Speed, Distance and Time

1) June 2010 V1

4 A person in a car, travelling at 108 kilometres per hour, takes 1 second to go past a building on the side of the road.

Calculate the length of the building in metres.

Answer ..... m [2]

2) June 2010 V1

9 A cyclist left Melbourne on Wednesday 21 May at 0945 to travel to Sydney.
The journey took 97 hours.

Write down the day, date and time that the cyclist arrived in Sydney.

Answer Day ..... Date ..... Time ..... [3]

4 The maximum speed of a car is 252 km/h.

Change this speed into metres per second.

Answer ..... m/s [2]

4) November 2010 V3

2 A plane took 1 hour and 10 minutes to fly from Riyadh to Jeddah.
The plane arrived in Jeddah at 2305.
At what time did the plane depart from Riyadh?

Answer ..... [1]

5) November 2010 V3

14 Priyantha completes a 10 km run in 55 minutes 20 seconds.
Calculate Priyantha's average speed in km/h.

Answer ..... km/h [3]

12 A train leaves Barcelona at 21 28 and takes 10 hours and 33 minutes to reach Paris.

(a) Calculate the time the next day when the train arrives in Paris.

Answer(a) ..... [1]

(b) The distance from Barcelona to Paris is 827 km.

Calculate the average speed of the train in kilometres per hour.

Answer(b) ..... km/h [3]

10 The table shows the opening and closing times of a café.

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Opening time	0600	0600	0600	0600	0600	(*a*)	0800
Closing time	2200	2200	2200	2200	2200	2200	1300

(a) The café is open for a total of 100 hours each week.
Work out the opening time on Saturday.

Answer(a) ..... [2]

(b) The owner decides to close the café at a later time on Sunday. This increases the **total** number of hours the café is open by 4%.
Work out the new closing time on Sunday.

Answer(b) ..... [1]

8) November 2011 V2

1 A bus leaves a port every 15 minutes, starting at 0900.
The last bus leaves at 1730.

How many times does a bus leave the port during one day?

Answer ..... [2]

9) November 2011 V2

8 A cruise ship travels at 22 knots.

[1 knot is 1.852 kilometres per hour.]

Convert this speed into metres per second.

Answer ..... m/s [3]

9 A shop is open during the following hours.

	Monday to Friday	Saturday	Sunday
Opening time	0645	0730	0845
Closing time	1730	1730	1200

(a) Write the closing time on Saturday in the 12-hour clock time.

Answer(a) ..... [1]

(b) Calculate the total number of hours the shop is open in one week.

Answer(b) ..... h [2]

11) June 2013 V3

3 The time in Lisbon is the same as the time in Funchal.
A plane left Lisbon at 0830 and arrived in Funchal at 10 20.
It then left Funchal at 1255 and returned to Lisbon.
The return journey took 15 minutes more.

What time did the plane arrive in Lisbon?

Answer ..... [2]

12) November 2013 V1

19 **(a)** Convert 144 km/h into metres per second.

Answer(a) ..... m/s [2]

(b) A train of length 120 m is travelling at 144 km/h.
It passes under a bridge of width 20 m.

Find the time taken for the whole train to pass under the bridge.
Give your answer in seconds.

Answer(b) s [2]

1 Christa had a music lesson every week for one year.
Each of the 52 lessons lasted for 45 minutes.

Calculate the total time that Christa spent in music lessons.
Give your time in hours.

Answer ..... h [2]

9 A bus company in Dubai has the following operating times.

Day	Starting time	Finishing time
Saturday	06 00	2400
Sunday	06 00	2400
Monday	06 00	2400
Tuesday	06 00	2400
Wednesday	06 00	2400
Thursday	06 00	2400
Friday	13 00	2400

(a) Calculate the total number of hours that the bus company operates in one week.

Answer(a) ..... h [3]

(b) Write the starting time on Friday in the 12-hour clock.

Answer(b) ..... [1]

5 A train takes 65 minutes to travel 52 km.

Calculate the average speed of the train in kilometres per hour.

Answer ..... km/h [2]

16) June 2015 V1

13 A car travels a distance of 1280 **metres** at an average speed of 64 kilometres per hour.

Calculate the time it takes for the car to travel this distance.
Give your answer in **seconds**.

Answer ..... s [3]

17) June 2015 V2

2 A doctor starts work at 20 40 and finishes work at 06 10 the next day.

How long is the doctor at work?
Give your answer in hours and minutes.

Answer ..... h ..... min [1]

14 A car travels at 56 km/h.

Find the time it takes to travel 300 metres.
Give your answer in seconds correct to the nearest second.

Answer ..... s [4]

19) March 2015 V2

19 Fritz drives a distance of 381 km in 2 hours and 18 minutes.
He then drives 75 km at a constant speed of 30 km/h.

Calculate his average speed for the whole journey.

Answer ..... km/h [4]

20) June 2016 V1

1 A train leaves Zurich at 22 40 and arrives in Vienna at 07 32 the next day.

Work out the time taken.

..... h ..... min [1]

21) June 2016 V1

18 A car of length 4.3 m is travelling at 105 km/h.
It passes over a bridge of length 36 m.

Calculate the time, in seconds, it takes to pass over the bridge **completely**.

..... s [3]

22) June 2012 V2

1 The ferry from Helsinki to Travemunde leaves Helsinki at 1730 on a Tuesday.
The journey takes 28 hours 45 minutes.

Work out the day and time that the ferry arrives in Travemunde.

Answer Day ..... Time ..... [2]

23) June 2016 V1

1 A train leaves Zurich at 2240 and arrives in Vienna at 07 32 the next day.

Work out the time taken.

..... h ..... min [1]

20 A train travels for m minutes at a speed of x metres per second.

(a) Find the distance travelled, in **kilometres**, in terms of m and x.
Give your answer in its simplest form.

..... km [2]

(b) When $m = 5$, the train travels 10.5 km.

Find the value of x.

$x =$ ..... [2]

19 The braking distance, d metres, for Alex's car travelling at v km/h is given by the formula

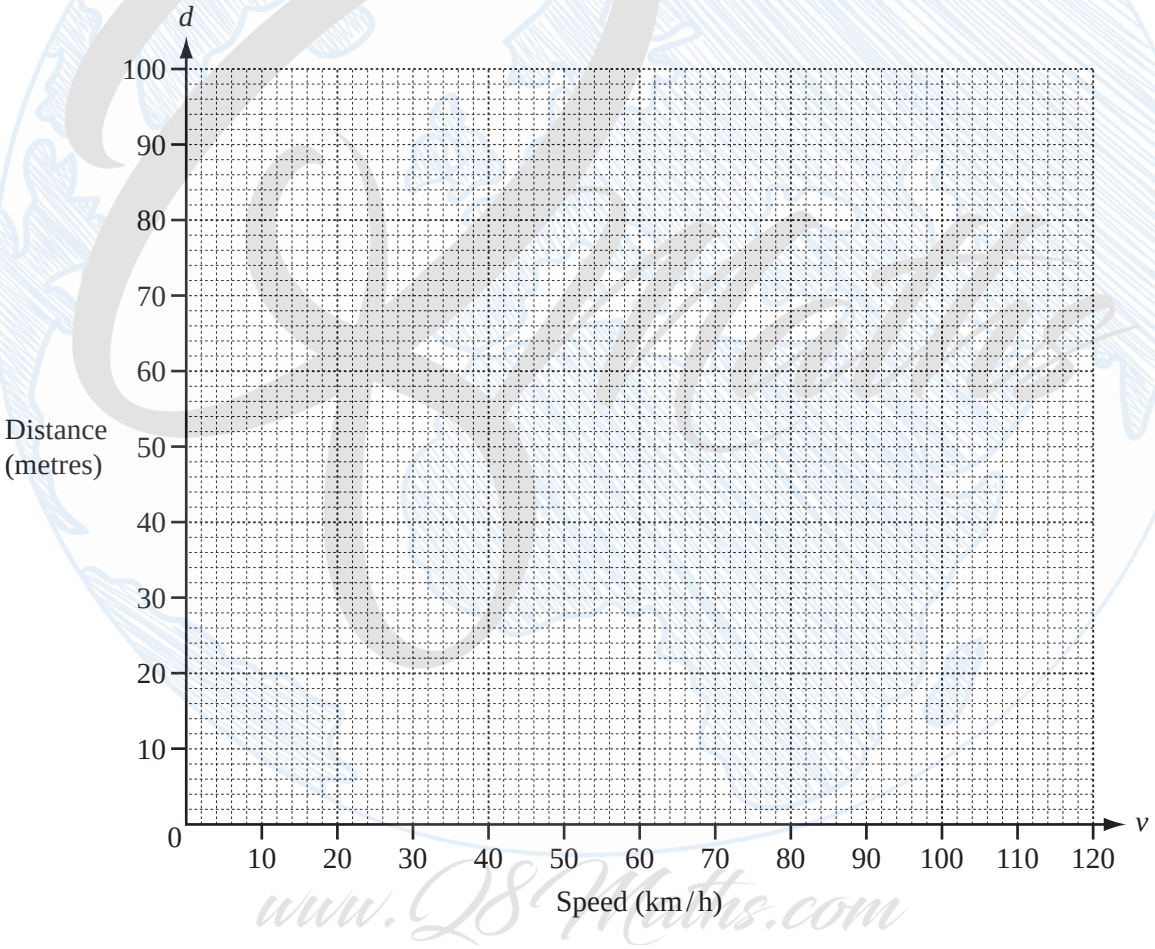
$$200d = v(v + 40).$$

(a) Calculate the missing values in the table.

v (km/h)	0	20	40	60	80	100	120
d (metres)	0		16		48		96

[2]

(b) On the grid below, draw the graph of $200d = v(v + 40)$ for $0 \leqslant v \leqslant 120$.



[3]

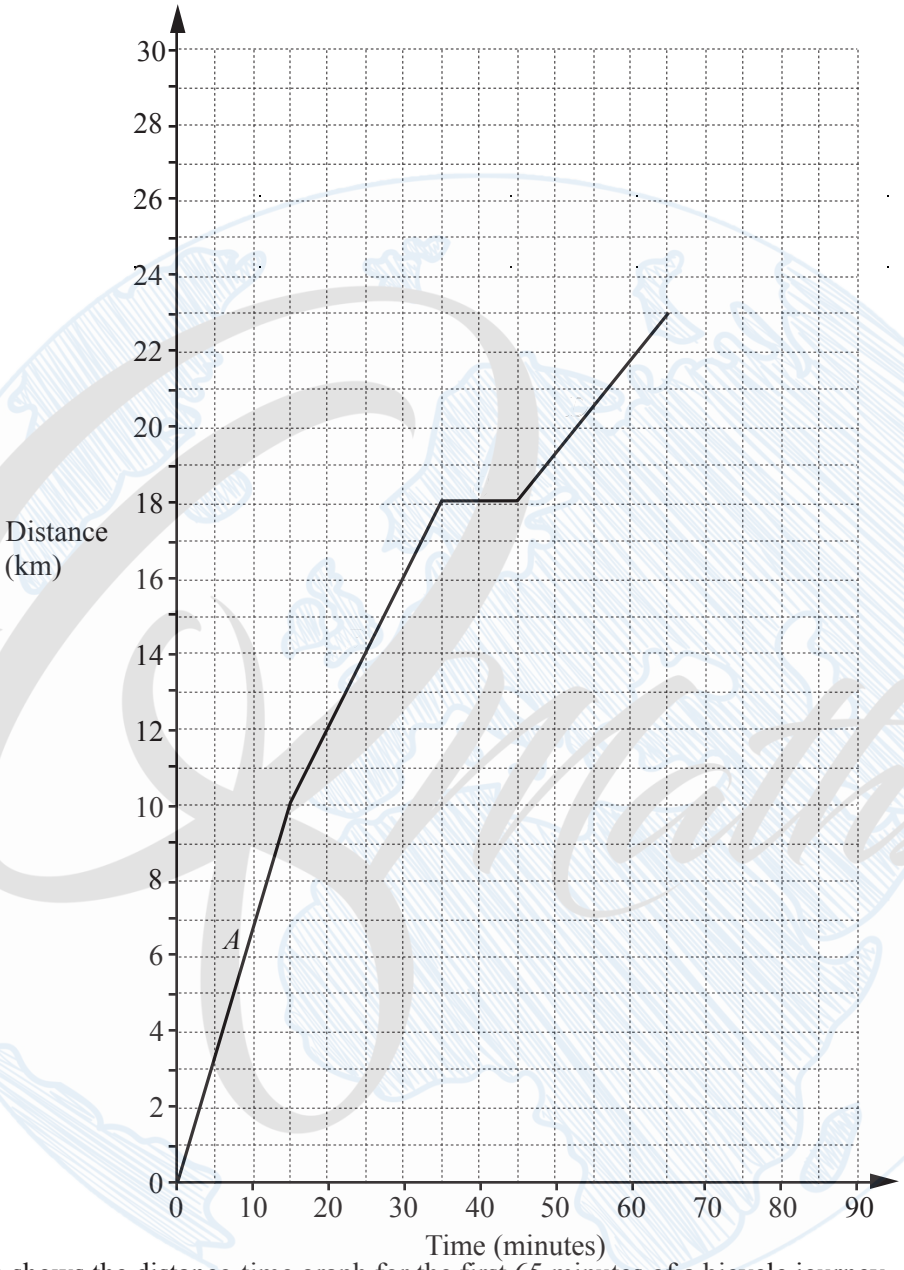
(c) Find the braking distance when the car is travelling at 110 km/h.

Answer(c) ..... m [1]

(d) Find the speed of the car when the braking distance is 80 m.

Answer(d) ..... km/h [1]

9



The diagram shows the distance-time graph for the first 65 minutes of a bicycle journey.

(a) There are four different parts to the journey labelled A, B, C and D.

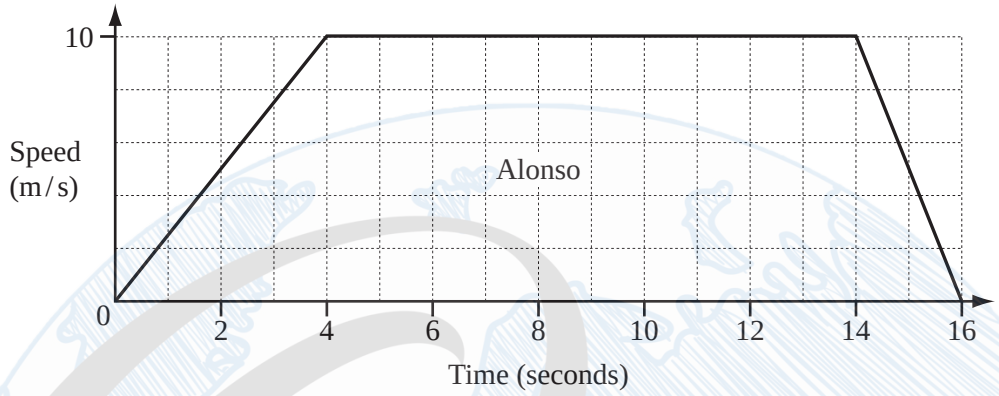
Write down the part of the journey with the fastest speed.

..... [1]

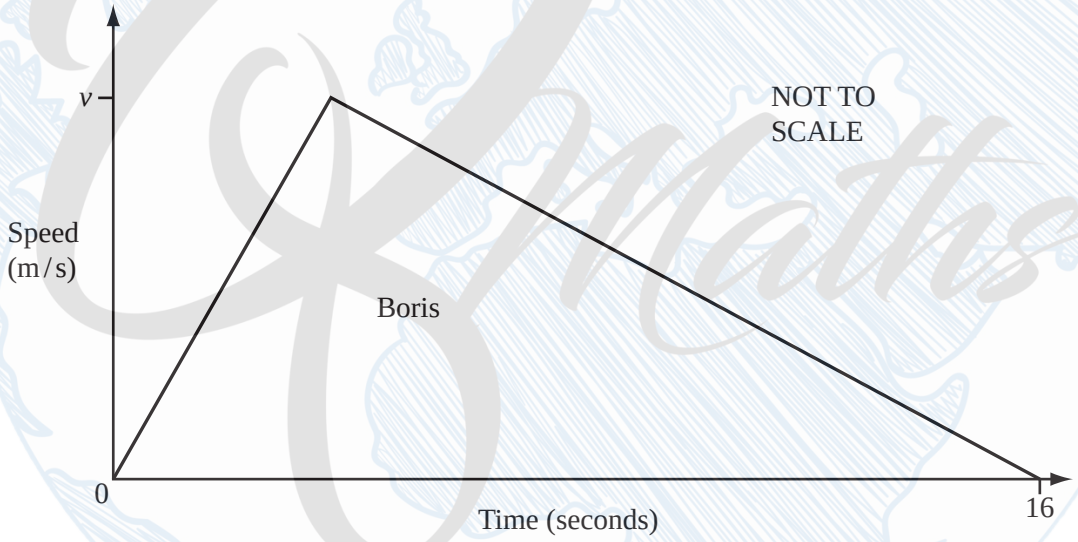
(b) After the first 65 minutes the bicycle travels at a constant speed of 20 km/h for 15 minutes.
Draw this part of the journey on the diagram. [1]

16 The graphs show the speeds of two cyclists, Alonso and Boris.

Alonso accelerated to 10 m/s, travelled at a steady speed and then slowed to a stop.



Boris accelerated to his maximum speed, v m/s, and then slowed to a stop.

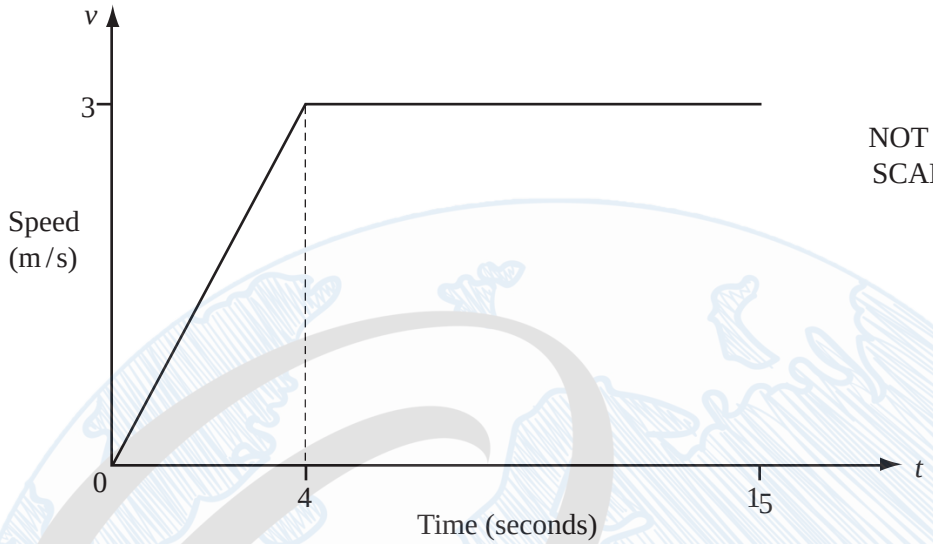


Both cyclists travelled the same distance in the 16 seconds.

Calculate the maximum speed for Boris.
Show all your working.

Answer ..... m/s [5]

19



The diagram shows the speed-time graph for 15 seconds of the journey of a cyclist.

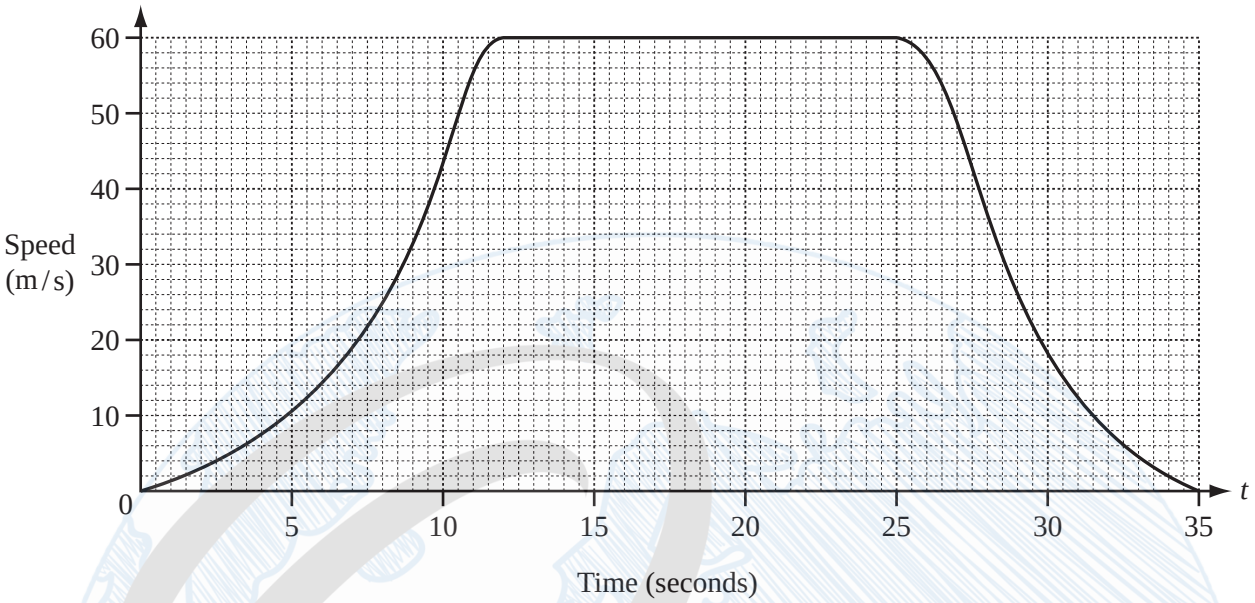
(a) Calculate the acceleration of the cyclist during the first 4 seconds.

Answer(a) ..... m/s^2 [1]

(b) Calculate the average speed for the first 15 seconds.

Answer(b) ..... m/s [3]

18



The graph shows the speed of a sports car after t seconds.

It starts from rest and accelerates to its maximum speed in 12 seconds.

(a) **(i)** Draw a tangent to the graph at $t = 7$. [1]

(ii) Find the acceleration of the car at $t = 7$.

Answer(a)(ii) ..... m/s^2 [2]

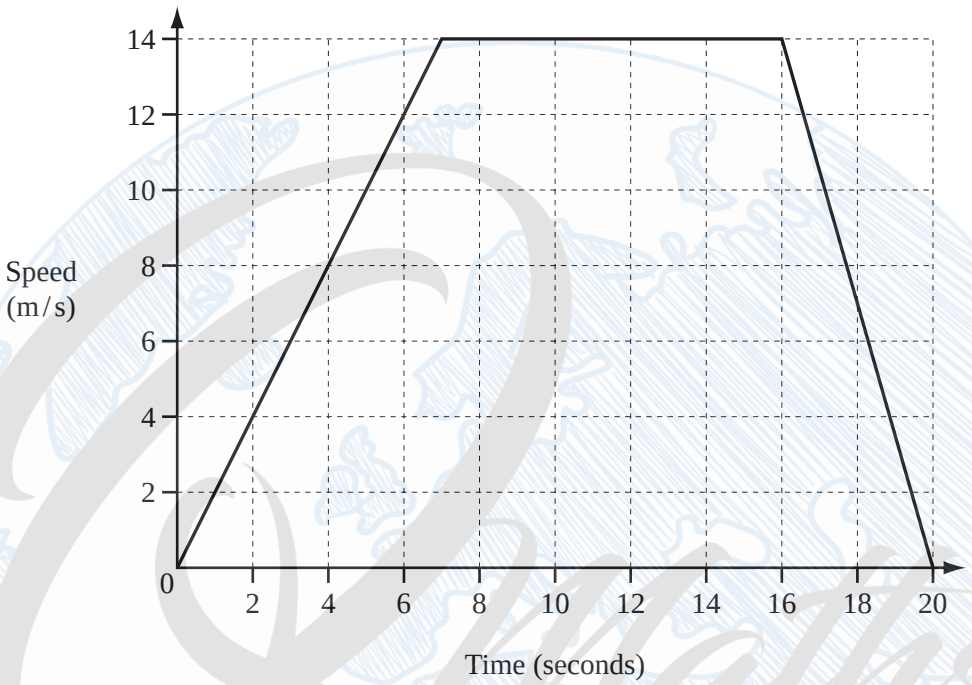
(b) The car travels at its maximum speed for 13 seconds.

Find the distance travelled by the car at its maximum speed.

Answer(b) ..... m [2]

21 An animal starts from rest and accelerates to its top speed in 7 seconds. It continues at this speed for 9 seconds and then slows to a stop in a further 4 seconds.

The graph shows this information.



(a) Calculate its acceleration during the first seven seconds.

Answer(a) ..... m/s^2 [1]

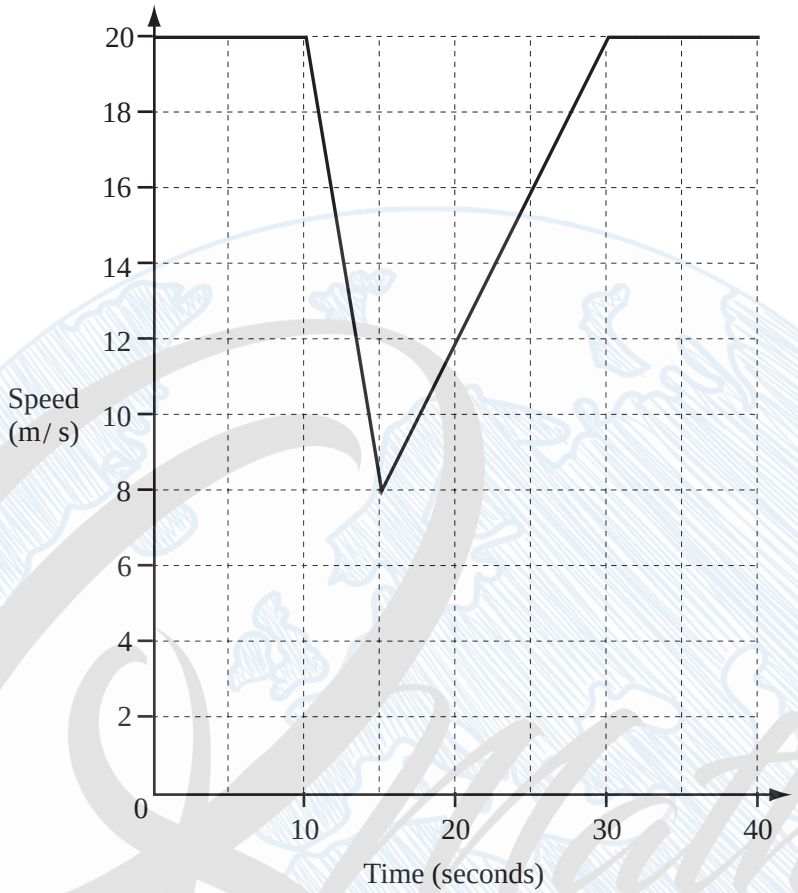
(b) Write down its speed 18 seconds after the start.

Answer(b) ..... m/s [1]

(c) Calculate the total distance that the animal travelled.

Answer(c) ..... m [3]

21



The graph shows 40 seconds of a car journey.

The car travelled at a constant speed of 20 m/s, decelerated to 8 m/s then accelerated back to 20 m/s.

Calculate

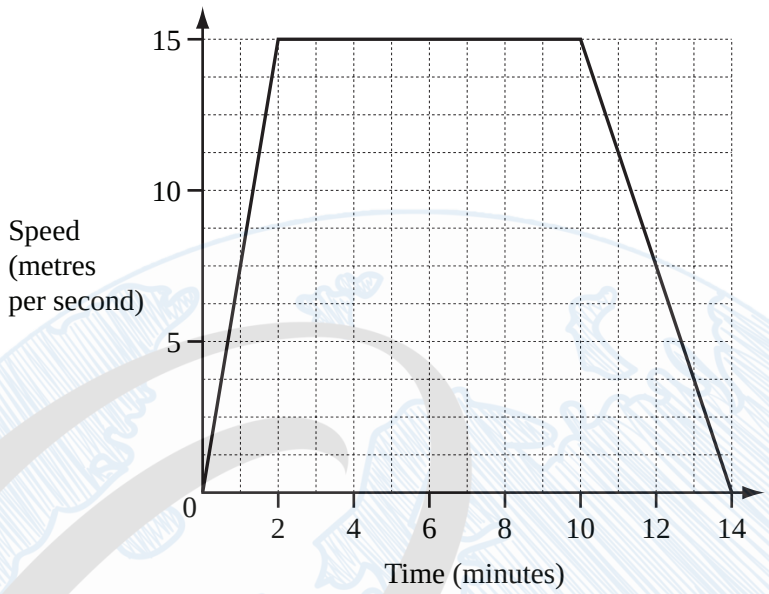
(a) the deceleration of the car,

Answer(a) ..... m/s^2 [1]

(b) the total distance travelled by the car during the 40 seconds.

Answer(b) ..... m [3]

19



The diagram shows the speed-time graph of a train journey between two stations.
The train accelerates for two minutes, travels at a constant maximum speed, then slows to a stop.

(a) Write down the number of **seconds** that the train travels at its constant maximum speed.

Answer(a) ..... s [1]

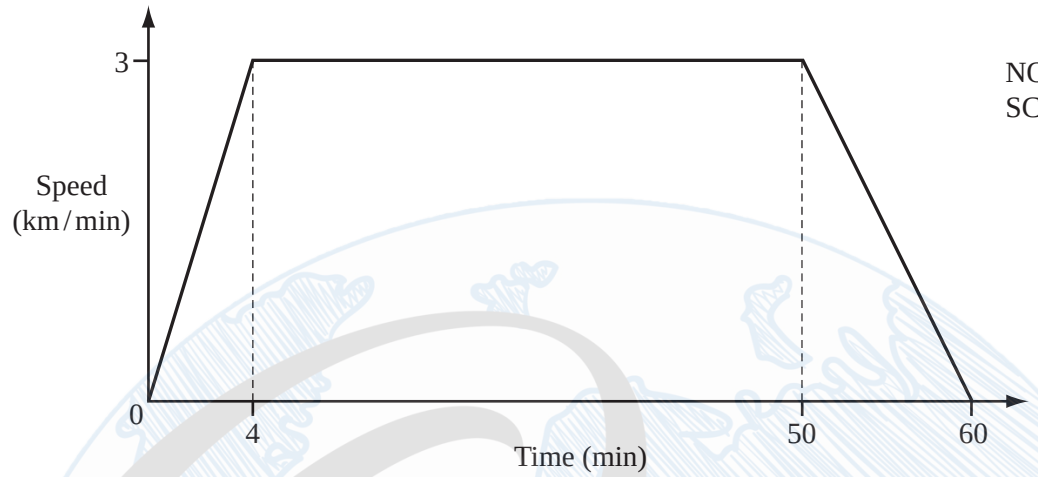
(b) Calculate the distance between the two stations **in metres**.

Answer(b) ..... m [3]

(c) Find the acceleration of the train in the **first two minutes**.
Give your answer in m/s^2.

Answer(c) ..... m/s^2 [2]

22



A train journey takes one hour.
The diagram shows the speed-time graph for this journey.

(a) Calculate the total distance of the journey.

Give your answer in kilometres.

Answer(a) ..... km [3]

(b) **(i)** Convert 3 kilometres / minute into metres / second.

Answer(b)(i) ..... m/s [2]

(ii) Calculate the acceleration of the train during the first 4 minutes.

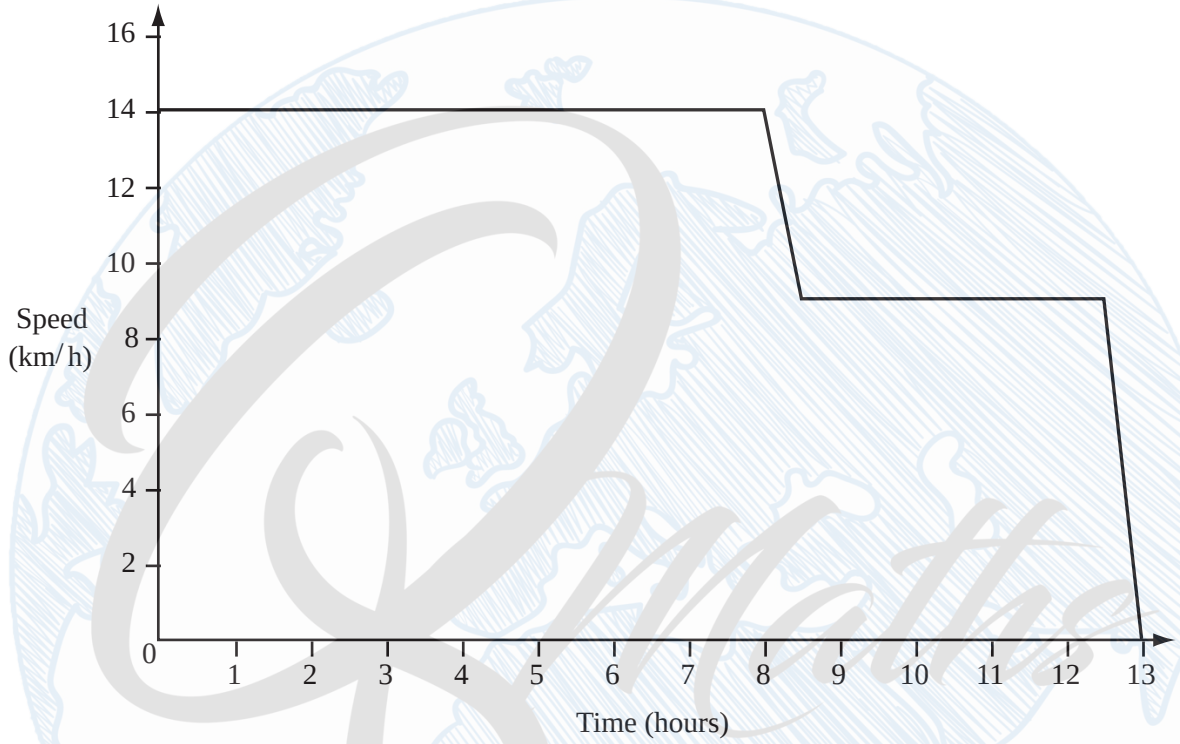
Give your answer in metres / second^2.

Answer(b)(ii) ..... m/s^2 [2]

15 A container ship travelled at 14 km/h for 8 hours and then slowed down to 9 km/h over a period of 30 minutes.

It travelled at this speed for another 4 hours and then slowed to a stop over 30 minutes.

The speed-time graph shows this voyage.



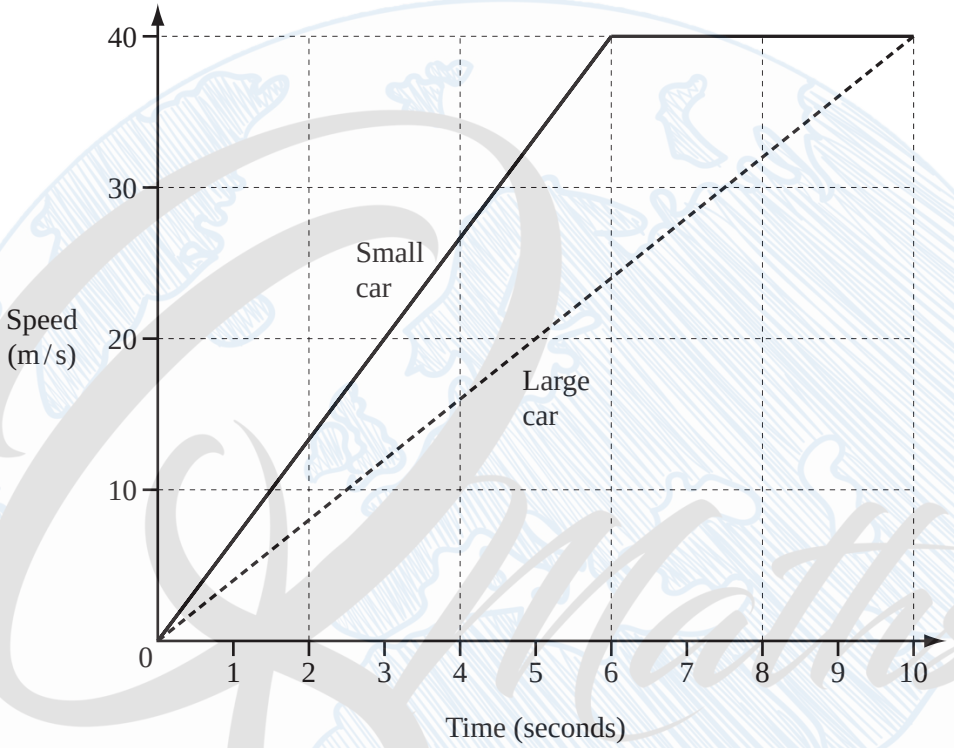
(a) Calculate the total distance travelled by the ship.

Answer(a) ..... km [4]

(b) Calculate the average speed of the ship for the whole voyage.

Answer(b) ..... km/h [1]

12

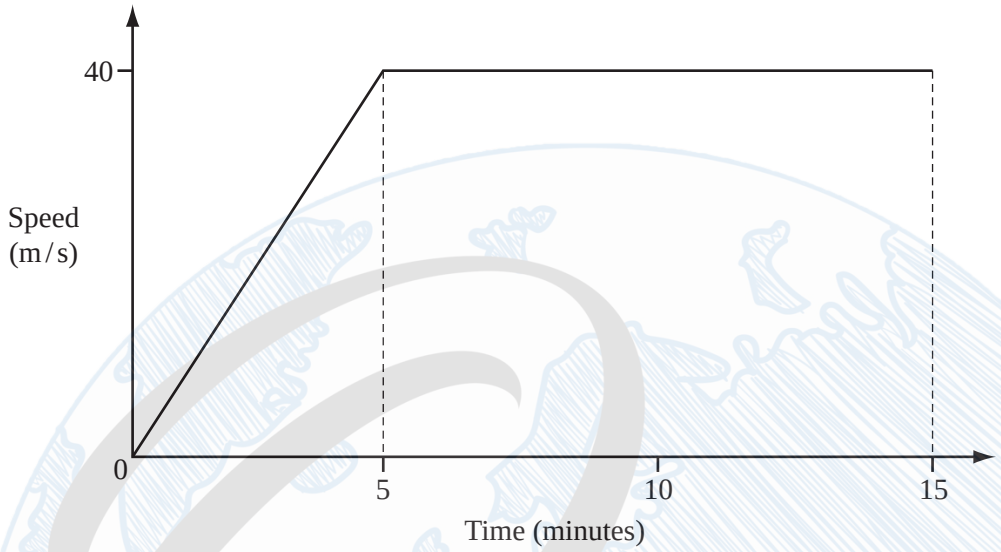


A small car accelerates from 0 m/s to 40 m/s in 6 seconds and then travels at this constant speed.
A large car accelerates from 0 m/s to 40 m/s in 10 seconds.

Calculate how much further the small car travels in the first 10 seconds.

Answer ..... m [4]

23



The diagram shows the speed-time graph for the first 15 **minutes** of a train journey.
The train accelerates for 5 minutes and then continues at a constant speed of 40 metres/**second**.

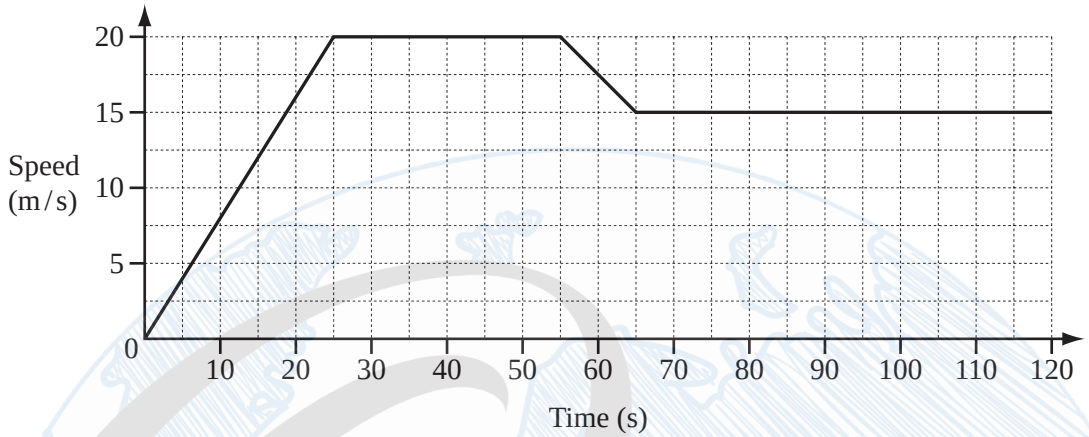
(a) Calculate the acceleration of the train during the first 5 minutes.
Give your answer in m/s^2.

Answer(a) ..... m/s^2 [2]

(b) Calculate the average speed for the first 15 minutes of the train journey.
Give your answer in m/s.

Answer(b) ..... m/s [3]

18



The diagram shows the speed-time graph for the first 120 seconds of a car journey.

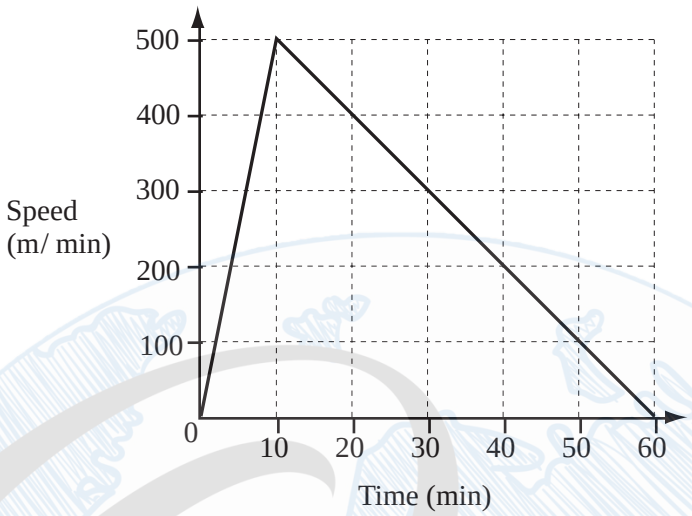
(a) Calculate the acceleration of the car during the first 25 seconds.

Answer(a) ..... m/s^2 [1]

(b) Calculate the distance travelled by the car in the first 120 seconds.

Answer(b) ..... m [4]

10



The diagram shows the speed-time graph for a boat journey.

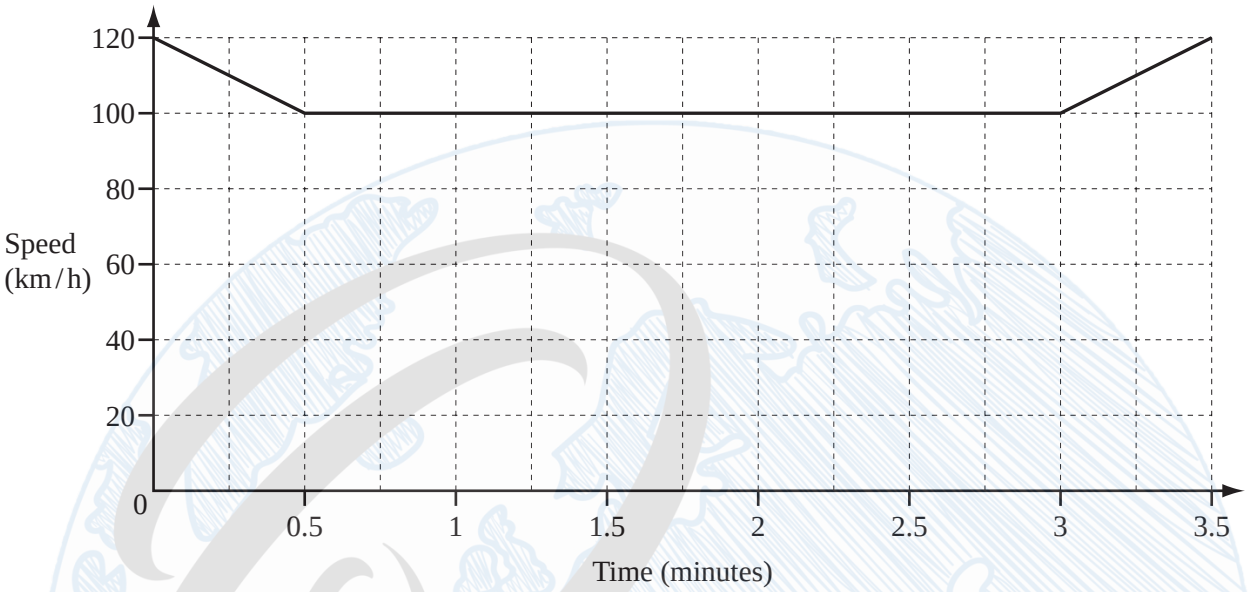
(a) Work out the acceleration of the boat in metres / minute^2.

Answer(a) ..... m /min^2 [1]

(b) Calculate the total distance travelled by the boat.
Give your answer in **kilometres**.

Answer(b) ..... km [2]

19

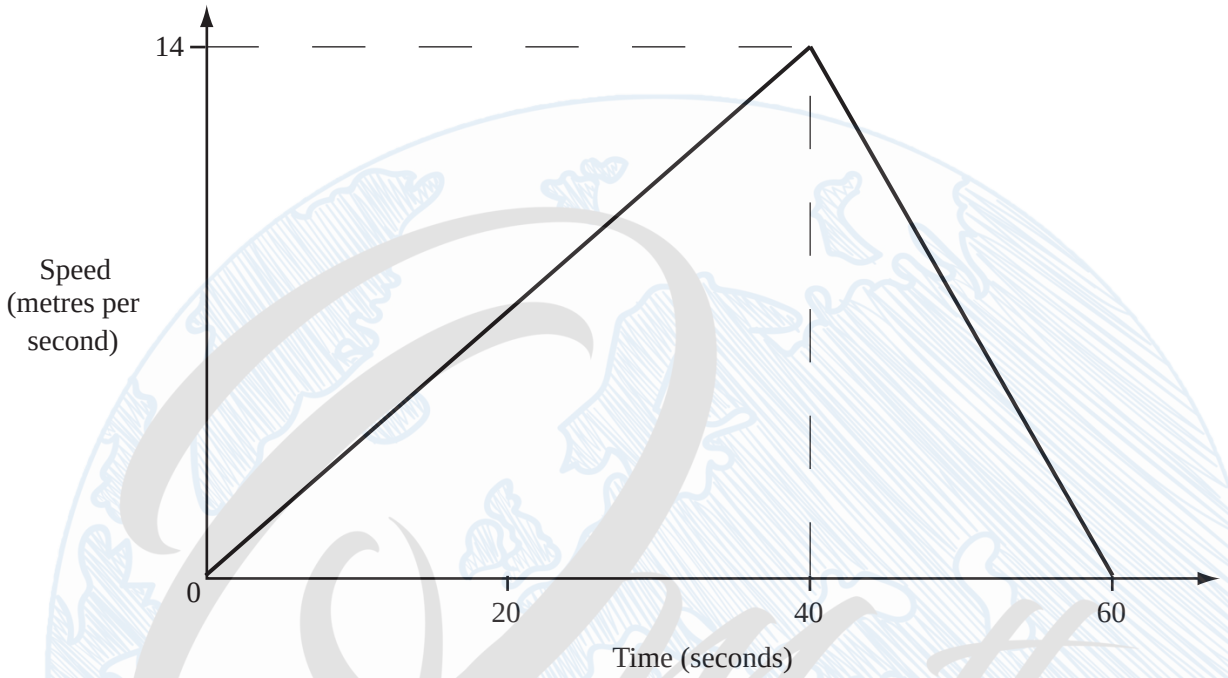


The diagram shows the speed-time graph for part of a car journey.
The speed of the car is shown in kilometres/**hour**.

Calculate the distance travelled by the car during the 3.5 **minutes** shown in the diagram.
Give your answer in kilometres.

Answer ..... km [4]

15

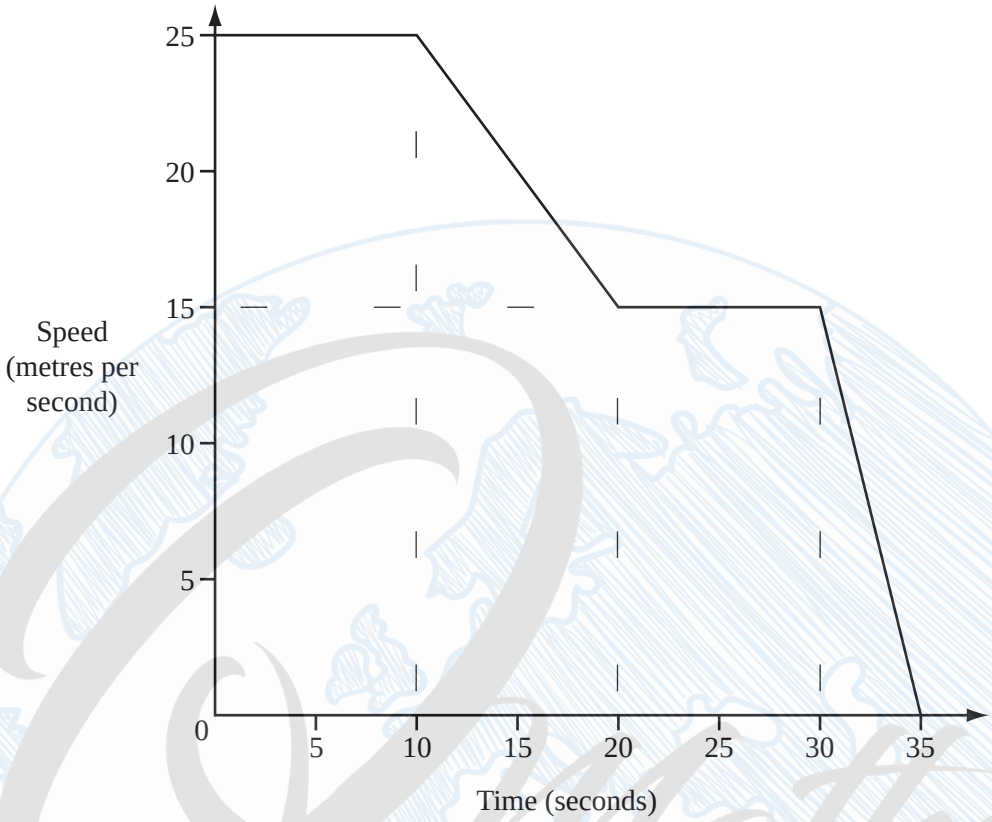


The diagram shows the speed-time graph of a bus journey between two bus stops.
Hamid runs at a constant speed of 4 m/s along the bus route.
He passes the bus as it leaves the first bus stop.
The bus arrives at the second bus stop after 60 seconds.

How many metres from the bus is Hamid at this time?

Answer ..... m [3]

15



The diagram shows the speed-time graph for the last 35 seconds of a car journey.

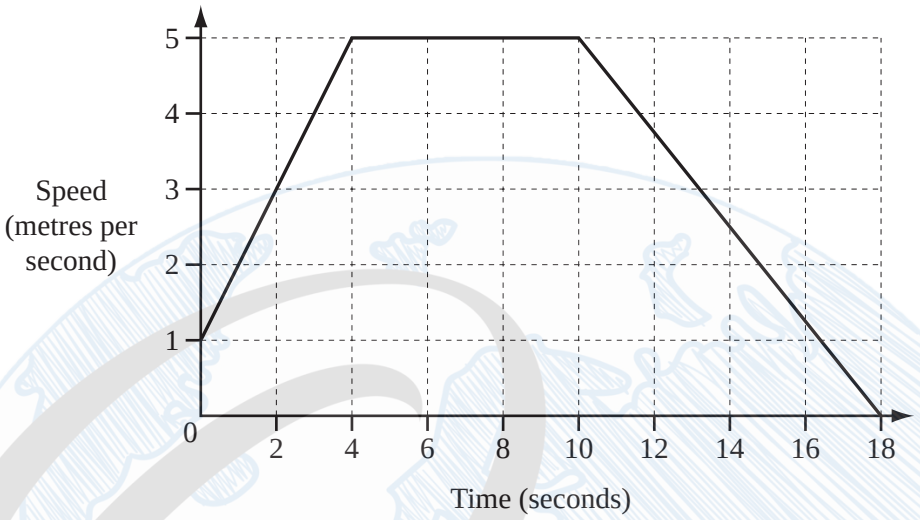
(a) Find the deceleration of the car as it came to a stop.

Answer(a) ..... m/s^2 [1]

(b) Calculate the total distance travelled by the car in the 35 seconds.

Answer(b) ..... m [3]

19



The diagram shows the speed-time graph for the last 18 seconds of Roman's cycle journey.

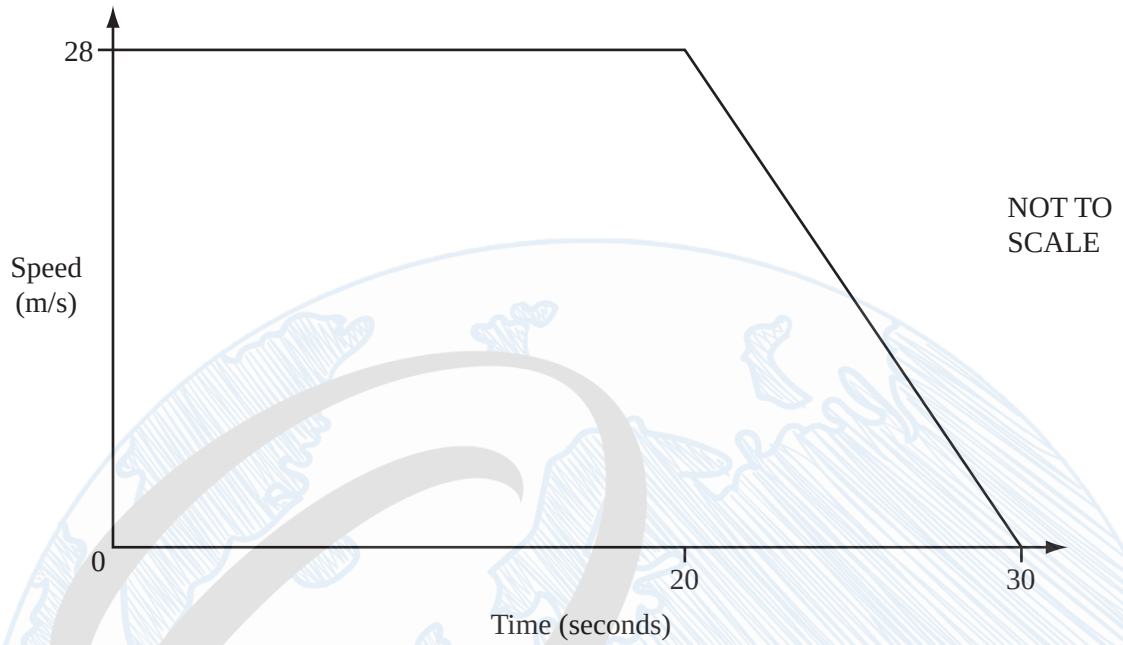
(a) Calculate the deceleration.

Answer(a) ..... m/s^2 [1]

(b) Calculate the total distance Roman travels during the 18 seconds.

Answer(b) ..... m [3]

25



The diagram shows the speed-time graph of a car.
It travels at 28 m/s for 20 seconds and then decelerates until it stops after a further 10 seconds.

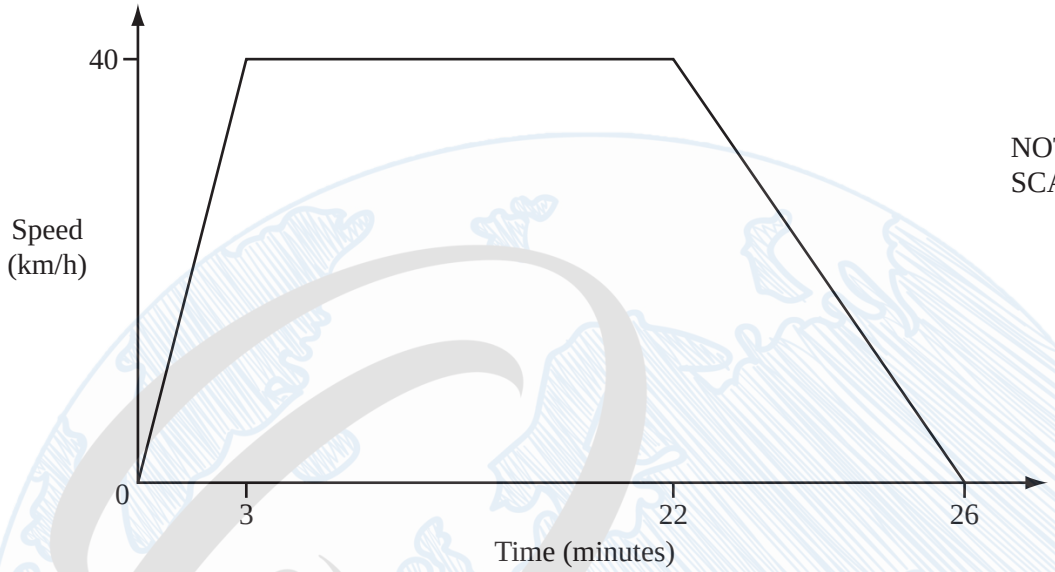
(a) Calculate the deceleration of the car.

Answer(a) ..... m/s^2 [1]

(b) Calculate the distance travelled during the 30 seconds.

Answer(b) ..... m [3]

16



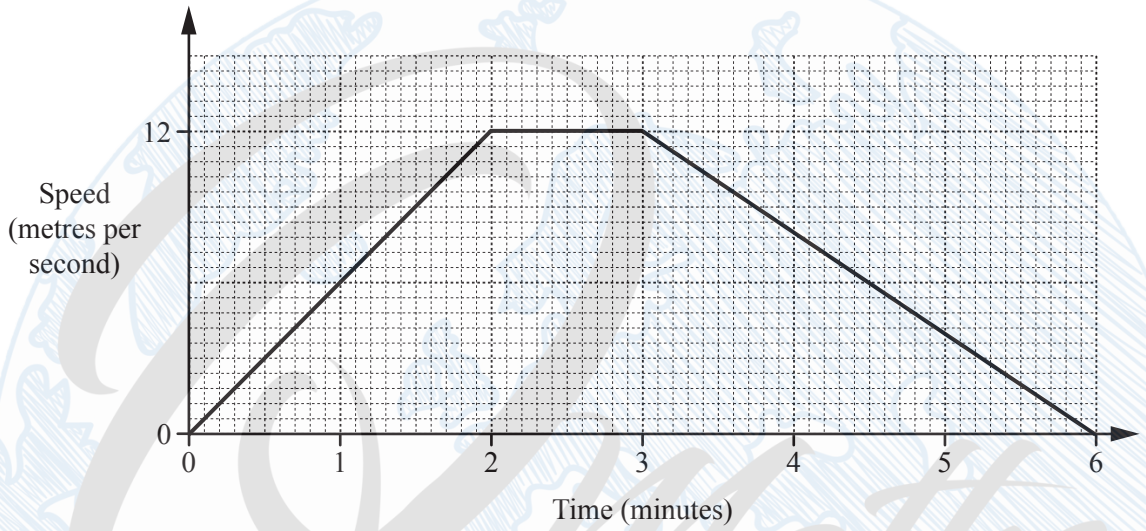
The diagram shows the speed-time graph of a train journey between two stations.

The train accelerates for 3 minutes, travels at a constant maximum speed of 40 km/h, then takes 4 minutes to slow to a stop.

Calculate the distance in kilometres between the two stations.

Answer ..... km [4]

10

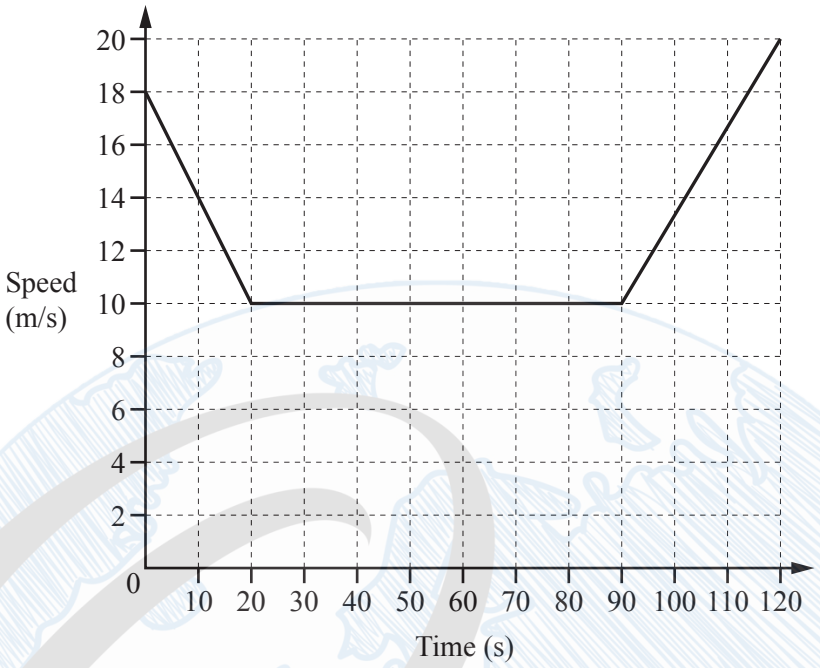


A tram leaves a station and accelerates for 2 **minutes** until it reaches a speed of 12 metres per second.
It continues at this speed for 1 minute.
It then decelerates for 3 minutes until it stops at the next station.
The diagram shows the speed-time graph for this journey.

Calculate the distance, in metres, between the two stations.

Answer ..... m [3]

23



The diagram shows the speed-time graph for 120 seconds of a car journey.

(a) Calculate the deceleration of the car during the first 20 seconds.

Answer(a) ..... m/s^2 [1]

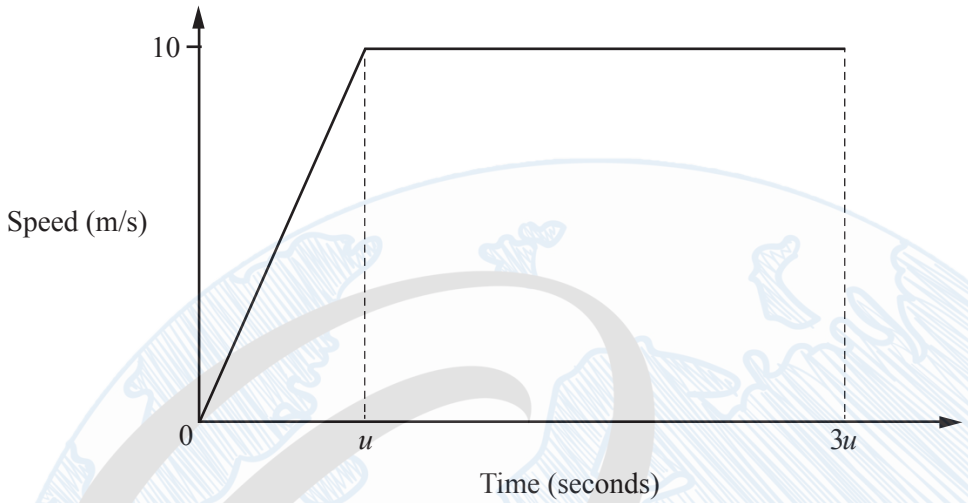
(b) Calculate the total distance travelled by the car during the 120 seconds.

Answer(b) ..... m [3]

(c) Calculate the average speed for this 120 second journey.

Answer(c) ..... m/s [1]

12



A car starts from rest and accelerates for u seconds until it reaches a speed of 10 m/s.
The car then travels at 10 m/s for $2u$ seconds.
The diagram shows the speed-time graph for this journey.

The distance travelled by the car in the first $3u$ seconds is 125 m.

(a) Find the value of u

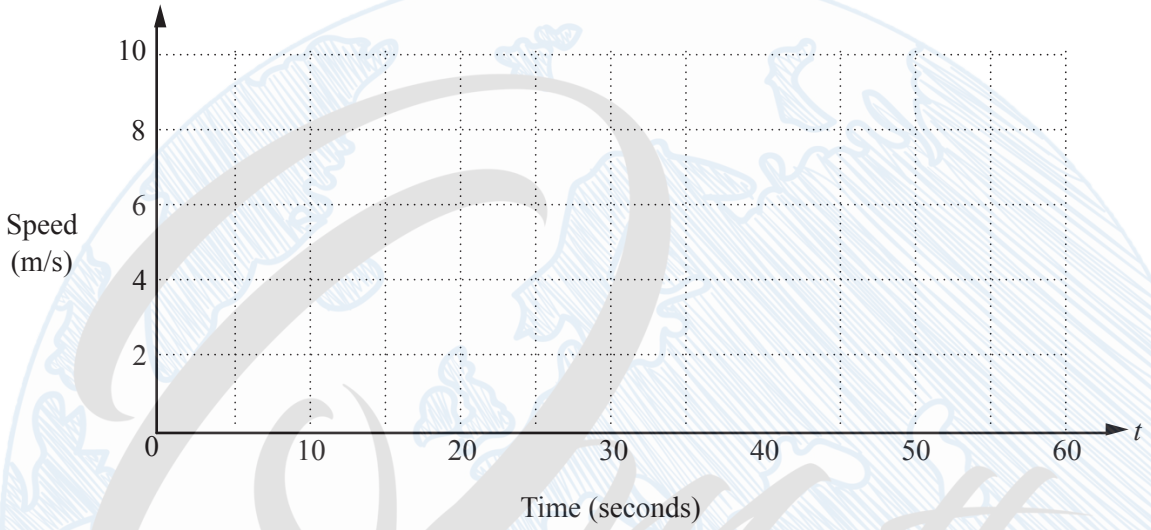
Answer(a) $u =$ ..... [3]

(b) Find the acceleration in the first u seconds.

Answer(b) ..... m/s^2 [1]

20 A car passes through a checkpoint at time $t = 0$ seconds, travelling at 8 m/s.
It travels at this speed for 10 seconds.
The car then decelerates at a constant rate until it stops when $t = 55$ seconds.

(a) On the grid, draw the speed-time graph.

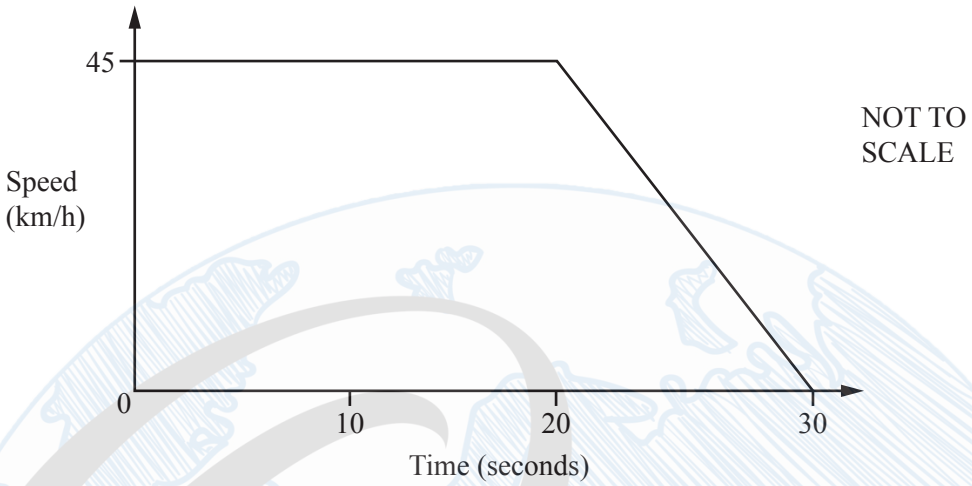


[2]

(b) Calculate the total distance travelled by the car after passing through the checkpoint.

Answer(b) ..... m [3]

26



The diagram shows the speed-time graph of a car.
The car travels at 45 km/h for 20 seconds.
The car then decelerates for 10 seconds until it stops.

(a) Change 45 km/h into m/s.

Answer(a) ..... m/s [2]

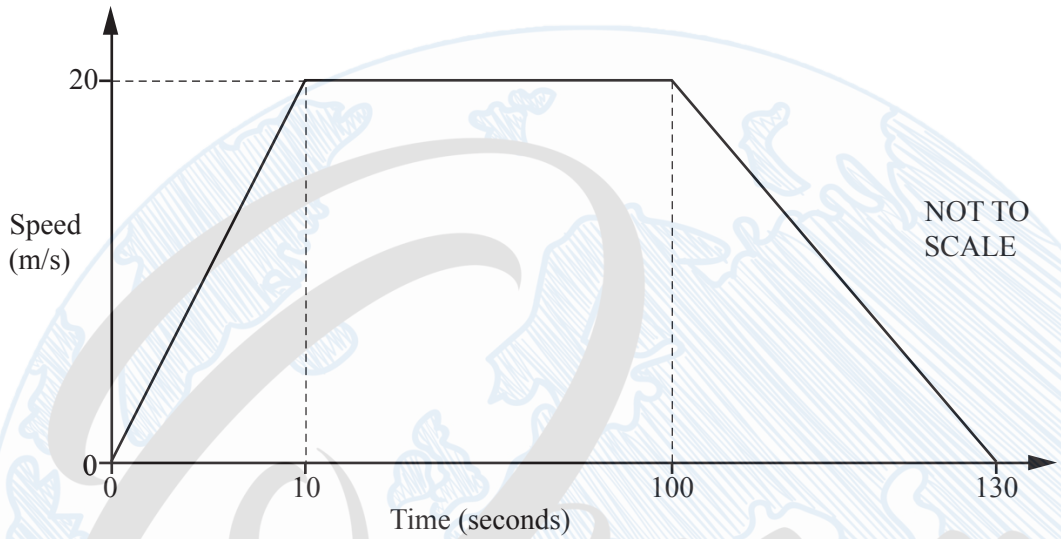
(b) Find the deceleration of the car, giving your answer in m/s^2.

Answer(b) ..... m/s^2 [1]

(c) Find the distance travelled by the car during the 30 seconds, giving your answer in metres.

Answer(c) ..... m [3]

17

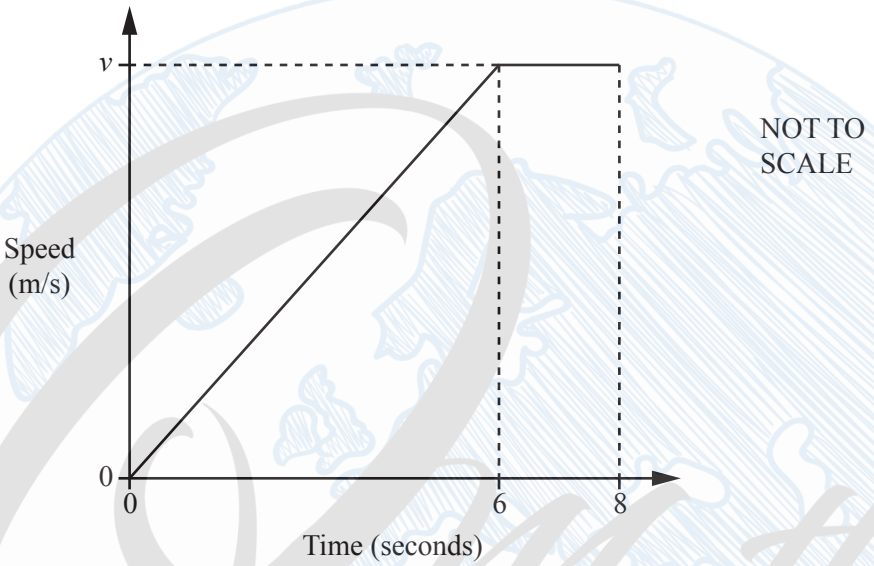


The speed time graph shows information about the journey of a tram between two stations.

(a) Calculate the distance between the two stations.

..... m [3]

17 The diagram shows information about the first 8 seconds of a car journey.

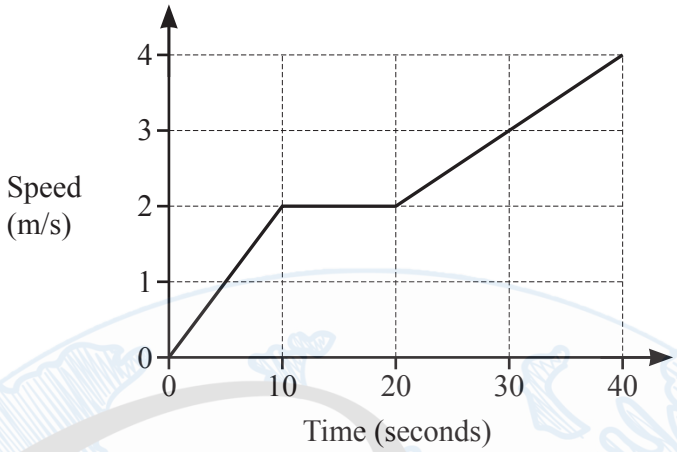


The car travels with constant acceleration reaching a speed of v m/s after 6 seconds.
The car then travels at a constant speed of v m/s for a further 2 seconds.
The car travels a total distance of 150 metres.

Work out the value of v.

$v =$ ..... [3]

17



The diagram shows the speed–time graph for the first 40 seconds of a cycle ride.

(a) Find the acceleration between 20 and 40 seconds.

..... m/s^2 [1]

(b) Find the total distance travelled.

..... m [3]