Worksheet - Ratio, proportion and percentages

Year: Year 6 · 20

Show your working.

Question 1

Question 1 – Writing and simplifying ratios *(Section A · Skills practice)*

A bag contains 3 red counters and 5 blue counters. In a class there are 12 boys and 18 girls.

a. Write the ratio of red counters to blue counters.
b. Write the ratio of blue counters to red counters. Why is it different from your answer to part (a)?
c. What fraction of the counters are red?
d. Write the ratio of boys to girls in its simplest form.
e. Write 40 cm to 1 m as a ratio in its simplest form.

Question 2

Question 2 – Simplifying more ratios *(Section A · Skills practice)*

Simplify each ratio by dividing every part by the highest common factor.

a. 45 : 60
b. 24 : 36 : 60
c. 6 : 9
d. £1.20 : £2.80 (change to pence first)
e. 2 kg : 500 g

Question 3

Question 3 – Finding missing values *(Section A · Skills practice)*

Work out the missing numbers in these questions about proportion.

a. 3 : 7 = 12 : ?
b. A recipe uses flour and sugar in the ratio 3 : 1. How much sugar goes with 12 g of flour?
c. 3 pens cost £2.40. How much do 12 pens cost?
d. 5 : 8 = ? : 40

Question 4

Question 4 – Sharing in a ratio *(Section A · Skills practice)*

Share each amount in the ratio given. Check that the shares add up to the total.

a. Share £40 in the ratio 3 : 5.
b. Share 72 sweets in the ratio 2 : 3 : 4.
c. Share 90 kg in the ratio 1 : 4.
d. Two friends share 56 stickers in the ratio 3 : 4. How many more stickers does the second friend get?

Question 5

Question 5 – Scale factors and maps *(Section A · Skills practice)*

Use scale factors to answer these questions.

a. A rectangle is 3 cm by 5 cm. It is enlarged by a scale factor of 4. What are the new lengths?
b. A triangle has sides 4 cm, 6 cm and 8 cm. It is enlarged so that the 4 cm side becomes 12 cm. Find the other two sides.
c. On a map, 1 cm stands for 5 km. A road is 6.5 cm long on the map. How long is the real road?
d. A river is 40 km long. How long is it on the map?

Question 6

Question 6 – Comparing with percentages *(Section A · Skills practice)*

Percentages help us to compare fairly. Work out each answer.

a. Find 20% of 350.
b. Find 15% of £48.
c. In Class A, 18 out of 24 children passed a swimming test. In Class B, 21 out of 30 passed. Which class has the higher percentage?
d. Increase £80 by 25%.

Question 7

Question 7 – The strawberry smoothie *(Section B · Real-life practice)*

Priya makes smoothies using strawberries and bananas in the ratio 3 : 2 by mass.

a. She uses 450 g of strawberries. What mass of bananas does she use?
b. What is the total mass of fruit?
c. What fraction of the fruit mixture is bananas?
d. She wants to make a bigger batch with 600 g of bananas. What mass of strawberries does she need, and what is the total mass?

Question 8

Question 8 – Mixing the paint *(Section B · Real-life practice)*

An art teacher mixes blue and white paint in the ratio 2 : 3 to make a pale blue. Tins of paint are all the same size.

a. How many tins of blue paint are needed with 15 tins of white?
b. How many tins of paint are used altogether?
c. She has 20 tins of blue paint. How many tins of white does she need, and how many tins of pale blue paint does she make in total?
d. What percentage of the mixture is blue paint?

Question 9

Question 9 – The class ratios *(Section B · Real-life practice)*

There are 28 pupils in Class 6C. The ratio of boys to girls is 3 : 4.

a. How many boys and how many girls are in the class?
b. Seven more girls join the class. How many pupils are there now?
c. What is the new ratio of boys to girls? Simplify it if you can.
d. What percentage of the original class are girls? Give the answer to the nearest whole number.

Question 10

Question 10 – The walking map *(Section B · Real-life practice)*

A map of a national park has a scale of 1 cm to 5 km. A group of friends plans a hike.

Route	Length on the map
Lake path	6.5 cm
River path	4.2 cm
Hill path	2.8 cm

a. Work out the real length of each route.
b. Which route is the longest in real life, and by how much is it longer than the shortest?
c. The friends walk 3.5 km each hour. How long does the Lake path take?
d. On the map, another route is 1.5 cm shorter than the River path. What is its real length?

Question 11

Question 11 – Sharing the pocket money *(Section B · Real-life practice)*

Sam and Tia earn £40 for washing a neighbour\'s car. They share the money in the

ratio 3 : 5, because Tia worked for more hours.

a. How much does each of them get?
b. How many hours did they work if Sam worked for 3 hours?
c. They find another £16 and decide to share it in the same ratio. How much does each of them get this time?
d. How much has each of them got altogether?

Question 12

Question 12 – Bags of sweets *(Section B · Real-life practice)*

A jar has 72 sweets. The red, green and yellow sweets are in the ratio 2 : 3 : 4.

a. How many sweets of each colour are in the jar?
b. Isla eats all the red sweets. How many sweets are left in the jar?
c. What is the new ratio of green sweets to yellow sweets? Simplify it.
d. What percentage of the sweets that are left are green?

Question 13

Question 13 – The model car *(Section B · Real-life practice)*

A model car is made to a scale of 1 : 24. This means that every length on the model is $\frac{1}{24}$ of the real length.

a. The real car is 4.8 m long. Find the length of the model in centimetres.
b. The wheel of the model has a diameter of 3 cm. What is the diameter of a real wheel?
c. The real car is 1.68 m high. How high is the model, in centimetres?
d. The model is 5 cm wide. How wide is the real car in metres?

Question 14

Question 14 – Scaling a recipe *(Section B · Real-life practice)*

This recipe for rice pudding serves 4 people. The school cook needs to scale it for 10 people.

Ingredient	For 4 people
Rice	200 g
Milk	800 ml
Sugar	60 g
Butter	20 g

a. What is the multiplier for scaling from 4 people to 10 people?
b. Work out the amount of each ingredient needed for 10 people.

c. The cook has 2 litres of milk. How many people can she cook for?
d. What is the ratio of rice to sugar in the recipe? Simplify it.

Question 15

Question 15 – The football league *(Section C · Problem solving)*

Three football teams have played some matches this season. The table shows how many matches each team has won.

Team	Matches played	Matches won
Rovers	24	18
United	30	21
Town	20	14
City	25	20

a. Write the number of matches won as a percentage of the matches played for each team.
b. Which team has the best winning record?
c. Which two teams have the same winning record? Explain.
d. Town and Rovers both play 5 more matches and win all 5. Work out the new percentage for each team.
e. Rovers say "we have won more matches than Town, so we are better". Is this the best way to compare? Explain.

Question 16

Question 16 – Concrete for the patio *(Section C · Problem solving)*

A builder makes concrete by mixing cement, sand and gravel in the ratio 1 : 2 : 3 by mass. She needs 1.8 tonnes of concrete for a patio.

a. How many parts are there altogether in the mixture?
b. Work out the mass of cement, the mass of sand and the mass of gravel needed.
c. Cement is sold in 25 kg bags. How many bags are needed?
d. What percentage of the mixture is sand? Give the answer to the nearest whole number.
e. The builder only has 200 kg of sand. What is the largest mass of concrete she can make with that sand?

Question 17

Question 17 – Enlarging the flower bed *(Section C · Problem solving)*

A garden has a rectangular flower bed that measures 3 m by 5 m. The gardener makes a similar, bigger bed by using a scale factor of 2.5.

a. Work out the length and the width of the bigger bed.
b. Work out the perimeter of each bed. How do the perimeters compare?
c. Work out the area of each bed. How many times bigger is the area of the larger bed?
d. Fencing costs £4.80 per metre. How much does it cost to fence the larger bed?
e. The gardener has £150 for fencing. How many metres can she buy?

Question 18

Question 18 – The cost of the bike *(Section C · Problem solving)*

A shop sells a bike for £240. In a sale, there is 15% off. A customer also has a loyalty card that gives a further 5% off the sale price.

a. Work out the sale price after 15% off.
b. Work out the price after the loyalty card discount.
c. What is the total saving? What percentage of £240 is this? Give your answer to the nearest whole number.
d. Another shop sells the same bike for £250 with 20% off. Which shop is cheaper, and by how much?
e. The first shop adds a lock that costs £18 to the price paid. Work out the total cost with the lock.

Question 19

Question 19 – The best value pens *(Section C · Problem solving)*

A stationery shop sells pens in different packs. Five pens cost £3.50. A pack of 12 pens costs £7.80 and a pack of 20 pens costs £12.

a. How much does 1 pen cost in the pack of 5?
b. How much do 8 pens cost if you buy them at the price for the pack of 5?
c. Work out the cost of 1 pen in the pack of 12 and in the pack of 20.
d. Which pack is the best value for money? Explain.
e. A teacher needs 60 pens. Find the cheapest way to buy them using only packs of the same size.

Question 20

Question 20 – Challenge: the beads *(Section D · Challenge)*

A bag contains red and blue beads in the ratio 2 : 3. There are 10 more blue beads than red beads.

a. How many beads are there altogether?
b. Some more red beads are added so that the ratio becomes 1 : 1. How many red beads are added?
c. After that, the beads are shared in the ratio 3 : 2 between two friends. How many

beads does each friend get?