Chapter 10

Decimals fractions and percentages

Learn the ideas below, follow each worked example, then attempt the practice before checking the answers.

10.1 Decimal notation and calculation

Decimals write fractions with denominators 10, 100, 1,000 and so on. Align place values for addition and subtraction. Trailing zeros do not change a value. Multiplication and division by powers of ten change place values rather than simply adding or removing zeros.

Worked example $4.08 + 0.7 = 4.08 + 0.70 = 4.78$. Also, $3.47 \times 100 = 347$ and $3.47 \div 100 = 0.0347$.

10.2 Converting fractions to decimals

Divide the numerator by the denominator. A simplified fraction has a terminating decimal exactly when its denominator has no prime factors except 2 and 5. Other rational fractions repeat. Use a recurring mark or an ellipsis to show that the pattern continues.

Worked example $\frac{3}{8} = 3 \div 8 = 0.375$. The denominator $8 = 2^3$ gives a terminating decimal. In contrast, $\frac{2}{3} = 0.666\ldots$ repeats forever.

10.3 Converting decimals to fractions

Read the decimal as a number of tenths, hundredths or thousandths, then simplify. Preserve leading decimal zeros when choosing the denominator. For a repeating decimal, an algebraic subtraction can remove the repeating part.

Worked example $0.045 = \frac{45}{1000} = \frac{9}{200}$. For $x = 0.777\ldots$, $10x = 7.777\ldots$, so $9x = 7$ and $x = \frac{7}{9}$.

10.4 Percentages and equivalent forms

Percent means per hundred. Convert a decimal to a percentage by multiplying by 100. Convert a percentage to a decimal by dividing by 100. To convert a fraction to a percentage, multiply it by 100%. Percentages greater than 100% describe more than one whole.

Worked example $\frac{3}{5} = 0.6 = 60\%$. Also, $7\% = 0.07 = \frac{7}{100}$, while $125\% = 1.25 = 1\frac{1}{4}$.

10.5 Choosing useful representations

Use the form that makes a calculation easiest. Exact common fractions can simplify mental arithmetic. Retain recurring fractions exactly when an exact answer is needed, and round only when instructed. Know common equivalents such as one half, one quarter, three quarters and one fifth.

Worked example $\frac{1}{2} = 0.5 = 50\%$; $\frac{1}{4} = 0.25 = 25\%$; $\frac{3}{4} = 0.75 = 75\%$; $\frac{1}{5} = 0.2 = 20\%$. To find 25% of 88, calculate $88 \div 4 = 22$.

Chapter 10 practice

Work in your notebook. Show your method and include units where needed.

1. Convert $\frac{7}{20}$ to a decimal and percentage.
2. Write 0.125 as a simplified fraction.
3. Write 2.4% as a decimal.
4. Which is greatest: $\frac{2}{5}$, 0.45 or 42%?
5. Find 12.5% of 96.

Answers with methods

1. $\frac{7}{20} = \frac{35}{100} = 0.35 = 35\%$.

2. $\frac{125}{1000} = \frac{1}{8}$.

3. $2.4 \div 100 = 0.024$.

4. They are 0.40, 0.45 and 0.42, so 0.45 is greatest.

5. $12.5\% = \frac{1}{8}$, so $96 \div 8 = 12$.

Common mistake to avoid

0.5% means 0.005 of an amount. It is not the same as 0.5, which is 50%.