



KS3.M-R4 Ratio Problems with Totals and Differences

AQA KS3.M-R4 · Calculators not allowed · about 50 minutes

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

1 Write the following ratios in their simplest form.

(a) Simplify the ratio 12 : 20 (1)

(b) Simplify the ratio 18 : 27 (1)

2 There are 24 pupils in a club. The ratio of boys to girls is 5 : 7. Work out the number of boys and the number of girls.

(a) How many boys are in the club? (1)

(b) How many girls are in the club? (1)

3 A recipe uses milk and water in the ratio 3 : 5. If you have 2 litres of milk, how much water do you need to keep the same ratio?

(single) Calculate the required volume of water in litres. (2)

4 The angles in a quadrilateral are in the ratio 2 : 3 : 4 : 5. Find the size of the largest angle.

(single) Work out the largest angle in degrees. (2)

- 5** Tom and Aisha share 84 pounds in the ratio 5 : 7. How much more does Aisha get than Tom?

(single) Find the difference between Aisha's share and Tom's share.

(3)

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- 6** A map scale shows 1 cm represents 6 km. On the map two towns are placed so the map distance between them is divided in the ratio 2 : 3 and the total map distance is 15 cm. What is the actual distance in km between the two towns?

(single) Calculate the actual distance in kilometres.

(2)

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- 7** Three numbers are in the ratio 1 : 4 : 5. The difference between the largest and the smallest is 36. Find the three numbers.

(single) Calculate the three numbers.

(2)

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- 8** A and B share a prize in the ratio 3 : 5. The difference between their amounts is 40 pounds. Work out A's share and B's share.

(single) Find A's share and B's share in pounds.

(3)

- 9** A school has a ratio of teachers to teaching assistants of 7 : 2. If there are 81 staff members in total, how many teachers and how many teaching assistants are there?

(single) Find the number of teachers and the number of teaching assistants.

(3)

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- 10** A mixture contains sugar and water in the ratio 2 : 9. After adding 3 kg of sugar, the ratio becomes 5 : 9. How much sugar was in the mixture to start with?

(single) Find the initial mass of sugar in kilograms.

(4)

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- 11** Two numbers are in the ratio 7 : 11. Their total is 162. Find the two numbers.

(single) Calculate the two numbers.

(4)

12 A class mixes red and blue paint in the ratio 4 : 7 to make purple. They need 33 litres of purple paint. How many litres of blue paint must they use? If they decide instead to add 2 litres more red paint but keep the blue the same, what will the new ratio of red to blue be?

(a) How many litres of blue paint are used? (3)

(b) If 2 litres more red are added but blue remains the same, what is the new ratio of red to blue? Give the ratio in its simplest whole-number form. (3)

13 Stretch question. A, B and C share an inheritance in the ratio 4 : 6 : 9. C then gives 70 to A and 10 to B. Now the three have equal amounts. Work out the original total inheritance.

(single) Find the original total inheritance in pounds. (5)

Mark scheme · KS3.M-R4 Ratio Problems with Totals and Differences

Question 1

- (a) **B1** 3 : 5 cao
- (a) Answer: **3 : 5**
- (b) **B1** 2 : 3 cao
- (b) Answer: **2 : 3**

Question 2

- (a) **B1** 10 cao
- (a) Answer: **10**
- (b) **B1** 14 cao
- (b) Answer: **14**

Question 3

- (single) **M1** method: one part = milk amount divided by 3 or equivalent
- (single) **A1** 10/3 or 3 1/3 litres cao
- (single) Answer: **10/3**

Question 4

- (single) **M1** method: total of angles 360 and one part = $360 / (2+3+4+5) = 360/14$
- (single) **A1** 900/7 degrees cao
- (single) Answer: **900/7**

Question 5

- (single) **M1** method: one part = $84 / (5+7) = 84/12 = 7$
- (single) **M1** method: compute each share: Tom = 5×7 , Aisha = 7×7
- (single) **A1** 14 cao
- (single) Answer: **14**

Question 6

- (single) **M1** method: total map length 15 cm corresponds to 15×6 km
- (single) **A1** 90 km cao
- (single) Answer: **90 km**

Question 7

- (single) **M1** method: difference in parts = $5 - 1 = 4$ so one part = $36 / 4 = 9$
- (single) **A1** 9, 36, 45 cao
- (single) Answer: **9, 36, 45**

Question 8

- (single) **M1** method: difference in parts = $5 - 3 = 2$ so one part = $40 / 2 = 20$
- (single) **M1** method: compute each share: A = 3×20 , B = 5×20
- (single) **A1** A = 60, B = 100 cao
- (single) Answer: **A = 60, B = 100**

Question 9

- (single) **M1** method: one part = $81 / (7+2) = 81/9 = 9$
- (single) **M1** method: compute each group: teachers = 7×9 , assistants = 2×9
- (single) **A1** 63 teachers and 18 teaching assistants cao
- (single) Answer: **63 teachers and 18 teaching assistants**

Question 10

- (single) **M1** method: let one part = x , initial sugar = $2x$, water = $9x$
- (single) **M1** method: after adding 3 kg sugar new sugar = $2x + 3$ and ratio $(2x+3) : 9x = 5 : 9$ leading to equation $9(2x+3) = 5(9x)$
- (single) **M1** method: solve equation $18x + 27 = 45x$ to get x
- (single) **A1** initial sugar = 2 kg cao
- (single) **Answer: 2**

Question 11

- (single) **M1** method: one part = $162 / (7+11) = 162/18 = 9$
- (single) **M1** method: compute each number: 7×9 and 11×9
- (single) **M1** method: show both numbers 63 and 99
- (single) **A1** 63 and 99 cao
- (single) **Answer: 63 and 99**

Question 12

- (a) **M1** method: one part = $33 / (4+7) = 33/11 = 3$
- (a) **M1** method: blue = 7×3
- (a) **A1** 21 litres cao
- (a) **Answer: 21**
- (b) **M1** method: initial red = $4 \times 3 = 12$, after adding 2 litres red = 14
- (b) **M1** method: new ratio $14 : 21$ then simplify by dividing by GCF 7
- (b) **A1** 2 : 3 cao
- (b) **Answer: 2 : 3**

Question 13

- (single) **M1** method: let one part = x so shares are $4x$, $6x$, $9x$
- (single) **M1** method: after transfers $A = 4x + 70$, $B = 6x + 10$, $C = 9x - 70 - 10 = 9x - 80$
- (single) **M1** method: set equal amounts $A = B$ leading to an equation in x
- (single) **M1** method: from $A = B$: $4x + 70 = 6x + 10$ gives $60 = 2x$ so $x = 30$
- (single) **A1** original total = $(4+6+9)x = 19 \times 30 = 570$ pounds cao
- (single) **Answer: 570**