Planner

Using ratios

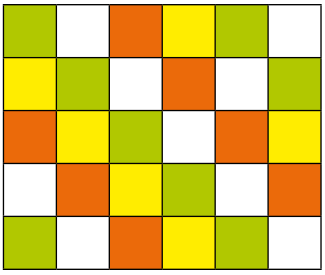
- Converting between ratios, fractions and percentages
- Dividing a quantity in a given ratio
- Comparing two ratios
- Understanding the ratio properties of similar 2-D shapes
- Solving problems using direct and indirect proportion

Keywords

You should know

explanation 1

1 This is a patchwork quilt.



a Find the ratio of yellow to green to orange to white squares.

b Find the proportion of each of these.

i yellow squares **ii** green squares

iii orange squares **iv** white squares

c Find the percentage of white squares.

2 In a different quilt, 24% of the squares were red, 36% were blue and the rest were white.

a What proportion of the squares were each colour?

i red **ii** blue **iii** white

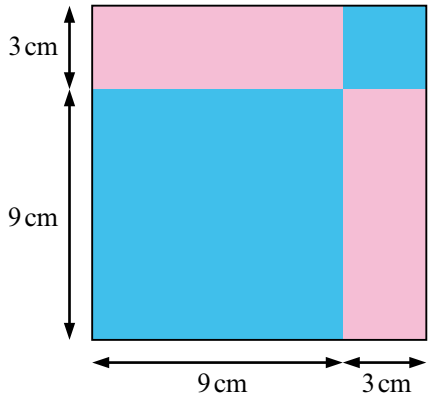
b Write the ratio of red to blue to white squares.

c What is the smallest number of squares that the quilt could be made from?

3 Two parts of this square design are shaded pink.

Two parts are shaded blue.

Show that the ratio of blue to pink is 5 : 3.



explanation 2a | explanation 2b

4 Write each ratio in its simplest form.

a 16 : 24 **b** 35 : 50 **c** 32 : 72 **d** 56 : 84

e 26 : 156 **f** 280 : 630 **g** 12 : 9 : 15 **h** 28 : 49 : 63

i 39 : 26 : 130 **j** 200 : 1000 : 400 **k** 48 : 180 : 312

5 Write each ratio in its simplest form.

a $2 : \frac{1}{2}$ **b** $\frac{1}{3} : 1$ **c** $\frac{1}{4} : 3$ **d** $\frac{1}{4} : \frac{1}{2}$

e $\frac{3}{4} : \frac{1}{2}$ **f** 1.5 : 1 **g** 6.5 : 2.5 **h** 1.25 : 3

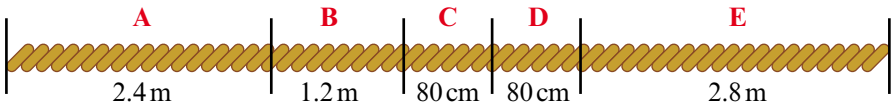
6 Simplify these ratios.

a £2 : 40p **b** 6 hours : 3 days **c** 75 cm : 6 m

d 36 minutes : 1 day **e** 45 seconds : 3 minutes **f** 4 litres : 480 ml

g 16 hours : 1 week **h** £1.30 : 52p **i** 1.44 kg : 840 g

7 An 8 m length of rope was cut into these sections to make parts for a rope ladder.



a What is the ratio of section A to section B?

b What percentage of the rope is cut into sections less than 1 m long?

c What is the ratio of the lengths of sections C to D to E?

8 **a** For this almond cake recipe write the ratio of butter to sugar to flour to ground almonds in its simplest form.

b In another recipe the ratio of flour to sugar is 3 : 2.

How much sugar is needed to mix with 1.2 kg of flour?

Rich Almond Cake

0.25 kg butter
350 g sugar
0.5 kg flour
150 g ground almonds

explanation 3 online

9 Divide each amount in the given ratio.

a 63 in the ratio 4 : 5
b 90 in the ratio 3 : 7
c 75 in the ratio 2 : 3
d 500 in the ratio 1 : 4
e 225 in the ratio 2 : 3
f 91 in the ratio 3 : 4
g 105 in the ratio 5 : 2
h 216 in the ratio 8 : 1
i 120 in the ratio 1 : 2 : 3
j 84 in the ratio 3 : 4 : 5
k 168 in the ratio 3 : 1 : 4
l 300 in the ratio 2 : 5 : 5

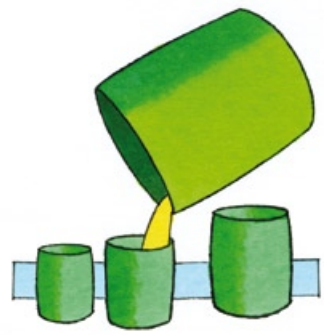
10 The angles in a triangle are in the ratio 1 : 2 : 3.

Find the sizes of the three angles.

11 A large plastic barrel contains 250 litres of vegetable oil.

It is poured into three containers with capacities in the ratio 3 : 5 : 2.

How many litres of oil does each container hold?



12 Mrs Graham won £22 500 playing the lottery.

She gave it to her three grandchildren in the ratio 6 : 4 : 5.

How much did they each receive?

explanation 4a explanation 4b online

13 Write these ratios in the form 1 : m. Round to one decimal place if necessary.

a 10 : 32 **b** 4 : 15 **c** 3 : 8 **d** 8 : 21 **e** 36 : 80

14 Write these ratios in the form m : 1. Round to one decimal place if necessary.

a 33 : 4 **b** 69 : 23 **c** 11 : 3 **d** 42 : 8 **e** 47 : 13

15 The ratio of tries scored to tries converted for the Lowlanders and the Clansmen rugby teams are 18 : 5 and 15 : 4 respectively.

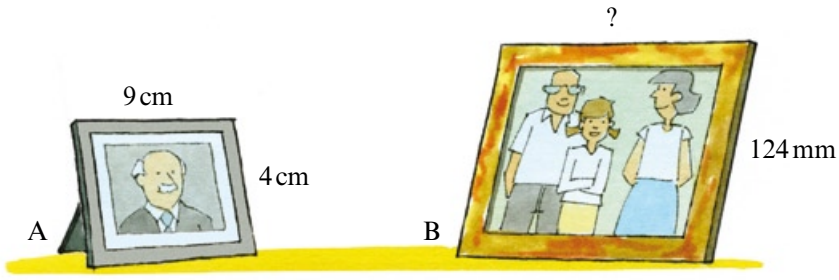
Which team has the better conversion rate? Explain.

16 Which of these two dresses has the greater proportion of Lycra to other fibres?

Lycra : other fibres
3 : 7

Lycra : other fibres
4 : 9

17 The ratio of the lengths of corresponding sides of these photo frames are the same.

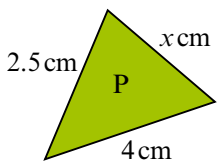


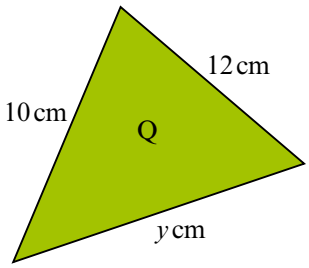
a Write the ratio width : length of photo frame A.

b Find the length of photo frame B.

18 Triangles P and Q are similar. They are not drawn to scale.

a What are the values of x and y?

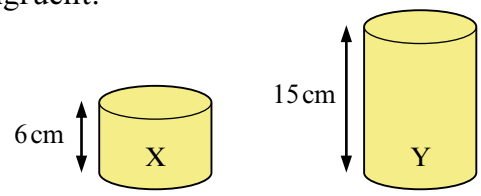




b Find the dimensions of two other triangles that could be similar to triangles P and Q.

19 The circular bases of two cylinders are congruent.

Cylinder X is 6 cm high and has a volume of 300 cm^3.

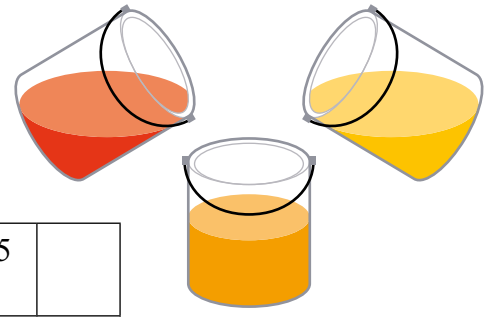


a Find the ratio of the heights of the two cylinders in the form $1 : m$.

b What is the volume of cylinder Y?

explanation 5a explanation 5b explanation 5c

20 This table shows the quantities of red and yellow paint mixed to make orange paint.



Red paint (litres)	3	6	9		45	
Yellow paint (litres)	7			84		147

a What is the ratio of red paint to yellow paint?

b Copy and complete the table.

c Copy and complete these sentences using the correct words from the box.

The ratio of red paint to yellow paint is _____ .

The numbers are in _____ *proportion to each other.*

direct
inverse
constant

21 In a frozen pasta bake there is 5 g of protein in every 8 g of pasta bake.

a Copy and complete the table to show this relationship.

Pasta bake (g)	8	16	24	32
Protein (g)	5			

b Find the amount of protein in

i 80 g of pasta bake

ii 128 g of pasta bake

iii 500 g of pasta bake

22 Sunita has 375 g of butter and adapts her apple pie recipe so that she can use all the butter.

a What quantities of the other ingredients would she need?

b How many people would this serve?

Apple pie (for 4)
3 large apples
25 g brown sugar
200 g flour
75 g butter (or margarine)
50 g castor sugar
1 tablespoon water to mix

23 Tammy wanted to raise £192 for charity by selling tickets to a concert.

She drew up a table of the possible prices she could charge per ticket and the numbers of tickets she would have to sell.

Number of tickets	8	10	12		20	
Price per ticket (£)	24			12		8

a Copy and complete this sentence using the correct word from the box.

The product of the number of tickets and the price per ticket is _____ .

direct
inverse
constant

b Copy and complete the table.

c Copy and complete this sentence using the correct word from the box.

The numbers are in _____ *proportion to each other.*

24 For each of these tables decide whether the values are in direct or inverse proportion to each other. Explain your answers.

a

Price (£)	20	15	12	10	5
Number	3	4	5	6	12

b

Weight (kg)	5	10	15	20	25
Height (cm)	15	30	45	60	75

c

Hourly rate (£)	2	4	5	8	10
Hours	50	25	20	12.5	10

25 Last week Jack earned £200. This week he earned 40% more than last week.

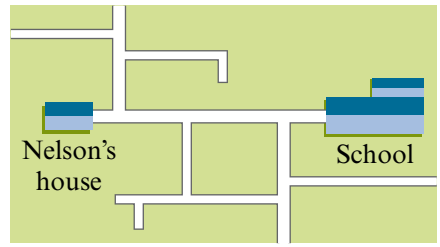
What is the ratio of what he earned last week to what he earned this week?

26 A city street map has a scale of 1 cm : 350 m.

a On the map the distance from Nelson's house to school is 3 cm.

i How far is this in metres?

ii How far is this in kilometres?



b The actual distance from his house to the town centre is 2.8 km.

What distance is this on the map?

c A different map has a scale of 1 cm : 400 m.

What distance would it be from Nelson's house to the town centre on this map?

27 Jessica bought two cakes for a total of £15.75.

One cake cost two and a half times as much as the other.

How much did each cake cost?

28 A 500 ml jug is filled with orange squash and lemonade in the ratio 1 : 4.

Another 500 ml jug is filled with orange squash and lemonade in the ratio 1 : 3.

Both jugs are poured into one large jug.

What is the ratio of orange squash to lemonade in the large jug?

29 A pastry mix is made from 2 parts butter mixed with 3 parts flour.

a How much of each ingredient is needed to make one kilogram of pastry mix?

b Bianca has 200 g of butter and 400 g of flour,

What is the most pastry mix she can make?

c Gina has 1.5 kg of butter and 1125 g of flour.

What is the most pastry mix she can make?