



Fractions, Decimals and Percentages

Decimals

In the decimal system the position of a digit is important. The position or **place determines the value of the digit** sitting in it. Each column contains objects that are ten times larger (or smaller) than the next column.

thousands	hundreds	tens	units	•	tenths	hundredths	thousandths
1	2	3	4	•	5	6	7

Addition and subtraction with decimals

- **line up the decimal places** and fill in the blanks with 0's if you need to

eg $3.174 + 25.82$

$$\begin{array}{r}
 3.174 + \\
 \underline{25.82} \\
 28.994
 \end{array}$$

↓

$$\begin{array}{r}
 3.174 + \\
 \underline{25.820} \\
 28.994
 \end{array}$$

←

Multiplication:

- Ignore the decimal points and multiply normally
- The number of decimal places in the question = the number of decimal places in the answer

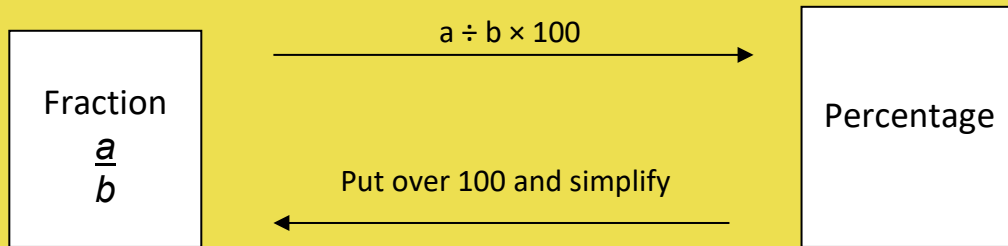
eg. $0.2 \times 0.03 = 0.006$ *three* decimal places on each side of the equals sign



Percentages

Percentages are fractions over 100. For example, 50% means 50 out of 100 or $\frac{50}{100}$, 12.5% means 12.5 out of 100 or $\frac{12.5}{100} = \frac{25}{200}$. Notice we avoid mixing decimals and fractions.

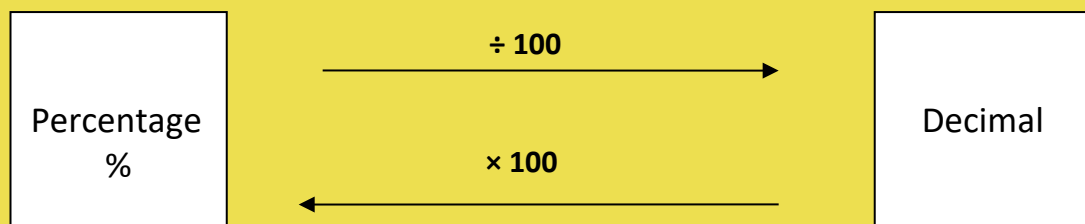
Conversion between fractions and percentages



$$\frac{45}{50} = 45 \div 50 \times 100 = 90\%$$

$$15\% = \frac{15}{100} = \frac{3}{20}$$

Conversion between decimals and percentages



12% = 0.12 (divide by 100, i.e. move the decimal place 2 places to the left)

0.23 = 23% (multiply by 100, i.e. move the decimal place 2 places to the right)

1.35 = 135% (multiply by 100, i.e. move the decimal place 2 places to the right)

To find a percentage of a given number: eg find 75% of 400

Remember $75\% = \frac{75}{100} = \frac{3}{4}$.

Calculate $\frac{3}{4} \times 400 = 300$ and so 75% of 400 is 300.

Notice we could have use any of the following to get this answer
($3 \div 4 \times 400$) or ($3 \times 400 \div 4$) or ($400 \times 3 \div 4$)



Exercises

1. Convert to decimals: 82%, 2%, 1.25%, 0.06%
2. Convert to percentages: 0.38, 0.091, 2.05, $\frac{15}{100}$, $\frac{5}{20}$
3. Convert to fractions: 30%, 85%, 17.5%, 0.02%
4. Find 45% of 60
5. Find 2% of 325
6. Write a score of 15 out of 60 as percentage
7. Calculate 0.2×7
8. Calculate 0.05×25
9. Add 1.025 and 40.3
10. Subtract 12.05 from 231.5

Answers

1. 0.82, 0.02, 0.0125, 0.0006
2. 38%, 9.1%, 205%, 15%, 25%
3. $\frac{30}{100} = \frac{3}{10}$, $\frac{85}{100} = \frac{17}{20}$, $\frac{17.5}{100} = \frac{175}{1000} = \frac{7}{40}$, $\frac{0.02}{100} = \frac{2}{10000} = \frac{1}{5000}$
4. 27
5. 6.5
6. 25%
7. 1.4
8. 1.25
9. 41.325
10. 219.45