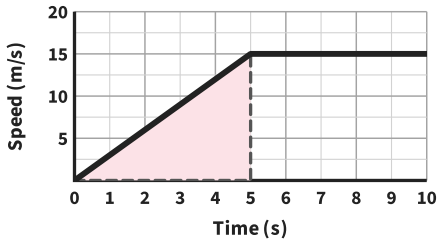
Speed-Time Graphs: Acceleration

ANSWERS

1

Find the acceleration in the first 5 seconds.



change in speed = 15 m/s

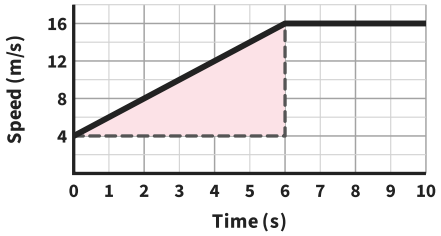
time = 5 s

acceleration = $\frac{15}{5}$

Acceleration 3 m/s²

2

Find the acceleration in the first 6 seconds.



change in speed = 12 m/s

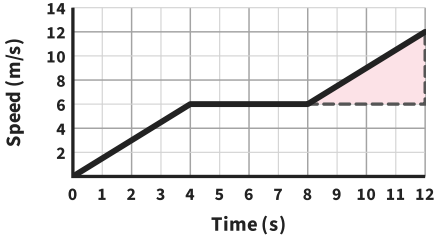
time = 6 s

acceleration = $\frac{12}{6}$

Acceleration 2 m/s²

3

Find the acceleration from 8 to 12 seconds.



change in speed = 6 m/s

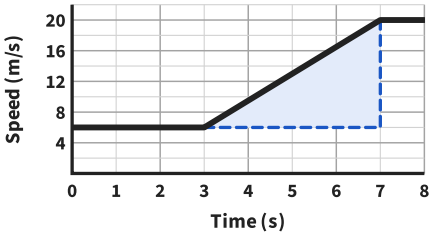
time = 4 s

acceleration = $\frac{6}{4}$

Acceleration 1.5 m/s²

4

Draw a triangle under the line.
Find the acceleration from 3 to 7 seconds.



change in speed = 14 m/s

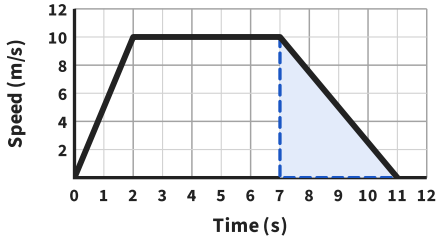
time = 4 s

acceleration = $\frac{14}{4}$

Acceleration 3.5 m/s²

5

Find the acceleration from 7 to 11 seconds.



change in speed = −10 m/s

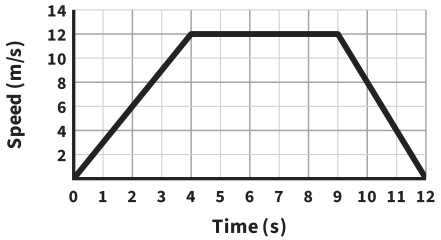
time = 4 s

acceleration = $\frac{-10}{4}$

Acceleration −2.5 m/s²

6

Sam says the car stopped between 4 and 9 seconds because the line is flat.
Explain why Sam is wrong. What is the acceleration between 4 and 9 seconds?



The speed stays at 12 m/s:

it is moving at a constant speed

Acceleration 0 m/s²

7

A motorbike speeds up steadily from 6 m/s to 27 m/s in 7 seconds.
Work out its acceleration.

change in speed = 27 − 6 = 21 m/s

acceleration = $\frac{21}{7}$

Acceleration 3 m/s²

8

A lift is moving at 4 m/s. It slows down steadily and stops after 2.5 seconds.
Work out its deceleration.

change in speed = 0 − 4 = −4 m/s

acceleration = $\frac{-4}{2.5}$ = −1.6

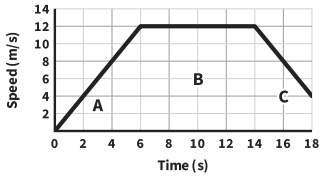
Deceleration 1.6 m/s²

Speed-Time Graphs: Acceleration *further practice*

ANSWERS

9

Find the acceleration in each part, A, B and C, of the journey.



A: 12 ÷ 6 = 2, B: flat, so 0

C: (4 − 12) ÷ 4 = −2

Answer 2, 0 and −2 m/s²

10

A van speeds up steadily from 5 m/s to 17 m/s. Its acceleration is 3 m/s².
How long does this take?

change in speed = 17 − 5 = 12 m/s

12 ÷ 3 = 4

Answer 4 seconds

11

A train starts from a standstill and reaches 72 km/h in 40 seconds.
Find its acceleration in m/s².

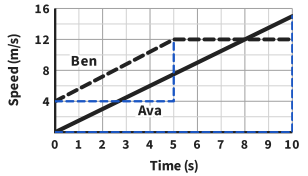
72 000 m in 3600 s: 20 m/s

20 ÷ 40 = 0.5

Answer 0.5 m/s²

12

Ava and Ben cycle from the start of a path. The graph shows their speeds.
Who has the greater acceleration at the start? Show how you know.



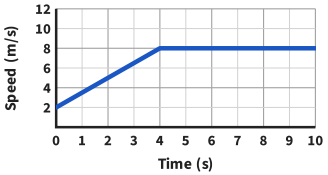
Ava: 15 ÷ 10 = 1.5 m/s²

Ben: (12 − 4) ÷ 5 = 1.6 m/s²

Answer Ben

13

A cyclist is moving at 2 m/s.
She speeds up with an acceleration of 1.5 m/s² for 4 seconds, then rides at a constant speed for 6 seconds.
Draw the speed-time graph.



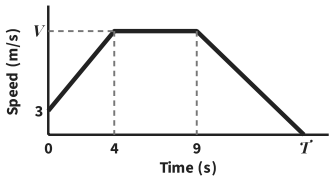
2 + 1.5 × 4 = 8 m/s after 4 s

then flat at 8 m/s until 10 s

Answer on the graph

14

The sketch shows a car's journey.
It accelerates at 2.5 m/s² for the first 4 seconds. At the end it decelerates at 2 m/s² until it stops. Find V and T.



V = 3 + 2.5 × 4 = 13

13 ÷ 2 = 6.5 s, so T = 9 + 6.5 = 15.5

Answer $V = 13$, $T = 15.5$

15

A cable car must not accelerate faster than 1.2 m/s². It goes from a standstill to 3.5 m/s in 2.8 seconds.
Is it within the limit?
Show how you know.

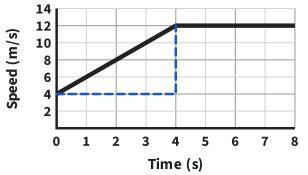
3.5 ÷ 2.8 = 1.25 m/s²

1.25 is more than 1.2

Answer No: 1.25 m/s² > 1.2

16

Tom says the acceleration in the first 4 seconds is 12 ÷ 4 = 3 m/s².
Explain Tom's mistake.
Find the correct acceleration.



12 is the speed, not the change in speed:

(12 − 4) ÷ 4 = 2

Answer 2 m/s²