Planner

Ratios

- The relationship between fractions and ratios
- Simplifying ratios
- Dividing a quantity in a given ratio
- Using the unitary method to solve problems involving ratio

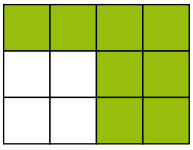
Keywords

You should know

explanation 1 online

1 Write the proportion of each shape that is coloured, as a fraction in its simplest form.

a



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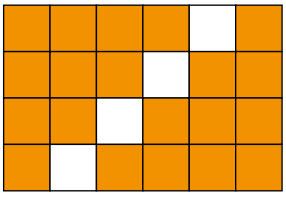

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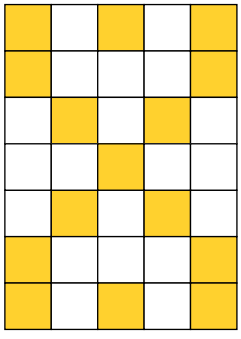

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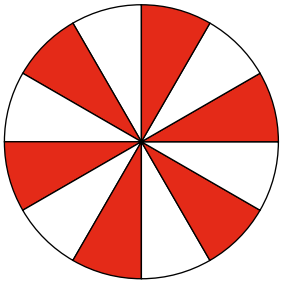

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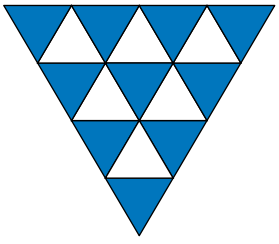

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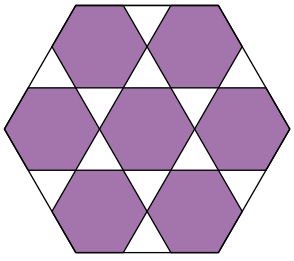
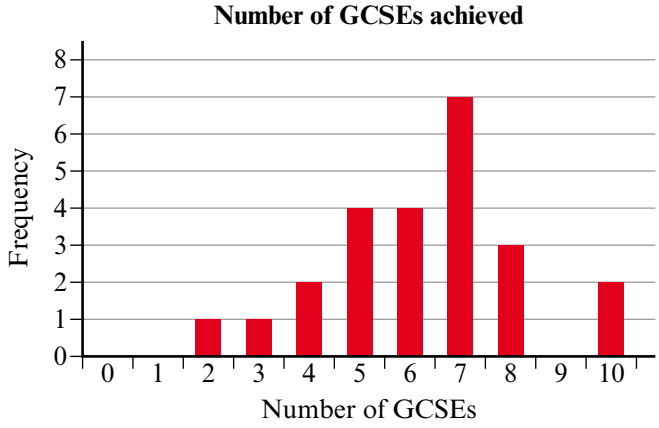


2 Write the ratio of coloured area to non-coloured area for each of the shapes in question **1**.

3 The bar chart shows the number of GCSEs achieved by a group of 24 pupils.



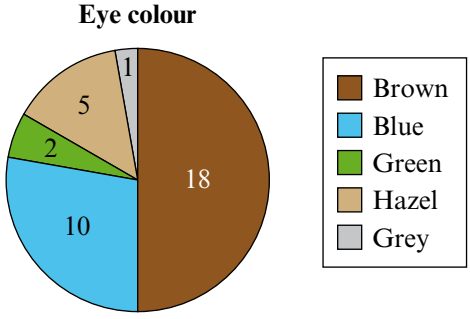
a What proportion of the pupils achieved exactly 5 GCSEs?
Give your answer as a fraction in its simplest form.

b What proportion of the pupils achieved 5 or more GCSEs?
Give your answer as a fraction in its simplest form.

c What is the ratio of pupils achieving 5 GCSEs to pupils achieving other results?

d What is the ratio of pupils achieving 5 or more GCSEs to pupils achieving fewer than 5 GCSEs?

4 The pie chart shows the eye colour of a group of 36 people.



a What proportion of the people have hazel eyes?

b What is the ratio of people with hazel eyes to people with other coloured eyes?

c What proportion of the people have either hazel or green eyes?

d What is the ratio of people with green or hazel eyes to people with other coloured eyes?

explanation 2 online

5 Use the data on eye colour from question **4**.

a What is the ratio of blue to hazel eye colours among the 36 people? Give your ratio in its simplest form.

b What is the ratio of blue to brown eye colours among these people? Give your ratio in its simplest form.

c One of the ratios of eye colour is given as 9 : 1. Which two eye colours are in this ratio?

6 Simplify these ratios.

a 4 : 2	**b** 8 : 6	**c** 8 : 12	**d** 5 : 15
e 16 : 24	**f** 18 : 27	**g** 6 : 72	**h** 30 : 6
i 14 : 56	**j** 28 : 21	**k** 48 : 144	**l** 49 : 63

7 The following pairs of ratios are equivalent. Work out the unknown values.

a $1:2 = 3:x$	**b** $7:21 = p:42$	**c** $2:5 = n:25$
d $15:y = 45:18$	**e** $a:9 = 40:72$	**f** $6:18 = 5:b$
g $1:2:3 = 5:m:n$	**h** $3:5:6 = p:30:q$	**i** $d:3:7 = 16:12:e$

explanation 3

8 The following ratios involve quantities with different units. Write both quantities in the same units then simplify to give the ratio in its simplest form.

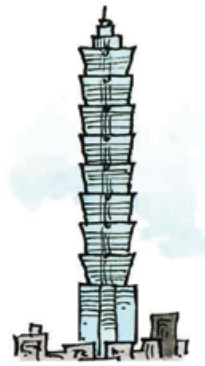
a 2 cm : 5 m	**b** 8 mm : 12 cm	**c** 25 g : 3 kg
d 6 mm : 5 m	**e** 4 mm : 1 km	**f** 15 kg : 2 tonnes
g 125 g : 1 tonne	**h** 20 s : 5 min	**i** 5 s : 2 hours
j 150 mm : 15 km	**k** 10 min : 3 days	**l** 40 ml : 10 litres

9 A model car is made to a scale of 1 : 50.

a The model has a length of 10 cm. Calculate the length of the real car. Give your answer in metres.

b The real car has a height of 1.75 m. Calculate the height of the model car.

10 In 2007, the Taipei Tower in Taiwan was the world tallest building, standing at a height of approximately 510 m.



a On a photograph, the tower is 15 cm tall.
What is the scale of the photo to the real thing?
Write the ratio in its simplest form.

b A poster is produced to a scale of 1 : 200.
Calculate the height of the tower on the poster.

11 A map is drawn to a scale of 1 : 50 000.

a Calculate the real distance, if a distance on the map is 3 cm.
Give your answer in metres.

b Calculate the distance on the map, if a distance on the ground is 8 km.
Give your answer in centimetres.

12 An architect produces a plan of a building to a scale of 1 : 25.

a The height of the real building will be 8 m.
What height is the building on the plan? Give your answer in centimetres.

b The length of the building on the plan is 45 cm.
Calculate the length of the actual building. Give your answer in metres.

explanation 4 — online

13 A piece of string 24 cm long is divided into smaller pieces in these ratios.
Calculate the length of each of the smaller pieces.

a 1 : 7 **b** 1 : 5 **c** 1 : 3 **d** 7 : 5

e 5 : 19 **f** 5 : 3 **g** 1 : 2 : 3 **h** 3 : 5 : 4

14 A piece of wood 48 cm long is cut into smaller pieces in these ratios.
Calculate the length of each of the smaller pieces of wood.

a 1 : 15 **b** 5 : 1 **c** 1 : 31 **d** 1 : 1 : 14

e 1 : 2 : 3 : 6 **f** 3 : 5 : 4 : 4 **g** 6 : 8 : 5 : 3 : 2 **h** 8 : 12 : 7 : 5

15 Blue, white and yellow paint is mixed in the ratio 3 : 20 : 2.
The paint is sold in 5-litre containers.

Calculate the volume of each colour paint in the containers.

a White paint **b** Blue paint **c** Yellow paint

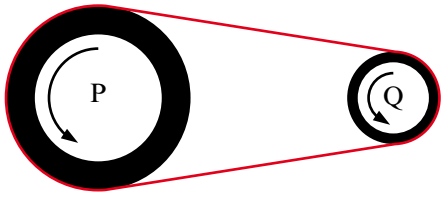
16 A fruit juice is made from mango, orange, apple and grape juices in the ratio 4 : 8 : 3 : 1. The juice is sold in 1 litre cartons.

a Calculate the amount of mango juice in a carton.

b Calculate the amount of apple juice in a carton.

c A promotional carton is produced with 25% extra free.
Calculate the amount of orange juice used in a promotional carton.

17 P and Q are two chain wheels. For every 2 complete rotations that wheel P makes, wheel Q makes 7.

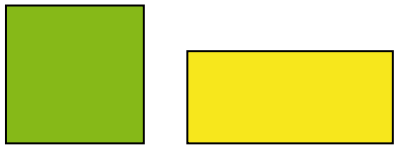


a If wheel P makes 250 rotations, calculate the number of rotations made by wheel Q.

b If wheel Q makes 497 rotations, calculate the number of rotations made by wheel P.

c If the combined number of rotations is 1620, calculate the number of rotations made by each wheel.

18 A square has the same area as a rectangle.



The sides of the rectangle are in the ratio 9 : 4.
The perimeter of the rectangle is 130 cm.

a Calculate the lengths of the sides of the rectangle.

b Calculate the area of the rectangle.

c Calculate the side length of the square.

d Write down the ratio of the perimeters of the two shapes in the form perimeter of square : perimeter of rectangle.
Give your answer in its simplest form.