The Panda Math Tutor

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Ratio, Rate and Proportion

Solutions & Answer Key

Full worked solutions, marking scheme & answer key

IGCSE Mathematics

The Panda Math Tutor

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Companion to the *Student Worksheet*

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Note

About this booklet. These are the complete solutions to every question in the *Ratio, Rate and Proportion — Student Worksheet*. Question numbers match exactly: simplifying ratios S1–S10, dividing in a ratio B1–B9, rate and unit rate U1–U8, speed–distance–time W1–W9, distance–time graphs D1–D8, velocity–time graphs V1–V8, direct proportion P1–P9, inverse proportion I1–I8, percentage G1–G9, map scales M1–M7, the Mixed Review MR1–MR10, and the examination questions Q1–Q8 of Part III.
Each solution names the method being used — "one part =", "unit rate", "direct proportion, so $y = kx$", "reverse percentage, so divide by the multiplier" — and works one step at a time. Part V collects the common mistakes to watch for, and Part VI is a quick answer key for fast marking.

4 Part IV — Complete Solutions

Note

Each solution states the method first and the arithmetic second, exactly as the notes recommend. Depth is scaled to difficulty — brief for basic questions, fuller for the harder ones. Units are carried through every line of working.

4.1 Solutions — Simplifying Ratios

Solution S1

HCF$(42, 56) = 14$:

$$42 : 56 = (42 \div 14) : (56 \div 14) = \boxed{3 : 4}$$

Solution S2

HCF$(45, 75) = 15$:

$$45 : 75 = \boxed{3 : 5}$$

Solution S3

HCF$(18, 30, 48) = 6$:

$$18 : 30 : 48 = \boxed{3 : 5 : 8}$$

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Solution S4

Multiply both parts by 10 to clear the decimals, then divide by the HCF:

$$2.4 : 0.6 = 24 : 6 = \boxed{4 : 1}$$

Solution S5

The first part has two decimal places, so multiply both parts by 100:

$$0.35 : 1.4 = 35 : 140$$

$\mathrm{HCF}(35, 140) = 35$:

$$35 : 140 = \boxed{1 : 4}$$

Solution S6

The LCM of the denominators 3 and 6 is 6, so multiply both parts by 6:

$$\frac{2}{3} : \frac{5}{6} = \left(\frac{2}{3} \times 6\right) : \left(\frac{5}{6} \times 6\right) = \boxed{4 : 5}$$

Solution S7

The LCM of 5, 10 and 2 is 10, so multiply every part by 10:

$$\frac{3}{5} : \frac{7}{10} : \frac{1}{2} = 6 : 7 : 5$$

These have no common factor, so the answer is

$$\boxed{6 : 7 : 5}$$

Solution S8

Convert to the same unit first. $1.8\,\mathrm{kg} = 1800\,\mathrm{g}$:

$$750 : 1800$$

$\mathrm{HCF}(750, 1800) = 150$:

$$750 : 1800 = \boxed{5 : 12}$$

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Common Mistake

Writing 750 : 1.8 without converting gives a completely wrong answer. A ratio compares quantities of the *same* kind measured in the *same* unit.

Solution S9

Convert to the same unit. 3 hours = 180 minutes:

$$45 : 180 = \boxed{1 : 4}$$

Solution S10

To make the first part equal to 1, divide both parts by 1.25:

$$1.25 : 2 = \frac{1.25}{1.25} : \frac{2}{1.25} = \boxed{1 : 1.6}$$

In the form $1 : n$ the second part does not have to be a whole number.

4.2 Solutions — Dividing a Quantity in a Given Ratio

Solution B1

Total parts $= 4 + 5 = 9$:

$$\text{one part} = \frac{360}{9} = \$40$$

$$\text{Shares} = 4 \times 40 \text{ and } 5 \times 40 = \boxed{\$160 \text{ and } \$200}$$

Check: $160 + 200 = 360$ ✓

Solution B2

Total parts $= 5 + 7 = 12$:

$$\text{one part} = \frac{288}{12} = 24\,\text{g}$$

$$\text{Shares} = \boxed{120\,\text{g and } 168\,\text{g}}$$

Check: $120 + 168 = 288$ ✓

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Solution B3

Total parts $= 2 + 3 + 4 = 9$:

$$\text{one part} = \frac{540}{9} = 60\,\text{ml}$$

$$\text{Shares} = \boxed{120\,\text{ml},\ 180\,\text{ml},\ 240\,\text{ml}}$$

Check: $120 + 180 + 240 = 540$ ✓

Solution B4

Total parts $= 3 + 4 + 5 = 12$:

$$\text{one part} = \frac{1260}{12} = £105$$

$$\text{Shares} = \boxed{£315,\ £420,\ £525}$$

Check: $315 + 420 + 525 = 1260$ ✓

Solution B5

(a) Sand is 7 parts and 7 parts $= 84\,\text{kg}$, so

$$\text{one part} = \frac{84}{7} = 12\,\text{kg}$$

$$\text{Cement} = 2 \times 12 = \boxed{24\,\text{kg}}$$

(b) The mix is 9 parts altogether:

$$\text{Total} = 9 \times 12 = \boxed{108\,\text{kg}}$$

(Or simply $84 + 24 = 108\,\text{kg}$.)

Solution B6

(a) Girls have 9 parts and boys have 7, so the difference is $9 - 7 = 2$ parts. That difference is 26 members:

$$\text{one part} = \frac{26}{2} = 13$$

$$\text{Boys} = 7 \times 13 = \boxed{91}, \qquad \text{Girls} = 9 \times 13 = \boxed{117}$$

(b) Total $= 16$ parts $= 16 \times 13 = \boxed{208}$ members.
Check: $117 - 91 = 26$ ✓

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