3.1 Units, ratio and sharing

Name: _____ Class: _____ Date: _____ **Total: 23 marks**

KEY WORDS density

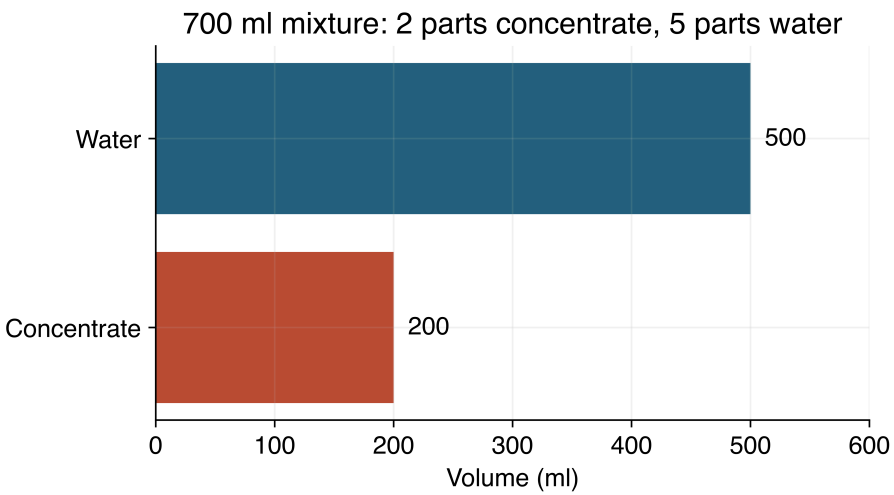
Units, ratio and sharing

Objective

Convert units and compound units, express quantities as fractions, use and share ratios in part : part and part : whole form, and apply ratio to real contexts including best-buy problems (rows R1–R8).

1 Key knowledge and worked examples

Units and ratios. Change freely between standard units; compound units add a division: speed = distance/time, density = mass/volume (additional foundation; algebraic contexts at Higher). Ratio reduces to simplest form; sharing uses parts/total: £350 in 2 : 5 gives £100 and £250.



Original native-lesson illustration; labels belong to its worked example.

2 Practice

2.1 Simplify 45 : 60 [1]

2.2 Share £350 in the ratio 2 : 5 [3]

2.3 Express 7 as a fraction of 28 [1]

2.4 A 234 km journey takes 2 h 36 min. Find the average speed in km/h. [3]

2.5 A block of mass 96 g has volume 12 cm^3. Find its density. [2]

2.6 A 2.5 kg bag costs £6.00 and a 400 g bag costs £1.10. Which is better value? Show working. [3]

3 Exam-style questions

3.1 *(Original.)* An alloy is copper and zinc in the ratio $7:3$. A block weighs 950 g. (a) Find the mass of copper. (b) A second block has 273 g of zinc: find its total mass. [4]

3.2 *(Original, Higher algebraic density.)* A solid has volume $V = 2x^3$ and mass $m = 5x^2$. Find an expression for its density in terms of x. [3]

3.3 *(Original.)* Water and juice are mixed $4:1$ to make 15 litres. A different batch uses 12 litres of water. How much juice does it need, and how much drink does it make? [3]

Solutions

2.1 $3:4$.

2.2 £100 and £250.

2.3 $\frac{7}{28} = \frac{1}{4}$.

2.4 2 h 36 min = 2.6 h; $234 \div 2.6 = 90$ km/h.

2.5 $96 \div 12 = 8$ g/cm^3.

2.6 2.5 kg bag: $6.00 \div 2.5 =$ £2.40/kg; 400 g bag: $1.10 \div 0.4 =$ £2.75/kg – the 2.5 kg bag is better value.

3.1 (a) $\frac{7}{10} \times 950 = 665$ g. (b) Zinc is $\frac{3}{10}$ of total: total $= 273 \div \frac{3}{10} = 910$ g.

3.2 density $= \dfrac{5x^2}{2x^3} = \dfrac{5}{2x}$.

3.3 Water makes 4 parts = 12 litres, so 1 part = 3 litres: juice = 3 litres, total drink = 15 litres.

Local review guidance: unit prices or parts-per-total stated; exact amounts with units; best-buy verdicts quote the compared rates. This is authored classroom guidance.