Planner

Using ratios

- Changing between proportions as fractions and ratios
- Changing between proportions as percentages and ratios
- Interpreting ratios
- Solving problems involving ratio and proportion

Keywords

You should know

explanation 1a | explanation 1b | explanation 1c | explanation 1d

1 Each fraction shows the proportion of a shape that is shaded.
Write each fraction as a ratio to show shaded : unshaded. Simplify your ratios where possible.

a $\frac{2}{7}$ **b** $\frac{3}{7}$ **c** $\frac{3}{8}$ **d** $\frac{13}{14}$

e $\frac{28}{30}$ **f** $\frac{24}{72}$ **g** $\frac{35}{50}$ **h** $\frac{36}{84}$

2 Some patterns are made using red and blue squares.
Write the ratio of red to blue squares in its simplest form.

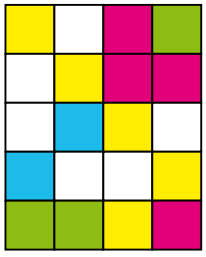
a 40% of squares are red.

b 65% of squares are blue.

c 68% of squares are red.

d 100 % of squares are blue.

3 Work these out for this pattern of squares.



a The ratio blue : green : pink : yellow : white squares.

b The fraction of the whole shape that is taken up by each colour.

c The percentage of the whole shape that is taken up by each colour.

d If the grid was twice as big in both directions, with the squares coloured in the same proportions, how many squares of each colour would there be?

4 The table shows information about the proportions of boys and girls in some groups. Copy the table and fill in the gaps.

Proportion of girls in group	$\frac{7}{12}$		$\frac{17}{63}$	
Ratio girls : boys		1:7		5:6

5 Give each ratio in its simplest form.

a 20 : 25 **b** 16 : 48 **c** 5 : 15 **d** 16 : 28

e 24 : 120 **f** 60 : 48 **g** 72 : 144 **h** 85 : 17

i 56 : 63 **j** 81 : 108 **k** 93 : 99 **l** 99 : 100

m 7 : 14 : 63 **n** 4 : 16 : 28 **o** 180 : 120 : 240 **p** 550 : 300 : 750

q 2.5 : 5 **r** $\frac{1}{4}$: 3 **s** 4.5 : 6 **t** $\frac{1}{2}$: 9

6 Fill in the missing numbers so that the ratios are equivalent.

a 1 : 3 = 3 : ☐ **b** 7 : 56 = 28 : ☐

c 5 : ☐ = 15 : 48 **d** 3 : 8 = 9 : ☐

e 12 : ☐ = 36 : 9 **f** ☐ : 45 = 60 : 9

g 2 : 4 : 5 = 4 : ☐ : ☐ **h** 8 : 10 : 13 = ☐ : 50 : ☐

i ☐ : 21 : 24 = 4 : 28 : ☐ **j** 16 : 48 = 4 : 9 : ☐

7 The numbers of pupils in one year group who passed the end-of-year test over five years are shown in the table.

Year	2003	2004	2005	2006	2007
Number who passed	200	185	192	203	211

If there were 250 pupils in this year group, calculate the following.

a The proportion who passed in 2003 (as a fraction in its simplest form).

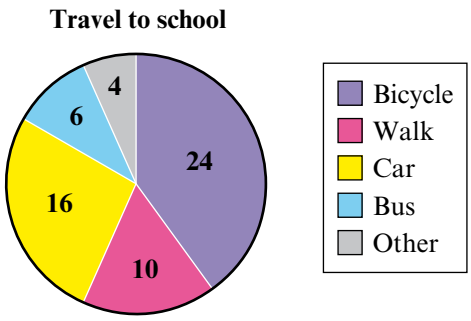
b The proportion who did not pass in 2005 (as a fraction in its simplest form).

c The percentage who passed in 2004.

d The percentage who failed in 2006.

e The mean pass rate over the five-year period (as a percentage).

8 The pie chart shows the results of a survey of 60 pupils on methods of travel to school.



a What proportion of the group travelled by bicycle?
Give your answer as a fraction in its simplest form.

b What is the ratio of cyclists to walkers (in its simplest form)?

c What percentage of the group travelled by bus or car?

d Give the ratio of car passengers to all other methods of travel (in its simplest form).

explanation 2 — online

9 Divide these quantities in the given ratios.

a 18 in the ratio 2 : 1

b 24 in the ratio 3 : 5

c 30 in the ratio 3 : 2

d 35 in the ratio 3 : 4

e 48 in the ratio 5 : 3

f 65 in the ratio 9 : 4

g 100 in the ratio 2 : 3 : 5

h 160 in the ratio 1 : 2 : 5

10 Jo and Melissa won £150 in a raffle. They divided this amount in the ratio 3 : 2.
How much did each girl get?

11 Ross makes potting mix for his plants with loam, peat and sand in the ratio 7 : 3 : 2 respectively. What mass of each is there in 240 kg of potting mix?

12 The angles in a triangle are in the ratio 1 : 2 : 3.
The total of the angles is 180°. What is the size of each of the angles?

explanation 3a explanation 3b

13 A map has a scale of 1 inch to 5 miles. This table gives the lengths of some roads as measured on the map. How long is each road in real life?

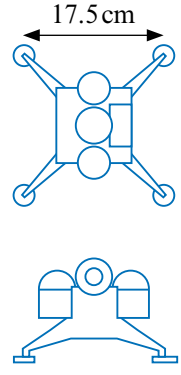
Road	Length on the map
Parson's Green Road	4.5 inches
Torbay Road	3.7 inches
Century Road	5.6 inches
Market Road	0.8 inches

14 **a** On a map with a scale of 1 : 50 000, the distance between two adjacent farmhouses is 2.4 cm.
What is the corresponding distance on the ground in metres?

b The shortest distance from the railway line to the river is 3.05 km.
What distance on the map would represent this?

15 A NASA design for a lunar landing craft is drawn to a scale of 5 cm : 1 m.

The feet of the landing craft form a square.
On the drawing, the distance between adjacent feet is 17.5 cm.



a What is the actual distance between feet along one side of the square?

b What is the area covered by this square on the surface of the moon?

16 An architect's 3-D model of a new apartment block is made to a scale of 1 : 120. If the height of the model block is 40 cm, what is the actual height?

explanation 4

17 Shortcrust pastry is made from flour and butter in the ratio 2 : 1.

a How much flour is needed if 300 g of butter is used to make the pastry?

b How much butter is needed if 500 g of flour is used to make the pastry?

18 This is a recipe for 4 servings.

How much of each ingredient would be needed for 6 servings?

Pancakes
3 cups of flour
2 tsp baking powder
1 cup milk

19 To make a date and walnut sponge you need 4 bananas, 150 g walnuts, 200 g flour and 1 teaspoon of cinnamon, plus other ingredients.

a The quantities given are for 6 people.
What quantities would be needed for 9 people?

b A large sponge contains 450 g of walnut pieces.
What quantities of the other ingredients does it contain?

20 A recipe uses 12 onions to make $1\frac{1}{2}$ litres of chutney.

a How much chutney can be made with 48 onions?

b How many onions are needed for $4\frac{1}{2}$ litres of chutney?

explanation 5 online

21 Convert these ratios to the form $1:n$, rounding to 2 d.p. where necessary.

a 2:4 **b** 13:52 **c** 3:7 **d** 5:21 **e** 12:114

22 Sanjay was comparing a grey and a black pair of trousers to see which had the higher proportion of wool.
The grey pair had wool to other materials in the ratio of 5:2.
The black pair had wool to other materials in the ratio of 9:4.

a Convert both ratios to the form $1:n$.

b Which pair of trousers has the higher proportion of wool?

23 Two different paints are mixed. The first paint contains 3 parts yellow to 5 parts blue and the second paint contains 9 parts yellow to 14 parts blue.

a Write these proportions as ratios.

b Convert each ratio to the form $1:n$ to find which paint has a higher proportion of blue.