

GCSE Maths: Multi-stage ratio problems with algebra (Higher): answers

GCSE Maths - Ratio and Proportion - Higher - Lesson 15.9

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch15-ratio-proportion/higher/multi-stage-ratio-problems-with-algebra/

Exercise 15I Multi-stage ratio problems Non-calculator

1 Solve each problem by forming an equation.

(a)

The ratio of red counters to blue counters is 3 : 4. Six more red counters are added and the ratio becomes 3 : 2. Find the original numbers of red and blue counters.

Answer: red counters 6, blue counters 8

(b)

The ratio of boys to girls is 5 : 7. Six more boys join and the ratio becomes 6 : 7. How many boys were there at first?

Answer: 30

(c)

The ratio of cats to dogs in a rescue centre is 7 : 4. Nine cats are rehomed and the ratio becomes 11 : 8. Find the original numbers of cats and dogs.

Answer: cats 42, dogs 24

(d)

Two numbers A and B are in the ratio 2 : 5. When 10 is added to each number the ratio becomes 1 : 2. Find A and B.

Answer: A 20, B 50

2 Money and marbles are passed between two people. Find the amount asked for.

(a)

Ali and Ben have marbles in the ratio 7 : 3. Ali gives 8 marbles to Ben, and now they have the ratio 1 : 1. How many marbles did Ali have at first?

Answer: 28

(b)

Ana and Bo have money in the ratio 4 : 5. Ana gives £3 to Bo and the ratio becomes 7 : 11. How much money do they have altogether?

Answer: £54

3 A shop has pens and pencils in the ratio 4 : 7. It sells 12 pencils and the ratio of pens to pencils is now 4 : 3. How many pencils were there at the start?

Answer: 21

4 Solve each equation.

(a) $(x + 4) : (x + 10) = 2 : 3$

Answer: 8

(b) $(3x + 1) : (2x - 1) = 5 : 3$

Answer: 8

(c) $(4x - 2) : (x + 7) = 2 : 1$

Answer: 8

(d) $(2x + 5) : (5x - 3) = 13 : 17$

Answer: 4

(e) $(3x - 1) : (x + 9) = 1 : 1$

Answer: 5

5 $x : y$ is given. Work out the second ratio in its simplest form.

(a) $x : y = 3 : 5$. Find $(2x + y) : (x + 3y)$

Answer: 11 : 18

(b) $x : y = 4 : 3$. Find $(x + y) : (x - y)$

Answer: 7 : 1

(c) $x : y = 2 : 5$. Find $(3x + 2y) : (x + y)$

Answer: 16 : 7

(d) $x : y = 2 : 3$. Find $(5x - y) : (x + 2y)$

Answer: 7 : 8

6 $a : b = 2 : 3$ and $b : c = 4 : 7$. Work out the ratio $a : c$ in its simplest form.

Answer: 8 : 21

7 The ages of Ali and Bea are in the ratio 3 : 5. In 6 years' time the ratio of their ages will be 5 : 7. Work out their ages now.

Answer: Ali 9 years, Bea 15 years

8 A rectangle has sides in the ratio 3 : 5. The shorter side is increased by 4 cm and the longer side is decreased by 2 cm. The new shape is a square. Find the lengths of the sides of the original rectangle.

Answer: shorter side 9 cm, longer side 15 cm

9 Container A holds 30 litres of squash and water in the ratio 1 : 4. Container B holds 20 litres of squash and water in the ratio 2 : 3. They are poured into one tank. Write the ratio squash : water in the tank in its simplest form.

Answer: 7 : 18

10 $a : b = 3 : 4$. Show that $(a + b) : (b - a) = 7 : 1$.

Answer: 7 : 1

11 Show that adding 5 to both parts of the ratio 2 : 3 can never give the ratio 2 : 3 again.

Answer: The equation has no solution

- 12** Marbles in a bag are red and blue in the ratio 3 : 5. Eight red marbles are removed and twelve blue marbles are added. The ratio of red to blue is now 1 : 3. How many marbles were in the bag at the start?

Answer: 72

- 13** In a club, the ratio of girls to boys is 3 : 2. Seven girls leave and then the number of girls equals the number of boys. How many girls and boys were in the club at first?

Answer: girls 21, boys 14

- 14** Two numbers A and B are in the ratio 3 : 4. When 12 is added to each number, the ratio becomes 5 : 6. Find A and B. Then show that the new ratio is closer to 1 : 1 than the old ratio.

Answer: A 18, B 24; $18/24 = 0.75$ and $30/36 = 0.8333...$