Test answers - Ratio and proportion

Year: Year 8 · Duration: 45 minutes · /20

Answer to Question 1 (4 marks)

a. Both 36 and 48 are multiples of 12, their HCF. Dividing each part by 12 leaves $3 : 4$. (1 mark)
b. To make the first part 1, divide both parts by 2.4: $2.4 \div 2.4 = 1$ and $6 \div 2.4 = 2.5$. The ratio is $1 : 2.5$. (1 mark)
c. The ratio has $2 + 3 + 4 = 9$ parts, so one part is $90 \div 9 = £10$ (1 mark). The shares are $2 \times 10 =$**£20**, $3 \times 10 =$**£30** and $4 \times 10 =$**£40** (1 mark).

Check (c): $20 + 30 + 40 = 90$. In (b) the form $1 : n$ often gives a decimal; that is allowed and makes ratios easy to compare. Check: $1 : 2.5$ multiplied by 2.4 gives back $2.4 : 6$.

Answer to Question 2 (4 marks)

a. Find the cost of one notebook: $£7.20 \div 6 = £1.20$ (1 mark). Ten notebooks cost $10 \times £1.20 =$**£12** (1 mark).
b. Find how far the car goes on one litre: $156 \div 12 = 13$ miles (1 mark). On 20 litres it goes $20 \times 13 =$**260 miles** (1 mark).

Both questions are direct proportion: when one quantity doubles, the other doubles. A sense check for (a): 10 notebooks are a bit less than twice 6 notebooks, so the cost should be a bit less than £14.40, and £12 fits. For (b), 20 litres is $\frac{5}{3}$ of 12 litres, and $156 \times \frac{5}{3} = 260$ gives the same distance.

Answer to Question 3 (4 marks)

a. This is inverse proportion: fewer builders need more days. The total work is $5 \times 12 = 60$ builder-days (1 mark). Shared between 4 builders: $60 \div 4 =$**15 days** (1 mark).
b. The scale 1 : 25 000 means 1 cm on the map is 25 000 cm on the ground. The 8 cm gap on the map is therefore $8 \times 25\,000 = 200\,000$ cm in reality (1 mark). Divide by 100 to get metres (2 000 m), then by 1 000 to get kilometres: **2 km** (1 mark).

A typical error in (a) is to work out $12 \times \frac{4}{5} = 9.6$ days, which treats the situation as direct proportion; with fewer builders the job must take longer, not shorter.

Answer to Question 4 (4 marks)

a. The ratio 5 : 3 has $5 + 3 = 8$ parts, and 72 cakes ÷ 8 = 9 cakes per part (1 mark). Sam bakes $5 \times 9 =$**45** cakes and Tia bakes $3 \times 9 =$**27** cakes (1 mark).
b. All 72 cakes sell at £1.50 each: $72 \times 1.50 =$**£108**. (1 mark)
c. Tia gets 3 of the 8 parts of the money: $108 \div 8 = 13.50$ per part, and $3 \times 13.50 =$ **£40.50**. (1 mark)

Check: Sam receives $5 \times 13.50 = £67.50$, and $67.50 + 40.50 = 108$. Tia's money can also be found directly from her cakes: $27 \times 1.50 = £40.50$, because the money is shared in the same ratio as the baking.

Answer to Question 5 (4 marks)

a. Divide each price by the number of batteries: $4.80 \div 6 = £0.80$, $7.60 \div 10 = £0.76$ and $17 \div 24 = £0.708\ldots$, about £0.71 (1 mark for two correct, 2 marks for all three).
b. The lowest price per battery is in the pack of **24**. (1 mark)
c. One pack of each size gives exactly $24 + 10 + 6 = 40$ batteries for $17 + 7.60 + 4.80 = £29.40$. Other choices cost more: four packs of 10 cost £30.40 and two packs of 24 cost £34. The cheapest way is **£29.40**. (1 mark)

Best value per battery does not always mean cheapest overall, because buying more than you need can waste money.