PERCENTAGES

The percent sign, % probably originated in an Italian manuscript in 1425. The word “percent” comes from the two Latin words: “per” meaning “by” and “centum,” meaning “hundred.” “Percent” and “hundredths” are two names for the same thing. Thus, 0.02 = 2 hundredths = 2% and 0.45 = 45 hundredths = 45%, etc. “Percent” came into use before decimals and though it is no longer needed when the decimal system is understood and used, it is still widely accepted.

Percent means hundredths. Thus the percent symbol, % represents two decimal places.

1. To express percent as a decimal, divide the numeral by 100. This is the same as moving the decimal point two places to the left.

   \[ 41\% = \frac{41}{100} = 0.41 \]

   \[ 5.6\% = \frac{5.6}{100} = 0.056 \]

   \[ 256\% = \frac{256}{100} = 2.56 \]

2. To express percent as a common fraction, change the percent to a decimal by dividing by 100 (since percent means part of 100) and dropping the % sign. This is equivalent to moving the decimal point two places to the left. Put the resulting numeral over its proper denominator and reduce as far as possible.

   \[ 24\% = 0.24 = \frac{24}{100} = \frac{24+4}{100+4} = \frac{6}{25} \]

   (Notice that since 0.24 is read 24 hundredths, 0.24 = \( \frac{24}{100} \))

   \[ 7\% = 0.07 = \frac{7}{100} \]

   \[ 3 \frac{1}{4}\% = 3.25\% = 0.0325 = \frac{325}{10000} = \frac{13}{400} \]

   \[ 316\% = 3.16 = 3 \frac{16}{100} = 3 \frac{4}{25} \]

   (When the percent is more than 100%, the answer will be a whole or mixed number.)
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3. **To express decimals as percents**, multiply the decimal by 100. This is the same as moving the decimal point two places to the right. Then add the percent symbol.

   - 0.30 as a percentage is 0.30 \times 100 = 30\%
   - 0.003 as a percentage is 0.003 \times 100 = 0.3\%
   - 1.68 as a percentage is 1.68 \times 100 = 168\%
   - 0.9 as a percentage is 0.9 \times 100 = 90\%
   - 3 as a percentage is 3 \times 100 = 300\%
   (Remember, when no decimal point is visible, it is assumed to be at the right-hand side of the digits.)

4. **To express a common fraction as percent**, divide the numerator by the denominator, finding the quotient to at least 4 decimal places. Multiply the quotient by 100 and add the percent symbol. If there should be a remainder in the quotient, it can be written as a common fraction or as a decimal.

   **Example 1:** \( \frac{1}{3} \) means 1 divided by 3.

   \[
   0.3333 \\
   3 \mid 1.0000 \\
   - 9 \\
   - 10 \\
   - 9 \\
   - 10 \\
   - 9 \\
   - 1
   \]
   
   \(0.3333 \times 100 = 33.33\%\) or \(33 \frac{1}{3}\%\)

   **Example 2:** \( \frac{4}{5} \) means 4 divided by 5 = 0.8 = 80\%
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5. **To find a percent of a number**, change the percent to its equivalent decimal fraction or common fraction. Then multiply the given number by this fraction.

Example: Find 25% of 36

\[
\begin{align*}
\text{Method 1:} & \quad \frac{36 \times 0.25}{180} = \frac{72}{9.00} \\
\text{Or} & \\
\text{Method 2:} & \quad \frac{25}{100} = \frac{1}{4}, \quad 36 \times \frac{1}{4} = 9
\end{align*}
\]

6. **To find what percent one number is of another**, find what fractional part one number is of the other (in lowest terms). Then change this fraction to a % (see Section 4).

Example 1: What percent of 14 is 12?

\[
\frac{12}{14} = \frac{6}{7} \quad \text{which means 6 divided by 7}
\]

\[
0.8571 \quad .8571 \times 100 = 85.71\%
\]

Example 2: What percent of 8 is 12?

\[
\frac{12}{8} = 1.5 = 150\%
\]
Example 3: 9 is what percent of 24?

\[ \frac{9}{24} = \frac{3}{8} \quad \text{which means 3 divided by 8} \]

\[
\begin{array}{c|c}
8 & 3.000 \\
24 & 60 \\
56 & 40 \\
\end{array}
\]

0.375 \quad 0.375 \times 100 = 37.5\%

[Notice that the number following the word “of” became the denominator in each case]