Percentages and how to use them in daily life

By Gale, Cengage Learning, adapted by Newsela staff on 04.24.18
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Image 1. Retail stores often indicate sales promotions as percentages, as in this shop in Munich, Germany, in 2015. Photo by: Henning Schlottmann/Wikimedia

A percentage is a fraction with a denominator of 100. It can be expressed using the term itself, such as 25 percent, or using the % symbol, as in 25%. Percentages are the backbone of a wide range of mathematical applications.

Fractions, Ratios And Proportions

Percentages are related to three other concepts: fractions, ratios and proportions.

A fraction is a number expressed as one whole number divided by another. For example, one half can be expressed as ½.

A ratio is the relationship between two similar quantities. For example, in 2005 there were 31 million people in Canada and 310 million people in the United States. The ratio of the population in Canada to the population in the U.S. was therefore 1 to 10.

A proportion is a pair of ratios expressed as a mathematical equation. Say a city has 100,000 residents and 1,000 of them have red hair. The proportion of the population with red hair will be expressed as 1,000/100,000, or 1/100. The equation 1,000/100,000 = 1/100 is a proportion.

All percentages are an expression of a relationship based on 100, and every fraction, ratio and proportion may be expressed as a percentage. Percentages may also be expressed where decimals are required, as in the figure 66.92%.

A range of data can be divided into 99 points to make 100 groups of equal size, and each point is called a percentile. For example, students in a class or across a larger population are given percentile rankings on a national test. Percentile rankings can be used to compare students to one another.

How To Write Percentages

A percentage can be expressed in any of the following ways: 38 percent, 38%, 38/100 or 0.38.

To convert a decimal to a percentage, move the decimal point two places to the right and add a % sign. For example, the decimal 0.09 equals 9%.

To convert a percentage to a fraction, put the percentage over 100. For example, 40% is the same as $^{40}/_{100}$. The simplest form of this fraction is $^{4}/_{10}$, or $^{2}/_{5}$.

To convert a fraction to a percentage, find the decimal equivalent of the fraction, then convert the decimal to a percentage as described above. For example, ¾ = .75 = 75%.
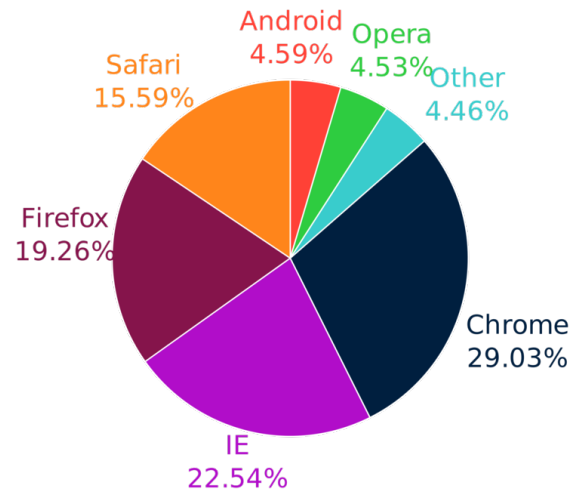
Often, percentages are used to find an exact number out of a total quantity. Let's say 15% of a shipment of 350 books was damaged by water. You can find the number of damaged books in the shipment by multiplying the total of books (350) by 15% (or 0.15), which leaves you with 52.5.

A Brief History Of Discovery And Development

In Latin, the language of ancient Romans, "per" means "by," and "cent" means "one hundred." People back then were already dividing by 100, so they were already using percentages. However, it's hard to say exactly when percentages were invented.

Decimals were developed to easily tell the difference between fractions with different denominators. For example, the difference between the fractions $\frac{4}{13}$ and $\frac{5}{17}$ might be hard to see, but the decimals for each, 0.307 and 0.294, are easier to compare. The same goes for percentages. The decimal point became standard throughout Europe in the early 1600s, simplifying numerical calculations.

We are now used to percentages being used in support of a particular viewpoint or concept. As a result, percentages can sometimes be misleading. Politicians or people in business often use percentages to make broad statements. For example, "The economy will grow by 2% this year" sounds persuasive because a specific percentage is used. Without knowing how it was calculated, though, it is hard to say how accurate that measurement is.

Real-Life Applications

Percentages are used in many real-life situations.

• In education, the ranking of students will often be determined by their grades, usually expressed as a percentage. Grades can also be calculated based on percentiles.

• Doctors, chemists and other scientists calculate how much of a particular substance is in a mixture or solution.

• In the food industry, percentages are used to determine the contents of food and drinks, like the amount of fat or vitamins.

• In retail, pricing increases and sales discounts are almost always expressed as a percentage. This can be easier to understand than unfamiliar fractions.

• In weather forecasts, the possibility of certain changes in the weather is expressed as a percentage, like a 20% possibility of rain.

• Percentages are used to make comparisons in all types of sports. Shooting percentage in basketball or a baseball player's batting average are two examples.

The 1% Method

This method of calculation is often useful for quickly determining small percentages. Determine 1% of the given number, and then calculate the value of the desired percent. For example, to calculate 3% of 1,800, first take 1% of 1,800, which is 18, then multiply that by 3 to get 54, or 3%.

Finding The Rate Percent

Rate is the comparison between two numbers expressed as a ratio, written as a common fraction. For example, to express what percent of 20 is 8, you can start with the rate: $8/20 = 0.40 = 40\%$.

Percentage Change: Increase Or Decrease

Some problems are expressed by words like "is 15% more than" or "is 60% less than" or "has increased by 180%" or "has decreased by 38%." These problems require a calculation of the percentage change. For example, if 44 increases by 25%, the new number will be 44 plus 25% of 44. Since 25% of 44 is equal to 11, the result of 44 + 25% is 55.

Finding The Rate Of Increase Or Decrease

The rate of change may be expressed as the following equation: rate of change = amount of change / original number. For example, if 40 increases to 46, the rate of change is $(46 - 40)/40 = 6/40 = 0.15 = 15\%$.

Finding The Original Amount

If the quantity after the change is known, the original quantity may be found. For example, 96 is 60% more than what number? In this example, 96 is the number after the increase.

Let the original number be x. Then, x plus 60% of x is 96. That means x + 0.6x = 96, or 1.6x = 96. To find x, divide both sides of this equation by 1.6 to get x = 96/1.6 = 60.

Quiz

1 Read the section "How To Write Percentages."

Select the paragraph from the section that suggests that percentages can be expressed in three different ways.

(A) To convert a decimal to a percentage, move the decimal point two places to the right and add a % sign. For example, the decimal 0.09 equals 9%.

(B) To convert a percentage to a fraction, put the percentage over 100. For example, 40% is the same as $^{40}\!/_{100}$. The simplest form of this fraction is $^{4}\!/_{10}$, or $^{2}\!/_{5}$.

(C) To convert a fraction to a percentage, find the decimal equivalent of the fraction, then convert the decimal to a percentage as described above. For example, ¾ = .75 = 75%.

(D) Often, percentages are used to find an exact number out of a total quantity. Let's say 15% of a shipment of 350 books was damaged by water. You can find the number of damaged books in the shipment by multiplying the total of books (350) by 15% (or 0.15), which leaves you with 52.5.

2 Read the conclusion below.

Percentages have a connection to several important mathematical concepts.

Which sentence from the article provides the BEST support to the statement above?

(A) It can be expressed using the term itself, such as 25 percent, or using the % symbol, as in 25%.

(B) All percentages are an expression of a relationship based on 100, and every fraction, ratio and proportion may be expressed as a percentage.

(C) A range of data can be divided into 99 points to make 100 groups of equal size, and each point is called a percentile.

(D) Shooting percentage in basketball or a baseball player's batting average are two examples.

3   Read the section "A Brief History Of Discovery And Development."

What does this section explain that other sections do not?

(A)   how the first people to invent percentages used them

(B)   the connection between decimals and percentages

(C)   some examples of how percentages are currently used

(D)   where the word "percentage" originally came from

4   How effective is the section "Finding The Original Amount" at closing the topic of percentages?

(A)   It is highly effective because it summarizes the main points from the article and shows that percentages can be used in many different ways.

(B)   It is highly effective because it describes the most important way people can use percentages and explains the process for using that method.

(C)   It is only somewhat effective because it explains one of the ways percentages are used but does not mention the other main points of the article.

(D)   It is only somewhat effective because it fails to describe the different steps a person must take in order to find the number before the percentage changed.

Answer Key

1   Read the section "How To Write Percentages."

Select the paragraph from the section that suggests that percentages can be expressed in three different ways.

(A)   To convert a decimal to a percentage, move the decimal point two places to the right and add a % sign. For example, the decimal 0.09 equals 9%.

(B)   To convert a percentage to a fraction, put the percentage over 100. For example, 40% is the same as $\frac{40}{100}$. The simplest form of this fraction is $\frac{4}{10}$, or $\frac{2}{5}$.

(C)   To convert a fraction to a percentage, find the decimal equivalent of the fraction, then convert the decimal to a percentage as described above. For example, ¾ = .75 = 75%.

(D)   Often, percentages are used to find an exact number out of a total quantity. Let's say 15% of a shipment of 350 books was damaged by water. You can find the number of damaged books in the shipment by multiplying the total of books (350) by 15% (or 0.15), which leaves you with 52.5.

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            use percentages and explains the process for using that method.

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            percentages are used but does not mention the other main points of the
            article.**

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            person must take in order to find the number before the percentage changed.