Investigation 4

Using Percents

When a store has a sale, you see advertisements for discounts. The discounts are usually given in percents (20% off, 30% off, etc.). Percents are helpful in many situations involving money. Discounts, taxes, and tips are all described with percents. Understanding how to compute and use these percents can make you a smarter consumer.

4.1 Determining Tax

Remember that a percent is a special way of representing a fraction (or rate) with a denominator of 100. You can think of percent as meaning "out of 100."

Most states have a sales tax. A sales tax of 6% means that for every dollar an item costs, a person needs to pay an additional six hundredths of a dollar, which is 6 cents, or \$0.06, for taxes:

$$\$1.00 + (6\% \text{ of } \$1.00) = \$1.00 + \$0.06 = \$1.06$$

Or, since \$1.00 is 100 pennies:

$$\begin{aligned} 100 \text{ pennies} + (6\% \text{ of } 100 \text{ pennies}) &= 100 \text{ pennies} + 6 \text{ pennies} \\ &= 106 \text{ pennies} \\ &= \$1.06 \end{aligned}$$

You can use this same type of reasoning with other sales tax problems.

Getting Ready for Problem 4.1

States, and sometimes counties and cities, establish sales tax for certain goods and services. Some states have a higher sales tax than others.

- What is the sales tax in your area?
- How does it compare to the taxes in other parts of the country?

Problem 4.1 Determining Tax

A. Jill wants to buy a CD that is priced at $7.50. The sales tax is 6%. What will be the total cost of the CD? Try to find more than one way to solve this problem. Be prepared to explain the different methods you find.

B. Using a sales tax of 6%, find the total cost for each item.

1. a $2.00 magazine **2.** a $5.00 book on dogs

3. a $0.50 comic book

C. Use a sales tax of 7%. Find the total cost for each item in Question B.

D. Use what you have learned to solve these problems.

1. Alexis bought a CD player. She does not remember the price, but she does know that the 6% sales tax came to $4.80. What was the price of the CD player? Explain your reasoning.

2. Frank buys a new video game. The 5% sales tax is $0.75. What is the price of the game? Explain.

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4.2 Computing Tips

You have developed some strategies for computing a sales tax and finding the total cost. As you work on Problem 4.2, look for more shortcuts and strategies for solving problems involving taxes and tips.

At most restaurants, customers pay their server a tip for providing good service. A typical tip is 15% to 20% of the price of the meal. Some people calculate the tip based on the price of the meal before the tax is added. Others base the tip on the total cost after the tax is added.

Problem 4.2 Computing Tips

Try to find more than one way to solve the problems. Be prepared to explain the different methods you used.

A. Have each member of your group use the menu shown to make up a lunch order. Write a list of all the items ordered by your group.

Larry's Lunch Place

Lunch Specials

Roast Turkey **3.95**
Slices of turkey breast, savory dressing, homemade gravy, and cranberry sauce

Veggie Quesadilla **3.95**
Whole-wheat tortillas stuffed with tomatoes, roasted peppers, and three kinds of cheese

Chicken Tenders **4.50**
Strips of all-white-meat chicken baked to a golden brown, served with a baked potato, coleslaw, and barbeque sauce

Larry's Famous Burgers

Quarter Pound Hamburger Platter **3.30**

Quarter Pound Cheeseburger Platter **3.60**

Larry's Special **4.35**
Two patties, with crisp lettuce, Larry's own sauce, and cheese on a specially baked bun

Seafood

Shrimp Cocktail **6.95**
Tender steamed shrimp served on ice with tangy cocktail sauce

Fish and Chips **4.45**
Three deep-fried fillets with french fries, coleslaw, and tartar sauce

Baked Meatloaf **3.95**
Tasty homestyle meatloaf with mixed green salad

Spaghetti with Tomato Sauce **3.25**
A generous portion of pasta with zesty sauce, parmesan cheese, and garlic bread

Grilled Chicken Breast **5.25**
Served over rice with lemon parsley sauce, crisp lettuce, tomato slices, and whole wheat rolls (low cholesterol)

Desserts

Fresh Strawberry Pie **1.89**
With frozen yogurt **2.25**
Chocolate Cake **1.50**
With ice cream **1.95**

Beverages

Coffee, Regular or Decaffeinated ..... **.80**
Hot or Iced Tea ..... **.80**
White or Chocolate Milk ..... **.99**
Lemonade ..... **.99**
Soft Drinks ..... **.99**
Orange Juice ..... **.99**
Hot Chocolate ..... **.99**
Root Beer Float **1.99**

1. Find the total bill for food and tax for your group. Use a sales tax of 6%.
2. How much will you leave for the tip? (The tip must be between 15% and 20%.)
3. Your group members decide to share the cost of the meal equally. What is each person's share of the cost, including the tip?

B. Many people use benchmarks for determining tips. Gil explains his strategy: "I always figure out 10% of the bill, and then I use this information to calculate a 15% or 20% tip."

1. Find 10% and 5% of $20.00. How are the two percents related?
2. Find 10% and 20% of $24.50. How are the two percents related?
3. Find 10% of $17.35. Use this to find 15% and 20% of $17.35. Explain.

C. The sales tax in Kadisha's state is 5%. Kadisha says she computes a 15% tip by multiplying the tax shown on her bill by three. For a bill with a tax charge of $0.38, Kadisha's tip is $0.38 × 3 = $1.14.

1. Why does Kadisha's method work?
2. Use a similar method to compute a 20% tip. Explain.

D. When people leave a 15% or 20% tip, they often round up to the nearest multiple of 5 or 10 cents. For example, in Question C, Kadisha might leave a tip of $1.15 rather than $1.14.

1. If Kadisha always rounds up, what is a 20% tip on her bill?
2. Omar always leaves a 20% tip based on the meal price before tax is added. Find a meal price for which Omar leaves a tip of $1.00 after rounding up to the nearest multiple of 5 or 10 cents.
3. Marlene always leaves a 15% tip based on the meal price before tax. Find a meal price for which Marlene leaves a tip of $4.50 after rounding up to the nearest multiple of 5 or 10 cents.
4. Customers leave Jerome $2.50 as a tip for service. The tip is 20% of the total bill for their food. How much is the bill?

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4.3 Finding Bargains

At Loud Sounds Music, CDs are regularly priced at $15.95, and CD singles are regularly priced at $3.45. Every day this month, the store is offering a discount on all CDs and CD singles.

Problem 4.3 Using Discounts

Jeremy goes to Loud Sounds. He discovers that if he buys three or more items today, he can save 20% on each item.

A. Suppose Jeremy buys a CD and a CD single. The store adds a 6.5% sales tax on the discounted price. How much does Jeremy spend?

B. Jeremy thinks he can buy six CD singles for less money than the cost of one CD single and a CD. Is he correct? Explain your reasoning.

C. Mr. Fernandes wants to take advantage of the day's 20% special to add to his CD collection. There are 15 CDs he wants to buy.

1. What is the total amount of the discount he will receive?

2. Suppose the discount is only 1%. What total discount amount would Mr. Fernandes receive on the 15 CDs?

3. What is the relationship between 1% and 20% of the cost?

4. How can you use what you found out above to find a 16% discount on the cost of the 15 CDs? Can you find another way to compute 16%? Explain your methods and how they are related.

D. 1. At another music store, Rita gets a $12 discount off a purchase of $48. What percent discount does she get?

2. Masako has a $25-off coupon on a purchase of $100 or more at a department store. She buys a jacket with a price tag of $125. What percent off does she get on her purchase?

3. Describe how you answered parts (1)–(2). Explain why your method works.

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