

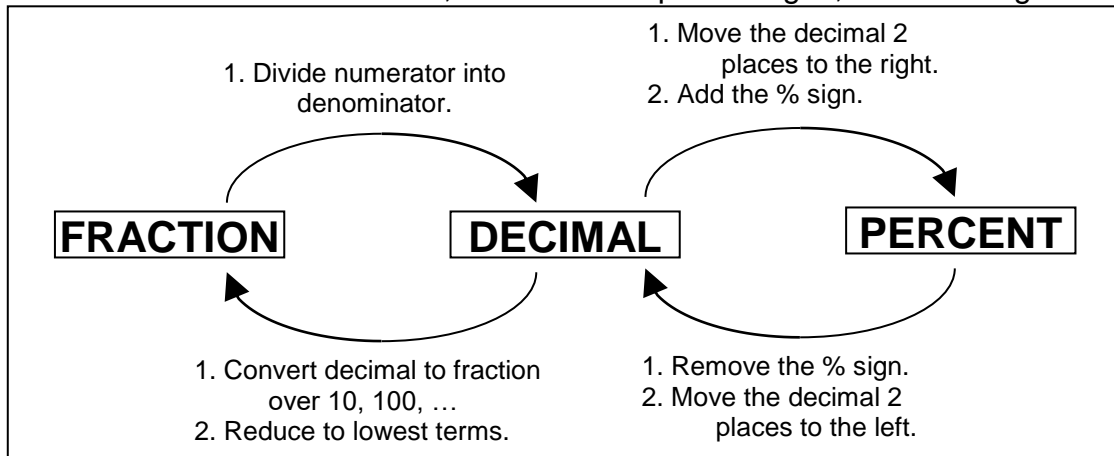


Working with Percentages

The symbol % means a fraction over 100: 0.01 or $\frac{1}{100}$.

The word **of** in percentage problems means “times”.

To convert between fractions, decimals and percentages, use this diagram:



There are three types of percent problems:

1) Determine the percentage of a given number.

Example: What is 17% of 82?

$$\begin{aligned} \text{Solution: } x &= 17\% \times 82 \\ &= 0.17 \times 82 \\ &= 13.94 \end{aligned}$$

2) Determine what percentage one number is of another number.

Example: What percent of 48 is 16?

$$\begin{aligned} \text{Solution: } x\% \times 48 &= 16 \\ x(0.01)(48) &= 16 \\ 0.48x &= 16 \\ x &= 16 \div 0.48 \\ &= 33 \frac{1}{3} \end{aligned}$$

3) Determine a number when a percentage of it is given.

Example: 3 is 16% of what?

$$\begin{aligned} 3 &= 16\% \times x \\ 3 &= (0.16)x \end{aligned}$$

$$\begin{aligned} 3 \div 0.16 &= x \\ x &= 18.75 \end{aligned}$$

FRACTION	DECIMAL	PERCENT
$\frac{1}{10}$	0.1	10%
$\frac{1}{8}$	0.125	12½%
$\frac{1}{6}$	0.1666...	16⅔%
$\frac{1}{5}$	0.2	20%
$\frac{1}{4}$	0.25	25%
$\frac{1}{3}$	0.3333...	33⅓%
$\frac{3}{8}$	0.375	37½%
$\frac{2}{5}$	0.4	40%
$\frac{1}{2}$	0.5	50%
$\frac{3}{5}$	0.6	60%
$\frac{5}{8}$	0.625	62½%
$\frac{2}{3}$	0.6666...	66⅔%
$\frac{3}{4}$	0.75	75%
$\frac{4}{5}$	0.8	80%
$\frac{5}{6}$	0.8333...	83⅓%
$\frac{7}{8}$	0.875	87½%



1	1	100%
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EXERCISES

A. Change to percentages:

- | | |
|----------------|----------------|
| 1) 0.24 _____ | 5) 0.125 _____ |
| 2) 0.2 _____ | 6) 0.065 _____ |
| 3) 0.07 _____ | 7) 1 _____ |
| 4) 0.007 _____ | 8) 3.375 _____ |

B. Express the following as decimals:

- | | |
|----------------|-----------------|
| 1) 8% _____ | 5) 144.8% _____ |
| 2) 28% _____ | 6) 100% _____ |
| 3) 19.5% _____ | 7) 287.5% _____ |
| 4) 495% _____ | 8) 0.5% _____ |

C. Change the following to percentages:

- | | |
|-------------------------|--------------------------|
| 1) $\frac{1}{2}$ _____ | 5) $\frac{3}{8}$ _____ |
| 2) $\frac{1}{5}$ _____ | 6) $1\frac{3}{4}$ _____ |
| 3) $\frac{3}{20}$ _____ | 7) $\frac{7}{2}$ _____ |
| 4) $\frac{1}{10}$ _____ | 8) $\frac{1}{200}$ _____ |

D. Determine:

- | | |
|------------------------------------|------------------------------------|
| 1) 6% of 300 = _____ | 5) 28% of 50 = _____ |
| 2) 4% of 600 = _____ | 6) 100% of 100 = _____ |
| 3) 18% of 800 = _____ | 7) $37\frac{1}{2}\%$ of 48 = _____ |
| 4) $16\frac{2}{3}\%$ of 42 = _____ | 8) 130% of 900 = _____ |

E. Find the missing percentages.

- | | |
|-----------------------|--------------------------|
| 1) _____ % of 48 = 16 | 5) _____ % of 16 = 16 |
| 2) _____ % of 50 = 25 | 6) _____ % of 40 = 2 |
| 3) _____ % of 75 = 15 | 7) _____ % of 27 = 9 |
| 4) _____ % of 40 = 32 | 8) _____ % of 98 = 122.5 |



F. Find the missing numbers:

1) 20% of _____ = 8

5) 50% of _____ = 2

2) 250% of _____ = 105

6) $\frac{1}{2}\%$ of _____ = 4

3) 75% of _____ = 33

7) 100% of _____ = 72

4) 1% of _____ = 55

8) $33\frac{1}{3}\%$ of _____ = 111

G. Translate and solve:

1) What is 15% of 555? _____

2) 25% of 44 is what? _____

3) What percent of 50 is 23? _____

4) 13 is what percent of 52? _____

5) 120% of what is 42? _____

6) 48 is 25% of what? _____

7) 1.8 is what percent of 1.5? _____

8) 52 is what percent of 13? _____

SOLUTIONS

A. (1) 24% (2) 20% (3) 7% (4) 0.7% (5) $12\frac{1}{2}\%$ or 12.5% (6) $6\frac{1}{2}\%$ or 6.5%
(7) 100% (8) $337\frac{1}{2}\%$ or 337.5%

B. (1) 0.08 (2) 0.28 (3) 0.195 (4) 4.95 (5) 1.448 (6) 1 (7) 2.875 (8) 0.005

C. (1) 50% (2) 20% (3) 15% (4) 10% (5) $37\frac{1}{2}\%$ or 37.5% (6) 175% (7) 350%
(8) $\frac{1}{2}\%$ or 0.5%

D. (1) 18 (2) 24 (3) 144 (4) 7 (5) 14 (6) 100 (7) 18 (8) 1170

E. (1) $33\frac{1}{3}\%$ (2) 50% (3) 20% (4) 80% (5) 100% (6) 5% (7) $33\frac{1}{3}\%$ (8) 125%

F. (1) 40 (2) 42 (3) 44 (4) 5500 (5) 4 (6) 800 (7) 72 (8) 333

G. (1) $x = 15\% \cdot 555$; 83.25 (2) $25\% \cdot 44 = x$; 11 (3) $x\% \cdot 50 = 23$; 46%
(4) $13 = x\% \cdot 52$; 25% (5) $120\% \cdot x = 42$; 35 (6) $48 = 25\% \cdot x$ (7) $1.8 = x\% \cdot 1.5$;
120% (8) $52 = x\% \cdot 13$; 400%

