

Ratio Problems

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 (1 mark)

A garden has only daffodils and tulips.

The ratio of the number of daffodils to the number of tulips is 4 : 7

What fraction of the flowers are tulips?

Total number of parts = $4 + 7 = 11$

7 of the 11 parts are tulips.

Answer: $\frac{7}{11}$

Tip: The bottom of the fraction is the total number of parts (11), so the answer is not $\frac{7}{4}$ or $\frac{4}{7}$.

2 (1 mark)

A jar contains only red marbles and yellow marbles.

$\frac{3}{5}$ of the marbles are yellow.

Write down the ratio of the number of red marbles to the number of yellow marbles.

$\frac{3}{5}$ are yellow, so $1 - \frac{3}{5} = \frac{2}{5}$ are red.

red : yellow = $\frac{2}{5} : \frac{3}{5}$

Multiply both parts by 5: 2 : 3

Answer: 2 : 3

Tip: Red comes first in the ratio. Common wrong answers are 3:5, 3:2 and 2:5.

3 (3 marks)

A school orchestra has only string players, wind players and percussion players.
The numbers of string players, wind players and percussion players are in the ratio
8 : 5 : 2

- (a) What fraction of the players are wind players?

Total number of parts = $8 + 5 + 2 = 15$

5 of the 15 parts are wind players.

$$\frac{5}{15} = \frac{1}{3}$$

Answer: $\frac{5}{15}$ or $\frac{1}{3}$

- (b) There are 18 more string players than percussion players.
Work out the total number of players in the orchestra.

String has 8 parts and percussion has 2 parts.

String has $8 - 2 = 6$ more parts than percussion.

6 parts = 18 players

One part = $18 \div 6 = 3$

Total = 15 parts = $15 \times 3 = 45$

Answer: 45

Tip: The 18 matches the **difference** in parts ($8 - 2 = 6$), not the total number of parts.

Marks: 1 mark for one part = 3. 1 mark for 45.

4 (4 marks)

A garden centre sells only roses and lilies.
The ratio of the number of roses to the number of lilies is 7 : 3
30% of the roses are white.
60% of the lilies are white.

What percentage of all the flowers are white?

Imagine the garden centre has 100 flowers.

roses : lilies = 7:3, so there are 10 parts and each part is $100 \div 10 = 10$ flowers.

Roses: $7 \times 10 = 70$

Lilies: $3 \times 10 = 30$

White roses: 30% of 70 = 21

White lilies: 60% of 30 = 18

White flowers altogether: $21 + 18 = 39$ out of 100

So the answer is 39%.

Answer: 39%

Tip: You cannot just add or average the percentages (30% and 60%). Find how many roses and lilies there are first.

Marks: 1 mark for 70 roses and 30 lilies (or 70% and 30%). 1 mark for 21. 1 mark for 18. 1 mark for 39%.

5 (2 marks)

$p:q = 3:4$ and $q:r = 10:7$

Find $p:q:r$

Give your answer in its simplest form.

q is 4 in the first ratio and 10 in the second.

Make q the same in both: the LCM of 4 and 10 is 20.

$p:q = 3:4 = 15:20$ (multiply by 5)

$q:r = 10:7 = 20:14$ (multiply by 2)

So $p:q:r = 15:20:14$

Answer: 15 : 20 : 14

Tip: You cannot just write 3:4:7 or 3:10:7. First make the q parts the same.

Marks: 1 mark for 15:20 or 20:14. 1 mark for 15:20:14.

6 (4 marks)

Nia, Tomas and Kavi share £400 in the ratio 2 : 3 : 5

Kavi then gives some of his money to Nia.

Nia and Kavi now have the same amount of money.

Work out the ratio of the amounts Nia, Tomas and Kavi have now.

Give your answer in its simplest form.

Total number of parts = $2 + 3 + 5 = 10$

One part = $400 \div 10 = £40$

Nia = $2 \times 40 = £80$, Tomas = $3 \times 40 = £120$, Kavi = $5 \times 40 = £200$

Kavi gives some money to Nia, so together they still have $80 + 200 = £280$

They now have the same amount: $280 \div 2 = £140$ each

Tomas still has £120

Nia : Tomas : Kavi = 140:120:140

Divide all parts by 20: 7:6:7

Answer: 7 : 6 : 7

Tip: Money moves from Kavi to Nia, so the total of their two amounts does not change.

Tomas's amount does not change at all.

Marks: 1 mark for £40 for one part. 1 mark for £80 and £200 (or £280). 1 mark for £140. 1 mark for 7:6:7.

7 (3 marks)

In a bowl, the ratio of apples to pears is 3 : 5

There are 12 apples in the bowl.

Sam puts 4 more apples in the bowl.

Find the new ratio of apples to pears.

Give your answer in its simplest form.

Apples are 3 parts, and 3 parts = 12

One part = $12 \div 3 = 4$

Pears = $5 \times 4 = 20$

Apples now = $12 + 4 = 16$

apples : pears = 16:20

Divide both parts by 4: 4:5

Answer: 4 : 5

Tip: Only the apples change. The number of pears stays at 20.

Marks: 1 mark for 20 pears. 1 mark for 16:20. 1 mark for 4:5.

8 (3 marks)

The ratio of Tia's age to Ken's age is 3 : 5

In 6 years' time, the ratio of Tia's age to Ken's age will be 3 : 4

How old is Ken now?

Try pairs of ages in the ratio 3:5, then add 6 to each.

3 and 5 → 9 and 11: 9:11 is not 3:4

6 and 10 → 12 and 16: 12:16 = 3:4 ✓

So Tia is 6 and Ken is 10.

Answer: 10

Marks: 1 mark for a trial with ages in the ratio 3:5. 1 mark for adding 6 to both ages and testing the ratio. 1 mark for 10.
