

Additional Notes on Percent Equations:

Basic Percent Equation

$$(\text{percent}) \times (\text{base}) = (\text{amount})$$

In this equation, the **base** is the number of which we are taking a percentage and the **amount** is the value that results from taking the percent of the base. This means that in any percent problem, there are three basic values to be concerned about: the percent, the base, and the resulting amount. A percentage problem may ask us to find any one of these three values.

The **Basic Percent Equation** is the basic relationship that we need to learn to understand. We need to know how to identify which number is the base and which number is the amount?

Example: Suppose you go out to dinner at a restaurant. After dinner when you pay your bill, you decide to give your server a 15% tip. If the total bill (before tipping) is \$20.00, then how much should you leave as a tip?

We can **restate** the problem as: 15% of the total bill of \$20 is the tip. The **base** in this case is the total bill of \$20.00, since this is the value we are taking a percentage of. We solve for the tip which is the resulting **amount**.

$$(\text{percent}) \times (\text{base}) = (\text{amount})$$

$$(\text{percent}) \times (\text{bill}) = (\text{tip})$$

$$(15\%) \times (\$20) = x$$

where x represents the amount of the tip.

Next, we convert the percent to either fraction or decimal form and then multiply:

$$x = (0.15)(20)$$

$$x = 3$$

You would tip the server \$3.

Example: You live in a city that charges 6% sales tax on all purchases. If you go to a store and purchase \$30 worth of merchandise, what is your total bill?

We can **restate** the sales tax portion of the problem as: 6% of the \$30 worth of merchandise is the sales tax.

Next, we compute the tax on the purchase using the **Basic Percent Equation**. We do not know the amount of sales tax, so we let x represent the amount of sales tax in the equation and solve for x .

$$(\text{percent}) \times (\text{base}) = (\text{amount})$$

$$(6\%) \times (\$30) = (\text{amount of tax})$$

We compute

$$(0.06)(30) = x$$

$$1.80 = x$$

The amount of tax is \$1.80. Notice that this *does not* give the total bill. It only gives the *amount of tax* paid on the purchase. To compute the total bill, we add the amount of tax on to the cost of the merchandise.

Since $\$30.00 + \$1.80 = \$31.80$, the total bill is \$31.80.

We may also solve the problem in a single equation.

Second Method for the above problem: You live in a city that charges 6% sales tax on all purchases. If you go to a store and purchase \$30 worth of merchandise, what is your total bill?

Note that you will pay 100% of the cost plus 6% for sales tax, so you will pay 106% of the cost of the merchandise.

We **restate** the problem as: 106% of the \$30 worth of merchandise is the total cost.

Next, we compute the tax on the purchase using the **Basic Percent Equation**. We do not know the total cost, so we let x represent the amount of the total cost in the equation and solve for x .

$$(\text{percent}) \times (\text{base}) = (\text{amount})$$

$$(106\%) \times (\$30) = (\text{amount of the total cost})$$

We compute

$$(1.06)(30) = x$$

$$31.80 = x$$

The total bill is \$31.80.