

Writing and Simplifying Ratios

Solutions

For AQA GCSE Mathematics (8300) • 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)

Which ratio is equivalent to $4 : 7$?

Circle your answer.

Options: $8 : 11$, $12 : 21$, $20 : 49$, $7 : 4$

Equivalent ratios: multiply (or divide) both parts by the same number.

Multiply both parts by 3:

$$4 \times 3 = 12 \text{ and } 7 \times 3 = 21$$

Answer: $12 : 21$

Tip: Adding the same number to both parts (e.g. $4 + 4 = 8$ and $7 + 4 = 11$) does **not** give an equivalent ratio. You must multiply or divide.

2 (2 marks)

(a) Simplify fully $28 : 42$

The highest common factor (HCF) of 28 and 42 is 14.

Divide both parts by 14:

$$28 \div 14 = 2 \text{ and } 42 \div 14 = 3$$

Answer: $2 : 3$

(b) Simplify fully $16 : 40 : 24$

The HCF of 16, 40 and 24 is 8.

Divide all three parts by 8:

$$16 \div 8 = 2, \quad 40 \div 8 = 5, \quad 24 \div 8 = 3$$

Answer: 2 : 5 : 3

Tip: “Fully” means you cannot divide any further. 8:20:12 is only partly simplified.

3 (2 marks)

(a) Write the ratio 6 : 2 in the form $n : 1$

To make the second part 1, divide both parts by 2.

$$6 \div 2 = 3 \quad \text{and} \quad 2 \div 2 = 1$$

Answer: 3 : 1

(b) Write the ratio 7 : 4 in the form $n : 1$

To make the second part 1, divide both parts by 4.

$$7 \div 4 = 1.75 \quad \text{and} \quad 4 \div 4 = 1$$

Answer: 1.75 : 1

Tip: In the form $n : 1$, the number n can be a decimal. Always divide both parts by the second number.

4 (1 mark)

Write the ratio 2 : 5 in the form $1 : n$

To make the first part 1, divide both parts by 2.

$$2 \div 2 = 1 \quad \text{and} \quad 5 \div 2 = 2.5$$

Answer: 1 : 2.5

5 (2 marks)

Write the ratio 250 g : 2 kg in its simplest form.

Both parts must be in the same units.

$$2 \text{ kg} = 2000 \text{ g}$$

So the ratio is 250:2000

Divide both parts by 250:

$$1:8$$

Answer: 1 : 8

Marks: 1 mark for 250:2000. 1 mark for 1:8.

6 (1 mark)

Every seat on a bus is either taken or empty.

Three eighths of the seats are empty.

Work out the ratio taken seats : empty seats

Circle your answer.

Options: 3 : 5, 5 : 3, 3 : 8, 5 : 8

Three eighths are empty, so imagine 8 seats.

3 are empty and $8 - 3 = 5$ are taken.

taken : empty = 5:3

Answer: 5 : 3

Tip: 3:8 and 5:8 compare with the **total**. The ratio compares taken seats with empty seats. Also keep the order the question asks for.

7 (2 marks)

Tomasz has 56 songs on a playlist.

21 are pop songs, 14 are rock songs and the rest are dance songs.

Work out the ratio pop : rock : dance

Give your answer in its simplest form.

$$\text{Dance songs} = 56 - 21 - 14 = 21$$

$$\text{pop : rock : dance} = 21:14:21$$

Divide all three parts by 7:

$$3:2:3$$

Answer: 3 : 2 : 3

Tip: Keep the parts in the order the question asks for, and remember to simplify.

Marks: 1 mark for 21 dance songs. 1 mark for 3:2:3.

8 (3 marks)

A cinema sells adult tickets and child tickets.

On Saturday it sells 240 tickets.

Five twelfths of Saturday's tickets are child tickets.

On Sunday it sells 160 tickets.

60 of Sunday's tickets are child tickets.

Work out the ratio adult tickets : child tickets
for the two days altogether.

Give your answer in its simplest form.

$$\text{Saturday child tickets} = \frac{5}{12} \times 240 = 100$$

$$\text{Saturday adult tickets} = 240 - 100 = 140$$

$$\text{Sunday adult tickets} = 160 - 60 = 100$$

$$\text{Adult tickets altogether} = 140 + 100 = 240$$

$$\text{Child tickets altogether} = 100 + 60 = 160$$

$$\text{adult : child} = 240:160$$

Divide both parts by 80: 3:2

Answer: 3 : 2

Tip: Put the two days together before you simplify. Check that your totals add up to $240 + 160 = 400$ tickets.

Marks: 1 mark for 100 (Saturday child tickets). 1 mark for 240:160. 1 mark for 3:2.

9 (1 mark)

Which ratio is **not** equivalent to 5 : 3 ?

Tick **one** box.

5:3, dividing both parts by 5: 1:0.6 ✓

5:3, multiplying both parts by 2: 10:6 ✓

5:3, dividing both parts by 2: 2.5:1.5 ✓

3:5 has the parts the other way round, so it is not equivalent.

Answer: 3 : 5

Tip: A ratio with decimals, like 2.5:1.5, can still be equivalent. Order matters: 3:5 is not the same as 5:3.

10 (2 marks)

A shop sells rice in small bags and large bags.

A small bag costs £1.35

A large bag costs £3.15

Work out the ratio price of small bag : price of large bag

Give your answer in its simplest form.

small : large = 1.35:3.15

Change to pence to remove the decimals: 135:315

The HCF of 135 and 315 is 45.

Divide both parts by 45: 3:7

Answer: 3 : 7

Tip: Remove the decimals first by changing pounds to pence, then simplify.

Marks: 1 mark for 1.35:3.15 or 135:315. 1 mark for 3:7.

11 (2 marks)

Write the ratio 45 minutes : 2 hours in its simplest form.

Change to the same units: 2 hours = 120 minutes.

So the ratio is 45:120

Divide both parts by 15:

3:8

Answer: 3 : 8

Marks: 1 mark for 45:120. 1 mark for 3:8.

12 (2 marks)

Jay says,

‘The ratio 40 cm : 2 m simplifies to 20 : 1’

Is Jay correct?

Tick a box.

Show working to support your answer.

The units must be the same.

2 m = 200 cm

So the ratio is 40:200

Divide both parts by 40: 1:5

1:5 is not 20:1, so Jay is wrong.

Answer: No, it simplifies to 1 : 5

Tip: Jay divided 40 by 2 without changing 2 m into cm. Always use the same units before simplifying.

Marks: 1 mark for 40:200 (or 0.4:2). 1 mark for No with 1:5.
