

Rates



STARTER

Rates compare *unlike* quantities; quantities that are measured in different units. Here are four different examples and four rates. Try matching them.

Speed of a car
Wage rate for a supermarket employee
Petrol consumption
Cost of building a house

8 litres/100 km
80 km/h
\$1800/m²
\$18 per hour

Rates are usually written as simply as possible.

Example

A cyclist covers a distance of 60 km in 3 hours. Express this as a rate.

Answer

$$\frac{60}{3} = 20$$

60 km in 3 hours is the same as 20 km/h.



TIP
To simplify a rate, divide it out so that the second unit is a single unit.

Example

An employee at a fish-processing factory can shell oysters at a rate of eight per minute.

- a How many oysters can be shelled in 3 minutes?
- b How long will it take to shell 200 oysters?

Answer

- a $3 \times 8 = 24$ oysters
- b $\frac{200}{8} = 25$ minutes

EXERCISE 5.04

- 1 A person is paid at an hourly rate of \$12.50.
 - a How much will they be paid for 4 hours' work?
 - b How much will they be paid for 20 hours' work?
- 2 The fuel consumption for a car is 6 litres/100 km.
 - a How much fuel will it use on a 300 km journey?
 - b The car used 24 litres on another journey. Estimate how far it travelled.
- 3 A bus travels 300 km in 4 hours.
 - a How far does it travel in 1 hour?
 - b How far does it travel in 6 hours?
 - c How long does it take to travel 150 km?
 - d Express the speed of the bus as a rate in km/h.
- 4 A team of baggage handlers can load an aircraft at a rate of 15 pieces per minute.
 - a How many pieces can be loaded in 5 minutes?
 - b How long will it take to load an aircraft with 240 pieces of baggage?
 - c How many pieces can be loaded in 60 minutes?
 - d Express this rate in 'pieces per hour'.
- 5 Rolls of curtain material sell for \$15/m.
 - a How much will 4 m sell for?
 - b How much will 11 m sell for?
 - c Calculate the length of curtain material that sells for \$112.50.
- 6 A pump at a service-station is able to deliver petrol at a rate of 50 litres/minute. Convert this rate to the following units.
 - a litres/h
 - b litres/second
 - c mL/h
 - d mL/second
- 7 A water-pump can deliver a flow of up to 400 litres/minute. How long will it take to fill a swimming pool with a capacity of 30 000 litres?
- 8 An 800 m² section in the Nelson area sells for \$60 000.
 - a Express the price of the section in \$/m².
 - b How much would a section measuring 900 m² sell for at this rate?
 - c Estimate the area of a section that sells for \$48 000 (assuming the same rate).
- 9 An innings in a one-day cricket match lasts for 50 overs.
 - a A cricket team scores at a rate of 5.62 runs per over. How many runs did they score?
 - b If a team scored 307 runs, what was their run rate per over?
- 10 Water flows from a tap into a bath at a rate of 120 litres per minute.
 - a How long will it take to fill the bath with 600 litres of water?
 - b How much water will be in the bath after $3\frac{1}{2}$ minutes?
- 11 A conveyor belt is moving coal at the rate of 300 tonnes per hour. How long would it take to move 2000 tonnes?