Arithmetic Review: Percent*

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Abstract

This module is from Elementary Algebra by Denny Burzynski and Wade Ellis, Jr. This chapter contains many examples of arithmetic techniques that are used directly or indirectly in algebra. Since the chapter is intended as a review, the problem-solving techniques are presented without being developed. Therefore, no work space is provided, nor does the chapter contain all of the pedagogical features of the text. As a review, this chapter can be assigned at the discretion of the instructor and can also be a valuable reference tool for the student.

1 Overview

- The Meaning of Percent
- Converting A Fraction To A Percent
- Converting A Decimal To A Percent
- Converting A Percent To A Decimal

2 The Meaning of Percent

The word **percent** comes from the Latin word "per centum," "per" meaning "for each," and "centum" meaning "hundred."

Percent (%)

Percent means "for each hundred" or "for every hundred." The symbol % is used to represent the word percent.

Thus, $1\% = \frac{1}{100}$ or $1\% = 0.01$.

3 Converting A Fraction To A Percent

We can see how a fraction can be converted to a percent by analyzing the method that $\frac{3}{5}$ is converted to a percent. In order to convert $\frac{3}{5}$ to a percent, we need to introduce $\frac{1}{100}$ (since percent means for each hundred).

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Example 1

$$\begin{aligned}
\frac{3}{5} &= \frac{3}{5} \cdot \frac{100}{100} && \text{Multiply the fraction by 1.} \\
&= \frac{3}{5} \cdot 100 \cdot \frac{1}{100} && \text{Since } \frac{100}{100} = 100 \cdot \frac{1}{100}. \\
&= \frac{300}{5} \cdot \frac{1}{100} && \text{Divide 300 by 5.} \\
&= 60 \cdot \frac{1}{100} && \text{Multiply the fractions.} \\
&= 60\% && \text{Replace } \frac{1}{100} \text{ with the \% symbol.}
\end{aligned}$$

Fraction to Percent
To convert a fraction to a percent, multiply the fraction by 1 in the form $100 \cdot \frac{1}{100}$, then replace $\frac{1}{100}$ with the % symbol.

4 Sample Set A

Convert each fraction to a percent.

Example 2

$$\begin{aligned}
\frac{1}{4} &= \frac{1}{4} \cdot 100 \cdot \frac{1}{100} \\
&= \frac{100}{4} \cdot \frac{1}{100} \\
&= 25 \cdot \frac{1}{100} \\
&= 25\%
\end{aligned}$$

Example 3

$$\begin{aligned}
\frac{8}{5} &= \frac{8}{5} \cdot 100 \cdot \frac{1}{100} \\
&= \frac{800}{5} \cdot \frac{1}{100} \\
&= 160\%
\end{aligned}$$

Example 4

$$\begin{aligned}
\frac{4}{9} &= \frac{4}{9} \cdot 100 \cdot \frac{1}{100} \\
&= \frac{400}{9} \cdot \frac{1}{100} \\
&= (44.4...) \cdot \frac{1}{100} \\
&= \left(44.\overline{4}\right) \cdot \frac{1}{100} \\
&= 44.\overline{4}\%
\end{aligned}$$

5 Converting A Decimal To A Percent

We can see how a decimal is converted to a percent by analyzing the method that 0.75 is converted to a percent. We need to introduce $\frac{1}{100}$.

$$\begin{aligned} 0.75 &= 0.75 \cdot 100 \cdot \frac{1}{100} && \text{Multiply the decimal by 1.} \\ &= 75 \cdot \frac{1}{100} \\ &= 75\% && \text{Replace } \frac{1}{100} \text{ with the \% symbol.} \end{aligned}$$

Decimal to Percent
To convert a fraction to a percent, multiply the decimal by 1 in the form $100 \cdot \frac{1}{100}$, then replace $\frac{1}{100}$ with the % symbol. This amounts to moving the decimal point 2 places to the right.

6 Sample Set B

Convert each decimal to a percent.

Example 5

$$\begin{aligned} 0.62 &= 0.62 \cdot 100 \cdot \frac{1}{100} \\ &= 62 \cdot \frac{1}{100} \\ &= 62\% \end{aligned}$$

Notice that the decimal point in the original number has been moved to the right 2 places.

Example 6

$$\begin{aligned} 8.4 &= 8.4 \cdot 100 \cdot \frac{1}{100} \\ &= 840 \cdot \frac{1}{100} \\ &= 840\% \end{aligned}$$

Notice that the decimal point in the original number has been moved to the right 2 places.

Example 7

$$\begin{aligned} 0.47623 &= 0.47623 \cdot 100 \cdot \frac{1}{100} \\ &= 0.47623 \cdot \frac{1}{100} \\ &= 47.623\% \end{aligned}$$

Notice that the decimal point in the original number has been moved to the right 2 places.

7 Converting A Percent To A Decimal

We can see how a percent is converted to a decimal by analyzing the method that 12% is converted to a decimal. We need to introduce $\frac{1}{100}$.

$$\begin{aligned} 12\% &= 12 \cdot \tfrac{1}{100} && \text{Replace \% with } \tfrac{1}{100}. \\ &= \tfrac{12}{100} && \text{Multiply the fractions.} \\ &= 0.12 && \text{Divide 12 by 100.} \end{aligned}$$

Percent to Decimal
To convert a percent to a decimal, replace the % symbol with $\frac{1}{100}$, then divide the number by 100. This amounts to moving the decimal point 2 places to the left.

8 Sample Set C

Convert each percent to a decimal.

Example 8

$$\begin{aligned} 48\% &= 48 \cdot \tfrac{1}{100} \\ &= \tfrac{48}{100} \\ &= 0.48 \end{aligned}$$

Notice that the decimal point in the original number has been moved to the left 2 places.

Example 9

$$\begin{aligned} 659\% &= 659 \cdot \tfrac{1}{100} \\ &= \tfrac{659}{100} \\ &= 6.59 \end{aligned}$$

Notice that the decimal point in the original number has been moved to the left 2 places.

Example 10

$$\begin{aligned} 0.4113\% &= 0.4113 \cdot \tfrac{1}{100} \\ &= \tfrac{0.4113}{100} \\ &= 0.004113 \end{aligned}$$

Notice that the decimal point in the original number has been moved to the left 2 places.

9 Exercises

For the following problems, convert each fraction to a percent.

Exercise 1 ***(Solution on p. 7.)***

$\frac{2}{5}$

Exercise 2

$\frac{7}{8}$

Exercise 3 *(Solution on p. 7.)*

$\frac{1}{8}$

Exercise 4

$\frac{5}{16}$

Exercise 5 *(Solution on p. 7.)*

$15 \div 22$

Exercise 6

$\frac{2}{11}$

Exercise 7 *(Solution on p. 7.)*

$\frac{2}{9}$

Exercise 8

$\frac{16}{45}$

Exercise 9 *(Solution on p. 7.)*

$\frac{27}{55}$

Exercise 10

$\frac{7}{27}$

Exercise 11 *(Solution on p. 7.)*

15

Exercise 12

8

For the following problems, convert each decimal to a percent.

Exercise 13 *(Solution on p. 7.)*

0.36

Exercise 14

0.42

Exercise 15 *(Solution on p. 7.)*

0.446

Exercise 16

0.1298

Exercise 17 *(Solution on p. 7.)*

4.25

Exercise 18

5.875

Exercise 19 *(Solution on p. 7.)*

86.98

Exercise 20

21.26

Exercise 21 *(Solution on p. 7.)*

14

Exercise 22

12

For the following problems, convert each percent to a decimal.

Exercise 23 *(Solution on p. 7.)*

35%

Exercise 24
76%

Exercise 25 *(Solution on p. 7.)*
18.6%

Exercise 26
67.2%

Exercise 27 *(Solution on p. 7.)*
9.0145%

Exercise 28
3.00156%

Exercise 29 *(Solution on p. 7.)*
0.00005%

Exercise 30
0.00034%

Solutions to Exercises in this Module

Solution to Exercise (p. 4)
40%
Solution to Exercise (p. 4)
12.5%
Solution to Exercise (p. 5)
68.18%
Solution to Exercise (p. 5)
22.22%
Solution to Exercise (p. 5)
49.09%
Solution to Exercise (p. 5)
1500%
Solution to Exercise (p. 5)
36%
Solution to Exercise (p. 5)
44.6%
Solution to Exercise (p. 5)
425%
Solution to Exercise (p. 5)
8698%
Solution to Exercise (p. 5)
1400%
Solution to Exercise (p. 5)
0.35
Solution to Exercise (p. 6)
0.186
Solution to Exercise (p. 6)
0.090145
Solution to Exercise (p. 6)
0.0000005