

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

GCSE Maths - Ratio and Proportion - Higher - Lesson 15.9

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Score: \_\_\_\_\_

14 questions. Write your answers in the spaces. Answers and step-by-step help are free at [websink.site/gcse/maths/ch15-ratio-proportion/higher/multi-stage-ratio-problems-with-algebra/](https://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: \_\_\_\_\_

(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: \_\_\_\_\_

(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: \_\_\_\_\_

(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: \_\_\_\_\_

### 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: \_\_\_\_\_

(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: \_\_\_\_\_

### 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: \_\_\_\_\_

### 4 Solve each equation.

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

Answer:

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

Answer:

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

Answer:

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

Answer:

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

Answer:

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:

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

Answer:

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

Answer:

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

Answer:

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

Answer:

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:

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:

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:

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

Answer:

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

Answer:

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:

- 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: .....

- 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: .....