

3. Write in the form  $n : 1$ , each of the following ratios:
- (a)  $24 : 3$                       (b)  $4 : 5$                       (c)  $7 : 10$   
(d)  $15 : 2$                       (e)  $18 : 5$                       (f)  $6 : 5$
4. Jennifer mixes 600 ml of orange juice with 900 ml of apple juice to make a fruit drink. Write the ratio of orange juice to apple juice in its simplest form.
5. A builder mixes 10 shovels of cement with 25 shovels of sand. Write the ratio of cement to sand:
- (a) in its simplest form,  
(b) in the form  $1 : n$ ,  
(c) in the form  $n : 1$ ,
6. In a cake recipe, 300 grams of butter are mixed with 800 grams of flour. Write the ratio of butter to flour:
- (a) in its simplest form,  
(b) in the form  $1 : n$ ,  
(c) in the form  $n : 1$ .
7. In a school there are 850 pupils and 40 teachers. Write the ratio of teachers to pupils:
- (a) in its simplest form,                      (b) in the form  $1 : n$ .
8. A map is drawn with a scale of  $1 : 50\,000$ . Calculate the actual distances, in km, that the following lengths on the map represent:
- (a) 2 cm                      (b) 9 cm                      (c) 30 cm.
9. A map has a scale of  $1 : 200\,000$ . The distance between two towns is 60 km. How far apart are the towns on the map?
10. On a map, a distance of 5 cm represents an actual distance of 15 km. Write the scale of the map in the form  $1 : n$ .

## 7.2 Direct Proportion

Direct proportion can be used to carry out calculations like the one below:

If 10 calculators cost £120,  
then 1 calculator costs £12,  
and 8 calculators cost £96.



### Example 1

If 6 copies of a book cost £9, calculate the cost of 8 books.



### Solution

If 6 copies cost £9,

$$\begin{aligned} \text{then 1 copy costs } & \text{£} \frac{9}{6} \\ & = \text{£}1.50 \end{aligned}$$

$$\begin{aligned} \text{and 8 copies cost } & \text{£}1.50 \times 8 \\ & = \text{£}12 \end{aligned}$$



### Example 2

If 25 floppy discs cost £5.50, calculate the cost of 11 floppy discs.



### Solution

$$\text{If 25 discs cost } \quad \text{£}5.50 = 550\text{p}$$

$$\text{then 1 disc costs } \quad \frac{550}{25} = 22\text{p}$$

$$\begin{aligned} \text{so 11 discs cost } \quad 11 \times 22\text{p} & = 242\text{p} \\ & = \text{£}2.42 \end{aligned}$$



### Exercises

- If 5 tickets for a play cost £40, calculate the cost of:
  - 6 tickets
  - 9 tickets
  - 20 tickets.
- To make 3 glasses of orange squash you need 600 ml of water. How much water do you need to make:
  - 5 glasses of orange squash,
  - 7 glasses of orange squash?
- If 10 litres of petrol cost £8.20, calculate the cost of:
  - 4 litres
  - 12 litres
  - 30 litres.
- A baker uses 1800 grams of flour to make 3 loaves of bread. How much flour will he need to make:
  - 2 loaves
  - 7 loaves
  - 24 loaves?

5. Ben buys 21 football stickers for 84p. Calculate the cost of:
  - (a) 7 stickers
  - (b) 12 stickers
  - (c) 50 stickers.
  
6. A 20 m length of rope costs £14.40.
  - (a) Calculate the cost of 12 m of rope.
  - (b) What is the cost of the rope, per metre?
  
7. A window cleaner charges  $n$  pence to clean each window, and for a house with 9 windows he charges £4.95.
  - (a) What is  $n$  ?
  - (b) Calculate the window cleaner's charge for a house with 13 windows.
  
8. 16 teams, each with the same number of people, enter a quiz. At the semifinal stage there are 12 people left in the competition.  
How many people entered the quiz?
  
9. Three identical coaches can carry a total of 162 passengers. How many passengers in total can be carried on seven of these coaches?
  
10. The total mass of 200 concrete blocks is 1460 kg. Calculate the mass of 900 concrete blocks.

## 7.3 Proportional Division

Sometimes we need to divide something in a given ratio. Malcolm and Alison share the profits from their business in the ratio 2 : 3. This means that, out of every £5 profit, Malcolm gets £2 and Alison gets £3.



### Example 1

Julie and Jack run a stall at a car boot sale and take a total of £90. They share the money in the ratio 4 : 5. How much money does each receive?



### Solution

As the ratio is 4 : 5, first add these numbers together to see by how many parts the £90 is to be divided.

$4 + 5 = 9$ , so 9 parts are needed.

Now divide the total by 9.

$\frac{90}{9} = 10$ , so each part is £10.