Test answers - Ratio and proportion

Year: Year 7 · Duration: 45 minutes · /20

Answer to Question 1 (4 marks)

a. The highest common factor of 24 and 36 is 12. Divide both parts by 12: $24 \div 12 = 2$ and $36 \div 12 = 3$. The simplest form is **2 : 3**. (1 mark)
b. Add the parts: $3 + 4 = 7$. One part is worth $84 \div 7 = £12$ (1 mark). The shares are $3 \times 12 =$**£36** and $4 \times 12 =$**£48** (1 mark).
c. Both quantities must be in the same units before simplifying. Write 2 kg as 2 000 g, giving 500 : 2 000. Divide both parts by 500: **1 : 4**. (1 mark)

Check (b): $36 + 48 = 84$, and $36 : 48$ simplifies to 3 : 4 when divided by 12. In (c), answering 250 : 1 would be wrong because the units were mixed.

Answer to Question 2 (4 marks)

a. Use the unitary method. One bottle costs $£4.50 \div 6 = £0.75$ (1 mark). Ten bottles cost $10 \times £0.75 =$**£7.50** (1 mark).
b. Find the amount for one person first: $300 \div 4 = 75$ g of pasta (1 mark). For seven people multiply by 7: $7 \times 75 =$**525 g** (1 mark).

A sense check for (a): 10 bottles is a little less than twice 6 bottles, so the cost should be a little less than $2 \times £4.50 = £9$. £7.50 fits. For (b), 7 people is just under double 4 people, so a little under 600 g of pasta is expected, and 525 g agrees. Both are direct proportion: doubling the people doubles the pasta.

Answer to Question 3 (4 marks)

a. Work in pence. The 400 g jar is 4 lots of 100 g: $480 \div 4 = 120$p per 100 g (1 mark). The 750 g jar is 7.5 lots of 100 g: $825 \div 7.5 = 110$p per 100 g (1 mark).
b. The lower cost per 100 g gives better value, so the **750 g jar** is the better buy. (1 mark)
c. 1 500 g is 15 lots of 100 g. In small jars this costs $15 \times 120 = 1\,800$p and in large jars $15 \times 110 = 1\,650$p. The saving is $1800 - 1650 = 150$p, which is **£1.50**. (1 mark)

Check (c): 1 500 g is exactly 2 large jars, $2 \times £8.25 = £16.50$. It is also 3.75 small jars, $3.75 \times £4.80 = £18$.

Answer to Question 4 (4 marks)

a. The ratio 4 : 1 : 5 has $4 + 1 + 5 = 10$ parts, so one part is $80 \div 10 = 8$ kg (1 mark).

Compost $4 \times 8 =$**32 kg**, sand $1 \times 8 =$**8 kg**, soil $5 \times 8 =$**40 kg** (1 mark).

b. Cost of each material: compost $32 \times £0.30 = £9.60$, sand $8 \times £0.20 = £1.60$, soil $40 \times £0.10 = £4.00$ (1 mark). Total cost $9.60 + 1.60 + 4.00 =$**£15.20** (1 mark).

Check (a): $32 + 8 + 40 = 80$ kg, the full amount of mixture needed. Even though soil is the largest quantity, compost costs the most because its price per kilogram is three times that of soil.

Answer to Question 5 (4 marks)

a. The scale 1 : 25 000 means 1 cm on the map is 25 000 cm in real life. So 8 cm represents $8 \times 25\,000 = 200\,000$ cm (1 mark). Convert: 100 cm = 1 m and 1 000 m = 1 km, so 200 000 cm = 2 000 m = **2 km** (1 mark).

b. Time = distance ÷ speed $= 2 \div 4 = 0.5$ hours (1 mark). Half an hour is **30 minutes** (1 mark).

Useful fact: on a 1 : 25 000 map, 4 cm represents exactly 1 km, so 8 cm is 2 km. Check (b): at 4 km/h Dan covers 1 km every 15 minutes, so 2 km take $2 \times 15 = 30$ minutes.