

Please get your clicker, calculator/device and notebook ready.

Today's lesson is on Applications of percent-- sales tax, tax rates, tips, and commissions-- things you will encounter every time you sell or buy items.

Get ready for the warm-up problems.



To write a decimal as a percent, you move the decimal places two places to the \_\_\_\_\_.

**A** left

**B** right

**C** the decimal does not move



**Write 6.5% as a decimal**

**A** 6.5

**D** .65

**B** .065

**E** 65

**C** 650

Algebra

**5-4**

## Applications of Percent

### What You'll Learn

To find and estimate solutions to application problems involving percent and to use different ways to represent a situation

**New Vocabulary** commission, percent error

7.RP.3

## Why Learn This?

You use percents to calculate taxes, tips, commissions fees, and percent error.

In many states, you must pay a sales tax on items you buy. The sales tax is a percent of the purchase price. A tax percent is also called a tax rate.

To find sales tax, you can use the formula  
 $\text{sales tax} = \text{tax rate} \cdot \text{purchase price}$ .



## EXAMPLE Finding Sales Tax

**1 Shopping** The price of a bicycle you plan to buy is \$159.99. The sales tax rate is 6%. How much will you pay for the bicycle?

$$0.06 \cdot 159.99 \approx 9.60 \quad \leftarrow \text{Find the sales tax. Round to the nearest cent.}$$

$$159.99 + 9.60 = 169.59 \quad \leftarrow \text{Add the sales tax to the purchase price.}$$

You will pay \$169.59 for the bicycle.

**1 EXAMPLE** A video game costs \$34.98. The sales tax rate is 5.5%.

Find the total cost.

$$0.055 \cdot 34.98 = 1.92 \quad \leftarrow \text{Find the sales tax. Round to the nearest cent.}$$

$$34.98 + 1.92 = 36.90 \quad \leftarrow \text{Add the purchase price to the sales tax.}$$

The total cost is \$36.90.

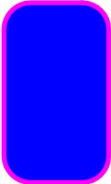


Table talk about this problem, then enter your answer on your clicker.

1. Find the total cost for a purchase of \$185 if the sales tax rate is 5.5%.
  - A. \$286.75
  - B. \$195.18
  - C. \$10.18
  - D. \$1202.5

A tip is a percent of a bill that you give to someone who provides a service. You can use estimation and mental math to find a 15% tip.

**Step 1** Round the bill to the nearest dollar.

**Step 2** Find 10% of the bill by moving the decimal point one place to the left.

**Step 3** Find 5% of the bill by taking one half of the result of Step 2.

**Step 4** Add the amounts of Step 2 and Step 3 together to find 15%.

### EXAMPLE Estimating a Tip



- 2 Your family takes a taxi to the train station. The taxi fare is \$17.85. Estimate a 15% tip to give the driver.

$$17.85 \approx 18 \quad \leftarrow \text{Round to the nearest dollar.}$$

$$0.1 \cdot 18 = 1.8 \quad \leftarrow \text{Find 10\% of the bill.}$$

$$\frac{1}{2} \cdot 1.8 = 0.9 \quad \leftarrow \text{Find 5\% of the bill. 5\% is } \frac{1}{2} \text{ of the 10\% amount.}$$

$$1.8 + 0.9 = 2.7 \quad \leftarrow \text{Add the 10\% and 5\% amounts to get 15\%.}$$

For a \$17.85 taxi fare, a 15% tip is about \$2.70.

**2 EXAMPLE**

Use estimation to calculate a 15% tip for each amount.

a. \$34.50

$$34.50 \approx 35 \quad \leftarrow \text{Round to the nearest dollar.}$$

$$0.1 \cdot 35 = 3.5 \quad \leftarrow \text{Find 10\% of the bill.}$$

$$\frac{1}{2} \cdot 3.5 = 1.75 \quad \leftarrow \text{Find 5\% of the bill. 5\% is } \frac{1}{2} \text{ of the 10\% amount.}$$

$$3.5 + 1.75 = 5.25 \quad \leftarrow \text{Add 10\% amount and 5\% amount to get 15\%.}$$

A 15% tip for \$34.50 is about \$5.25.

**2 EXAMPLE (continued)**

b. \$11.84

$$11.84 \approx 12 \quad \leftarrow \text{Round to the nearest dollar.}$$

$$0.1 \cdot 12 = 1.2 \quad \leftarrow \text{Find 10\% of the bill.}$$

$$\frac{1}{2} \cdot 1.2 = 0.6 \quad \leftarrow \text{Find 5\% of the bill. 5\% is } \frac{1}{2} \text{ of the 10\% amount.}$$

$$1.20 + 0.6 = 1.8 \quad \leftarrow \text{Add 10\% amount and 5\% amount to get 15\%.}$$

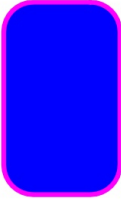
A 15% tip for \$11.84 is about \$1.80.



Table talk, then enter your answer on your clicker.

1. Estimate a 15% tip on \$58.20.
  - A. about \$7.80
  - B. about \$8.70
  - C. about \$5.80
  - D. about \$11.60

**ON YOUR OWN**

- 
3. Estimate a 15% tip on \$49.75.
    - A. about \$10.00
    - B. about \$7.50
    - C. about \$8.50
    - D. about \$5.00

Some sales jobs pay you a **commission**, a percent of the amount of your sales. To find a commission, use  $\text{commission} = \text{commission rate} \cdot \text{sales}$ .

### EXAMPLES Finding a Commission

- 3 Find the commission on a \$500 sale with a commission rate of 12.5%.

$$0.125 \cdot 500 = 62.5 \quad \leftarrow \text{Write 12.5\% as 0.125 and multiply.}$$

The commission on the sale is \$62.50.

- 4 A sales agent earns a weekly salary of \$650, plus a commission of 4% on all sales. His sales this week are \$1,250. How much does he earn?

**Words** total earnings = salary + commission



Let  $t$  = total earnings.

**Equation**  $t = 650 + 0.04 \cdot 1,250$

$$t = 650 + 0.04 \cdot 1,250 \quad \leftarrow \text{Write the equation.}$$

$$= 650 + 50 \quad \leftarrow \text{Multiply.}$$

$$= 700 \quad \leftarrow \text{Simplify.}$$

The sales agent earns \$700 this week.

- 3 **EXAMPLE** Find the commission on a \$450 sale when the commission rate is 7%.

$$0.07 \cdot 450 \quad \leftarrow \text{Change 7\% to 0.07.}$$

$$31.50 \quad \leftarrow \text{Simplify.}$$

The commission is \$31.50 for a \$450 sale.



**4 EXAMPLE** Find the total earnings for a salesperson with a salary of \$550 plus a 4% commission on sales of \$1,485.

**Words**       $\text{total earnings} = \text{salary} + \text{commission}$



Let  $t$  = total earnings.

**Equation**       $t = 550 + 0.04 \cdot 1,485$

$t = 550 + 0.04 \cdot 1,485$       ← Write the equation.

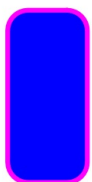
$= 550 + 59.40$       ← Multiply.

$= 609.40$       ← Simplify.

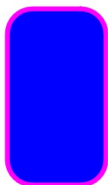
The salesperson earns \$609.40.

The remaining clicker questions are to be answered individually - no table talk.

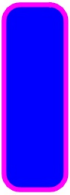
1. Find the commission on a \$3,200 sale when the commission rate is 6%.
  - A. 19.20
  - B. \$3,392
  - C. \$1,920
  - D. \$192



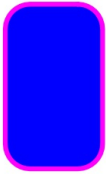
2. A salesperson has a weekly salary of \$800 and a commission rate of 3.5% of sales. Find the salesperson's earnings for a week when sales are \$1,400.
- A. \$1428
  - B. \$849
  - C. \$949
  - D. \$49



1. What does it mean to earn 8% commission?
- A. You earn \$8 on each item sold.
  - B. You earn 8% of the amount you sell.
  - C. You earn 8% on every 8 items sold.
  - D. You must pay 8% of each item sold.

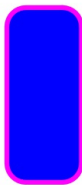


2. Is 4% sales tax on a \$250 item *greater than, less than, or equal to* 4% commission on a \$250 sale?
- A. greater than
  - B. less than
  - C. equal to



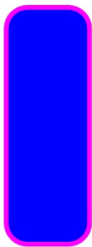
3. Calculate a 15% tip on a restaurant bill of \$24.
- A. \$2.40
  - B. \$1.20
  - C. \$3.60
  - D. \$1.50

**Find the sales tax for each item. The tax rate is 6%.**



4. a CD priced at \$12.99
- A. \$1.60
  - B. \$7.79
  - C. \$77.94
  - D. \$0.78

**Find each commission, given the sale.**



6. 5% on a \$900 sale
- A. \$450
  - B. \$50
  - C. \$45
  - D. \$4.50



**Power down your clickers and put them away. You have an assignment worksheet.**

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

**Practice 5-4** Applications of Percent

**Find the total cost.**

1. \$17.50 with a 7% sales tax \_\_\_\_\_  
 2. \$21.95 with a 4.25% sales tax \_\_\_\_\_

3. The price of a pair of shoes is \$85.99 before sales tax. The sales tax is 7.5%. Find the total cost of the shoes. \_\_\_\_\_

**Estimate a 15% tip for each amount.**

4. \$12.68 \_\_\_\_\_  
 5. \$18.25 \_\_\_\_\_  
 6. \$15.00 \_\_\_\_\_

**Find each commission.**

7. 2% on \$1,500 in sales \_\_\_\_\_  
 8. 8% on \$80,000 in sales \_\_\_\_\_  
 9. 5% on \$600 in sales \_\_\_\_\_

**Find the percent error.**

A student in a science lab is measuring the density of various materials. Compare the student's finding to the actual density.

Substance	Density g/cm <sup>3</sup>	Measured Density g/cm <sup>3</sup>	Percent Error
concrete	2.4	2.46	10.
corn kernel	0.4	0.38	11.
copper	8.9	9.1	12.

**Find the registration fee.**

10. To cover office expenses, a gymnastics camp charges a registration fee that is 3.4% of the tuition. If tuition is \$485, what is the fee? Round to the nearest cent. \_\_\_\_\_
11. During peak summer season, a whitewater rafting company charges a 15% registration fee to reserve a 6-person raft that rents for \$90. How much is the fee? \_\_\_\_\_

**Solve.**

12. To recover a large chair in your home, you purchase  $9\frac{1}{2}$  yards of upholstery fabric at \$11.00 per yard. If there is a 7% sales tax, what is the total cost of the fabric? \_\_\_\_\_