EXAM PAPERS PRACTICE

GCSE OCR Math J560

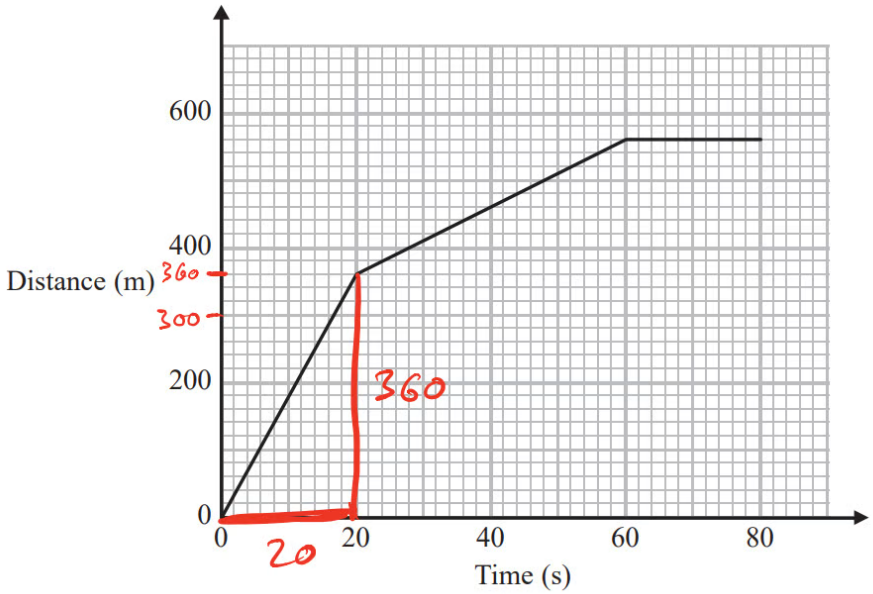
D-T / V-T Graphs

Answers

"We will help you to achieve A Star "

Answer 1

Here is part of a distance-time graph for a car's journey.



(a) Between which two times does the car travel at its greatest speed?
Give a reason for your answer.

STEEPEST GRADIENT = GREATEST SPEED

So 0s → 20s

DISTANCE-TIME GRAPHS
- GRADIENT IS SPEED
- STRAIGHT LINES = CONSTANT SPEED

Answer 2

(b) Work out this greatest speed.

SPEED = GRADIENT = $\frac{\text{RISE}}{\text{RUN}}$

$= \frac{360}{20}$

$= 18 \text{ m/s}$

GRADIENT

$m = \frac{\text{RISE}}{\text{RUN}}$

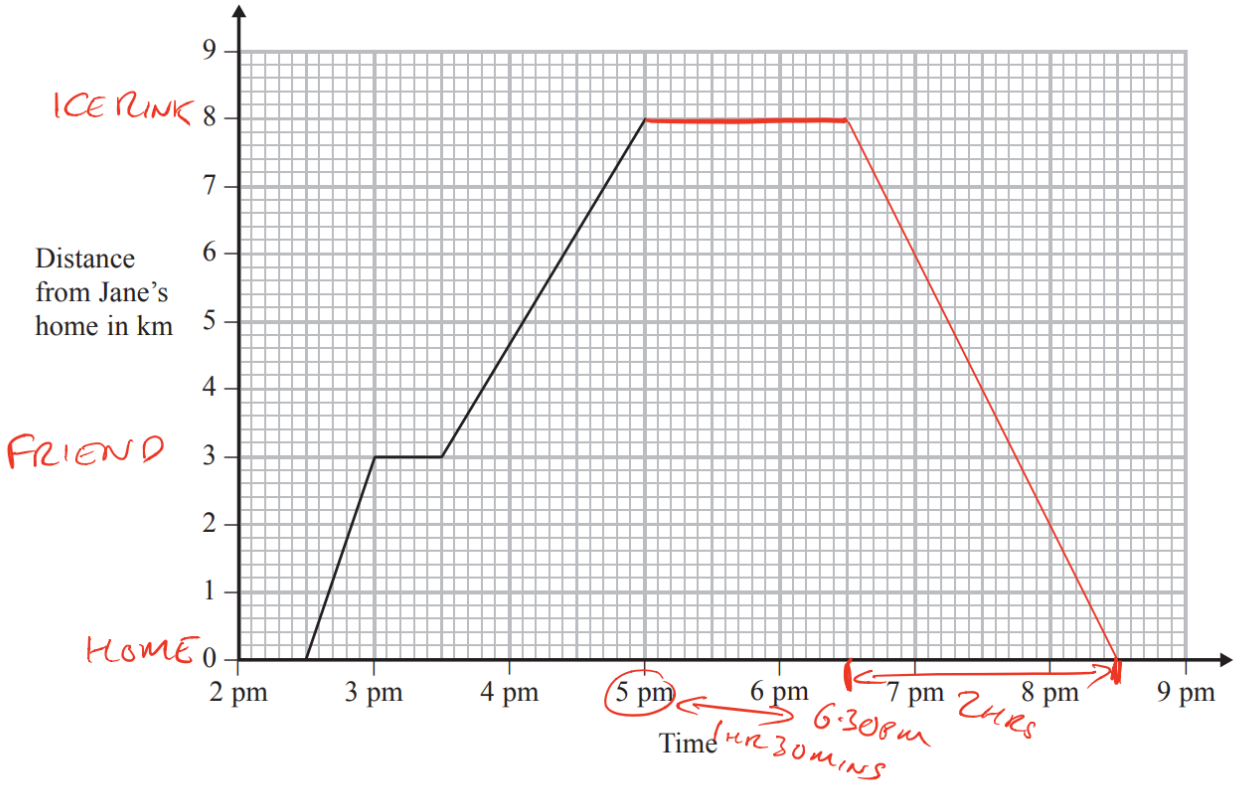
$m = \frac{y_2 - y_1}{x_2 - x_1}$

FOR TWO POINTS (x_1, y_1) AND (x_2, y_2)

Answer 3

Jane walked from her home to the ice rink.

The travel graph for Jane's journey to the ice rink is shown below.



On the way to the ice rink Jane stopped at her friend's house.

(a) How far is it from her friend's house to the ice rink?

8 − 3 = 5 km

Answer 4

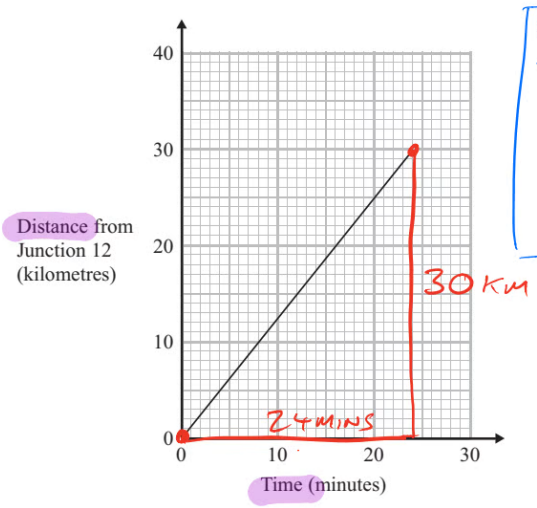
Jane was at the ice rink for 1 hour 30 minutes. — HORIZONTAL LINE
She then walked home at a steady speed. — STRAIGHT LINE
Jane took 2 hours to walk home.

(b) Complete the travel graph for this information.

Answer 5

Debbie drove from Junction 12 to Junction 13 on a motorway.

The travel graph shows Debbie's journey.



D-T GRAPHS

SPEED IS THE GRADIENT OF A D-T GRAPH

Ian also drove from Junction 12 to Junction 13 on the same motorway.
He drove at an average speed of 66 km/hour.

Who had the faster average speed, Debbie or Ian?
You must explain your answer.

DEBBIE'S AVERAGE SPEED = $\frac{\text{RISE}}{\text{RUN}} = \frac{30}{24}$ km/min

$= \frac{30}{24} \times 60$ km/h

$= \frac{3 \times 10 \times 2 \times 30}{6 \times 4}$

$= \frac{2 \times 5 \times 2 \times 15}{2 \times 2}$

DEBBIE'S SPEED

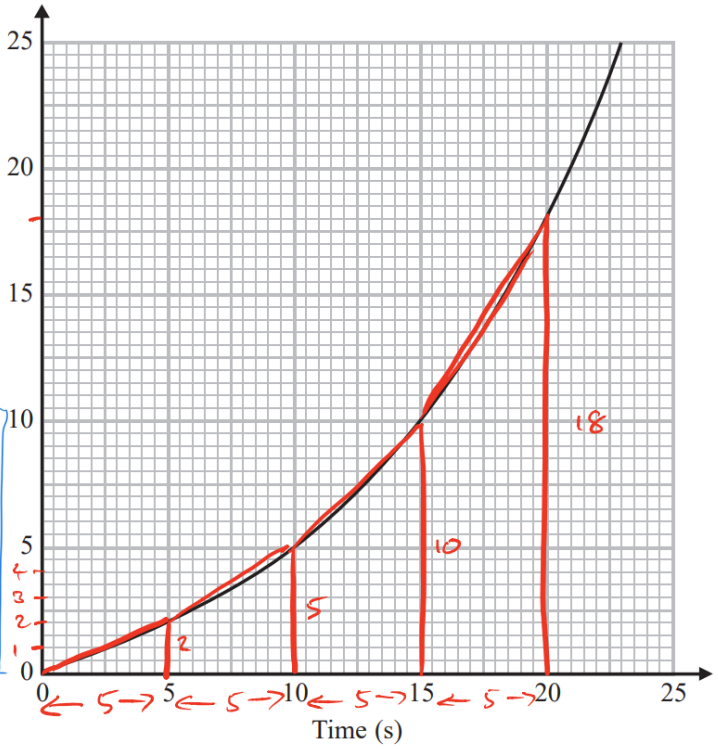
$= 5 \times 15$

$= 75$ km/h > 66 km/h

DEBBIE'S SPEED IS FASTER.

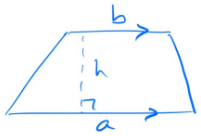
Answer 6

Here is a speed-time graph for a train.



AREA OF TRAPEZIUM

$A = \frac{1}{2}(a+b)h$



(a) Work out an estimate for the distance the train travelled in the first 20 seconds.
Use 4 strips of equal width.

DIST = AREA = Δ + 3 × TRAPEZIUMS

$= \frac{1}{2} \times 5 \times 2 + \frac{1}{2} \times (2+5) \times 5 + \frac{1}{2} \times (5+10) \times 5 + \frac{1}{2} \times (10+18) \times 5$

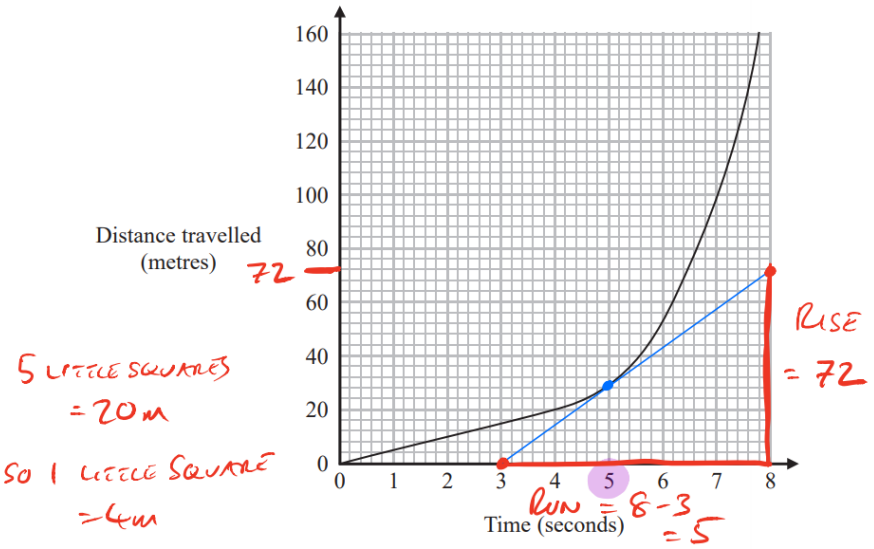
$= 130$ m

SPEED - TIME GRAPHS

- AREA UNDER GRAPH IS DISTANCE TRAVELLED
- GRADIENT IS ACCELERATION
- STRAIGHT LINES = CONSTANT ACCELERATION

Answer 7

The distance-time graph shows information about part of a car journey.



Use the graph to estimate the speed of the car at time 5 seconds.

GRADIENT OF CURVE = GRADIENT OF TANGENT AT THAT POINT

SPEED = GRAD = $\frac{\text{RISE}}{\text{RUN}}$

$= \frac{72}{5}$

$= 14.4$ m/s

DISTANCE-TIME GRAPHS

- GRADIENT IS SPEED.
- STRAIGHT LINES = CONSTANT SPEED

GRADIENT

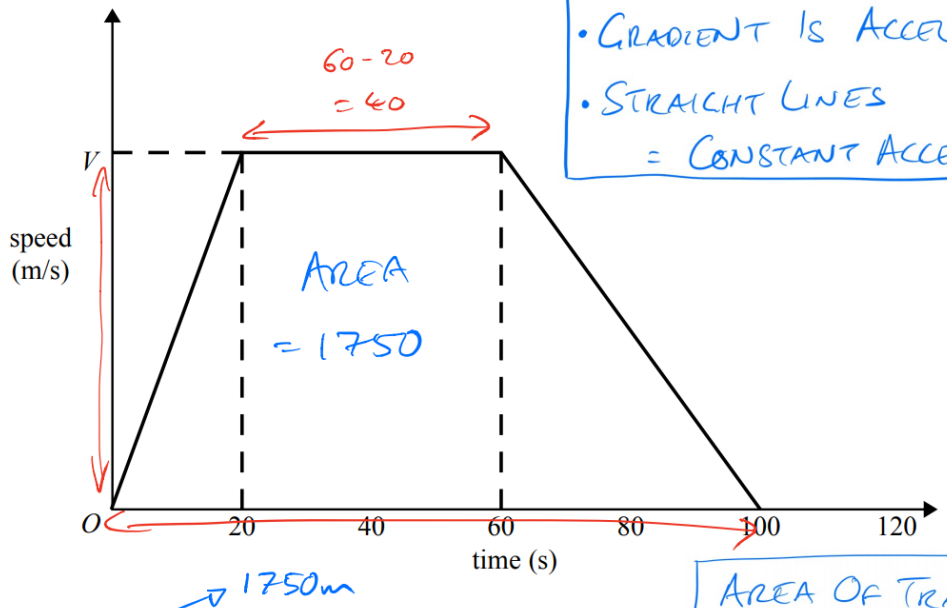
$m = \frac{\text{RISE}}{\text{RUN}}$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

FOR TWO POINTS (x_1, y_1) AND (x_2, y_2)

Answer 8

Here is a speed-time graph for a car journey.
The journey took 100 seconds.



60 - 20 = 40

AREA = 1750

1750m

The car travelled 1.75 km in the 100 seconds.

(a) Work out the value of V.

$A = \frac{1}{2}(a+b)h$

$2 \times 1750 = \frac{2\times}{2}(100+40) \times V$

$\frac{3500}{140} = \frac{140 \times V}{140}$

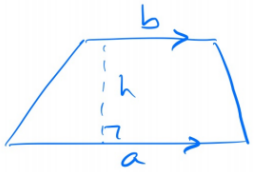
$V = \frac{3500}{140} = \frac{7 \times 5 \times 10^{5}}{7 \times 2} = 25\ ms^{-1}$

SPEED - TIME GRAPHS

- AREA UNDER GRAPH IS DISTANCE TRAVELLED
- GRADIENT IS ACCELERATION
- STRAIGHT LINES = CONSTANT ACCELERATION

AREA OF TRAPEZIUM

$A = \frac{1}{2}(a+b)h$

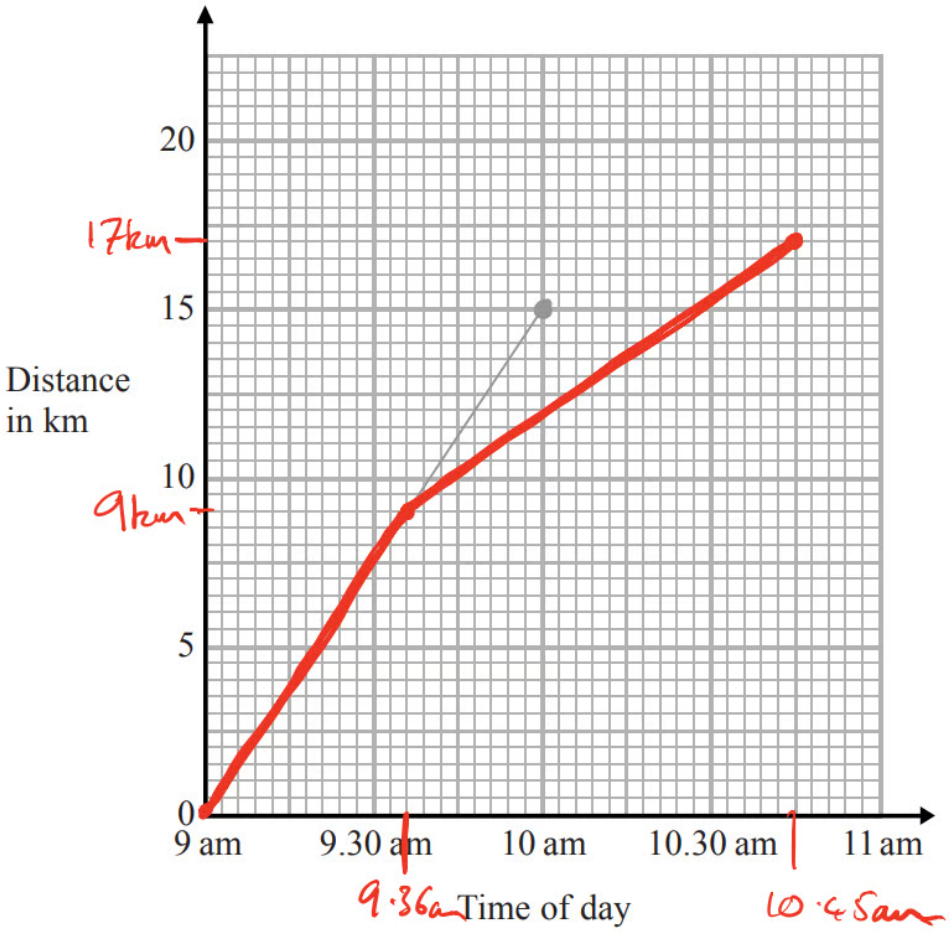


Answer 9

At 9 am, Bradley began a journey on his bicycle.

From 9 am to 9.36 am, he cycled at an average speed of 15 km/h.
From 9.36 am to 10.45 am, he cycled a further 8 km.

(a) Draw a travel graph to show Bradley's journey.



Answer 10

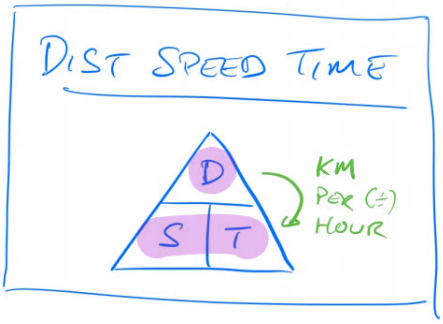
From 10.45 am to 11 am, Bradley cycled at an average speed of 18 km/h.

(b) Work out the distance Bradley cycled from 10.45 am to 11 am.

DIST = SPEED × TIME

DIST = $18 \times \frac{1}{4}$

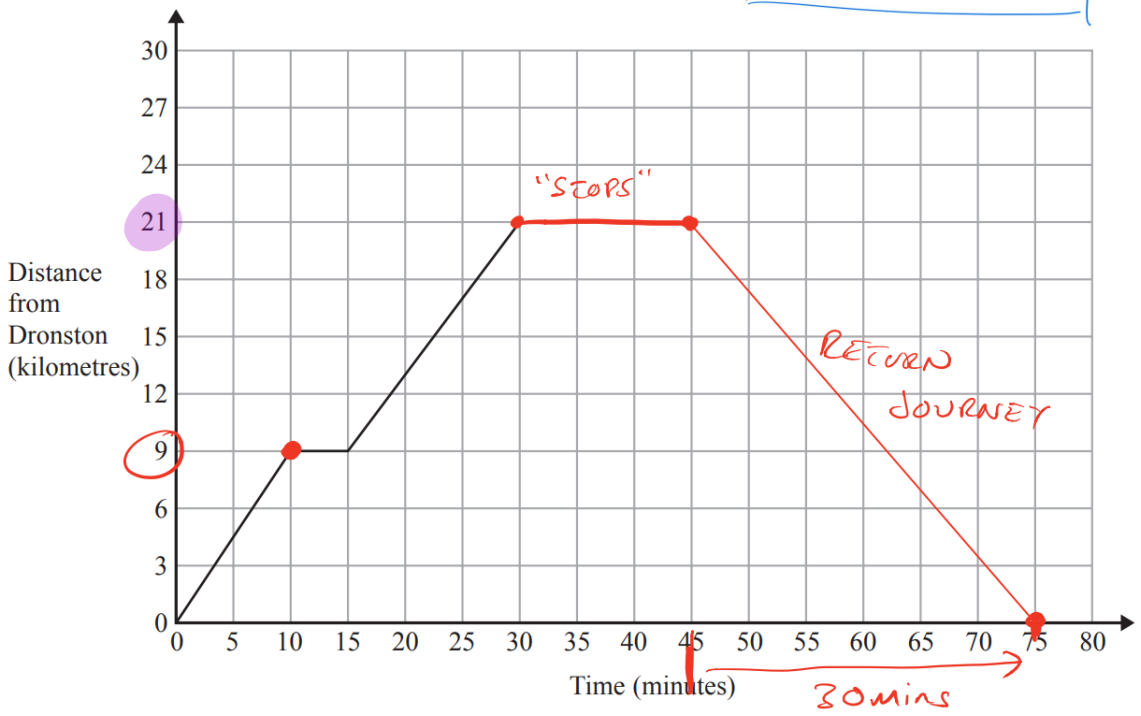
= 4.5 km



Answer 11

DIST SPEED TIME

A coach travels from Dronston to Luscoe.
The travel graph for this journey is shown below.



(a) Work out the average speed of the coach, in kilometres per hour, for the first 10 minutes of the journey.

$T = \frac{10}{60}$ HOURS $\rightarrow \frac{1}{6}$ HOURS

$D = 9$ km

$S = \frac{D}{T} = \frac{9}{1/6} = 9 \times 6$

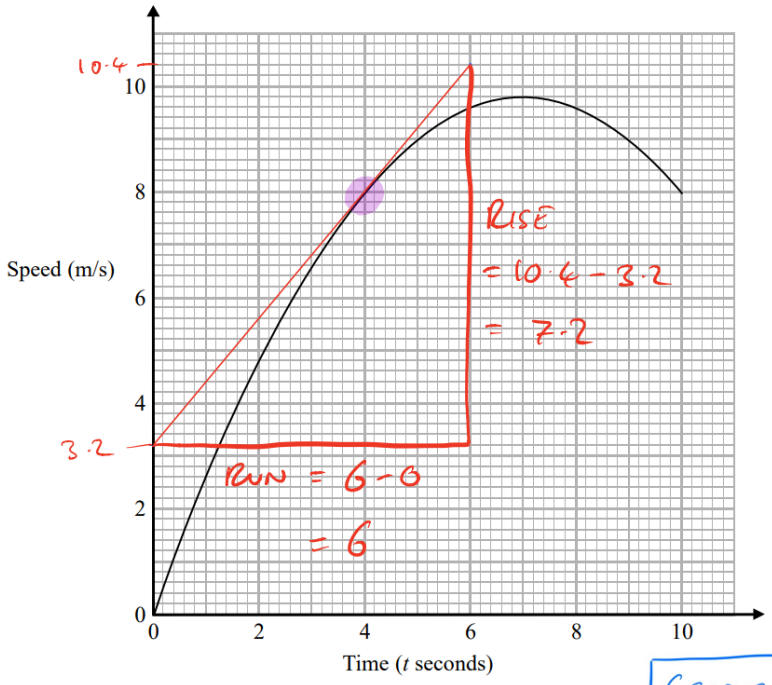
$= 54$ km/h

..... km/h

Answer 12

Karol runs in a race.

The graph shows her speed, in metres per second, t seconds after the start of the race.



(a) Calculate an estimate for the gradient of the graph when $t = 4$
You must show how you get your answer.

GRADIENT OF CURVE = GRADIENT OF TANGENT

$$\text{GRAD} = \frac{\text{RISE}}{\text{RUN}} = \frac{7.2}{6} = 1.2 \text{ m/s/s} \quad \text{or} \quad 1.2 \text{ m/s}^2$$

GRADIENT

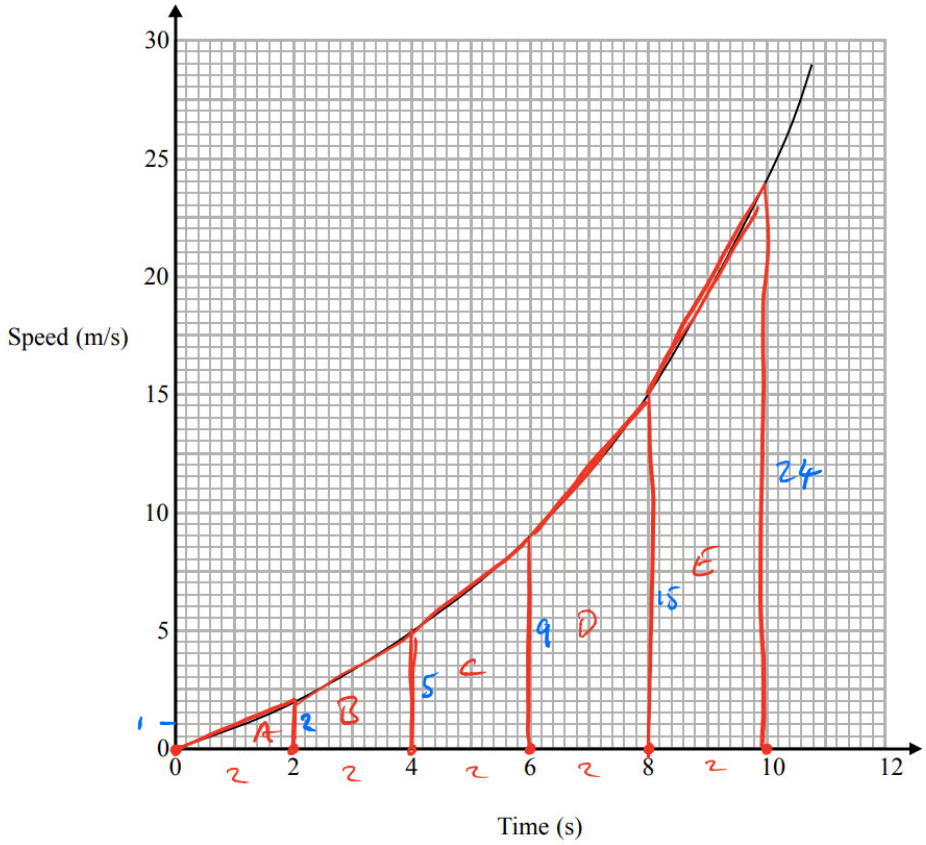
$$m = \frac{\text{RISE}}{\text{RUN}}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

FOR TWO POINTS (x_1, y_1) AND (x_2, y_2)

Answer 13

Here is a speed-time graph for a car.



(a) Work out an estimate for the distance the car travelled in the first 10 seconds.
Use 5 strips of equal width.

DIST = A + B + C + D + E

$= \frac{1}{2}\times 2\times 2 + \frac{1}{2}\times(2+5)\times 2 + \frac{1}{2}\times(5+9)\times 2 + \frac{1}{2}\times(9+15)\times 2$

$+ \frac{1}{2}\times(15+24)\times 2$

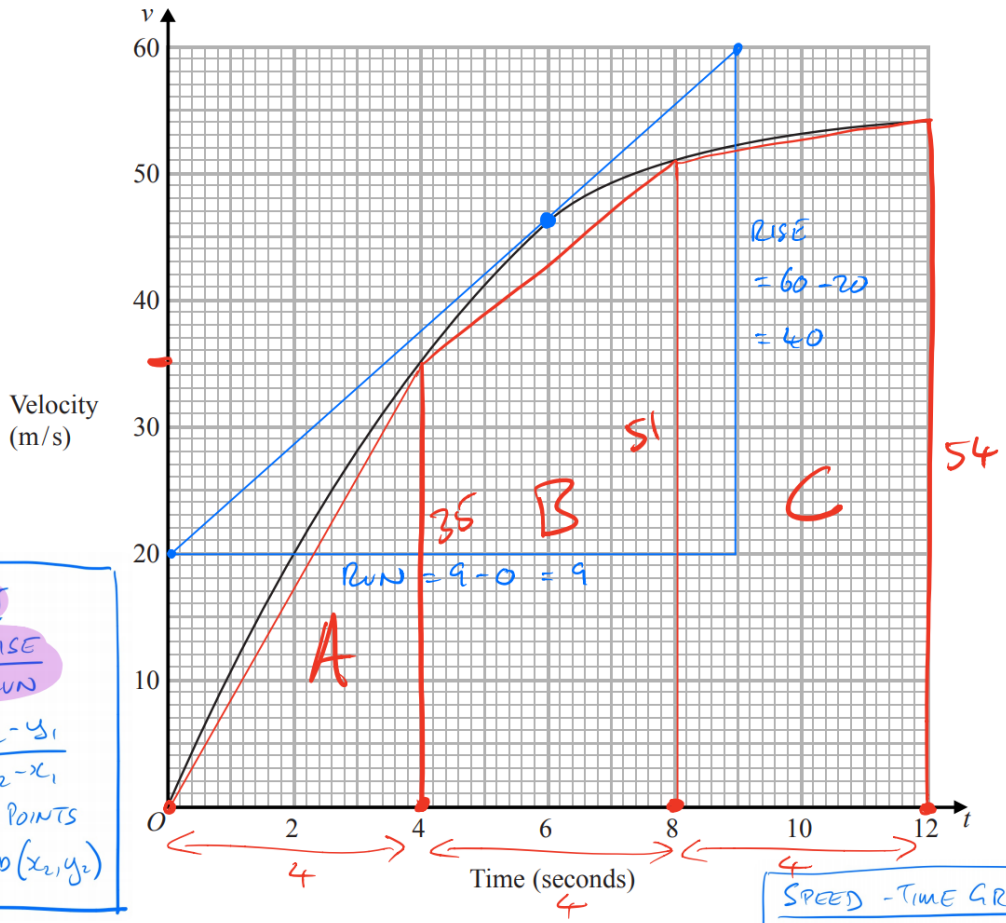
$= 86\text{ m}$

SPEED - TIME GRAPHS

- AREA UNDER GRAPH IS DISTANCE TRAVELLED
- GRADIENT IS ACCELERATION
- STRAIGHT LINES = CONSTANT ACCELERATION

Answer 14

The graph shows information about the velocity, v m/s, of a parachutist t seconds after leaving a plane.



GRADIENT

$m = \frac{\text{RISE}}{\text{RUN}}$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

FOR TWO POINTS (x_1, y_1) AND (x_2, y_2)

SPEED - TIME GRAPHS

- AREA UNDER GRAPH IS DISTANCE TRAVELLED
- GRADIENT IS ACCELERATION
- STRAIGHT LINES = CONSTANT ACCELERATION

(a) Work out an estimate for the acceleration of the parachutist at $t = 6$

NEED TO DRAW A TANGENT AT $t = 6$

ACCELERATION = $\frac{\text{RISE}}{\text{RUN}} = \frac{40}{9} = 4.4\dot{4}\ \text{m/s}^2$

Answer 15

(b) Work out an estimate for the distance fallen by the parachutist in the first 12 seconds after leaving the plane.
Use 3 strips of equal width.

DISTANCE = A + B + C

$= \frac{1}{2} \times 4 \times 35 + \frac{1}{2} \times (35 + 51) \times 4 + \frac{1}{2} \times (51 + 54) \times 4$

$= 452\text{m}$

AREA OF TRAPEZIUM

$A = \frac{1}{2}(a+b)h$