

C1.4 Fractions, decimals and percentages

Name: _____ Class: _____ Date: _____

Total: 20 marks

KEY WORDS percentage 百分比 • mixed number 带分数 • proper fraction 真分数
 • improper fraction 假分数 • numerator 分子

Objective

Use fractions, decimals and percentages to solve Core IGCSE Mathematics problems.

You must be able to:

- Convert mixed numbers, decimals and percentages
- Simplify fractions using common factors
- Express a part as a fraction or percentage of a whole

1 Key knowledge and worked examples

■ Key knowledge: Fractions, decimals and percentages

A proper fraction is less than 1; an improper fraction has numerator at least as large as its denominator. Divide numerator and denominator by the same common factor to simplify. Convert a mixed number using $(\text{whole} \times \text{denominator} + \text{numerator})/\text{denominator}$. A decimal is a fraction with a power-of-ten denominator. Percentage means out of 100.

■ Worked example: Fractions, decimals and percentages

fraction $\frac{3}{4}$

decimal 0.75

percentage 75

Convert $1\frac{3}{4}$ to the other forms.

- Improper fraction: $F = (1 \times 4 + 3)/4 = 7/4$.
- Divide to get $D = 7 \div 4 = 1.75$.
- Multiply by 100 for $p = 1.75 \times 100 = 175\%$.
- In reverse, $0.45 = 45/100 = 9/20$ by dividing both numbers by 5.
- To find the percentage of a capacity, use $p = (\text{part}/\text{whole})100$: 0.3 litres from 1.2 litres is $p = (0.3/1.2)100 = 25\%$.

■ Method check

A percentage needs a stated whole. Dividing a part by the whole gives a fraction of that whole; multiply by 100 only to express it as a percentage.

2 Practice

2.1 Simplify $24/36$. [2]

2.2 Convert $2\frac{2}{5}$ to an improper fraction and a decimal. [2]

2.3 Write 0.32 as a simplified fraction and a percentage. [2]

2.4 Convert $7/8$ to a decimal and a percentage. [2]

3 Exam-style questions

3.1 Apply the fractions, decimals and percentages methods below. Show working and include units where appropriate.

- (a) A bottle holds $1\frac{1}{5}$ litres. Write its capacity as a decimal. [2]

- (b) Write 0.3 litres as a simplified fraction of a litre. [2]

- (c) What percentage of the full bottle is 0.3 litres? [2]

3.2 A bottle contains 1.5 litres of juice. A serving uses 0.225 litres.

- (a) Express one serving as a simplified fraction and a percentage of the bottle. [3]

- (b) Six servings are poured. Find the fraction of the original bottle remaining and its volume. [3]

Solutions

Award method and answer marks as indicated; accept equivalent correct methods.

2.1

- The common factor is 12: $F = (24 \div 12)/(36 \div 12) = \mathbf{2/3}$.

2.2

- $F = (2 \times 5 + 2)/5 = \mathbf{12/5}$; $D = 12 \div 5 = \mathbf{2.4}$.

2.3

- $F = 32/100 = \mathbf{8/25}$; $p = 0.32 \times 100 = \mathbf{32\%}$.

2.4

- $D = 7 \div 8 = \mathbf{0.875}$; $p = 0.875 \times 100 = \mathbf{87.5\%}$.

3.1

(a)

- $V = (1 \times 5 + 1)/5 = 6/5 = \mathbf{1.2}$ litres.

(b)

- $V = 3/10$ litre, already simplified: $3/10$ **litre**.

(c)

- $p = (0.3/1.2) \times 100 = \mathbf{25\%}$.

3.2

(a)

- Use $f = \text{serving/whole} = 0.225/1.5 = \mathbf{3/20}$.
- Percentage $p = 100f = \mathbf{15\%}$.

(b)

- Six servings use $f_u = 6(3/20) = 9/10$, so the fraction left is $f_r = 1 - 9/10 = \mathbf{1/10}$.
- Volume $V = 1.5(1/10) = \mathbf{0.15}$ litres.