

Proportion - Recipes and the Unitary Method

Solutions

For Pearson Edexcel GCSE Mathematics (1MA1) • Foundation tier

Each question is shown in grey, followed by the working, one step per line. The final answer is in a box. *Marks* shows how the marks are usually given in the exam, and **Tip** points out a common mistake.

1 (3 marks)

Here is a list of ingredients for making 6 portions of tomato sauce.

Tomato sauce (6 portions)	
tomatoes	800 g
onions	2
olive oil	30 ml
garlic	4 cloves

Carys wants to make 9 portions of tomato sauce.

Work out how much of each ingredient she needs.

tomatoes		g
onions		
olive oil		ml
garlic		cloves

The recipe makes 6 portions. Carys wants 9 portions.

Scale factor = $9 \div 6 = 1.5$

So multiply every amount by 1.5.

Tomatoes: $800 \times 1.5 = 1200$ g

Onions: $2 \times 1.5 = 3$

Olive oil: $30 \times 1.5 = 45$ ml

Garlic: $4 \times 1.5 = 6$ cloves

Answer: 1200 g, 3 onions, 45 ml, 6 cloves

Tip: Don't add 3 to each amount because she makes 3 more portions. Multiply every amount by the scale factor.

Marks: 1 mark for 1.5 (or another correct method). 1 mark for two correct amounts. 1 mark for all four correct.

2 (3 marks)

Tomasz wants to make some muffins using this recipe.

Makes 8 muffins	
flour	200 g
milk	150 ml
blueberries	120 g

Tomasz has 750 g of flour, 500 ml of milk and 450 g of blueberries.

He says,

'I have enough ingredients to make 28 muffins.'

Is Tomasz correct?

You must show how you get your answer.

Scale factor = $28 \div 8 = 3.5$

Flour needed: $200 \times 3.5 = 700$ g. He has 750 g, which is enough.

Milk needed: $150 \times 3.5 = 525$ ml. He has 500 ml, which is **not** enough.

Blueberries needed: $120 \times 3.5 = 420$ g. He has 450 g, which is enough.

Tomasz is not correct, because he does not have enough milk.

Answer: No, he needs 525 ml of milk

Tip: Check every ingredient, and finish with a clear conclusion that says which ingredient there is not enough of.

Marks: 1 mark for 3.5 (or the amount for 1 muffin). 1 mark for 525 ml of milk. 1 mark for "No" with a reason.

3 (4 marks)

Here is a list of ingredients for making 4 pizza bases.

Ingredients for 4 pizza bases

bread flour	600 g
water	360 ml
olive oil	20 ml
dried yeast	8 g

Gwen has 2 kg of bread flour, 1.5 litres of water, 75 ml of olive oil and 28 g of dried yeast.

Work out the greatest number of pizza bases Gwen can make.

Change the units: 2 kg = 2000 g and 1.5 litres = 1500 ml.

Amounts for 1 base: flour $600 \div 4 = 150$ g, water $360 \div 4 = 90$ ml, olive oil $20 \div 4 = 5$ ml, yeast $8 \div 4 = 2$ g.

Flour: $2000 \div 150 = 13.3 \dots$, so enough for 13 bases.

Water: $1500 \div 90 = 16.6 \dots$, so enough for 16 bases.

Olive oil: $75 \div 5 = 15$ bases.

Yeast: $28 \div 2 = 14$ bases.

The flour runs out first, so she can make 13 pizza bases.

Answer: 13

Tip: Round **down:** 13.3 ... means there is only enough flour for 13 whole bases.

Marks: 1 mark for changing kg to g or litres to ml. 1 mark for one correct comparison. 1 mark for all four compared. 1 mark for 13.

4 (2 marks)

A recipe for 8 bowls of porridge uses 360 g of oats.

Work out how much oats is needed to make 14 bowls of porridge.

The recipe is for 8 bowls.

Oats for 1 bowl = $360 \div 8 = 45$ g

Oats for 14 bowls = $45 \times 14 = 630$ g

Answer: 630 g

Tip: The recipe is for 8 bowls, not 1. So do not just multiply 360 by 14.

Marks: 1 mark for $360 \div 8$. 1 mark for 630.

5 (2 marks)

8 cinema tickets cost £68

Work out the cost of 5 of these tickets.

Unitary method: find the cost of 1 ticket first.

1 ticket = $68 \div 8 = £8.50$

5 tickets = $5 \times 8.50 = £42.50$

Answer: £42.50

Marks: 1 mark for $68 \div 8$. 1 mark for £42.50.

6 (2 marks)

Tom is paid £93.60 for 8 hours of work.

How much is he paid for 13 hours of work at the same rate?

Pay for 1 hour = $93.60 \div 8 = £11.70$

Pay for 13 hours = $13 \times 11.70 = £152.10$

Answer: £152.10

Marks: 1 mark for $93.60 \div 8$. 1 mark for £152.10.

7 (4 marks)

Kerry drives 588 kilometres.

Her car uses 4.8 litres of petrol for every 100 kilometres.

Petrol costs £1.46 per litre.

- (a) Work out an estimate for the cost of the petrol Kerry uses on this journey.

Round each number to make it easy to work with.

$$588 \text{ km} \approx 600 \text{ km}$$

$$4.8 \text{ litres} \approx 5 \text{ litres}$$

$$£1.46 \approx £1.50$$

$$\text{Number of lots of 100 km} = 600 \div 100 = 6$$

$$\text{Petrol used} \approx 6 \times 5 = 30 \text{ litres}$$

$$\text{Cost} \approx 30 \times 1.50 = £45$$

Answer: £45

Marks: 1 mark for rounding the numbers. 1 mark for 30 litres (or 6×5). 1 mark for £45.

- (b) Is your answer to part (a) an underestimate or an overestimate?
Give a reason for your answer.

588 was rounded up to 600.

4.8 was rounded up to 5.

1.46 was rounded up to 1.50.

All the numbers are bigger than the real values, so the estimate is too big.

Answer: Overestimate: all the numbers were rounded up