Percentages

To convert a number to a percentage

$$\boxed{\text{multiply by } 100} \text{ which is the same as } \boxed{\text{multiply by } \frac{100}{1}.}$$

For example

1. What is $\frac{1}{2}$ as a percentage?

   $\frac{1}{2}$ as a percentage is $\frac{1}{2} \times \frac{100}{1} = \frac{1\times100}{2\times1} = \frac{100}{2} = 50\%$.

2. What is $\frac{3}{4}$ as a percentage?

   $\frac{3}{4}$ as a percentage is $\frac{3}{4} \times \frac{100}{1} = \frac{3\times100}{4\times1} = \frac{300}{4} = 75\%$.

3. Ali scored 9 out of 15 for a test. What is this as a percentage?

   It's $\frac{9}{15} \times \frac{100}{1} = \frac{9\times100}{15\times1} = \frac{900}{15} = 60\%$.

To convert a percentage to a fraction

$$\boxed{\text{put it over } 100} \text{ which is the same as } \boxed{\text{divide by } 100.}$$

For example

4. What is 60% as a fraction?

   It is $\frac{60}{100} = \frac{3}{5}$. As a decimal this is 0.6.

5. What is 50% as a fraction?

   It is $\frac{50}{100} = \frac{1}{2}$. As a decimal this is 0.5.

To find $n\%$ of a number X, convert $n\%$ to a fraction and multiply it by X. That is, calculate

$$\boxed{\frac{n}{100} \times X.}$$

For example

6. Find 60% of 15.

   This is $\frac{60}{100} \times 15 = \frac{3}{5} \times 15 = \frac{3\times15}{5} = \frac{45}{5} = 9$.

7. A machine is bought for \$5,660. GST of 10% has to be added to this. How much is the GST? What is the total cost?

   The GST is $\frac{10}{100}$ of \$5,660. This is $\frac{10}{100} \times 5660 = \frac{1}{10} \times 5660 = \frac{5660}{10} = 566$. It is \$566. The total cost is \$5,660 + \$566 = \$6,226.

8. Jules scored 40% in a test out of 30. What mark did Jules get?

   Jules got x out of 30. We know that $\frac{x}{30}$ is 40%, that is, we know that $\frac{x}{30} = \frac{40}{100}$. Therefore $x = 30 \times \frac{40}{100} = 12$. Jules scored 12 out of 30.

9. Jessie paid \$6,006 for equipment (including GST of 10%). Jessie will get a refund for the GST paid. How much will this refund be? (Be careful, the answer is not \$600.60.)

   Write n for the cost before GST is added. When the GST, which is 10% of n, is added we get \$6,006. The GST paid is $\frac{10}{100} \times n = \frac{n}{10}$. So the total Jessie paid is $n + \frac{n}{10} = 6006$.

   We must solve for n: $\frac{10n}{10} + \frac{n}{10} = 6006$, so $\frac{10n+n}{10} = 6006$ which is $\frac{11n}{10} = 6006$.

   Therefore $n = \frac{6006 \times 10}{11} = \frac{60060}{11} = 5460$. As the GST paid is $\frac{n}{10}$, the GST is $\frac{5460}{10} = \$546$.

Practice questions

The answers are on the next page. Attempt each question before looking at the answers.

10. What is $\frac{1}{4}$ as a percentage?
11. What is 80% as a fraction?
12. What is $\frac{3}{20}$ as a percentage?
13. What is 35% as a fraction?
14. Find 80% of 16.
15. Jay pays 32.5% tax on the income from last month. If the income was \$2,000, how much tax was paid?
16. Jane scored 68% in an exam. The exam was out of 400. What mark did Jane get out of 400?

Answers to practice questions

10. What is $\frac{1}{4}$ as a percentage?

    It is $\frac{1}{4} \times 100 = 25\%$.

11. What is 80% as a fraction?

    It is $\frac{80}{100} = \frac{4}{5}$.

12. What is $\frac{3}{20}$ as a percentage?

    It is $\frac{3}{20} \times 100 = \frac{3}{20} \times \frac{100}{1} = \frac{300}{20} = 15\%$.

13. What is 35% as a fraction?

    It is $\frac{35}{100} = \frac{7}{20}$.

14. Find 80% of 16.

    It is $\frac{80}{100} \times 16 = \frac{128}{10} = 12.8$.

15. Jay pays 32.5% tax on the income from last month. If the income was \$2,000, how much tax was paid?

    Tax paid is $\frac{32.5}{100} \times 2000 = \$650$.

16. Jane scored 68% in an exam. The exam was out of 400. What mark did Jane get out of 400?

    Jane's mark is $\frac{68}{100} \times 400 = 272$.