Name	Class

MATHS TEACHER HUB

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Speed time graphs

(9 – 1) Topic booklet

Higher

These questions have been collated from previous years GCSE Mathematics papers.

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.	Total Marks

Instructions

•Use **black** ink or ball-point pen.
•**Fill in the boxes** at the top of this page with your name, centre number and candidate number.
•Answer **all** questions.
•Answer the questions in the spaces provided
– *there may be more space than you need*.
•Diagrams are NOT accurately drawn, unless otherwise indicated.
•You must **show all your working out.**
•If the question is a **1H** question you are not allowed to use a calculator.
•If the question is a **2H** or a **3H** question, you may use a calculator to help you answer.

Information

•The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question*.

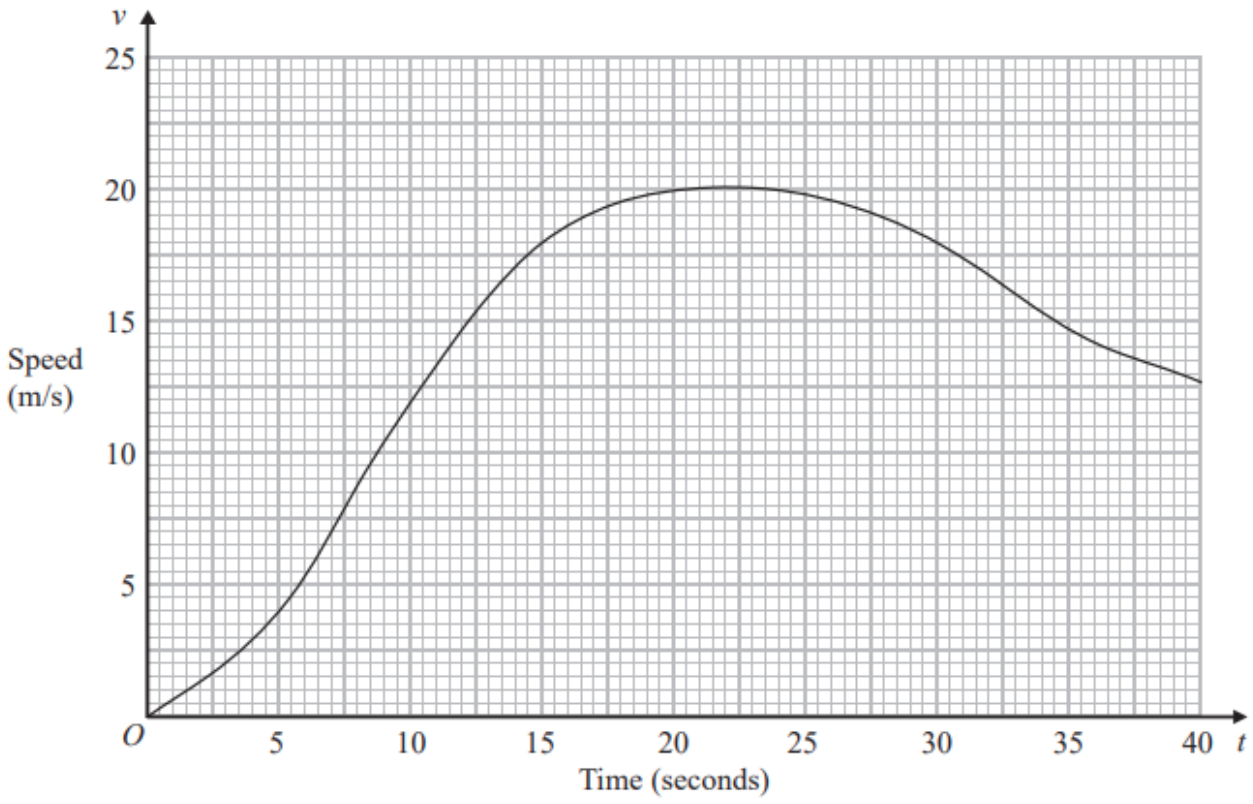
Advice

•Read each question carefully before you start to answer it.
•Keep an eye on the time.
•Try to answer every question.
•Check your answers if you have time at the end.

Answer ALL questions
Write your answers in the space provided.
You must write down all the stages in your working.

14 A car moves from rest.

The graph gives information about the speed, v metres per second, of the car t seconds after it starts to move.



(a) (i) Calculate an estimate of the gradient of the graph at $t = 15$

.....

(3)

(ii) Describe what your answer to part (i) represents.

.....

(1)

(b) Work out an estimate for the distance the car travels in the first 20 seconds of its journey.
Use 4 strips of equal width.

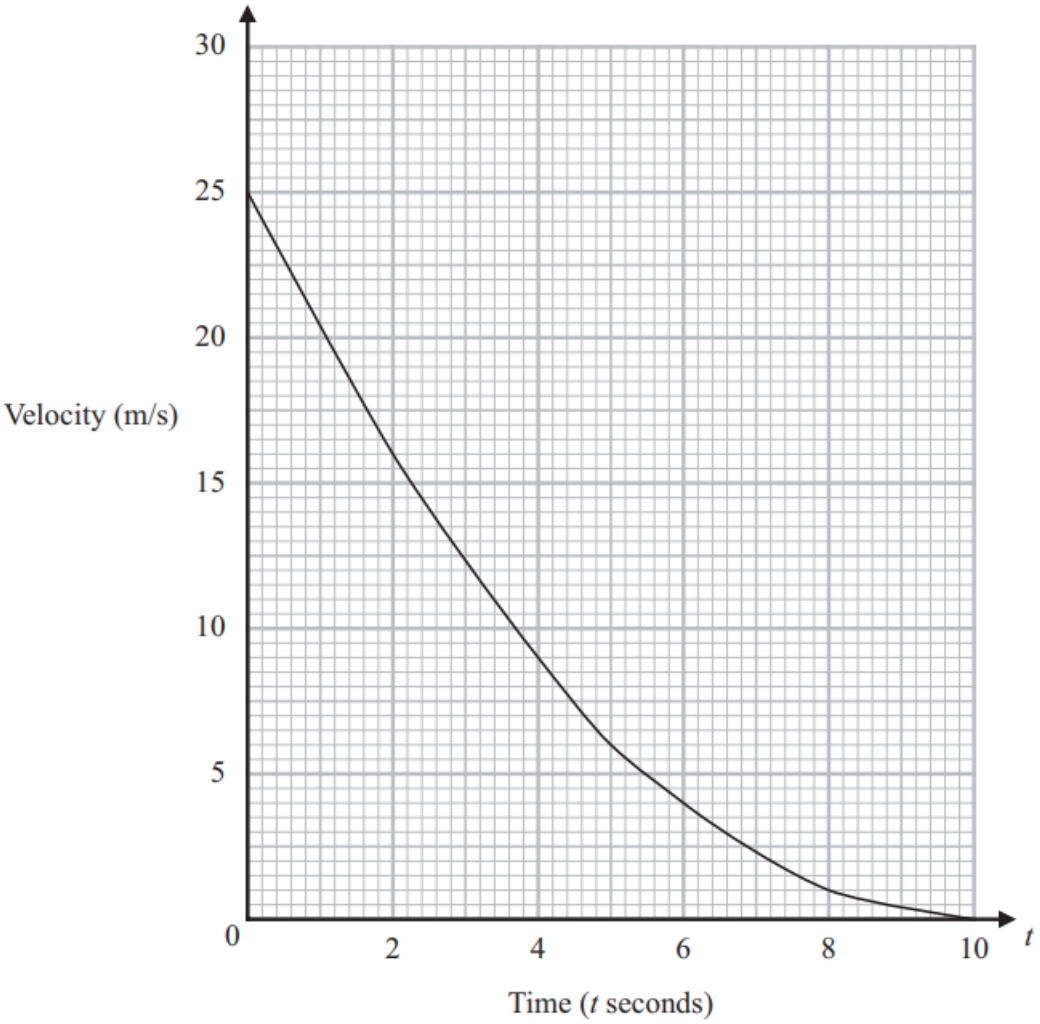
.....m

(3)

June 2019 – Paper 2H

(Total for Question 14 is 7 marks)

14 The graph shows the velocity of a car, in metres per second, t seconds after it starts to slow down.



(a) Calculate an estimate for the acceleration of the car when $t = 5$
You must show all your working.

..... m/s^2

(3)

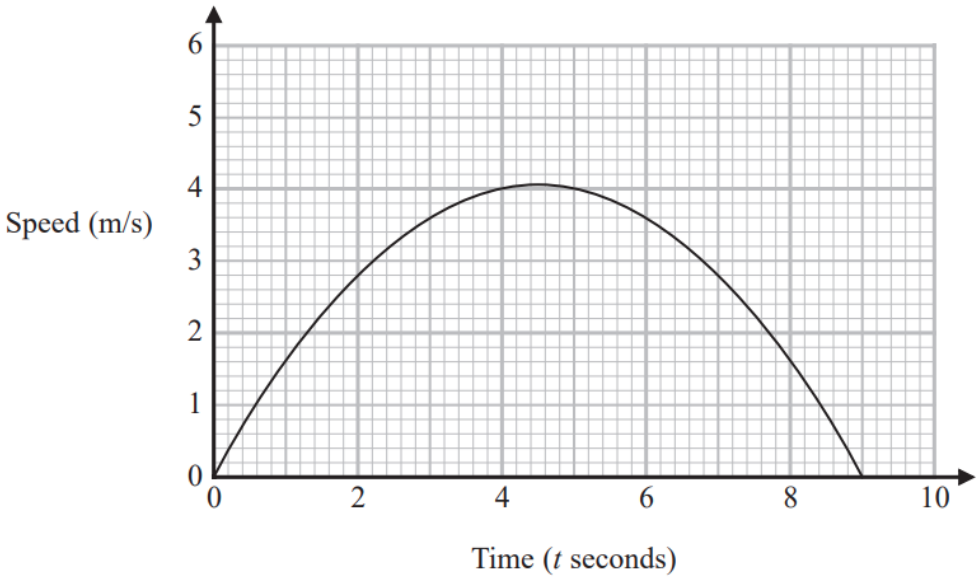
(b) Work out an estimate for the distance the car travels in the first 6 seconds after it starts to slow down.
Use 3 strips of equal width.

..... m

(3)

June 2024 – Paper 2H **(Total for Question 14 is 6 marks)**

14 Here is a speed-time graph.



(a) Work out an estimate of the gradient of the graph at $t = 2$

.....

(3)

(b) What does the area under the graph represent?

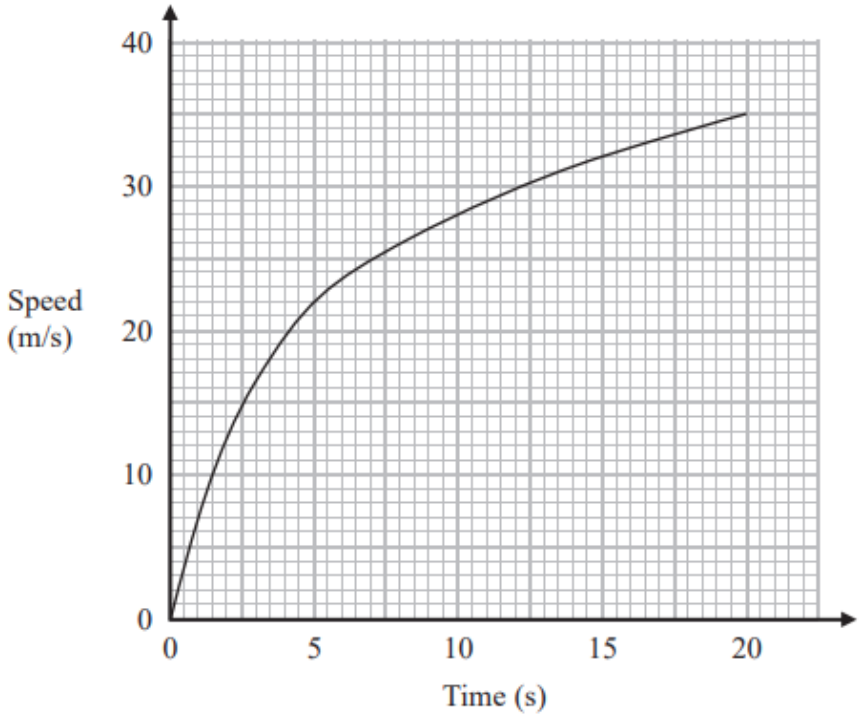
.....

.....

(1)

(Total for Question 14 is 4 marks)

15 The graph shows the speed of a car, in metres per second, during the first 20 seconds of a journey.



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

..... metres

(3)

(b) Is your answer to part (a) an underestimate or an overestimate of the actual distance the car travelled in the first 20 seconds?
Give a reason for your answer.

.....

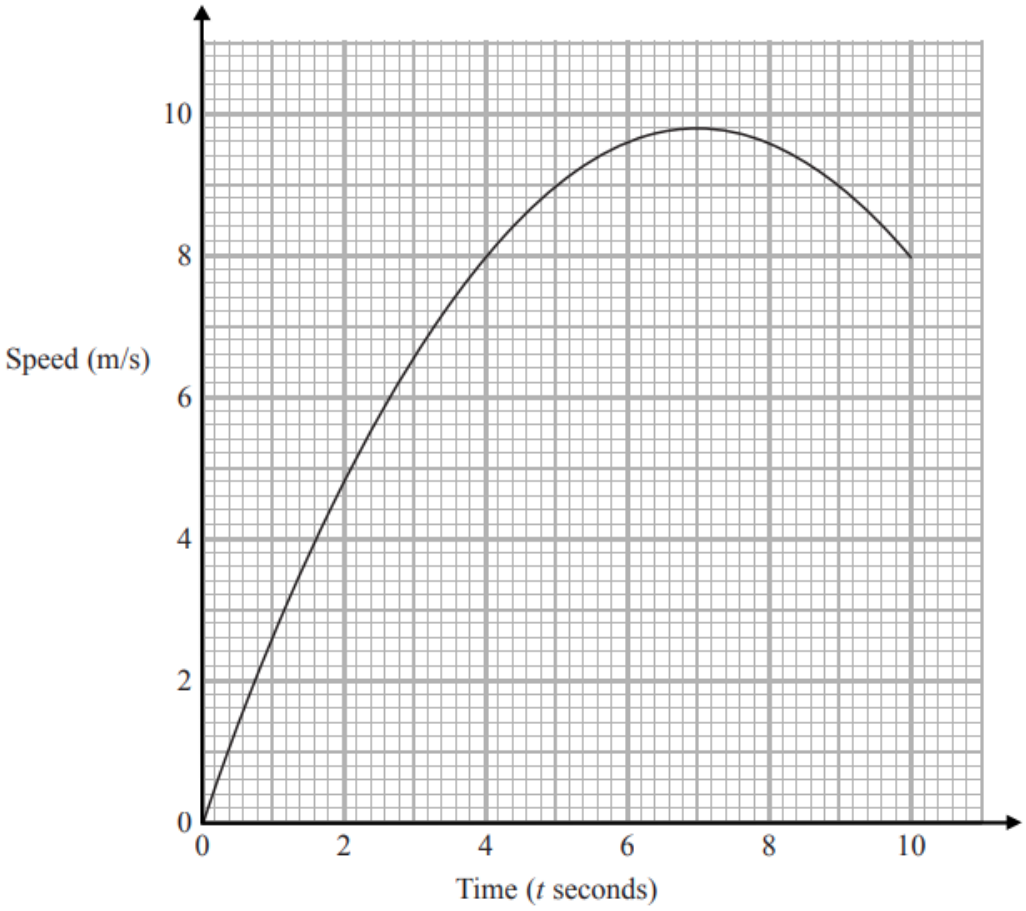
.....

(1)

(Total for Question 15 is 4 marks)

15 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.

.....

(3)

(b) Describe fully what your answer to part (a) represents.

.....

.....

(2)

(c) Explain why your answer to part (a) is only an estimate.

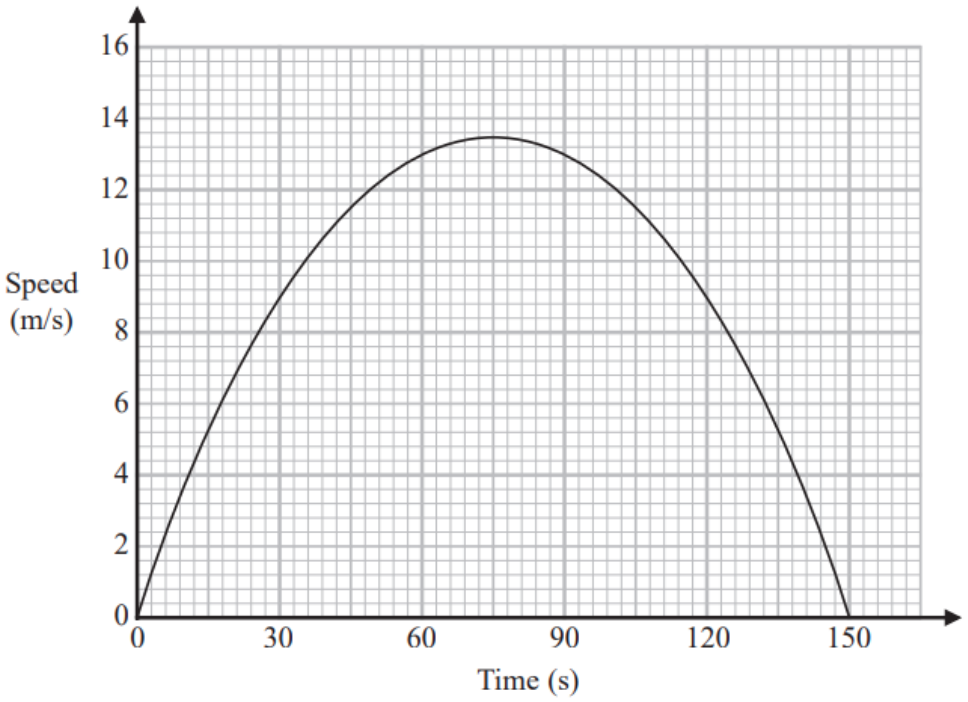
.....

.....

(1)

(Total for Question 15 is 6 marks)

16 Here is a speed-time graph for a car.



(a) Work out an estimate for the distance the car travelled in the first 30 seconds.

..... m

(2)

(b) Is your answer to part (a) an underestimate or an overestimate of the actual distance the car travelled in the first 30 seconds?
Give a reason for your answer.

.....

.....

.....

(1)

Julian used the graph to answer this question.

Work out an estimate for the acceleration of the car at time 60 seconds.

Here is Julian's working.

$$\text{acceleration} = \text{speed} \div \text{time}$$

$$= 13 \div 60$$

$$= 0.21\dot{6} \text{ m/s}^2$$

Julian's method does not give a good estimate of the acceleration at time 60 seconds.

(c) Explain why.

.....

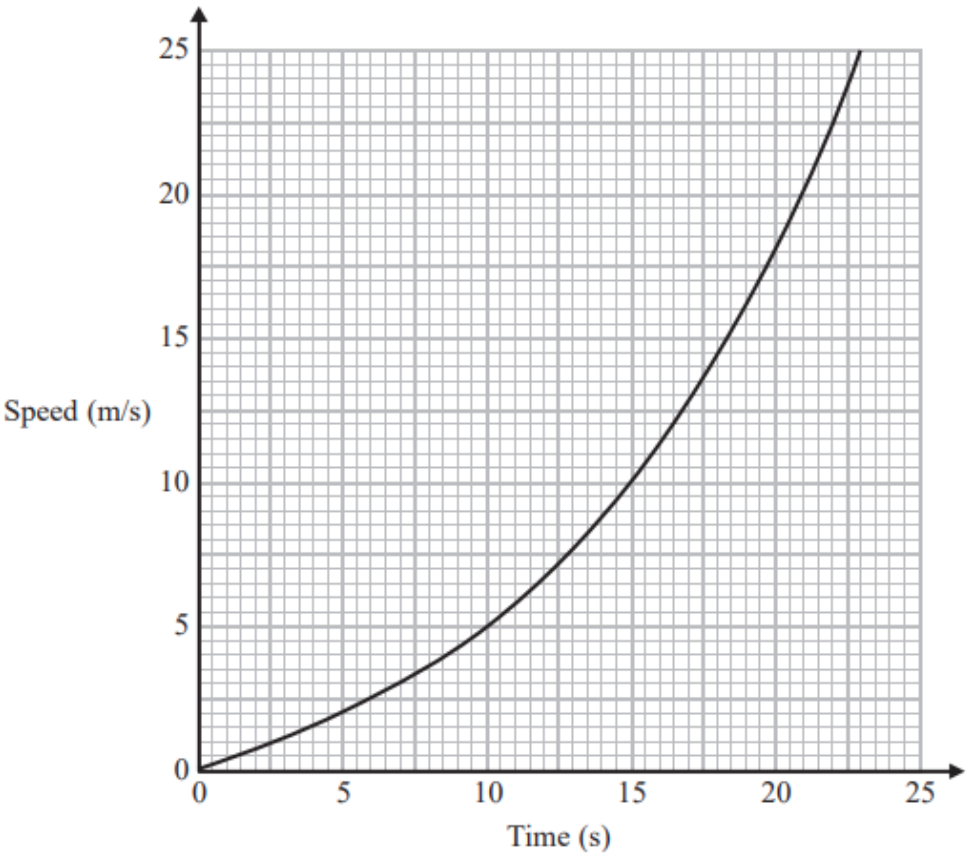
.....

.....

(1)

November 2020 – Paper 3H **(Total for Question 16 is 4 marks)**

18 Here is a speed-time graph for a train.



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

..... m

(3)

(b) Is your answer to (a) an underestimate or an overestimate of the actual distance the train travelled?
Give a reason for your answer.

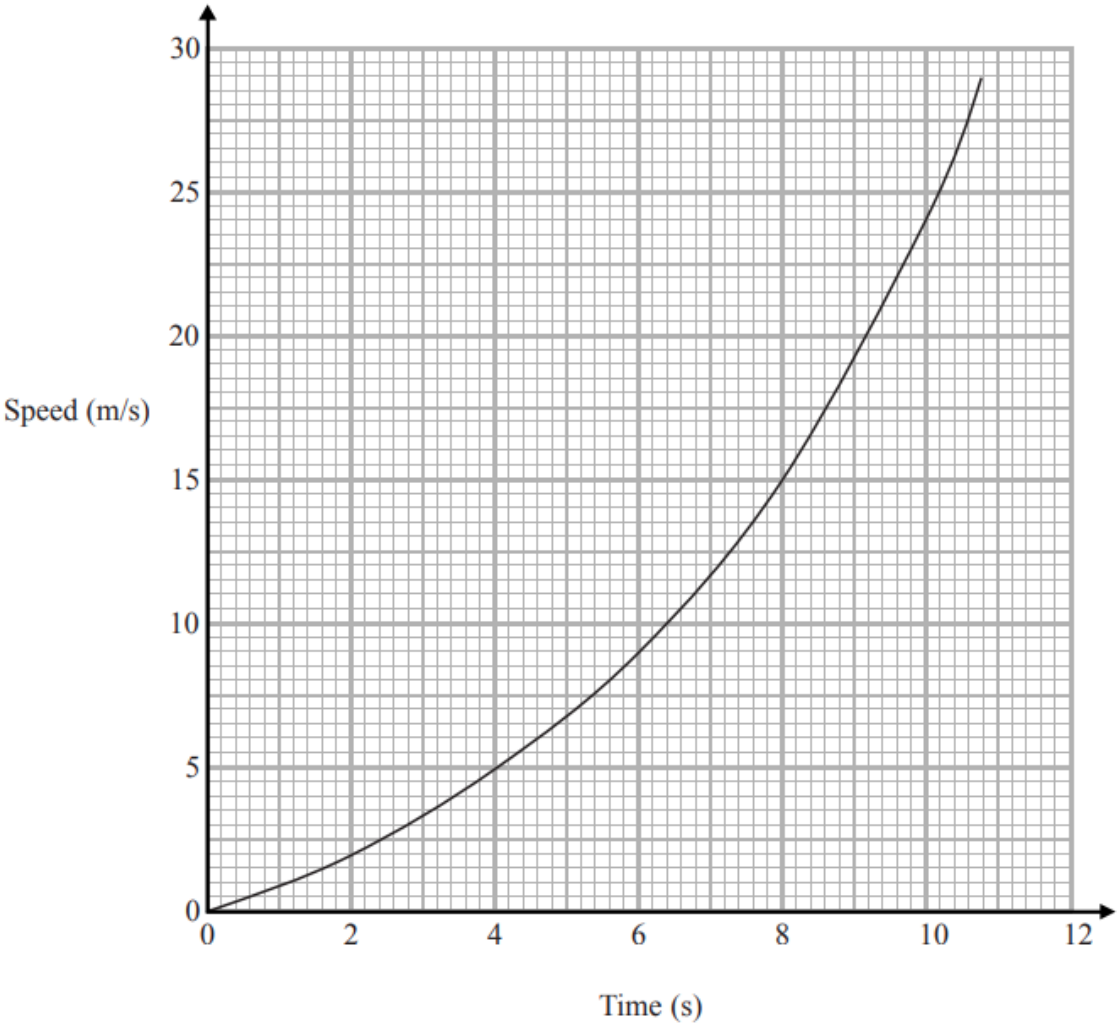
.....

.....

(1)

November 2017 – Paper 3H **(Total for Question 18 is 4 marks)**

18 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.

.....m

(3)

(b) Is your answer to (a) an underestimate or an overestimate of the actual distance?
Give a reason for your answer.

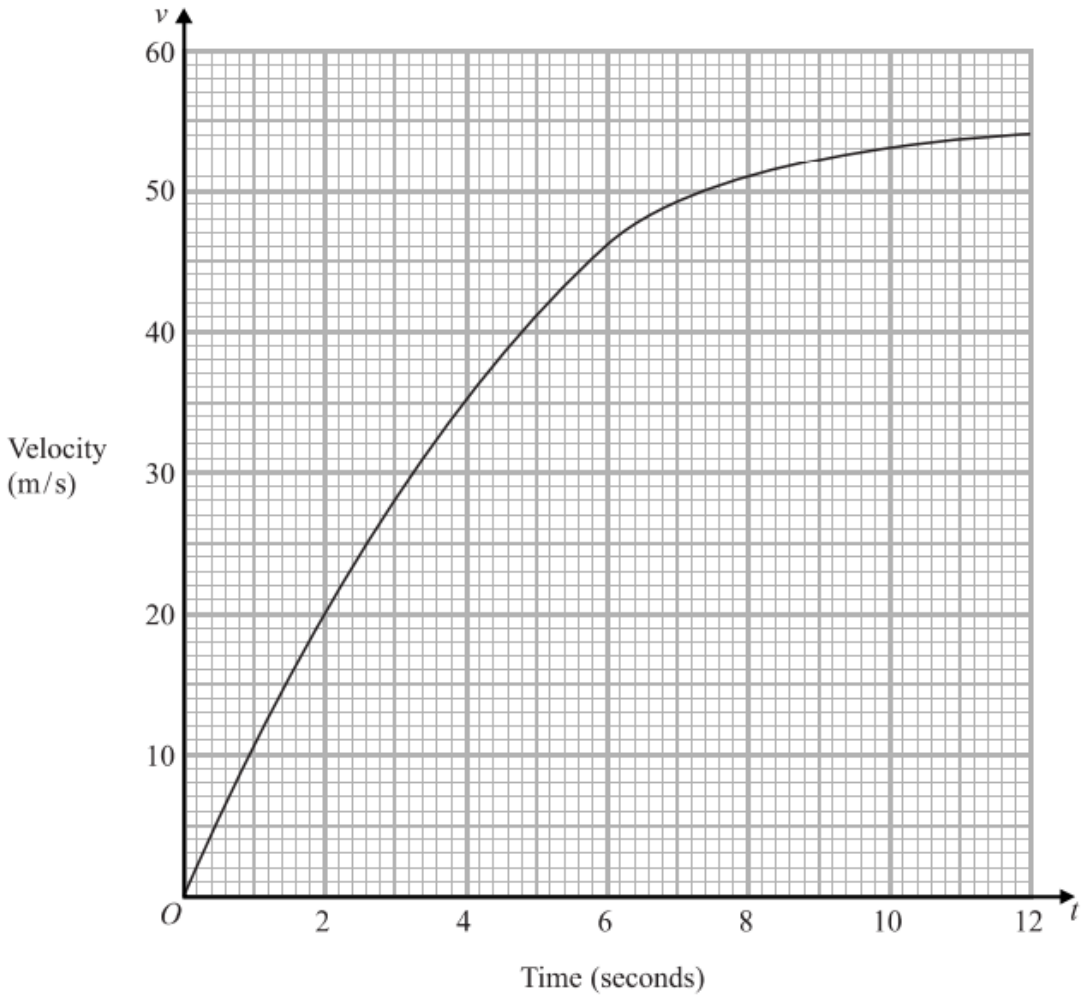
.....

.....

(1)

(Total for Question 18 is 4 marks)

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



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

..... m/s^2

(2)

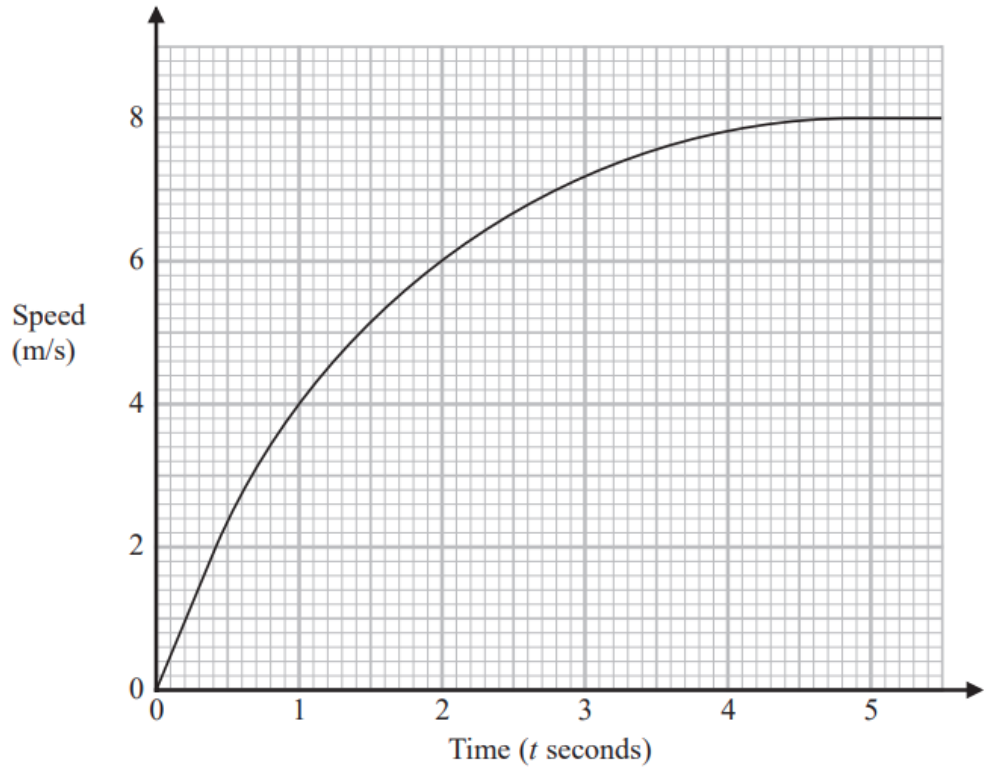
(b) Work out an estimate for the distance fallen by the parachutist in the first 12 seconds after leaving the plane.
Use 3 strips of equal width.

..... m

(3)

(Total for Question 20 is 5 marks)

21 Here is a speed-time graph showing the speed, in metres per second, of an object t seconds after it started to move from rest.



(a) Using 3 trapeziums of equal width, work out an estimate for the area under the graph between $t = 1$ and $t = 4$

.....

(3)

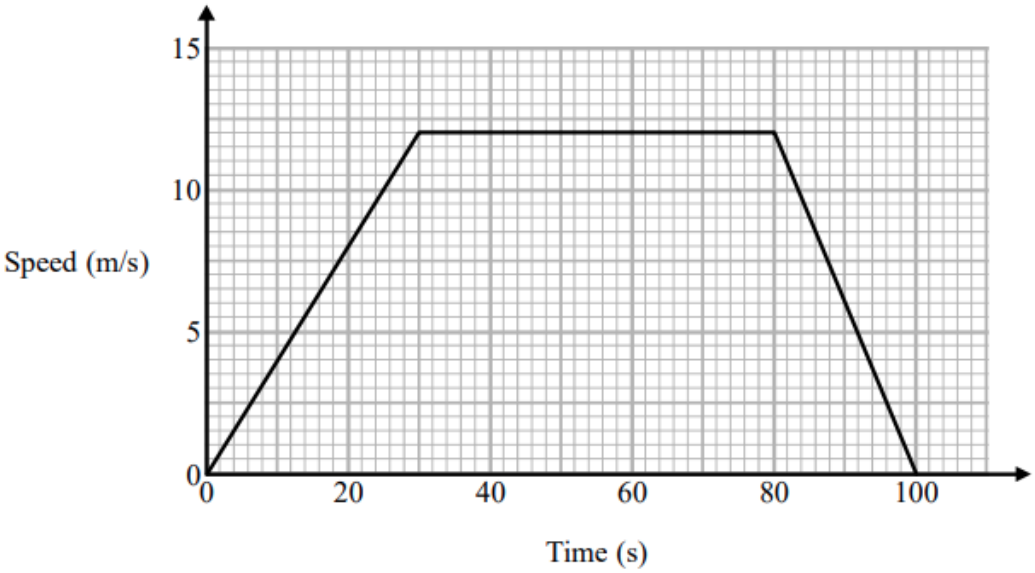
(b) What does this area represent?

.....

(1)

November 2021 – Paper 3H **(Total for Question 21 is 4 marks)**

21 Here is a speed-time graph for a train journey between two stations.
The journey took 100 seconds.



(a) Calculate the time taken by the train to travel half the distance between the two stations.
You must show all your working.

..... seconds
(4)

(b) Compare the acceleration of the train during the first part of its journey with the acceleration of the train during the last part of its journey.

.....

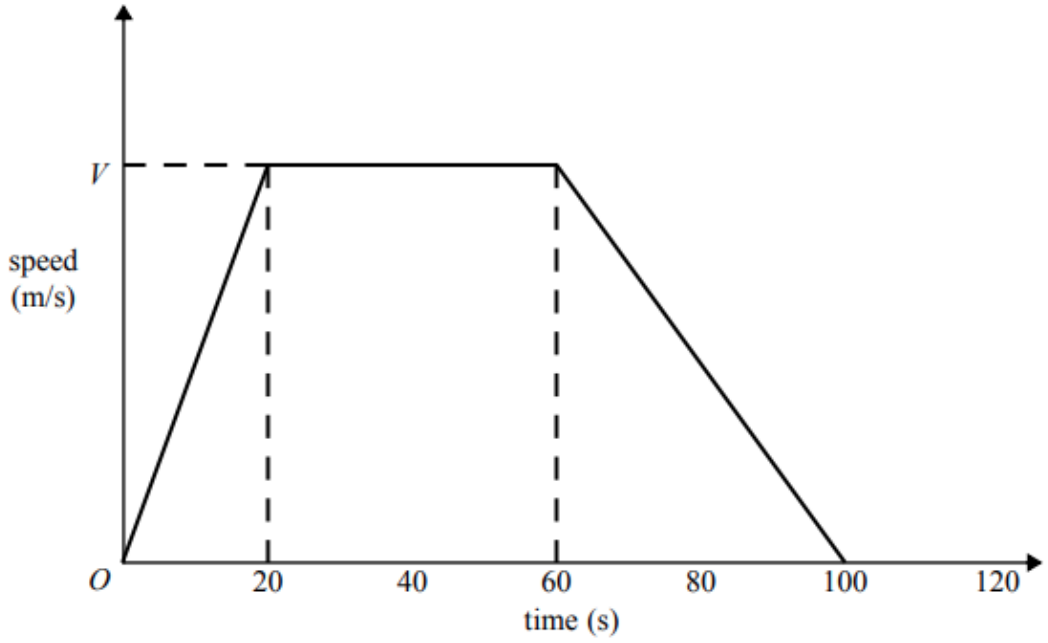
.....

.....

(1)

(Total for Question 21 is 5 marks)

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



The car travelled 1.75 km in the 100 seconds.

(a) Work out the value of V.

(3)

(b) Describe the acceleration of the car for each part of this journey.

(2)

(Total for Question 21 is 5 marks)