RATIOS

- A **ratio** is used to compare two or more related quantities.

  Examples

  1. The ratio of sand to cement is 3 : 1

  2. In a group of friends, 12 had brown eyes and 5 had blue eyes.
     Ratio of brown eyes to blue eyes is 12 : 5.

- To **simplify** ratios (writing them in their simplest form), divide both parts by the highest factor.

  Example

  $14 : 7 = 14 : 7 = \cancel{14}^{2} : \cancel{7}^{1} = 2 : 1$

- It is often useful to express a ratio in the form **n : 1**

  Example

  5 : 2 = 2.5 : 1

- The quantities in a ratio must have the **same units**.

  Example 1

  Geoff earned £10.80. He spent 90p.

  [Change £10.80 to pence]

  The ratio of what he earned to what he spent is 1080 : 90

  In its simplest form (or its **Lowest Terms**), 1080 : 90 = 12 : 1

  Example 2

  One object has a mass of 2.4 kg, the other has a mass of 400 g.

  [Change 2.4 kg to grams]

  The ratio of these masses is 2400 : 400 = 6 : 1

INCREASE OR DECREASE IN A GIVEN RATIOS

- Work out one part.
- Use this fact to answer the problem.

Example 1

A building took 6 people 8 days to build.

At the same rate, how long would it take

a) 10 people

b) 4 people

Solution

a) Time for 6 people = 8 days
Time for 1 person = 6 × 8 = 48 days
Time for 10 people = 48 ÷ 10 = 4.8 days

b) Time for 1 person = 48 days
Time for 4 people = 48 ÷ 4 = 12 days

Example 2

A recipe for 4 people needs 1800 g of flour.

How much flour would be needed for 7 people.

Solution

4 people need 1800 g
1 person needs 1800 ÷ 4 = 450 g
7 people need 7 × 450 = 3150 g

BEST BUYS

- Ratios are used to find the best value.

Example

Paint is sold in two different sized cans.

450 ml for £8.79

2.5 litres for £26

Which size represents the better value for money?

Solution

Find the cost per ml for both sizes.

450 ml costs £8.79 $\therefore$ 1 ml costs £8.79 ÷ 450 = £0.02

2500 ml costs £26 $\therefore$ 1 ml costs £26 ÷ 2500 = £0.01

The larger size costs less per ml so it represents the better buy.

PROPORTION

4 : 8 = 1 : 2

6 : 12 = 1 : 2

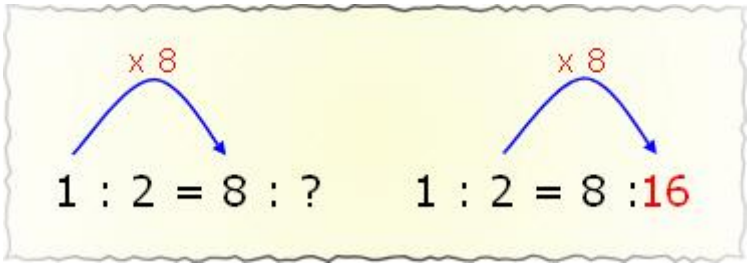
- The ratios 4 : 8 and 6 : 12 are equivalent ratios because both are equal to 1 : 2 in their simplest forms.
- The ratios 4 : 8 and 6 : 12 are proportional.

- Proportion can be used to solve problems.

EXAMPLE 1

The ratio 1 : 2 is the same as 8 : ?

Solution



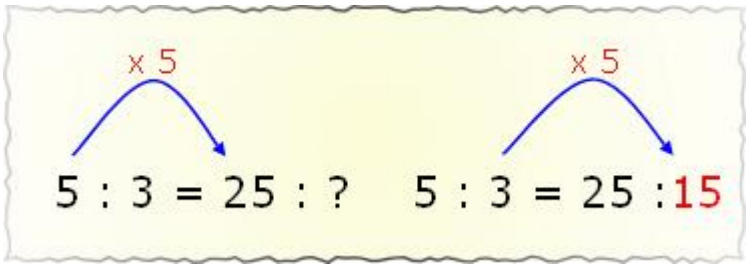
EXAMPLE 2

The ratio of cadets who passed the fitness test to those who failed is 5 : 3.

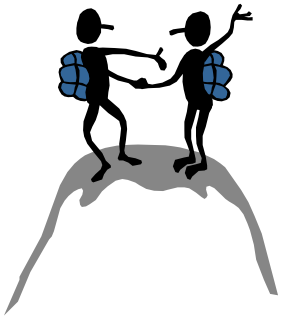
25 cadets passed. How many failed ?

Solution

In other words, 5 : 3 = 25 : ?



15 cadets failed !



SHARING IN A GIVEN RATIO

- Add up the total parts.
- Work out how much one part is worth.
- Work out what the other parts are worth.

Example 1

£2400 is shared between Ruth, Sue and Joe in the ratio 2:3:7.

How much does each receive?

Solution

Number of shares: 2 + 3 + 7 = 12

12 shares = £2400

1 share = £2400 ÷ 12 = £200

Ruth has 2 shares, she gets 2 × £200 = £400

Sue has 3 shares, she gets 3 × £200 = £600

Joe has 7 shares, she gets 7 × £200 = £1400

Example 2

Julie, Jo and Shelley started a business 10 years ago. Julie put £3000 into the business, Jo £2500 and Shelley £5500. The business is now worth £33000.

How much of the business does each partner own ?

Solution

Julie, Jo and Shelley invested in the ratio 3000 : 2500 : 5500.

Simplifying, this is 6 : 5 : 11.

Number of shares: 6 + 5 + 11 = 22

22 shares now worth £33000

1 share is worth £33000 ÷ 22 = £1500

Julie has 6 shares, she owns 6 × £1500 = £9000

Jo has 5 shares, she owns 5 × £1500 = £7500

Shelley has 11 shares, she owns 11 × £1500 = £16500.