Proportions and Percent

COMMON CORE

? ESSENTIAL QUESTION

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

40% OFF

Real-World Video

A store may have a sale with deep discounts on some items. They can still make a profit because they first markup the wholesale price by as much as 400%, then markdown the retail price.

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Are YOU Ready?

Complete these exercises to review skills you will need for this module.

Percents and Decimals

EXAMPLE $147\% = 100\% + 47\%$ Write the percent as the sum of 1 whole and a percent remainder.

$= \frac{100}{100} + \frac{47}{100}$ Write the percents as fractions.

$= 1 + 0.47$ Write the fractions as decimals.

$= 1.47$ Simplify.

Write each percent as a decimal.

1. 22% _____   **2.** 75% _____   **3.** 6% _____   **4.** 189% _____

Write each decimal as a percent.

5. 0.59 _____   **6.** 0.98 _____   **7.** 0.02 _____   **8.** 1.33 _____

Find the Percent of a Number

EXAMPLE 30% of 45 = ?

$30\% = 0.30$ Write the percent as a decimal.

$$\begin{array}{r} 45 \\ \times 0.3 \\ \hline 13.5 \end{array}$$ Multiply.
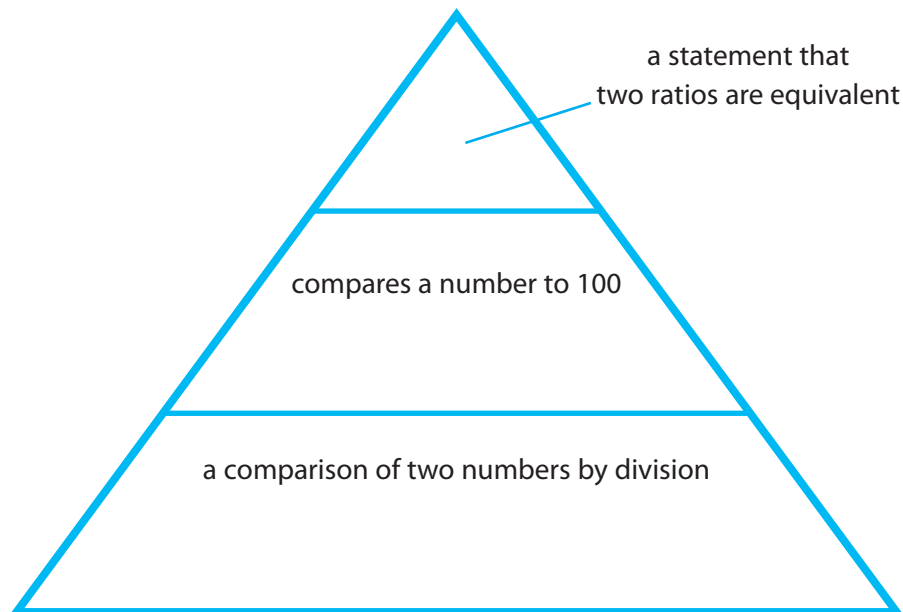
Find the percent of each number.

9. 50% of 64 _____   **10.** 7% of 30 _____   **11.** 15% of 160 _____

12. 32% of 62 _____   **13.** 120% of 4 _____   **14.** 6% of 1,000 _____

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Reading Start-Up

Visualize Vocabulary

Use the ✔ words to complete the triangle. Write the review word that fits the description in each section of the triangle.

a statement that two ratios are equivalent

compares a number to 100

a comparison of two numbers by division

Understand Vocabulary

Complete the sentences using the preview words.

1. A fixed percent of the principal is _____.

2. The original amount of money deposited or borrowed is the _____.

3. A _____ is the amount of increase divided by the original amount.

Active Reading

Tri-Fold Before beginning the module, create a tri-fold to help you learn the concepts and vocabulary in this module. Fold the paper into three sections. Label the columns "What I Know," "What I Need to Know," and "What I Learned." Complete the first two columns before you read. After studying the module, complete the third.

Unpacking the Standards

Understanding the Standards and the vocabulary terms in the Standards will help you know exactly what you are expected to learn in this module.

COMMON CORE 7.RP.3

Use proportional relationships to solve multistep ratio and percent problems.

Key Vocabulary

proportion *(proporción)*
An equation that states that two ratios are equivalent.

ratio *(razón)*
A comparison of two quantities by division.

percent *(porcentaje)*
A ratio that compares a part to the whole using 100.

What It Means to You

You will use proportions to solve problems involving ratio and percent.

UNPACKING EXAMPLE 7.RP.3

Find the amount of sales tax if the sales tax rate is 5% and the cost of the item is $40.

$$5\% = \frac{5}{100} = \frac{1}{20}$$

Multiply $\frac{1}{20}$ times the cost to find the sales tax.

$$\frac{1}{20} \times 40 = 2$$

The sales tax is $2.

COMMON CORE 7.EE.2

Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.

Key Vocabulary

expression *(expresión)*
A mathematical phrase containing variables, constants and operation symbols.

What It Means to You

You will find helpful ways to rewrite an expression in an equivalent form.

UNPACKING EXAMPLE 7.EE.2

A store advertises that all bicycle helmets will be sold at 10% off the regular price. Find two expressions that represent the value of the sale price p for the helmets that are on sale.

Sale price = original price minus 10% of the price

$$= p - 0.10p$$

Equivalently,

$$p - 0.10p = p(1 - 0.10) = 0.90p$$

Visit **my.hrw.com** to see all the **Common Core Standards** unpacked.

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Percent Increase and Decrease

? **ESSENTIAL QUESTION**

How do you use percents to describe change?

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Finding Percent Increase

Percents can be used to describe how an amount changes.

$$\text{Percent Change} = \frac{\text{Amount of Change}}{\text{Original Amount}}$$

The change may be an increase or a decrease. **Percent increase** describes how much a quantity increases in comparison to the original amount.

EXAMPLE 1 — Real World

COMMON CORE **7.RP.3**

Amber got a raise, and her hourly wage increased from \$8 to \$9.50. What is the percent increase?

STEP 1   Find the amount of change.

$$\text{Amount of Change} = \text{Greater Value} - \text{Lesser Value}$$
$$= 9.50 - 8.00 \qquad \textit{Substitute values.}$$
$$= 1.50 \qquad \textit{Subtract.}$$

STEP 2   Find the percent increase. Round to the nearest percent.

$$\text{Percent Change} = \frac{\text{Amount of Change}}{\text{Original Amount}}$$
$$= \frac{1.50}{8.00} \qquad \textit{Substitute values.}$$
$$= 0.1875 \qquad \textit{Divide.}$$
$$\approx 19\% \qquad \textit{Write as a percent and round.}$$

Reflect

1. What does a 100% increase mean?

_____

_____

YOUR TURN

2. The price of a pair of shoes increases from \$52 to \$64. What is the

percent increase to the nearest percent? _____

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Finding Percent Decrease

When the change in the amount decreases, you can use a similar approach to find percent decrease. **Percent decrease** describes how much a quantity decreases in comparison to the original amount.

EXAMPLE 2   Real World

COMMON CORE 7.RP.3

David moved from a house that is 89 miles away from his workplace to a house that is 51 miles away from his workplace. What is the percent decrease in the distance from his home to his workplace?

STEP 1 Find the amount of change.

Amount of Change = Greater Value − Lesser Value

$$= 89 - 51 \quad \text{Substitute values.}$$

$$= 38 \quad \text{Subtract.}$$

STEP 2 Find the percent decrease. Round to the nearest percent.

$$\text{Percent Change} = \frac{\text{Amount of Change}}{\text{Original Amount}}$$

$$= \frac{38}{89} \quad \text{Substitute values.}$$

$$\approx 0.427 \quad \text{Divide.}$$

$$= 43\% \quad \text{Write as a percent and round.}$$

Reflect

3. **Critique Reasoning** David considered moving even closer to his workplace. He claims that if he had done so, the percent of decrease would have been more than 100%. Is David correct? Explain your reasoning.

_____

_____

_____

YOUR TURN

4. The number of students in a chess club decreased from 18 to 12. What is the percent decrease? Round to the nearest percent. _____

5. Officer Brimberry wrote 16 tickets for traffic violations last week, but only 10 tickets this week. What is the percent decrease? _____

Using Percent of Change

Given an original amount and a percent increase or decrease, you can use the percent of change to find the new amount.

EXAMPLE 3 · Real World

COMMON CORE 7.RP.3

The grizzly bear population in Yellowstone National Park in 1970 was about 270. Over the next 35 years, it increased by about 115%. What was the population in 2005?

STEP 1 Find the amount of change.

$1.15 \times 270 = 310.5$ Find 115% of 270. Write 115% as a decimal.

≈ 311 Round to the nearest whole number.

STEP 2 Find the new amount.

New Amount = Original Amount + Amount of Change

$= 270 + 311$ Substitute values.

$= 581$ Add.

Add the amount of change because the population increased.

The population in 2005 was about 581 grizzly bears.

Reflect

6. Why will the percent of change always be represented by a positive number?

_____

_____

_____

7. **Draw Conclusions** If an amount of $100 in a savings account increases by 10%, then increases by 10% again, is that the same as increasing by 20%? Explain.

_____

_____

_____

YOUR TURN

A TV has an original price of $499. Find the new price after the given percent of change.

8. 10% increase _____

9. 30% decrease _____

Find each percent increase. Round to the nearest percent. (Example 1)

1. From $5 to $8 _____

2. From 20 students to 30 students _____

3. From 86 books to 150 books _____

4. From $3.49 to $3.89 _____

5. From 13 friends to 14 friends _____

6. From 5 miles to 16 miles _____

7. Nathan usually drinks 36 ounces of water per day. He read that he should drink 64 ounces of water per day. If he starts drinking 64 ounces, what is the percent increase? Round to the nearest percent. (Example 1) _____

Find each percent decrease. Round to the nearest percent. (Example 2)

8. From $80 to $64 _____

9. From 95°F to 68°F _____

10. From 90 points to 45 points _____

11. From 145 pounds to 132 pounds _____

12. From 64 photos to 21 photos _____

13. From 16 bagels to 0 bagels _____

14. Over the summer, Jackie played video games 3 hours per day. When school began in the fall, she was only allowed to play video games for half an hour per day. What is the percent decrease? Round to the nearest percent. (Example 2) _____

Find the new amount given the original amount and the percent of change. (Example 3)

15. $9; 10% increase _____

16. 48 cookies; 25% decrease _____

17. 340 pages; 20% decrease _____

18. 28 members; 50% increase _____

19. $29,000; 4% decrease _____

20. 810 songs; 130% increase _____

21. Adam currently runs about 20 miles per week, and he wants to increase his weekly mileage by 30%. How many miles will Adam run per week? (Example 3) _____

? ESSENTIAL QUESTION CHECK-IN

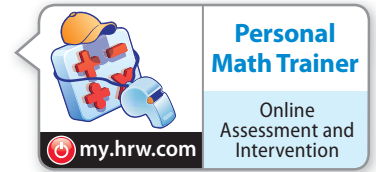**22.** What process do you use to find the percent change of a quantity?

_____

_____

5.1 Independent Practice

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23. Complete the table.

Item	Original Price	New Price	Percent Change	Increase or Decrease
Bike	$110	$96		
Scooter	$45	$56		
Tennis Racket	$79		5%	Increase
Skis	$580		25%	Decrease

24. Multiple Representations The bar graph shows the number of hurricanes in the Atlantic Basin from 2006–2011.

a. Find the amount of change and the percent of decrease in the number of hurricanes from 2008 to 2009 and from 2010 to 2011. Compare the amounts of change and percents of decrease.
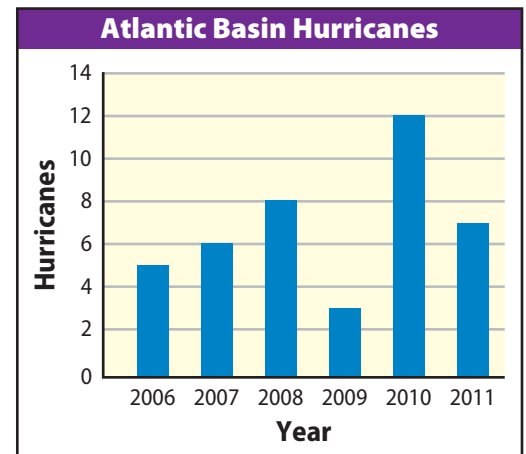
_____

_____

_____

b. Between which two years was the percent of change the greatest? What was the percent of change during that period?

_____

Atlantic Basin Hurricanes

25. Represent Real-World Problems Cheese sticks that were previously priced at "5 for $1" are now "4 for $1". Find each percent of change and show your work.

a. Find the percent decrease in the number of cheese sticks you can buy for $1.

_____

b. Find the percent increase in the price per cheese stick.

_____

_____

26. Percent error calculations are used to determine how close to the true values, or how accurate, experimental values really are. The formula is similar to finding percent of change.

$$\text{Percent Error} = \frac{|\text{Experimental Value} - \text{Actual Value}|}{\text{Actual Value}} \times 100$$

In chemistry class, Charlie records the volume of a liquid as 13.3 milliliters. The actual volume is 13.6 milliliters. What is his percent error? Round to

the nearest percent. _____

H.O.T. **FOCUS ON HIGHER ORDER THINKING**

27. Look for a Pattern Leroi and Sylvia both put $100 in a savings account. Leroi decides he will put in an additional $10 each week. Sylvia decides to put in an additional 10% of the amount in the account each week.

a. Who has more money after the first additional deposit? Explain.

_____

_____

b. Who has more money after the second additional deposit? Explain.

_____

_____

c. How do you think the amounts in the two accounts will compare after a month? A year?

_____

_____

_____

28. Critical Thinking Suppose an amount increases by 100%, then decreases by 100%. Find the final amount. Would the situation change if the original increase was 150%? Explain your reasoning.

_____

_____

29. Look for a Pattern Ariel deposited $100 into a bank account. Each Friday she will withdraw 10% of the money in the account to spend. Ariel thinks her account will be empty after 10 withdrawals. Do you agree? Explain.

_____

_____

_____

Rewriting Percent Expressions

? ESSENTIAL QUESTION

How can you rewrite expressions to help you solve markup and markdown problems?

Calculating Markups

A *markup* is one kind of percent increase. You can use a bar model to represent the *retail price* of an item, that is, the total price including the markup.

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EXAMPLE 1 Real World

COMMON CORE 7.EE.2, 7.RP.3, 7.EE.3

To make a profit, stores mark up the prices on the items they sell. A sports store buys skateboards from a supplier for *s* dollars. What is the retail price for skateboards that the manager buys for $35 and $56 after a 42% markup?

STEP 1 Use a bar model.

Draw a bar for the cost of the skateboard *s*.

Then draw a bar that shows the markup: 42% of *s*, or 0.42*s*.

s
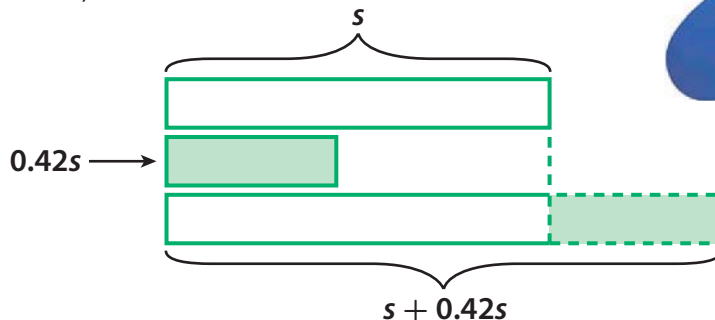
$0.42s \longrightarrow$

$s + 0.42s$

These bars together represent the cost plus the markup, $s + 0.42s$.

STEP 2 Retail price = Original cost + Markup

$$= \quad s \quad + \quad 0.42s$$
$$= \quad 1s \quad + \quad 0.42s$$
$$= \quad 1.42s$$

Math Talk
Mathematical Practices

Why write the retail price as the sum of two terms? as one term?

STEP 3 Use the expression to find the retail price of each skateboard.

$s = \$35 \longrightarrow$ Retail price $= 1.42(\$35) = \$49.70$

$s = \$56 \longrightarrow$ Retail price $= 1.42(\$56) = \$79.52$

Reflect

1. **What If?** The markup is changed to 34%; how does the expression for the retail price change?

YOUR TURN

2. Rick buys remote control cars to resell. He applies a markup of 10%.

   a. Write two expressions that represent the retail price of the cars.

   _____

   b. If Rick buys a remote control car for $28.00, what is his selling price?

   _____

3. An exclusive clothing boutique triples the price of the items it purchases for resale.

   a. What is the boutique's markup percent? _____

   b. Write two expressions that represent the retail price of the clothes.

   _____

Calculating Markdowns

An example of a percent decrease is a *discount*, or *markdown*. A price after a markdown may be called a sale price. You can also use a bar model to represent the price of an item including the markdown.
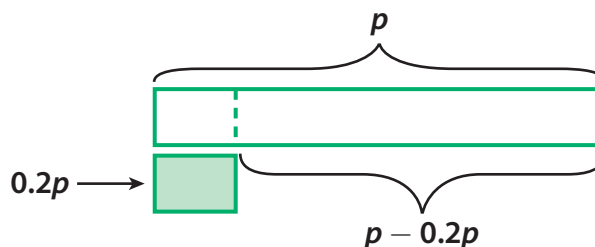
EXAMPLE 2   Real World

COMMON CORE   7.EE.2, 7.RP.3, 7.EE.3

A discount store marks down all of its holiday merchandise by 20% off the regular selling price. Find the discounted price of decorations that regularly sell for $16 and $23.
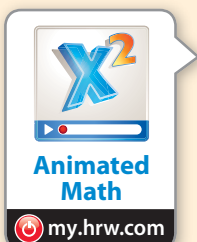
STEP 1   Use a bar model.

Draw a bar for the regular price p.

Then draw a bar that shows the discount: 20% of p, or $0.2p$.

p

$0.2p \longrightarrow$

$p - 0.2p$

The difference between these two bars represents the price minus the discount, $p - 0.2p$.

STEP 2 Sale price = Original price − Markdown

$$= \quad p \quad - \quad 0.2p$$

$$= \quad 1p \quad - \quad 0.2p$$

$$= \quad 0.8p$$

STEP 3 Use the expression to find the sale price of each decoration.

$p = \$16 \longrightarrow$ Retail price $= 0.8(\$16) = \$12.80$

$p = \$23 \longrightarrow$ Retail price $= 0.8(\$23) = \$18.40$

Reflect

4. **Conjecture** Compare the single term expression for retail price after a markup from Example 1 and the single term expression for sale price after a markdown from Example 2. What do you notice about the coefficients in the two expressions?

_____

_____

YOUR TURN

5. A bicycle shop marks down each bicycle's selling price b by 24% for a holiday sale.

a. Draw a bar model to represent the problem.

b. What is a single term expression for the sale price? _____

6. Jane sells pillows. For a sale, she marks them down 5%.

a. Write two expressions that represent the sale price of the pillows.

_____

b. If the original price of a pillow is $15.00, what is the sale price?

_____

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1. Dana buys dress shirts from a clothing manufacturer for *s* dollars each, and then sells the dress shirts in her retail clothing store at a 35% markup. (Example 1)

    a. Write the markup as a decimal. _____

    b. Write an expression for the retail price of the dress shirt. _____

    c. What is the retail price of a dress shirt that Dana purchased for $32.00? _____

    d. How much was added to the original price of the dress shirt? _____

List the markup and retail price of each item. Round to two decimal places when necessary. (Example 1)

	Item	Price	Markup %	Markup	Retail Price
2.	Hat	$18	15%		
3.	Book	$22.50	42%		
4.	Shirt	$33.75	75%		
5.	Shoes	$74.99	33%		
6.	Clock	$48.60	100%		
7.	Painting	$185.00	125%		

Find the sale price of each item. Round to two decimal places when necessary. (Example 2)

8. Original price: $45.00; Markdown: 22%

    _____

9. Original price: $89.00; Markdown: 33%

    _____

10. Original price: $23.99; Markdown: 44%

    _____

11. Original price: $279.99, Markdown: 75%

    _____

? ESSENTIAL QUESTION CHECK-IN
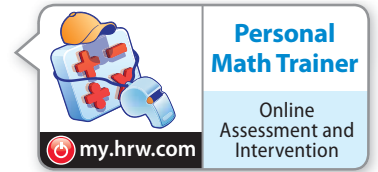
12. How can you determine the sale price if you are given the regular price and the percent of markdown?

    _____

    _____

5.2 Independent Practice

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13. A bookstore manager marks down the price of older hardcover books, which originally sell for *b* dollars, by 46%.

a. Write the markdown as a decimal. _____

b. Write an expression for the sale price of the hardcover book.

_____

c. What is the sale price of a hardcover book for which the original retail price was $29.00? _____

d. If you buy the book in part **c**, how much do you save by paying the sale price? _____

14. Raquela's coworker made price tags for several items that are to be marked down by 35%. Match each Regular Price to the correct Sale Price, if possible. Not all sales tags match an item.

Regular Price $3.29	Regular Price $4.19	Regular Price $2.79	Regular Price $3.09	Regular Price $3.77

Sale Price $2.01	Sale Price $2.45	Sale Price $1.15	Sale Price $2.72	Sale Price $2.24

15. **Communicate Mathematical Ideas** For each situation, give an example that includes the original price and final price after markup or markdown.

a. A markdown that is greater than 99% but less than 100%

_____

b. A markdown that is less than 1%

_____

c. A markup that is more than 200%

_____

16. Represent Real-World Problems Harold works at a men's clothing store, which marks up its retail clothing by 27%. The store purchases pants for $74.00, suit jackets for $325.00, and dress shirts for $48.00. How much will Harold charge a customer for two pairs of pants, three dress shirts, and a suit jacket?

_____

17. Analyze Relationships Your family needs a set of 4 tires. Which of the following deals would you prefer? Explain.

(I) Buy 3, get one free   **(II)** 20% off   **(III)** $\frac{1}{4}$ off

_____

_____

H.O.T. FOCUS ON HIGHER ORDER THINKING

18. Critique Reasoning Margo purchases bulk teas from a warehouse and marks up those prices by 20% for retail sale. When teas go unsold for more than two months, Margo marks down the retail price by 20%. She says that she is *breaking even*, that is, she is getting the same price for the tea that she paid for it. Is she correct? Explain.

_____

_____

_____

19. Problem Solving Grady marks down some $2.49 pens to $1.99 for a week and then marks them back up to $2.49. Find the percent of increase and the percent of decrease to the nearest tenth. Are the percents of change the same for both price changes? If not, which is a greater change?

_____

_____

20. Persevere in Problem Solving At Danielle's clothing boutique, if an item does not sell for eight weeks, she marks it down by 15%. If it remains unsold after that, she marks it down an additional 5% each week until she can no longer make a profit. Then she donates it to charity.

Rafael wants to buy a coat originally priced $150, but he can't afford more than $110. If Danielle paid $100 for the coat, during which week(s) could Rafael buy the coat within his budget? Justify your answer.

_____

_____

_____

Work Area

Applications of Percent

? ESSENTIAL QUESTION

How do you use percents to solve problems?

Finding Total Cost

Sales tax, which is the tax on the sale of an item or service, is a percent of the purchase price that is collected by the seller.

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**EXAMPLE 1** *Real World* | COMMON CORE 7.RP.3, 7.EE.3

Marcus buys a varsity jacket from a clothing store in Arlington. The price of the jacket is $80 and the sales tax is 8%. What is the total cost of the jacket?

STEP 1 Use a bar model to find the amount of the tax.

Draw a bar for the price of the jacket, $80. Divide it into 10 equal parts. Each part represents 10% of $80, or $8.

Then draw a bar that shows the sales tax: 8% of $80.

$80

Tax = 8%
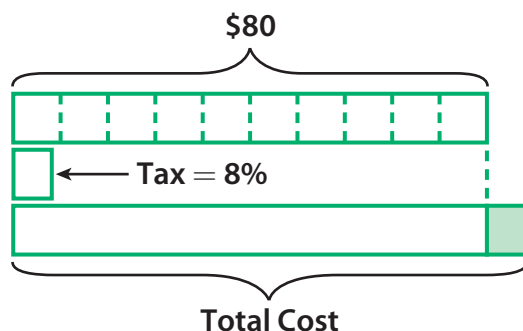
Total Cost

Because 8% is $\frac{4}{5}$ of 10%, the tax is $\frac{4}{5}$ of one part of the whole bar.

Each part of the whole bar is $8.

So, the sales tax is $\frac{4}{5}$ of $8.

$\frac{4}{5} \times \$8 = \$6.40$

The sales tax is $6.40.

Math Talk
Mathematical Practices

How could you find the tax without drawing a model of the situation?

STEP 2 To find the total cost of the jacket, add the price of the jacket and the sales tax.

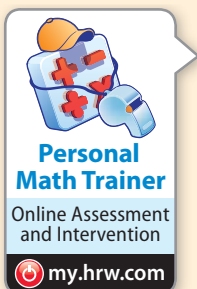Jacket price + Sales tax = Total cost

$80 $6.40   = $86.40
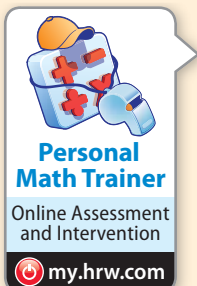
1. Sharon wants to buy a shirt that costs $20. The sales tax is 5%. How much is the sales tax? What is her total cost for the shirt? _____

Finding Simple Interest

When you deposit money in a savings account, your money usually earns interest. When you borrow money, you must pay back the original amount of the loan plus interest. **Simple interest** is a fixed percent of the *principal*. The **principal** is the original amount of money deposited or borrowed.

EXAMPLE 2 🌎 Real World   COMMON CORE 7.RP.3, 7.EE.3

Terry deposits $200 into a bank account that earns 3% simple interest per year. What is the total amount in the account after 2 years?

My Notes

STEP 1 Find the amount of interest earned in one year. Then calculate the amount of interest for 2 years.

Write 3% as a decimal: *0.03*

Interest Rate × Initial Deposit = Interest for 1 year

$\quad$ 0.03 $\quad$ × $\quad$ $200 $\quad$ = $\quad$ $6

Interest for 1 year × 2 years = Interest for 2 years

$\quad$ $6 $\quad$ × $\quad$ 2 $\quad$ = $\quad$ $12

STEP 2 Add the interest for 2 years to the initial deposit to find the total amount in his account after 2 years.

Initial deposit + Interest for 2 years = Total

$\quad$ $200 $\quad$ + $\quad$ $12 $\quad$ = $212

The total amount in the account after 2 years is $212.

Reflect

2. Write an expression you can use to find the total amount in Terry's account.

_____

3. Ariane borrows $400 on a 4-year loan. She is charged 5% simple interest per year. How much interest is she charged for 4 years? What is the total amount she has to pay back? _____

Using Multiple Percents

Some situations require applying more than one percent to a problem. For example, when you dine at a restaurant, you might pay a tax on the meal, and pay a tip to the wait staff. The tip is usually paid on the amount before tax. When you pay tax on a sale item, you pay tax only on the discounted price.

EXAMPLE 3 Problem Solving   COMMON CORE 7.EE.3, 7.RP.3

The Maxwell family goes out for dinner, and the price of the meal is $60. The sales tax on the meal is 7%, and they also want to leave a 15% tip. What is the total cost of the meal?

Analyze Information

Identify the important information.
- The bill for the meal is $60.
- The sales tax is 7%, or 0.07.
- The tip is 15%, or 0.15.

The total cost will be the sum of the bill for the meal, the sales tax, and the tip.

Formulate a Plan

Calculate the sales tax separately, then calculate the tip, and then add the products to the bill for the meal to find the total.

Solve

Sales tax: $0.07 \times \$60 = \$4.20$ Tip: $0.15 \times \$60 = \$9.00$

Meal $+$ Sales tax $+$ Tip $=$ Total cost

$\$60 \ + \ \$4.20 \ + \ \$9 \ = \ \$73.20$

The total cost is $73.20.

Justify and Evaluate

Estimate the sales tax and tip. Sales tax is about 10% plus 15% for tip gives 25%. Find 25% of the bill: $0.25 \times \$60 = \$15$. Add this to the bill: $\$60 + \$15 = \$75$. The total cost should be about $75.

YOUR TURN

4. Samuel orders four DVDs from an online music store. Each DVD costs $9.99. He has a 20% discount code, and sales tax is 6.75%. What is the total cost of his order?

_____

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1. 5% of $30 = _____

2. 15% of $70 = _____

3. 0.4% of $100 = _____

4. 150% of $22 = _____

5. 1% of $80 = _____

6. 200% of $5 = _____

7. Brandon buys a radio for $43.99 in a state where the sales tax is 7%. (Example 1)

    a. How much does he pay in taxes? _____

    b. What is the total Brandon pays for the radio? _____

8. Luisa's restaurant bill comes to $75.50, and she leaves a 15% tip. What is Luisa's total restaurant bill? (Example 1)

_____

9. Joe borrowed $2,000 from the bank at a rate of 7% simple interest per year. How much interest did he pay in 5 years? (Example 2)

_____

10. You have $550 in a savings account that earns 3% simple interest each year. How much will be in your account in 10 years? (Example 2)

_____

11. Martin finds a shirt on sale for 10% off at a department store. The original price was $20. Martin must also pay 8.5% sales tax. (Example 3)

    a. How much is the shirt before taxes are applied? _____

    b. How much is the shirt after taxes are applied? _____

12. Teresa's restaurant bill comes to $29.99 before tax. If the sales tax is 6.25% and she tips the waiter 20%, what is the total cost of the meal? (Example 3)
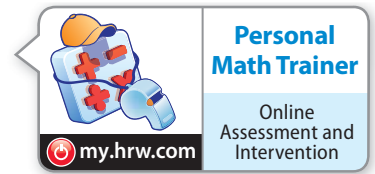
_____

? ESSENTIAL QUESTION CHECK-IN

13. How can you determine the total cost of an item including tax if you know the price of the item and the tax rate?

_____

_____

5.3 Independent Practice

COMMON CORE **7.RP.3, 7.EE.3**

Personal Math Trainer

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14. Emily's meal costs $32.75 and Darren's meal costs $39.88. Emily treats Darren by paying for both meals, and leaves a 14% tip. Find the total cost.

_____

15. The Jayden family eats at a restaurant that is having a 15% discount promotion. Their meal costs $78.65, and they leave a 20% tip. If the tip applies to the cost of the meal before the discount, what is the total cost of the meal?

_____

16. A jeweler buys a ring from a jewelry maker for $125. He marks up the price by 135% for sale in his store. What is the selling price of the ring with 7.5% sales tax?

_____

17. Luis wants to buy a skateboard that usually sells for $79.99. All merchandise is discounted by 12%. What is the total cost of the skateboard if Luis has to pay a state sales tax of 6.75%?

_____

18. Kedar earns a monthly salary of $2,200 plus a 3.75% *commission* on the amount of his sales at a men's clothing store. What would he earn this month if he sold $4,500 in clothing? Round to the nearest cent.

_____

19. Danielle earns a 7.25% commission on everything she sells at the electronics store where she works. She also earns a base salary of $750 per week. How much did she earn last week if she sold $4,500 in electronics merchandise? Round to the nearest cent.

_____

20. Francois earns a weekly salary of $475 plus a 5.5% commission on sales at a gift shop. How much would he earn in a week if he sold $700 in goods? Round to the nearest cent.

_____

21. Sandra is 4 feet tall. Pablo is 10% taller than Sandra, and Michaela is 8% taller than Pablo.

a. Explain how to find Michaela's height with the given information.

_____

_____

_____

_____

_____

_____

b. What is Michaela's approximate height in feet and inches?

_____

22. Eugene wants to buy jeans at a store that is giving $10 off everything. The tag on the jeans is marked 50% off. The original price is $49.98.

a. Find the total cost if the 50% discount is applied before the $10 discount.

_____

b. Find the total cost if the $10 discount is applied before the 50% discount.

_____

23. Multistep Eric downloads the coupon shown and goes shopping at Gadgets Galore, where he buys a digital camera for $95 and an extra battery for $15.99.

Gadgets Galore

It's Our Birthday **10% Discount** on any 1 item

a. What is the total cost if the coupon is applied to the digital camera?

_____

b. What is the total cost if the coupon is applied to the extra battery?

_____

c. To which item should Eric apply the discount? Explain.

_____

d. Eric has to pay 8% sales tax after the coupon is applied. How much is his total bill?

_____

24. Two stores are having sales on the same shirts. The sale at Store 1 is "2 shirts for $22" and the sale at Store 2 is "Each $12.99 shirt is 10% off".

a. Explain how much will you save by buying at Store 1.

_____

_____

b. If Store 3 has shirts originally priced at $20.98 on sale for 55% off, does it have a better deal than the other stores? Justify your answer.

_____

H.O.T. FOCUS ON HIGHER ORDER THINKING

Work Area

25. Analyze Relationships Marcus can choose between a monthly salary of $1,500 plus 5.5% of sales or $2,400 plus 3% of sales. He expects sales between $5,000 and $10,000 a month. Which salary option should he choose? Explain.

_____

_____

_____

26. Multistep In chemistry class, Bob recorded the volume of a liquid as 13.2 mL. The actual volume was 13.7 mL. Use the formula to find percent error of Bob's measurement to the nearest tenth of a percent.

$$\text{Percent Error} = \frac{|\text{Experimental Value} - \text{Actual Value}|}{\text{Actual Value}} \times 100$$

_____

Ready to Go On?

5.1 Percent Increase and Decrease

Find the percent change from the first value to the second.

1. 36; 63 _____

2. 50; 35 _____

3. 40; 72 _____

4. 92; 69 _____

5.2 Markup and Markdown

Use the original price and the markdown or markup to find the retail price.

5. Original price: $60; Markup: 15%; Retail price: _____

6. Original price: $32; Markup: 12.5%; Retail price: _____

7. Original price: $50; Markdown: 22%; Retail price: _____

8. Original price: $125; Markdown: 30%; Retail price: _____

5.3 Applications of Percent

9. Mae Ling earns a weekly salary of $325 plus a 6.5% commission on sales at a gift shop. How much would she make in a work week if she sold $4,800 worth of merchandise? _____

10. Ramon earns $1,735 each month and pays $53.10 for electricity. To the nearest tenth of a percent, what percent of Ramon's earnings are spent on electricity each month? _____

11. James, Priya, and Siobhan work in a grocery store. James makes $7.00 per hour. Priya makes 20% more than James, and Siobhan makes 5% less than Priya. How much does Siobhan make per hour? _____

12. The Hu family goes out for lunch, and the price of the meal is $45. The sales tax on the meal is 6%, and the family also leaves a 20% tip on the pre-tax amount. What is the total cost of the meal? _____

❓ ESSENTIAL QUESTION

13. Give three examples of how percents are used in the real-world. Tell whether each situation represents a percent increase or a percent decrease.

_____

_____

Selected Response

1. Zalmon walks $\frac{3}{4}$ of a mile in $\frac{3}{10}$ of an hour. What is his speed in miles per hour?

- Ⓐ 0.225 miles per hour
- Ⓑ 2.3 miles per hour
- Ⓒ 2.5 miles per hour
- Ⓓ 2.6 miles per hour

2. Find the percent change from 70 to 56.

- Ⓐ 20% decrease
- Ⓒ 25% decrease
- Ⓑ 20% increase
- Ⓓ 25% increase

3. The rainfall total two years ago was 10.2 inches. Last year's total was 20% greater. What was last year's rainfall total?

- Ⓐ 8.16 inches
- Ⓒ 12.24 inches
- Ⓑ 11.22 inches
- Ⓓ 20.4 inches

4. A pair of basketball shoes was originally priced at $80, but was marked up 37.5%. What was the retail price of the shoes?

- Ⓐ $50
- Ⓒ $110
- Ⓑ $83
- Ⓓ $130

5. The sales tax rate in Jan's town is 7.5%. If she buys 3 lamps for $23.59 each and a sofa for $769.99, how much sales tax does she owe?

- Ⓐ $58.85
- Ⓒ $67.26
- Ⓑ $63.06
- Ⓓ $71.46

6. The day after a national holiday, decorations were marked down 40%. Before the holiday, a patriotic banner cost $5.75. How much did the banner cost after the holiday?

- Ⓐ $1.15
- Ⓒ $3.45
- Ⓑ $2.30
- Ⓓ $8.05

7. Dustin makes $2,330 each month and pays $840 for rent. To the nearest tenth of a percent, what percent of Dustin's earnings are spent on rent?

- Ⓐ 84.0%
- Ⓒ 56.4%
- Ⓑ 63.9%
- Ⓓ 36.1%

8. A scuba diver is positioned at −30 feet. How many feet will she have to rise to change her position to −12 feet?

- Ⓐ −42 ft
- Ⓒ 18 ft
- Ⓑ −18 ft
- Ⓓ 42 ft

9. A bank offers an annual simple interest rate of 8% on home improvement loans. Tobias borrowed $17,000 over a period of 2 years. How much did he repay altogether?

- Ⓐ $1,360
- Ⓒ $18,360
- Ⓑ $2,720
- Ⓓ $19,720

Mini-Task

10. The granola Summer buys used to cost $6.00 per pound, but it has been marked up 15%.

a. How much did it cost Summer to buy 2.6 pounds of granola at the old price?

_____

b. How much does it cost her to buy 2.6 pounds of granola at the new price?

_____

c. Suppose Summer buys 3.5 pounds of granola. How much more does it cost at the new price than at the old price?

_____