Warm-up activity

Work out the following

a) 15 ÷ 5

b) 28 ÷ 4

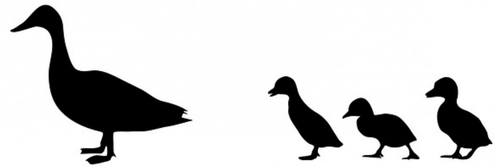
c) 56 ÷ 7

d) 310 ÷ 10

e) 112 ÷ 8

f) 108 ÷ 9

Examples



Speed, distance, time

a) Sebastian covers 240 miles in 3 hours on a highway. Work out his average speed.

b) Jess cycles to work at an average speed of 16 mph for 45 minutes. What distance does she cover?

c) A mapping app suggests that the average speed on a busy road is 20 mph. How long will it take to cover 5 miles on this road?

Diagnostic

Which of the following is a correct formula?

a) $\text{Speed} = \text{Distance} \times \text{Time}$

b) $\text{Time} = \dfrac{\text{Distance}}{\text{Speed}}$

c) $\text{Time} = \text{Distance} \times \text{Speed}$

d) $\text{Distance} = \dfrac{\text{Speed}}{\text{Time}}$

Diagnostic

A car travelled at 150 km in 3 hours. What was its average speed?

a) 450 km/h

b) 150 km/h

c) 50 km/h

d) 0.02 km/h

Diagnostic

A jogger travels at 5 m/s for 30 seconds. How far does she travel?

a) 6 metres

b) 150 metres

c) 2.5 metres

d) 150 km

Diagnostic

A cyclist travels 6 km at a steady 12 m/s. How much time does this take?

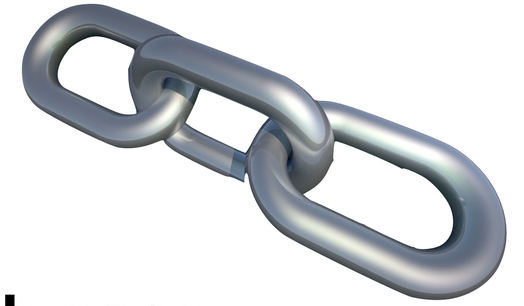
a) 2 seconds

b) 2 hours

c) Half an hour

d) 500 seconds

Spot the links…



Work out the average speed of the car in km/h in each case.

Try to spot what is changing from each question to the next to help you.

a) A car travels 80 km in 2 hours
b) A car travels 40 km in 2 hours
c) A car travels 40 km in 1 hour
d) A car travels 40 km in 30 minutes
e) A car travels 20 km in 30 minutes
f) A car travels 20 km in 20 minutes
g) A car travels 20 km in 40 minutes
h) A car travels 60 km in 40 minutes

Alpha Exercise

a) Pascal is training for a marathon. He runs **42 km** in **3 hours**. Work out his average speed in km/h.

b) A plane travels **4200 miles** in **7 hours**. Work out its average speed in mph.

c) Jon runs **10 km** in **30 minutes**.
Find his average speed in km/h

Hint: How far would he run in 1 hour?

Beta Exercise

a) Chris walks **2.8 km** in **30 minutes**. Work out his average speed in km/h.

b) Laura cycles a lap of the park at **12 metres per second**. The lap takes **58 seconds**. What distance does she cover?

c) Roberto is a racing driver. He completes a **500 mile** race at an average speed of **125 miles per hour**. How long did it take him to complete the race?

Gamma Exercise

a) Jules runs **9 km** in **40 min**. What is her average speed in km/h?

b) A sprinter runs **100 metres** in **10 seconds**. Work out his average speed in m/s. What is this speed in km/h?

c) The average speed on a moderately busy motorway is **48 mph**. How many minutes will it take to complete **4 miles** at this speed?

d) At what speed would you need to travel to complete a **3 mile journey** in **18 minutes**?

Explain the mistake

Kat answers this question as follows:

A train covers 27 km in 18 minutes. Find the average speed of the train.

$$\text{Speed} = \frac{\text{Distance}}{\text{time}} = \frac{27}{18} = 1.5\,\text{km/h}$$

Kat has made a mistake. What is it?

Exam-style question 1

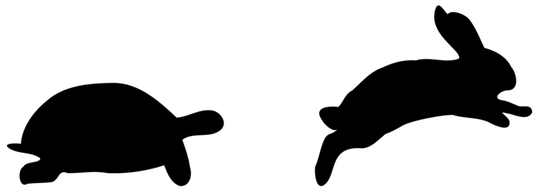
A tortoise and a hare have an 800 metre race.

The hare completes the first **half** of the race in 50 seconds.

(a) What is the hare's average speed for this part of the race? Give your answer in m/s.

The tortoise completes the first **half** of the race in 15 minutes.

(b) What is the tortoise's average speed for this part of the race? Give your answer in km/h.



Exam-style question 2

A cyclist travels a distance of 7.2 km, correct to the nearest 0.1 km.

The cyclist took 12 minutes to cover this distance, to the nearest minute.

a) Work out the upper bound for the speed of the cyclist in m/s, correct to 3 significant figures.

b) What is the upper bound for the speed of the cyclist in km/h, correct to 3 significant figures?

Challenge

Carlos and Luis are travelling by car from Barcelona to Madrid.

Carlos drives the first half of the distance at an average speed of 60 km/h.
Luis drives the second half of the distance at an average speed of 40 km/h.

Assuming that the time spent swapping drivers at the halfway point took a negligible amount of time, what was the average speed over the whole journey?