



Ratios

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

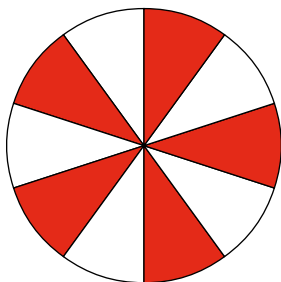
Keywords

You should know

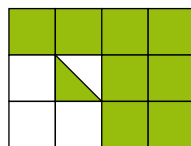
explanation 1

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

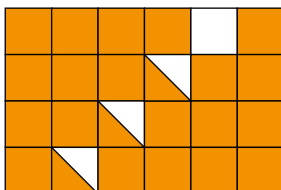
a



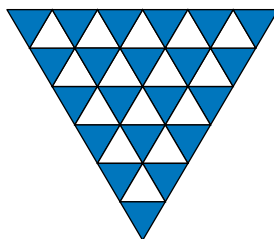
b



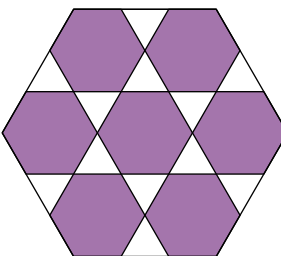
c



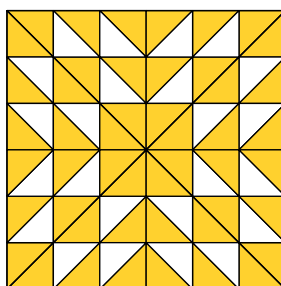
d



e

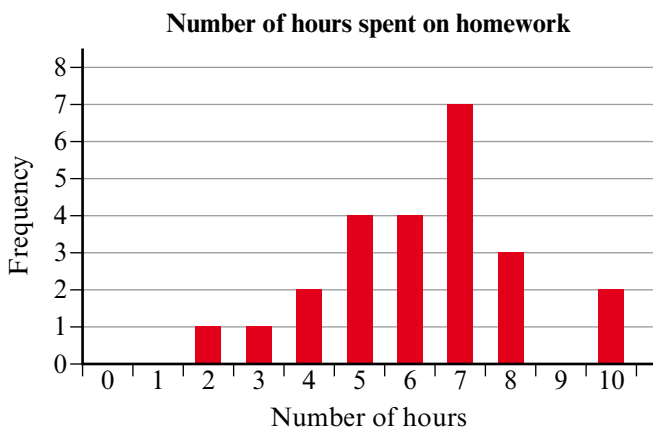


f

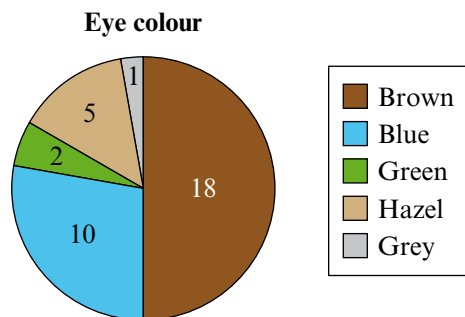


- 2** For each shape in question 1, write the proportion that is coloured as a ratio, coloured : all tiles

- 3** The bar chart shows the number of hours spent on homework by a group of 24 pupils in one week.



- a** What proportion of the pupils did exactly 5 hours?
Give your answer as a fraction in its simplest form.
 - b** What proportion of the pupils did 5 or more hours?
Give your answer as a fraction in its simplest form.
 - c** What is the ratio of pupils who did exactly 5 hours homework to pupils who spent other lengths of time doing homework?
 - d** What is the ratio of pupils who spent 5 or more hours on homework to pupils who spent fewer than 5 hours doing homework?
- 4** The pie chart shows the eye colour of a group of 36 people.



- a** What proportion of the people have brown eyes?
- b** What is the ratio of people with brown eyes to people with other coloured eyes?
- c** What proportion of the people have either green or grey eyes?
- d** What is the ratio of people with green or grey eyes to people with other coloured eyes?

explanation 2

5 Use the data on eye colour from question 4.

- a** What is the ratio of grey to hazel eyes in this group?
Express your ratio in its simplest form.
- b** What is the ratio of green to brown eyes in this group?
Express your ratio in its simplest form.
- c** Two of the eye colours in this group are in the ratio 9:5.
Which two eye colours are these?

6 Simplify these ratios.

- | | | | |
|----------------|----------------|-------------------|-------------------|
| a 4:2 | b 8:6 | c 8:12 | d 5:15 |
| e 16:24 | f 18:27 | g 30:72 | h 33:6 |
| i 21:56 | j 35:21 | k 21:28:35 | l 49:63:14 |

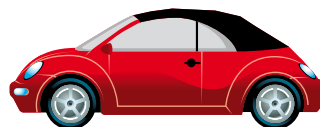
7 Each pair of ratios is equivalent. Work out the values of the letters.

- | | | |
|--------------------------|---------------------------|----------------------------|
| 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 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.



- 9** In 2007, the Taipei Tower in Taiwan, was the world's tallest building, standing at a height of approximately 510 m.

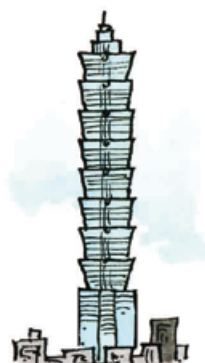
a On a photograph the tower is 15 cm tall.

What is the scale of the photo to the real tower?

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.



- 10** A map is drawn to a scale of 1 : 50 000.

a Calculate the real distance when the 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.

- 11** 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. Calculate the height of the building on the plan, giving 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.

- 12** Write each 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

Remember to change the quantities into the same units first.

explanation 4

- 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 41:7 **g** 1:2:3 **h** 3:5:4 **i** 38:7:3 **j** 35:35:2

- 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** 1:95 **d** 1:1:14
e 1:2:3:6 **f** 2:10:25:59 **g** 6:8:5:3:2 **h** 10:12:16:34

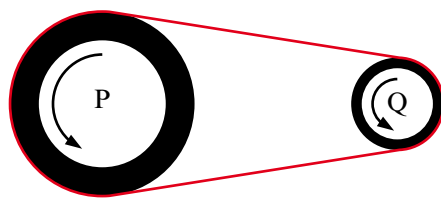
- 15** Blue, white and yellow paint is mixed in the ratio 3:20:2.
The paint is sold in 5 litre containers.



Calculate the volume of each colour paint in the container.

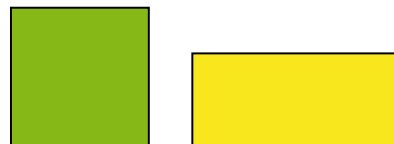
- a** White paint **b** Blue paint **c** Yellow paint
- 16** Fruit juice is made from mango, orange, apple and grape juice in the ratio 4:8:3:1. The juice is sold in 1 litre cartons.
- a** Calculate the amount of mango juice in a carton.
b Calculate the amount of apple juice in a carton.
c A promotional carton is produced with 25% extra free.
 Calculate the amount of grape juice 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.



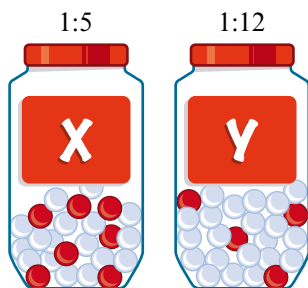
- Calculate the number of rotations made by wheel Q when wheel P makes 250 rotations.
- Calculate the number of rotations made by wheel P when wheel Q makes 497 rotations.
- If the combined number of rotations is 1620, calculate the number of rotations made by each wheel.

- 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.



- Calculate the lengths of the sides of the rectangle.
- Calculate the area of the rectangle.
- Calculate the side length of the square.
- 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.

- *19** Two jars contain sweets. Jar X has red and white sweets in the ratio 1:5, and jar Y has red and white sweets in the ratio 1:12.



The two jars are then mixed together. Find the smallest number of sweets that could have been in each jar if the red and white sweets are now in these ratios.

- 1:6
- 1:7
- 1:8
- 1:9
- 1:10
- 1:4