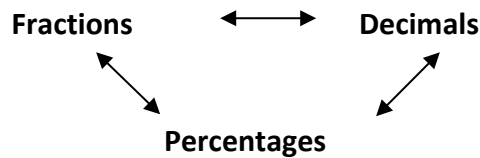# Fractions, Decimals & Percentages II

Fractions ⟷ Decimals

Percentages

These are just expressions of fractions in different forms. Decimals and percentages have their own notation which disguises that they are fractions!

- **Fractions**
  - $\dfrac{x}{y}$ where x and y can be any whole number (integer) except y cannot be 0.

  $$eg \quad \frac{2}{3} \quad , \quad \frac{-15}{7} \quad , \quad \frac{4}{9} \quad , \quad \frac{2}{10} \quad , \quad \frac{180}{100} \quad , \quad etc$$

- **Decimals**
  - Special fractions where the **denominator can ONLY be a power of 10**
  - Written with a different notation

  $$eg \quad \frac{3}{10} \quad , \quad \frac{5}{100} \quad , \quad \frac{158}{10} \quad , \quad \frac{46}{1000} \quad , \quad \frac{591}{100} \qquad \longleftarrow \quad \textit{fraction notation}$$

  $$\quad\;\; 0.3 \qquad 0.05 \qquad 15.8 \qquad 0.046 \qquad 5.91 \qquad \longleftarrow \quad \textit{decimal notation}$$

- **Percentages**
  - Special fractions where the **denominator is 100**
  - $\dfrac{x}{100}$ where x is any integer (whole number)
  - Written in special notation so it doesn't look like a fraction!

  $$eg \quad \frac{25}{100} \quad , \quad \frac{8}{100} \quad , \quad \frac{257}{100} \quad , \quad \frac{1.5}{100} \quad , \quad \frac{80}{100} \qquad \longleftarrow \quad \textit{fraction notation}$$

  $$\quad\;\; 25\% \qquad 8\% \qquad 257\% \qquad 1.5\% \textit{ or } 1\tfrac{1}{2}\% \qquad 80\% \qquad \longleftarrow \quad \textit{percentage notation}$$

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Change to a percentage

$$\text{Fraction or decimal} \times \frac{100}{1}\,\%$$

To change either a fraction or a decimal to a percentage is simple. Percentages are parts of 100.

eg $^1/_2$ is half of 100   or $\frac{1}{2} \times \frac{100}{1}\,\% = 50\,\%$

0.2   is 0.2 of 100   or $0.2 \times \frac{100}{1}\,\% = 20\,\%$

$$1^4/_5 \text{ to a percent } = 1^4/_5 \times \frac{100}{1}\,\%$$

$$= \frac{9}{5} \times \frac{100}{1}\,\%$$

$$= 180\,\%$$

Note: 180 % means $\dfrac{180}{100}$ Note: this is not the same as 180!

0.06 *as a percent* $= 0.06 \times \dfrac{100}{1}\,\%$

$$= 6\,\% \longleftarrow \quad \textit{make sure to keep the \% as } 6 \neq 0.06\,!$$

Change to a fraction

Remember decimals and percentages are really fractions in disguise so just write them back in fraction form as $\dfrac{x}{y}$

$8\% = \dfrac{8}{100} = \dfrac{2}{25}$

$0.3 = \dfrac{3}{10}$

recall the decimal place value to determine the denominator

$4.55 = \dfrac{455}{100} = \dfrac{91}{20}$

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Change to a decimal

- **Percentages to decimals**

Remember decimals are special fractions where the denominator can only be a power of 10. Percentages are already a fraction over 100, so it just needs to be written in the decimal notation. Recall dividing by 100 moves the decimal point to the left two places.

$$\frac{xxx}{100} \rightarrow x \cdot xx$$

%   decimal (whole percent in the **2nd place**)

125% $\rightarrow$ $\dfrac{125}{100}$ *or* $1 \cdot 25$ *as a decimal*

6% $\rightarrow$ $\dfrac{6}{100}$ *or* $0 \cdot 06$ *as a decimal*

80% $\rightarrow$ $\dfrac{80}{100}$ *or* $0 \cdot 80$ *or* 0.8 *as a decimal*

3.5% $\rightarrow$ $\dfrac{3.5}{100}$ *or* $0 \cdot 035$ *as a decimal*

YUK! Note 3 whole percent so 3 goes to the **2nd decimal place**

- **Fractions to decimals**

Recall $\dfrac{x}{y}$ *means* $x \div y$

$\dfrac{3}{④}$ *to a decimal* $\rightarrow$ $\overset{0.75}{4)\overline{3 \cdot 000000...}}$ —— add zeros as you need them

Add the decimal point to the top number of the fraction

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Note:
You may have to round or stop at a set number of
- o Significant figures (sf)
- o Decimal places (dp) – number of places after the decimal point

Express $\dfrac{6}{7}$ as a decimal correct to 2 dp

$\underset{\text{dp)}}{\dfrac{6}{\textcircled{7}}}$ *to a decimal* $\rightarrowtail$ $\overset{0.857\,\ldots}{7)\ 6\raisebox{0.3ex}{.}000000\ldots}$ ← add zeros   6/7 = 0.86 (2

Express $\dfrac{5}{3}$ as a decimal correct to 3 sf

$\underset{\text{sf)}}{\dfrac{5}{\textcircled{3}}}$ *to a decimal* $\rightarrowtail$ $\overset{1.6666\ldots}{3)\ 5\raisebox{0.3ex}{.}000000\ldots}$ ← add zeros   5/3 = 1.67 (3

Exercises

1. Convert to decimals: $\dfrac{5}{8}$,   2%,   82%,   0.06%, $2\,{}^{5}\!/_{6}$
2. Convert to percentages: 0.38,   0.091,   2.05, $\dfrac{15}{100}$, $\dfrac{5}{20}$
3. Convert to fractions: 0.30, 8.5, 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 giving your answer correct to 4 sf
10. Subtract 12.05 from 231.5 rounding your answer to 1 dp

Answers

1. 0.625, 0.02, 0.82, 0.0006, 2.83
2. 38%, 9.1%, 205%, 15%, 25%
3. $\dfrac{30}{100} = \dfrac{3}{10}$, $\dfrac{85}{10} = \dfrac{17}{2}$ or $8\frac{1}{2}$, $\dfrac{17.5}{100} = \dfrac{175}{1000} = \dfrac{7}{40}$, $\dfrac{0.02}{100} = \dfrac{2}{10000} = \dfrac{1}{5000}$
4. 27
5. 6.5
6. 25%
7. 1.4
8. 1.25
9. 41.33
10. 219.5