

Find the following percents. You may use a calculator, but must show your steps.

1. 65% of 34       $.65 \times 34 = 22.1$

2. 8.5% of 60       $.085 \times 60 =$

3. 12.5% of 250       $.125 \times 250 =$

LESSON **3.4** Applications of Percent



TEKS

Proportionality—

**7.4.D** Solve problems involving ratios, rates, and percents, including multi-step problems involving percent increase and percent decrease, and financial literacy problems. *Also 7.13.E*



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.

### EXAMPLE 1



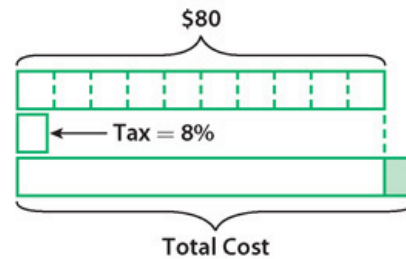
TEKS 7.4.D

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.



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.

### STEP 2

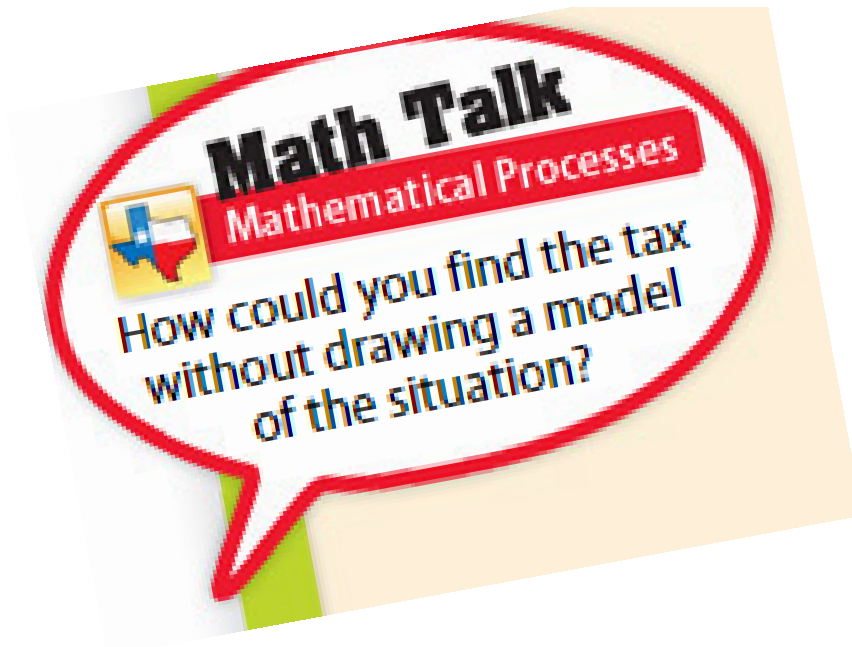
To find the total cost of the jacket, add the price of the jacket and the sales tax.

Jacket price + Sales tax = Total cost

$$\$80 + \$6.40 = \$86.40$$



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**Math Talk**  
Mathematical Processes

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

**YOUR TURN**

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? \_\_\_\_\_

$$.05 \times 20 = \$1.00$$
$$\$20 + \$1 = \$21.00$$

## Finding Simple Interest

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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



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?

**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  $\times$  Initial Deposit = Interest for 1 year

$$0.03 \times \$200 = \$6$$

Interest for 1 year  $\times$  2 years = Interest for 2 years

$$\$6 \times 2 = \$12$$

**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

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

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.

$$200 + 2 \left( \frac{r}{100} P \right)$$

**YOUR TURN**

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? \_\_\_\_\_

principal - \$400

interest-1yr -  $.05 \times 400 = \$20$

interest-4yr -  $20 \times 4 = \$80$

total  $\$400 + \$80 = \$480$

### Using Multiple Percents

p. 105

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

TEKS 7.4.D

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 rate is 15%, or 0.15.

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



*Handwritten calculations:*  
 $\text{tax } .07 \times \$60 = \$4.20$   
 $\text{tip } .15 \times \$60 = \$9.00$   
 $\$60 + \$4.20 + \$9.00 = \$73.20$

#### Formulate a Plan

Calculate the sales tax separately, then calculate the tip, and then add the sales tax and the tip 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?

*Handwritten answer:* 7.992

*Handwritten work:* DVD's -  $\$9.99 \times 4 = \$39.96$

*Handwritten work:* Discount -  $.2 \times \$39.96 = -7.99$

*Handwritten work:* cost before tax - \$31.97

*Handwritten work:* tax -  $.0675 \times 31.97 = 2.15798$

*Handwritten work:* Total cost -  $\$31.97 + \$2.16 = \$34.13$

- 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)
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**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? \_\_\_\_\_

Jorge earns a 9% commission on all of his sales. He had sales of \$89,400 for the month. What was the amount of his commission and monthly income?

9% of \$89,400

$$.09 \times 89,400 = 8,046$$

This month Salesperson A made 11% of \$67,530. Salesperson B made 8% of \$85,740. Who made more commission this month?  
How much did that salesperson make?

## Guided Practice

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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)  
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**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?

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## 3.4 LESSON QUIZ



**TEKS** 7.4.D, 7.13.E

**Find the indicated percent.**

1. 6% of \$120
2. 0.5% of \$44
3. Jonah's restaurant bill comes to \$25.65, and he leaves a 15% tip. What is Jonah's total restaurant bill?
4. Alicia borrowed \$3,000 from the bank at a rate of 12% simple interest per year. How much interest did she pay in 4 years?

