Sparx Maths

Crossover Workbook 3

Ratio & Proportion

3:2

In this series of six workbooks, there are a range of questions from key crossover topics that appear in both the GCSE Foundation and Higher tier papers.

Each workbook will focus on a particular strand of maths.

Workbook 3 will cover **Ratio & Proportion** topics.

The contents of Workbooks 1-6 are shown below.

1 Number

- Fractions
- Factors, multiples and primes
- Percentage change
- Standard form
- Error intervals

2 Algebra

- Solving linear equations
- Linear inequalities
- Index laws
- Linear simultaneous equations
- Linear graphs and coordinates
- Quadratic graphs and equations

3 Ratio & Proportion

- Ratio
- Speed
- Density and pressure
- Proportion

4 Geometry

- Area
- Volume
- Angles
- Pythagoras' theorem
- Trigonometry
- Transformations

5 Probability

- Calculating probabilities
- Expected outcomes
- Tree diagrams
- Set notation

6 Statistics

- Averages
- Averages with grouped data
- Sampling
- Scatter graphs
- Frequency polygons

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This workbook is split into two sections:
- **Introduce** questions are fluency questions on each topic to practise the key concepts.
- **Deepen** mixed topic questions are more challenging reasoning and problem solving questions.

Use the list below to keep track of your progress in each topic. If you use Sparx Maths you can find even more questions by searching for the Sparx topic codes in Independent Learning.

	Sparx topic codes	Teacher comment
Ratio	U687 U753 U176 U577 U921 U865	
Speed	U151	
Density and pressure	U910 U527	
Proportion	U721 U357 U610	

Calculators may be used in all questions

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Q1 The side lengths of a triangle are in the ratio $2:3:4$
The **longest** side has a length of 28 cm.

What is the **perimeter** of the triangle?

Answer: .... cm

Q2 Nihal, Rosie and Isaac sold books at a car boot sale.
The ratio of the numbers of books that they each sold is $3:5:1$
Rosie sold 32 more books than Isaac.

How many books did Nihal, Rosie and Isaac sell in total?

Answer: ....

Q3 15% of the fish in a pond are carp.
$\dfrac{3}{10}$ of the fish are trout and the rest of the fish are minnows.

Write the ratio of carp to trout to minnows in this pond in its simplest form.

Answer: ....

Q4 Raees has 80 coins in his piggy bank, all of which are £1 or 50p coins.
The ratio of £1 to 50p coins is 3:2

How much money does he have in total?

Answer: £ ....

Q5 The ratio of cows to sheep on a farm is 5:6, and there are 30 sheep.
Some more sheep arrive at the farm and the ratio of cows to sheep becomes 1:2

Work out how many new sheep arrived at the farm.

Answer: ....

Q6 A football club has three types of members: adults, juniors and children.
The ratio of juniors to children is 1:3
The ratio of children to adults is 5:3

What is the ratio of juniors to adults in its simplest form?

Answer: ....

Q7 The table below shows the number of pike and trout in three different lakes.

	Pike	Trout
Lake A	15	39
Lake B	9	33
Lake C	30	6

a) For each lake, write the ratio of pike to trout in the form $1:n$
Round your values of n to 1 decimal place.

Answer: Lake A .... Lake B .... Lake C ....

b) Put the lakes in ascending order based on the proportion of fish that are trout.

Answer: ....

Q8 A bag contains only green, purple and red tokens.
The ratio of green tokens to red tokens is $7:3$
The ratio of purple tokens to red tokens is $5:2$

What fraction of the tokens are purple?
Give your answer in its simplest form.

Answer: ....

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Q1 Olivia completed a 74 km cycling race at an average speed of 11.84 km/h.

How long did she take to complete the race?
Give your answer in hours and minutes.

Answer: ....

Q2 Harvey ran 1 km in 4 minutes and 22 seconds.

What was his average speed in metres per second?
Give your answer to 1 decimal place.

Answer: ....m/s

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Q3 Mohammed drove from Swansea to Chichester at an average speed of 60 mph for 3 hours and 30 minutes.

He then drove from Chichester to Dover at an average speed of 55 mph for 2 hours.

Work out how many miles Mohammed travelled in total.

Answer: .... miles

Q4 A car is travelling at 48.6 km/h.
Convert this speed into m/s.

Answer: .... m/s

Q1 2.5 m^3 of marble has a mass of 6775 kg.

a) Calculate the density of marble in kg/m^3.

Answer: .... kg/m^3

b) Find the mass of 1.9 m^3 of marble in kg.

Answer: .... kg

Q2 $$\text{pressure} = \frac{\text{force}}{\text{area}}$$

The pressure that a box exerts on a shelf is 200 newtons/m^2.
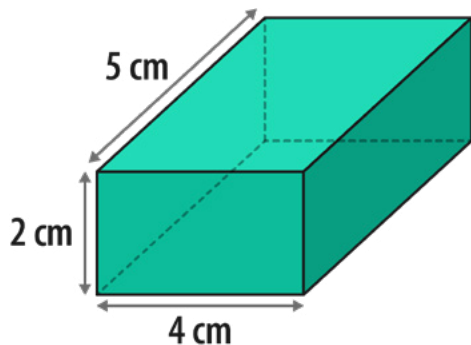The force that the box exerts on the shelf is 140 newtons.

Work out the area of the base of the box.

Answer: .... m^2

Q3 The cuboid below is made of silver and has a mass of 416 g.

Calculate its density, in g/cm^3.

Not drawn accurately

Answer: .... g/cm^3

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Q1 60 identical machines in a factory pack a total of 150 crates of limes per day.

How many crates of limes would 70 of these machines pack per day?

Answer: ....

Q2 It takes 20 minutes for 4 people to paint a wall.

a) How long would it take for 8 people to paint the same wall?

Answer: ....minutes

b) State one assumption you made in working out your answer to part a).

Answer: ....

....

....

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Q3 Lily-Rose and Sedra converted some pounds (£) into US dollars ($) using the same exchange rate.

Lily-Rose converted £58 and received $73.08

Sedra converted £84
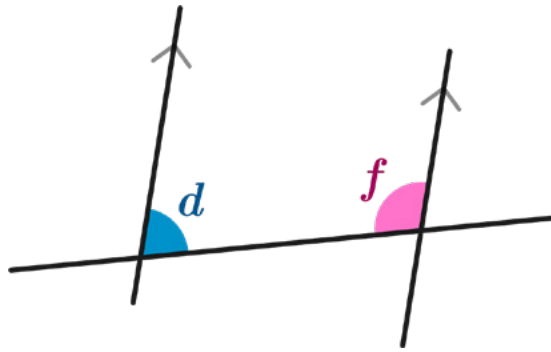
How much did Sedra receive in US dollars?

Answer: $ ....

Q4 Use the conversion rates below to find out how much $1 is worth in euros (€).

£1 = $1.36

£1 = €1.15

Answer: € ....

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Q1

The sizes of angles d and f below are in the ratio 2:3

What is the size of angle d?

Answer: $d =$ .... $^\circ$

Q2

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

A cube-shaped box has side lengths of 1.5 m. The box exerts a force of 63 newtons on the ground.

Calculate the pressure, in newtons/m^2, that the box exerts on the ground.

Answer: .... newtons/m^2

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Q3

The exchange rates between pounds, Singapore dollars and Hong Kong dollars are shown below.

1 Singapore dollar = £0.58

£1 = 10.50 Hong Kong dollars

Tsion bought a watch in Singapore for 72 Singapore dollars.
Ibrahim bought the same model of watch in Hong Kong for 399 Hong Kong dollars.

What is the difference between the amounts that Tsion and Ibrahim paid for their watches?

Give your answer in pounds.

Answer: £ ....

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Q4　　Henry is taking part in a race.
For the first 160 m he runs at 4 m/s.
The remaining 300 m of the race takes him 120 seconds.

What is Henry's average speed, in m/s, over the whole race?
Give your answer to 1 decimal place.

Answer: .... m/s

Q5　　Write the ratio $2\frac{1}{3} : 1\frac{1}{2}$ in its simplest form.

Answer: ....

Q6   The prices of petrol in a British and an American petrol station are shown below.

British petrol station	American petrol station
£19.20 for 12 litres of petrol	$18 for 20 litres of petrol

The conversion rate is $1 = £0.80

What is the difference between the price of 1 litre of petrol in the British and American petrol station?

Give your answer in pounds.

Answer: £ ....

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Q7   Some bronze is made by mixing 360 g of copper and 77g of tin.

The density of copper is 9 g/cm^3 and the density of tin is 7 g/cm^3.

Calculate the density of the bronze.
Give your answer to 2 decimal places.

Answer: .... g/cm^3

Q8   A fruit bowl contains a mixture of bananas, lemons and apples.
The ratio of bananas to lemons is $4 : 5$

Sophie picks a piece of fruit at random from the fruit bowl.
The probability that it is a **banana** is $\dfrac{1}{3}$

What is the probability that it is an **apple**?

Answer: ....

Q9 Anna is going on a 200 mile trip.

She leaves at 10am and travels for 4 hours at an average speed of 36 mph.

On average, how fast would Anna need to travel for the remainder of her journey in order to arrive at 4pm?

Answer: .... mph

Q10 The ratio of metal objects to glass objects in a recycling bin is 2 : 9

The glass objects are either bottles or jars, and the ratio of glass bottles to glass jars is 1 : 2

There are 24 glass jars in the recycling bin.

Work out how many metal objects are in the recycling bin.

Answer: ....

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Q11

Hudson wants to have an extension built on his house.

He is told it will take 9 builders 24 days to build the extension.

How many builders would Hudson need to hire if he wanted his extension built in 18 days?

Answer: ....

Q12

Liam fills some jars with chutney that he has made.

Each jar weighs 150 g when it is empty and can contain 300 cm^3 of chutney.

8 full jars of chutney weigh a total of 4.56 kg.

Calculate the density of the chutney, in g/cm^3.

Answer: .... g/cm^3

Q13   Macy makes a fruit purée by mixing blackcurrants and raspberries in the ratio 2 : 5

She then makes a milkshake by mixing milk and the fruit purée in the ratio 3 : 1

What fraction of her drink is made from blackcurrants?
Give your answer in its simplest form.

Answer: ....

Q14   In a bag, the ratio of pink counters to white counters was 3 : 10

9 more white counters were added to the bag, and the ratio of pink to white counters became 3 : 11

Work out how many pink counters are in the bag.

Answer: ....

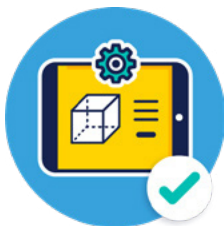1 hour of Sparx Maths a week significantly improves student grades

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