **Decrease; There are fewer students this year than last year.**

2. To find the percent change, you can use the following equation:

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

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

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

   In the problem above, circle the original amount. Underline the new value.
   **Check students’ work.**

3. Is the amount of change given in the problem? If so, draw a box around it. If not, describe how you can find it.
   **No; Subtract 590 from 625.**

4. After solving the equation for percent change, what form will the answer be in? What additional step is needed to find the final answer?
   **Decimal form; Sample answer: Multiply by 100 to convert the decimal to a percent.**
Use each of these words once to complete the sentences.

percent change  percent error

1. A __________ describes the accuracy of an estimated value as compared to an actual value.

2. The __________ describes how much a quantity has changed when compared to its original amount.

Read each scenario. Then choose whether you would find the percent increase, percent decrease, or percent error.

3. Yesterday, I ran 5 miles. Today, I ran 3.7 miles.
   percent increase  percent decrease  percent error

4. The marching band had 304 students last year. This year, 322 students participate in band.
   percent increase  percent decrease  percent error

5. Tomas estimated there were 125 people in the audience. There were actually 137 people.
   percent increase  percent decrease  percent error

6. A town’s population was 36,067 in 2005. Ten years later, the population is 37,902.
   percent increase  percent decrease  percent error

7. A faulty scale displayed the weight of the package as 14 pounds 13 ounces. The exact weight was 13 pounds 6 ounces.
   percent increase  percent decrease  percent error
A tent that usually sells for $220 is on sale for 15% off. What is the sale price?

**Step 1** Find the markdown amount.

markdown = percent markdown \cdot original price

\[ m = 0.15 \cdot 220 \]

\[ m = 33 \]

**Step 2** Find the sale price.

sale price = original price − markdown

\[ s = 220 − 33 \]

\[ s = 187 \]

The sale price is $187.

Use similar reasoning to find a markup amount. The markup is the amount of increase from the original price to the selling price. markup = percent markup \cdot cost

Marcy has $20. She wants to buy a book that is marked down 30% from its original price of $28. If the sales tax is 2.5%, does Marcy have enough money to buy the book?

1. Complete the percent equation to find the markdown.

\[ m = 0.3 \cdot 28 \]

\[ m = 8.40 \]

2. Complete the equation to find the sale price.

\[ s = 28 − 8.40 \]

\[ s = 19.60 \]

3. How much is the sales tax on the price you found in Exercise 2? Add the sale price and the sales tax to find the total cost of the book.

\[ $0.49; 19.60 + 0.49 = 20.09 \]

4. Does Marcy have enough money to buy the book? Explain.

**No; $20.09 > $20**

**On the Back!**

5. The school store buys granola bars for $0.40 each and sells them for $0.65. What is the percent markup?

62.5%
Read the word problem below. Then answer the questions to identify the steps for solving the problem.

A pair of shoes had an original price of $80. The shoes are now on sale for 35% off. What is the sale price of the shoes?

1. Circle the words in the problem that tell whether this is a markdown or markup.
   **Check students’ work.**

2. Complete the bar diagram to represent this problem.

   ![Bar Diagram]

<table>
<thead>
<tr>
<th>Sale price</th>
<th>35%</th>
</tr>
</thead>
<tbody>
<tr>
<td>$80</td>
<td></td>
</tr>
</tbody>
</table>

3. Draw an arrow toward the part of the bar diagram that represents the answer to the problem.
   **Check students’ work.**

4. After a sale of 35% off, the final price is 65% of the original price of the shoes.

5. What unit will the answer be in?
   **Dollars**

6. Describe a reasonable answer to this problem. Explain your reasoning.
   **Sample answer:** An amount of money greater than $40 and less than $80 is reasonable. The sale price of the shoes is less than the original price, and the sale price is greater than $40 because $40 is 50% of $80 and 65% of 80 is more than 50% of 80.
The **wholesale price** is the amount a store pays for an item before selling that item to a customer. The diagram below shows the prices of a T-shirt. Use the list below to complete the sentences about these prices.

![Diagram showing the relationship between wholesale price, regular selling price, and discounted sale price with the calculations: Wholesale Price: $10 + 50% = $5, Regular Selling Price: $15 - 20% = $3, Discounted Sale Price: $12]

<table>
<thead>
<tr>
<th>plus</th>
<th>discounted sale price</th>
<th>percent markdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>wholesale price</td>
<td>percent markup</td>
<td>markdown amount</td>
</tr>
<tr>
<td>markup amount</td>
<td>regular selling price</td>
<td>minus</td>
</tr>
</tbody>
</table>

1. The regular selling price includes a markup from the **wholesale price**.

2. If the wholesale price is $10, the 50% **markup amount** is $5.

3. The **percent markup** from the wholesale price to the regular selling price is 50%.

4. A customer’s cost for the T-shirt is the wholesale price **plus** the 50% markup.

5. During a sale, the T-shirt price is a markdown from the **regular selling price**.

6. The **markdown amount** from the regular selling price to the discounted sale price is $3.

7. The **percent markdown** from the regular selling price to the discounted sale price is 20%.

8. The discounted sale price for the T-shirt is the regular selling price **minus** the 20% markdown.

9. Marked down 20% from the regular selling price, the **discounted sale price** of the T-shirt is $12.
Darius deposits $600 into a simple interest savings account. After a year, the account balance will be $615. What is the interest rate?

**Step 1** Find the interest earned in one year.

$$615 - 600 = 15$$

**Step 2** Use the percent equation.

$$\text{interest amount} = \text{initial deposit} \cdot \text{interest rate}$$

$$15 = 600 \cdot r$$

Substitute.

$$15 = 600r$$

Simplify.

$$\frac{15}{600} = \frac{600r}{600}$$

Divide both sides by 600.

$$r = 0.025$$

Simplify to find the interest rate as a decimal.

The simple interest rate is 2.5%.

Enrique earned $101.40 in interest over 6 years in a savings account that pays 1.3% simple interest per year. How much did Enrique originally deposit?

1. What was the amount of interest earned in one year? Explain how you found your answer.

**$16.90**; Divide the total amount of interest earned, **$101.40**, by the number of years, 6: $$101.40 \div 6 = 16.90.$$ 

2. Complete the percent equation below to find how much Enrique initially deposited. Use the interest amount you found in Exercise 1.

$$\text{interest amount} = \text{interest rate} \cdot \text{initial deposit}$$

$$16.90 = 0.013 \cdot \text{initial deposit}$$

$$1,300 = \text{initial deposit}$$

On the Back!

3. Tony's deposit earned $40.80 in simple interest over 3 years in an account with an interest rate of 1.7%. How much did Tony deposit?

**$800**
Vinnie's savings account earns simple interest each year. His initial deposit was $800, and after 5 years, the balance is $848. What is the interest rate?

1. Underline the question that you need to answer. What form will the correct answer be in?

   Check students’ work; The answer will be a percent.

2. Highlight the information that you need to solve the problem.

   Check students’ work.

3. The following steps that you can use to solve the problem are not in order. Write a number from 1 to 4 in each box to indicate the correct order of the steps.

   1. Find the total amount of interest earned.
   2. Find the amount of interest earned each year.
   3. Find the interest rate as a decimal.
   4. Express the interest rate as a percent.

4. Without doing any calculations, describe how to find the total amount of interest earned and the amount of interest earned each year.

   Subtract the initial deposit, $800, from the final balance, $848, and divide the difference by the number of years, 5.

5. Explain the steps you can take to check your answer.

   Sample answer: Multiply the interest rate by 800 to find the interest earned each year. Multiply by 5 to find the total interest earned and add to 800. The sum should be 848.
Use the list to complete the table, equation, and sentences. Some terms might be used more than once.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>principal</td>
<td>The initial amount of money</td>
</tr>
<tr>
<td>interest</td>
<td>The amount of money that is earned on a deposit</td>
</tr>
<tr>
<td>interest rate</td>
<td>A percent used to calculate interest on a principal</td>
</tr>
</tbody>
</table>

Equation

\[
\text{interest} = \text{principal} \times \text{interest rate}
\]

Sentences

Owen deposits $300 in a savings account that earns 1.7% interest each year.

The principal of the savings account is $300.

The interest rate of the savings account is 1.7%.

The interest earned after the first year is \(0.017 \cdot 300 = 5.1\), or $5.10.

Match each interest rate with its decimal equivalent.

1. 3.5% \( \rightarrow \) 0.035
   2. 0.35% \( \rightarrow \) 0.0035
   3. 3.05% \( \rightarrow \) 0.0035