

NAME: \_\_\_\_\_

Math 7.1, Periods 1 and 2

Mr. Rogove

Date: \_\_\_\_\_

Sewage  
police,  
library,  
water,  
roads,  
stop lights  
fire  
education

**LEARNING OBJECTIVE:** We will solve real world percent problems involving tax, tip, commissions, and fees. (G7M4L10)

**CONCEPT DEVELOPMENT:**

**Tax:** taxes are typically paid to a government entity (local, state, and national) in exchange for public services. Home owners pay property tax. Many consumers pay sales tax. Companies also pay taxes. These taxes pay for things like roads, schools, and public safety (fire, police, EMT).

**Example:** Businesses in Mountain View charge 8.75% in sales tax. If you bought shoes for \$40, you would pay \$3.50 in tax.

**Commission:** Salespeople earn commission when they sell items (especially high priced items). Real Estate agents typically earn commission on selling homes. Car salespeople earn commission based on selling a car.

**Example:** A real estate agent who sold a \$400,000 house earned a 3% commission and made \$12,000 for the sale.

**Tip:** A gratuity that is added to the cost of bill for people who provide certain services. We typically tip at a restaurant, at a barbershop, and in a taxi or limo.

**Example:** Max and Daniela went to lunch together and the bill came to \$25.00 . they decided to leave a 20% tip, which works out to \$5.00.

**YOU NEED TO KNOW...**

...that these problems are applied (real world) problems and can be solved by using some of the same formulas we have already introduced.

**Example:** Tip is an application of the markup formula...in this case, we know the original amount (the bill) and we know the markup rate (the tip percentage). This lets us figure out a new amount. A bill at a restaurant comes to \$38.74 and you'd like to leave a 20% tip.

$$\begin{aligned}
 \text{Price you pay} &= (1 + \text{tip percentage})(\text{original check}) \\
 \text{Price you pay} &= (1.20)(38.74) \\
 \text{Price you pay} &= \$46.49
 \end{aligned}$$

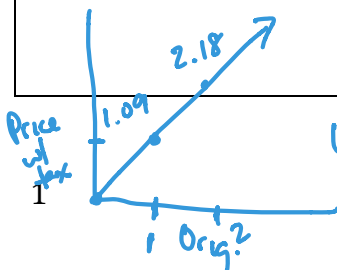
Constant of proportionality  
 $y = kx$   
"unit rate"

...that the rate (whether it's tax, tip, commission, etc) can be expressed as a **constant of proportionality** in graphs, equations, tables, and in the context of the situation.

**Example:** If you want to figure out the price you will pay for items after tax, you can use the  $y = kx$  equation, where the constant of proportionality is  $(1 + \text{tax rate})$ . If the tax rate in Mountain View is 8.75%, you can write:

$$\begin{aligned}
 \text{Price you pay} &= (1 + \text{tax rate})(\text{original price}) \\
 y &= 1.0875x
 \end{aligned}$$

where  $y$  is the price you pay and  $x$  is the original price



unit rate  $\rightarrow$  1.0875

**GUIDED PRACTICE:**

**Steps to Solving Applied Percent Problems**

1. Identify the type of problem you are trying to solve (tax, tip, or commission).
- 2a. Consider tax and tip to be applications of markup problems, where the tax or tip is the markup rate. Use the formula:  $Price\ you\ pay = (1 + tax\ or\ tip)(Original\ Check)$
- 2b. Consider commission problems to be simple percent problems like  $part = percent \times whole$ . Use the formula:  $Commission\ earned = (commission\ rate)(amount\ of\ sales)$
3. Interpret the problem in terms of the situation.
4. If required, find the unit rate.

Caterina is running the snack shack at the track meet. By doing so, she will earn a 30% commission on everything she can sell.

Write an equation that shows the proportional relationship between the dollar amount of snacks Caterina sells,  $d$ , and the amount of money she makes in commission,  $c$ .

| $d$              | $c$ |
|------------------|-----|
| 10               | 3   |
| 50               | 15  |
| 100              | 30  |
| $d \times 3 = c$ |     |
| 200              | 60  |

$$y = kx$$

$$c = .3d$$

What is the constant of proportionality?

.30

What does it mean in the context of this situation?

Commission. For every 1 dollar in sales, Caterina makes \$0.30

She wants to earn \$50.00 in order to get new calligraphy pens. How much does she need to sell in snacks in order to be able to afford the new pens?

$$c = .3d$$

$$\frac{50}{.3} = \frac{.3d}{.3}$$

$$\$166.67 = d$$

Matt is a real estate agent who makes a 3% commission on every house he sells.

Write an equation that shows the proportional relationship between the price of the house that Matt sells,  $d$ , and the amount that he makes in commission,  $c$ .

$$c = .03d$$

What is the constant of proportionality?

.03

What does it mean in the context of this situation?

For every dollar the house is worth, Matt gets 3 cents.

If Matt sells a house in Mountain View for \$925,000, how much money will he make in commission?

$$925,000 \times .03 =$$

$$\$27,750$$

Mr. Harter took Mr. Rogove out to Cheesecake Factory for his birthday. Mr. Harter had the Chicken Madeira and a piece of red velvet cheesecake. Mr. Rogove had the chicken and biscuits and a piece of fudge cake. Their bill was \$55.85. If Mr. Harter wants to leave an 18% tip, how much money will the server get for their work?

$$\text{Pre tip} \cdot 1 + \text{tip} = \text{final amount.}$$

$$55.85 \cdot 1.18 = 65.90$$

Mr. Harter pays \$65.90

He leaves \$10.05 in tip.

$$\begin{array}{r} 65.90 \\ - 55.85 \\ \hline 10.05 \end{array}$$

Ellen and Sam were at Crepevine for lunch on Saturday. Their bill was \$29.12. They decided to split the bill in half. Ellen thought the server did an excellent job, and wants to leave 20%, but Sam thought that 15% was more appropriate. How much tip all together did the server end up receiving?

| Ellen                                | Sam                                  |
|--------------------------------------|--------------------------------------|
| 14.56                                | 14.56                                |
| $\times .2$                          | $\times .15$                         |
| <hr style="width: 50%; margin: 0;"/> | <hr style="width: 50%; margin: 0;"/> |
| 2.91                                 | 2.18                                 |

Total: \$5.09

Property taxes are due twice each year, and are loosely based on your home's value. Currently, property tax rates are 1.125%. If your home is valued at \$900,000, how much money will you owe in property tax for the year?

$$.01125 \times 900,000$$

$$\boxed{\$10,125}$$

$$Y = KX$$

Property tax  $\rightarrow Y = .01125x$  ← value of home

Sales tax in Santa Clara county is 8.75%. If you get the \$6 combo at Subway, how much will you bill really end up being?

$$1.0875 \times 6 = \$6.53$$

$$.0875 \times 6 = .53 + 6.00$$

$$\boxed{\$6.53}$$

$$\boxed{\$6 \text{ Combo meal cost } \$6.53}$$

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The Smith family went out to a nice meal at Chili's last weekend. Their food and beverage bill was \$61.85. How much will you pay all together if tax is 8.5% and you want to tip 20%?

$$61.85 \times 1.085 = \$67.11$$

$$67.11 \times 1.2 = \$80.53$$

|            |             |
|------------|-------------|
| <u>Tax</u> | <u>Tip</u>  |
| 67.11      | 80.53       |
| -61.85     | -67.11      |
| <hr/> 5.26 | <hr/> 13.42 |

$$61.85 \times .2 = 12.37$$

Erika ordered pizza to be delivered for the dance team to celebrate a successful performance. She ordered 2 pizzas that were \$18.00 each. Tax is 8.5%, and she wants to tip the delivery driver 15%. How much money should she have ready?

Mr. Brown was shopping for a new wardrobe at the mall. He needed skinny jeans. He saw some at Banana Republic. They were originally priced at \$70, but they were advertised for 30% off. How much will Mr. Brown pay after tax (8.75%) is added?

Mr. Brown told Mr. Alberts about the terrific deals going on at Banana Republic, and he decided he needed to check it out himself. He needed a few pairs of suspenders, socks, and a belt. These items were marked down 45%. Mr. Alberts was stoked. He got items originally priced at \$110. With tax (8.75%), how much will he pay for his gear?

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**INDEPENDENT PRACTICE:**

|  |  |
|--|--|
|  |  |
|--|--|

**ACTIVATING PRIOR KNOWLEDGE:**

We know how to take double discounts

|   |   |
|---|---|
| <p>Gamestop was having a post-Christmas sale—40% all games. In addition to that, there was a discount bin for older games, where you saw NBA 2K10, this was an additional 60% off. If the game was originally priced at \$60, how much would you end up paying?</p> | <p>Crate and Barrel are having a 20% off President’s Day sale. A deep fryer is regularly priced for \$80.00. The tag on the fryer says “take an extra 20% off the already discounted price.” Score! How much is the deep fryer? (not that it matters because you would have bought it at full price).</p> |
|---|---|

**CLOSURE:**

In what ways is finding a 5% increase, commission, fee, and tax all the same?

**NOTES:**

This is based on lesson 11 from module 4, grade 7 of ENY.

We should work together (or in groups) on questions 2-5 of the problem set from lesson 11.