

Name \_\_\_\_\_

Date \_\_\_\_\_

Math III – Allison Cuttler

Due: Tuesday, January 19

## Practice with Percentages

Next semester, we're going to talk about **money**. In order to do this, everyone needs to be comfortable with *percentages* – calculating percentages, converting between percents, decimals, and fractions, etc.

**Remember, there are 3 ways to write any percentage.**

$$\text{For example, } 20\% = \frac{20}{100} = 0.20$$

Your task:

1. Go through the examples carefully. This requires actually taking out your calculator to do the steps.
2. Do the problems that follow. Feel free to get help from your peers, but remember that **you are responsible for knowing how to do everything on this worksheet (i.e., there will be a quiz and you will be using these skills throughout the semester)**. You are also welcome to get help at office hours on Monday or Wednesday.

### Examples

1. *What is 15% of \$120?*

Method 1: Set up a proportion, remembering that "15%" is the same as "15/100"

$$\begin{array}{l} \text{part} \rightarrow \frac{x}{120} = \frac{15}{100} \\ \text{whole} \rightarrow \end{array}$$

To solve the proportion, you need to isolate the x. So, multiply both sides by 120.

$$\begin{aligned} (120) \frac{x}{120} &= \frac{15}{100} (120) \\ x &= \frac{15 \times 120}{100} = 18 \end{aligned}$$

So, 15% of \$120 is \$18.

This kind of situation arises when you're figuring out the tip at a restaurant!

Method 2 (Short-cut): "15%" means ".15" and "of" means "times." So,

$$15\% \text{ of } \$120 = 0.15 \times 120 = 18$$

2. *17% of the students at Westlake High are seniors. There are 374 seniors at Westlake. How many students attend Westlake total?*

Again, set up a proportion. Remember: "17%" is the same as "17/100"

$$\begin{array}{l} \text{part} \longrightarrow \frac{374}{x} = \frac{17}{100} \\ \text{whole} \longrightarrow x \end{array}$$

Since  $x$  is in the denominator, the first step in isolating it is to first multiply both sides by  $x$ .

$$\begin{aligned} (x) \frac{374}{x} &= \frac{17}{100} (x) \\ 374 &= \frac{17x}{100} \end{aligned}$$

To finish isolating  $x$ , multiply both sides by 100, and then divide by 17.

$$\begin{aligned} (100)374 &= \frac{17x}{100} (100) \\ 37,400 &= 17x \\ x &= \frac{37,400}{17} = 2,200 \end{aligned}$$

So, there are 2,200 total students at Westlake High.

3. On Tuesday, May 5, 2009, the W.H.O. (World Health Organization) reported 1,490 cases of H1N1 worldwide. On Saturday, May 9, they reported a total of 3,440 cases.<sup>1</sup> What was the percent increase in the number of H1N1 cases?

We're looking for the percent *increase*. The total increase is

$$\text{Old number} - \text{New number} = 3,440 - 1,490 = 1,950$$

Set up a proportion. In this case, the percentage is the unknown so it's " $x\%$ " or " $x/100$ "

$$\frac{x}{100} = \frac{1,950}{1,490}$$

$\swarrow$  part  
 $\swarrow$  whole

To isolate  $x$ , multiply both sides by 100:

$$\begin{aligned} (100) \frac{x}{100} &= \frac{1,950}{1,490} (100) \\ x &= \frac{1,950 \times 100}{1,490} = 130.87 \end{aligned}$$

So in those 4 days, the number of reported H1N1 cases increased by almost 131%. (Note: it makes sense that this is more than a 100% increase, since the total number of cases more than doubled!)

<sup>1</sup> According to the New York Times interactive online graphic at <http://www.nytimes.com/interactive/2009/04/27/us/20090427-flu-update-graphic.html>

## Practice Problems

Work these problems out on a separate sheet of paper. Please show all of your work.

1. What is 80% of \$60?
2. 60 is 80% of what number? (Careful, this is a different question than #1!)
3. What percent of 470 is 72?
4. What is 0.25% of 650?
5. California has among the highest sales tax in the nation. It varies by county, but just to give you a taste, the combined sales tax (state sales tax + local taxes) in Sacramento is 8.75% and the combined sales tax in LA is 9.75%. How much money would you save by buying a \$20,000 car in Sacramento rather than in LA?
6. According to extensive clinical trials (what drug companies use to determine the effectiveness of their medications), approximately 1.5% of the people who use a certain cholesterol medication will experience severe side effects. If around 10 million people take the medication regularly, approximately how many of them will experience severe side effects?
7. A fancy pair of jeans normally costs \$100. Today, the jeans are on sale for 15% off. However, there is also a 15% tax on the jeans, calculated after the discount. How much will you pay for the jeans today?
8. You and a group of 8 friends go out for dinner, and the bill comes out to \$225. A 15% gratuity is already included in the check when the waitress brings it to you.
  - a. How much was did your group spend on food and drink (not including gratuity)?
  - b. If you didn't know that gratuity was included (so you thought food and drink came to \$225) and you wanted to leave a 15% tip, how much money would you leave?
  - c. That sneaky waitress! She didn't tell you that the gratuity was included, so you left a 15% tip based on the \$225 check. What percent gratuity did the lucky waitress end up with?
9. We'll be talking a lot about money and finance over the next several weeks. To begin, go to Google Finance (<http://www.google.com/finance>) and look up a stock of your choice. Click on "Get quotes."

The graph you see illustrates the stock's price as a function of time. The big number in bold black print above the graph tells you that stock's **current price** (i.e., how much it would cost you to buy a share of that stock right now). Click on "Historical Prices" in the left bar.

- a. Find the closing price of this stock on January 30, 2009. Calculate the percentage change in the stock price from 1/30/09 until now. Be sure to say whether this is a percent *increase* or percent *decrease*.
- b. If you had invested \$10,000 in this stock on January 30, 2009, how much money would you have made or lost?