Ratio and proportion

Worked solutions

KS3 Maths topic practice

This topic online

1 a. A class has 30 pupils. 13 of the pupils are boys. Write down the ratio of boys to girls.

b. Write 18 : 24 in its simplest form.

c. Write 2.5 : 4 in its simplest form.

d. Write 40 cm : 2 m in its simplest form.

(4 marks)

a) girls

$30 - 13 = 17$

$\boxed{13 : 17}$

b) divide both by 6

$18 : 24 = 3 : 4$

$\boxed{3 : 4}$

c) multiply both by 2

$2.5 : 4 = 5 : 8$

$\boxed{5 : 8}$

d) same units first: 2 m = 200 cm

$40 : 200 = 1 : 5$

$\boxed{1 : 5}$

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2 a. Aisha and Ben share £45 in the ratio 4 : 5. Work out how much each of them gets.

b. Chloe, Dev and Erin share 72 sweets in the ratio 2 : 3 : 7. Work out how many sweets each of them gets.

(4 marks)

a) total parts

4 + 5 = 9

45 ÷ 9 = 5

Aisha = 4 × 5 = 20

Ben = 5 × 5 = 25

Aisha £20, Ben £25

b) total parts

2 + 3 + 7 = 12

72 ÷ 12 = 6

Chloe = 2 × 6 = 12

Dev = 3 × 6 = 18

Erin = 7 × 6 = 42

12, 18 and 42 sweets

3 A model car is made using a scale of 1 : 18.

The real car is 4.5 m long.

Work out the length of the model car. Give your answer in centimetres.

(2 marks)

Change the real length to centimetres

4.5 m = 450 cm

Model length = 450 ÷ 18 = 25 cm

25 cm

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4 a. At an animal rescue centre the ratio of cats to dogs is 5 : 3. There are 35 cats. Work out the number of dogs.

b. The ratio of the number of stickers Ollie has to the number Priya has is 7 : 4. Ollie has 27 more stickers than Priya. Work out how many stickers Priya has.

(4 marks)

a) cats are 5 parts

5 parts = 35

1 part = 7

dogs = 3 x 7 = 21

21 dogs

b) difference in parts

7 - 4 = 3 parts

3 parts = 27

1 part = 9

Priya = 4 x 9 = 36

36 stickers

5 The ratio of a distance in miles to the same distance in kilometres is 5 : 8.

a. A cycle race is 40 miles long. Work out the length of the race in kilometres.

b. Sienna runs 12 km. Work out how far she runs in miles.

(3 marks)

a) miles : km = 5 : 8

40 ÷ 5 = 8

8 x 8 = 64

64 km

b)

12 ÷ 8 = 1.5

5 x 1.5 = 7.5

7.5 miles

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6 Here is a recipe for a fruit smoothie for 4 people.

Strawberries	300 g
Bananas	2
Yoghurt	500 ml

Kofi makes the smoothie for 6 people. Work out how much of each ingredient he needs. (3 marks)

for 1 person: divide by 4

300 ÷ 4 = 75 g

2 ÷ 4 = 0.5

500 ÷ 4 = 125 ml

for 6 people: multiply by 6

6 x 75 = 450 g

6 x 0.5 = 3

6 x 125 = 750 ml

450 g, 3 bananas, 750 ml

7 A shop sells two sizes of box of teabags.

Small box: 80 teabags for £2.40

Large box: 240 teabags for £6.60

Which box is the better value for money? Show your working. (3 marks)

Compare the cost of the same quantity in each box. Dividing price by the number of teabags gives the cost of one teabag, so the lower unit price is better value

Small box

240p ÷ 80 = 3p per teabag

Large box

660p ÷ 240 = 2.75p per teabag

2.75p is less than 3p, so the large box is the better value

8 A map of a national park has a scale of 1 : 25 000.

On the map, the distance from a car park to a waterfall is 9.6 cm.

Work out the real distance from the car park to the waterfall. Give your answer in kilometres. (3 marks)

Real distance = 9.6 x 25 000 = 240 000 cm

240 000 cm = 2400 m

2400 m = 2.4 km

2.4 km

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9 A photograph is 15 cm long and 10 cm wide.

The photograph is enlarged to make a print that is mathematically similar to it.

The print is 24 cm long.

a. Work out the scale factor of the enlargement.

b. Work out the width of the print.

(3 marks)

a) Scale factor = $24 \div 15 = 1.6$

b) Width of the print = $10 \times 1.6 = 16$ cm

10 Ella, Fred and Grace share some money in the ratio 3 : 5 : 8.

Grace gets £35 more than Ella.

Work out the total amount of money they share.

(4 marks)

The difference between Grace's parts and Ella's parts is 8 - 3 = 5 parts

5 parts = £35, so 1 part = £7

Total parts = 3 + 5 + 8 = 16

Total = 16 × £7 = £112

£112

11 a. In a bag of counters, the ratio of red to blue is 2 : 3 and the ratio of blue to green is 4 : 5. Write down the ratio red : blue : green in its simplest form.

b. In bag A the ratio of red counters to blue counters is 3 : 5. In bag B the ratio of red counters to blue counters is 2 : 3. Which bag has the greater proportion of red counters? You must show your working.

(4 marks)

a) make blue the same: 12

red : blue = 2 : 3 = 8 : 12

blue : green = 4 : 5 = 12 : 15

8 : 12 : 15

b) fraction of red in each bag

A: $\frac{3}{8} = 0.375$

B: $\frac{2}{5} = 0.4$

Bag B, as 0.4 > 0.375

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12 It takes 8 bricklayers 15 days to build a wall.

a. Work out how many days it would take 12 bricklayers to build the same wall.

b. State one assumption you have made.

(3 marks)

a) Total work = 8 × 15 = 120 worker-days

Time for 12 bricklayers = 120 ÷ 12 = 10 days

b) Assumption: every bricklayer works at the same steady rate

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