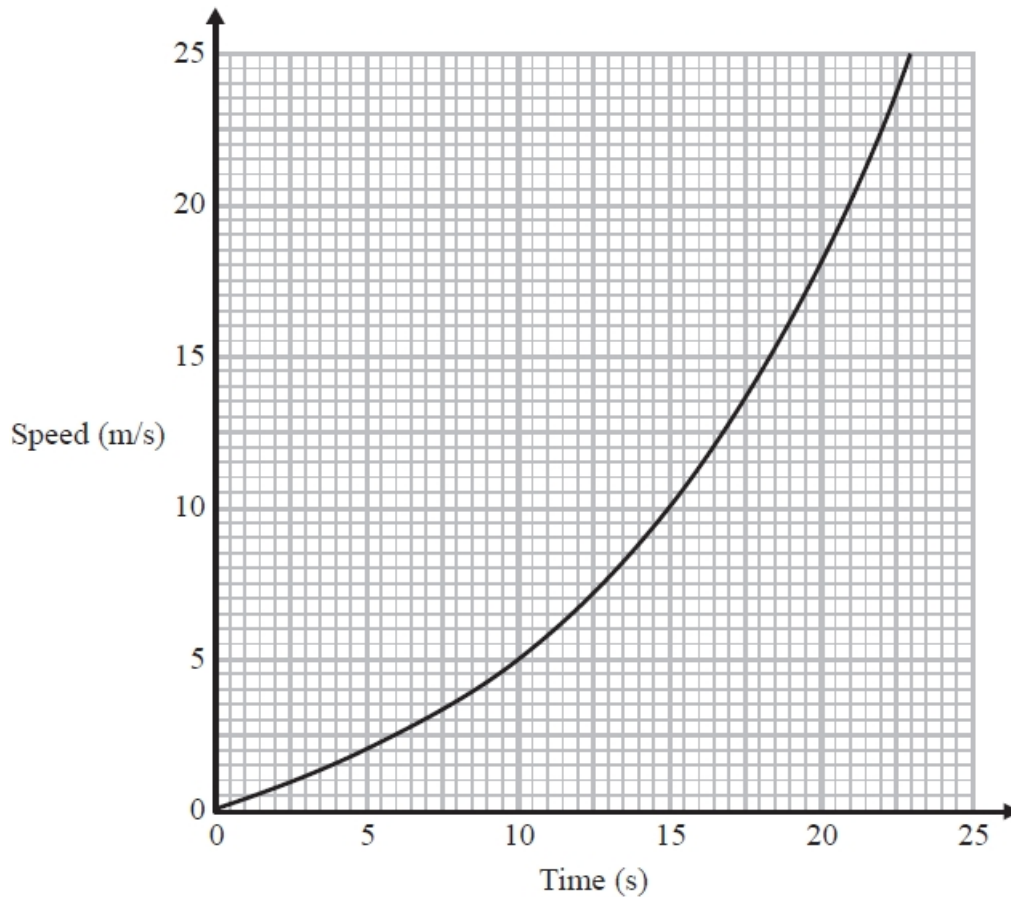


# A309 Precalculus

Q1.

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.

.....  
.....

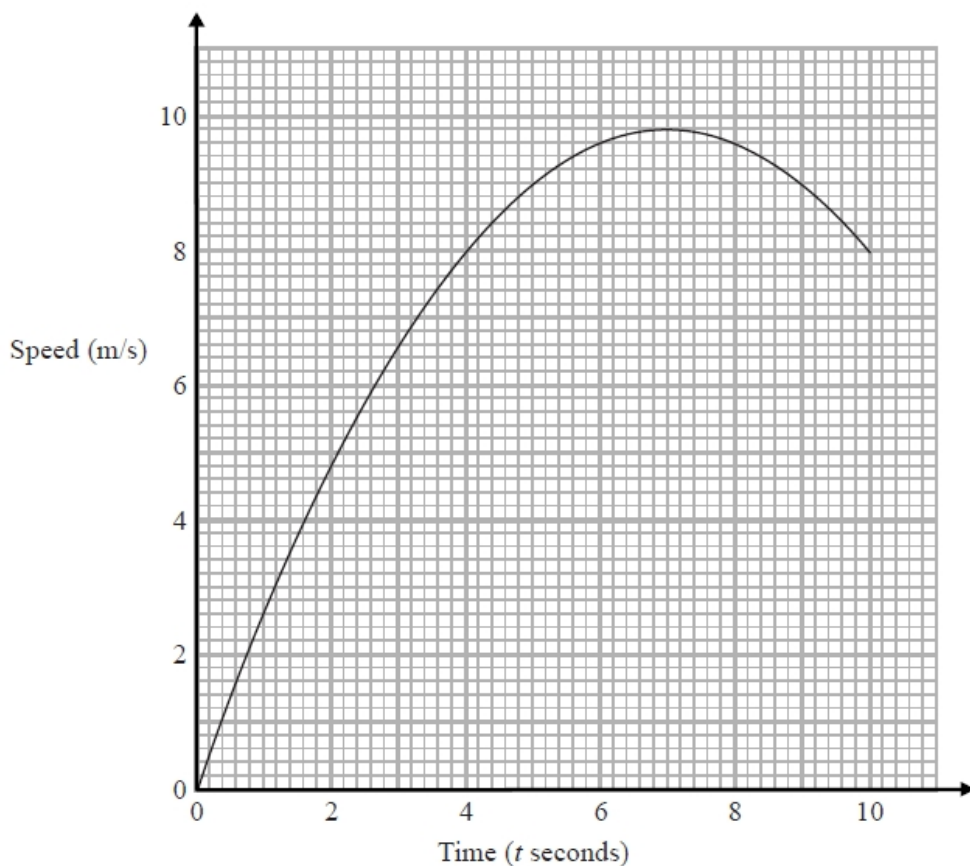
(1)

**(Total for question = 4 marks)**

**Q2.**

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)

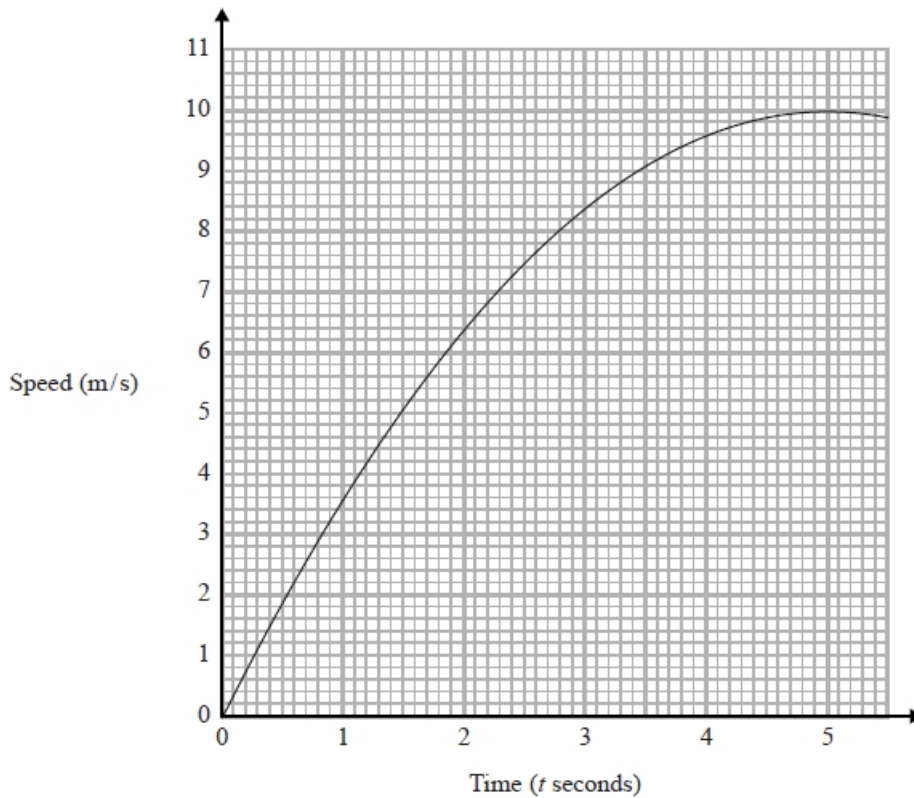
- (c) Explain why your answer to part (a) is only an estimate.

.....  
.....  
(1)

**(Total for question = 6 marks)**

**Q3.**

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



(a) Use 3 strips of equal width to find an estimate for the area under the graph between  $t = 1$  and  $t = 4$

.....  
(3)

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

.....  
 .....  
 (2)

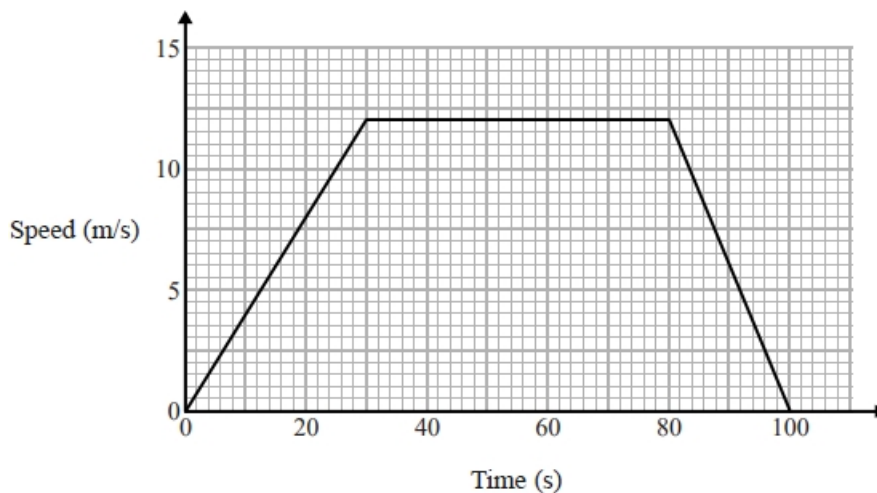
(c) Explain whether your answer in part (a) gives an underestimate or an overestimate for the area under the graph.

.....  
 .....  
 (1)

**(Total for question = 6 marks)**

**Q4.**

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.

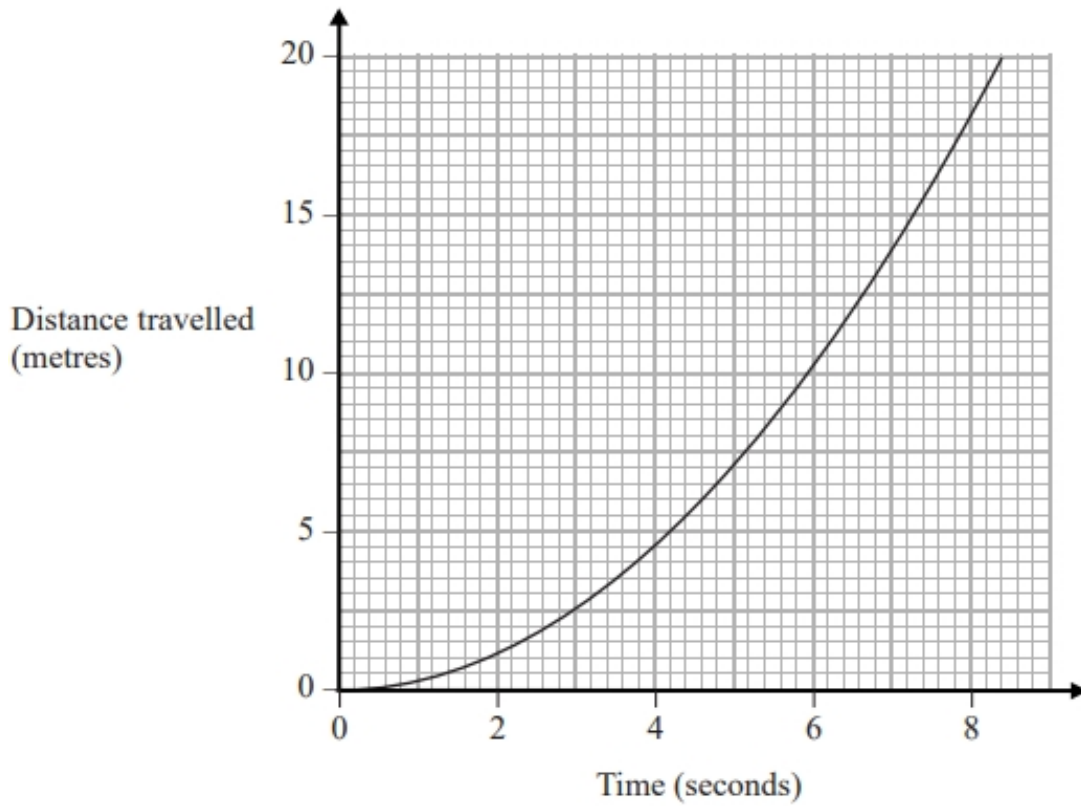
.....  
.....  
.....

(1)

**(Total for question = 5 marks)**

**Q5.**

The graph shows information about part of a cyclist's journey.



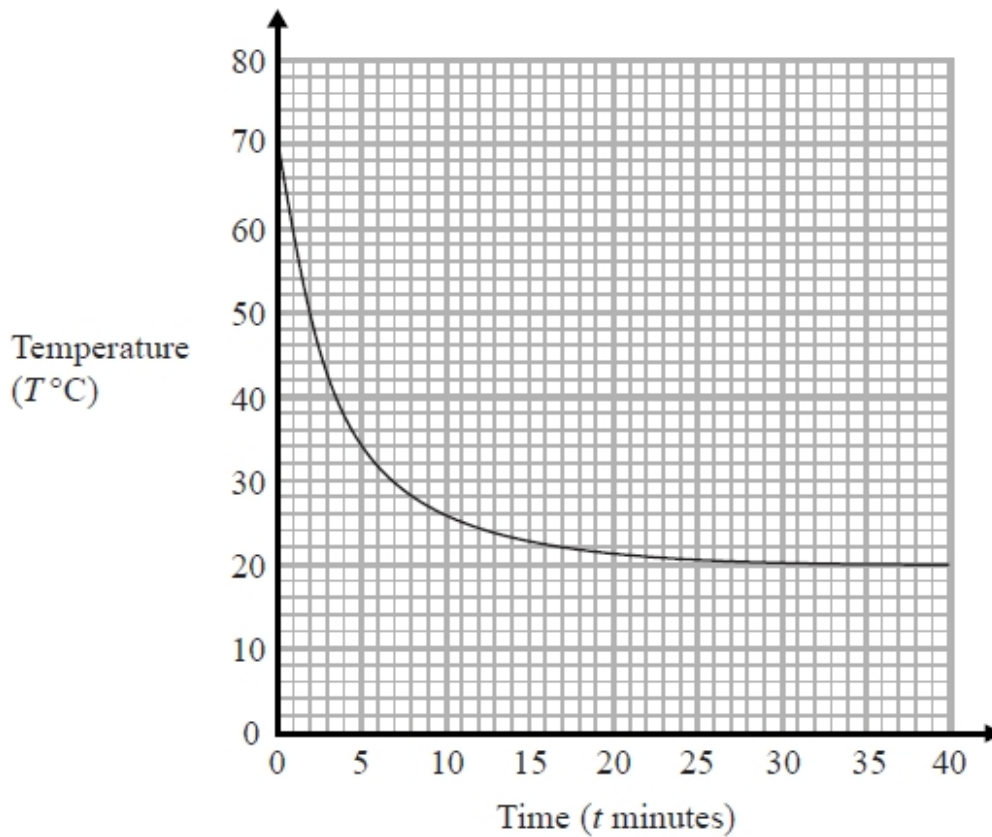
Work out an estimate of the speed, in m/s, of the cyclist at time 6 seconds.

..... m/s

**(Total for question = 3 marks)**

**Q6.**

The graph shows the temperature,  $T^{\circ}\text{C}$ , of the coffee in a cup at a time  $t$  minutes.



(a) Find an estimate for the gradient of the graph at time 5 minutes.

.....  
(2)

(b) Explain what this gradient represents.

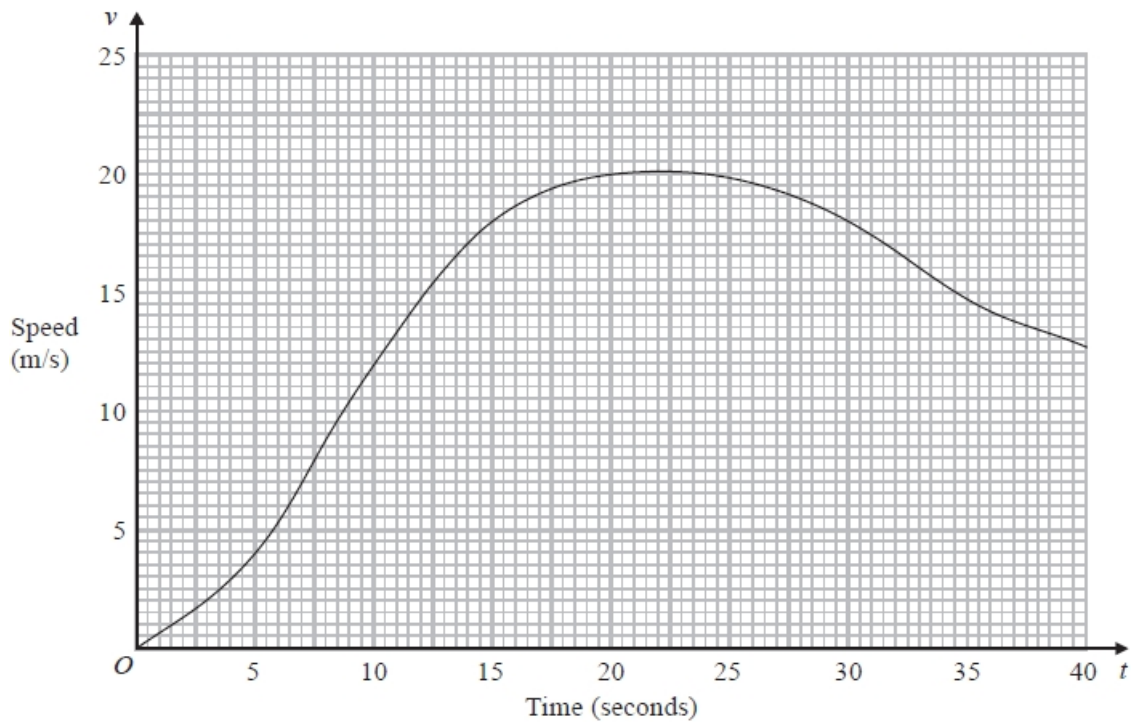
.....  
.....  
(1)

**(Total for question = 3 marks)**

**Q7.**

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)

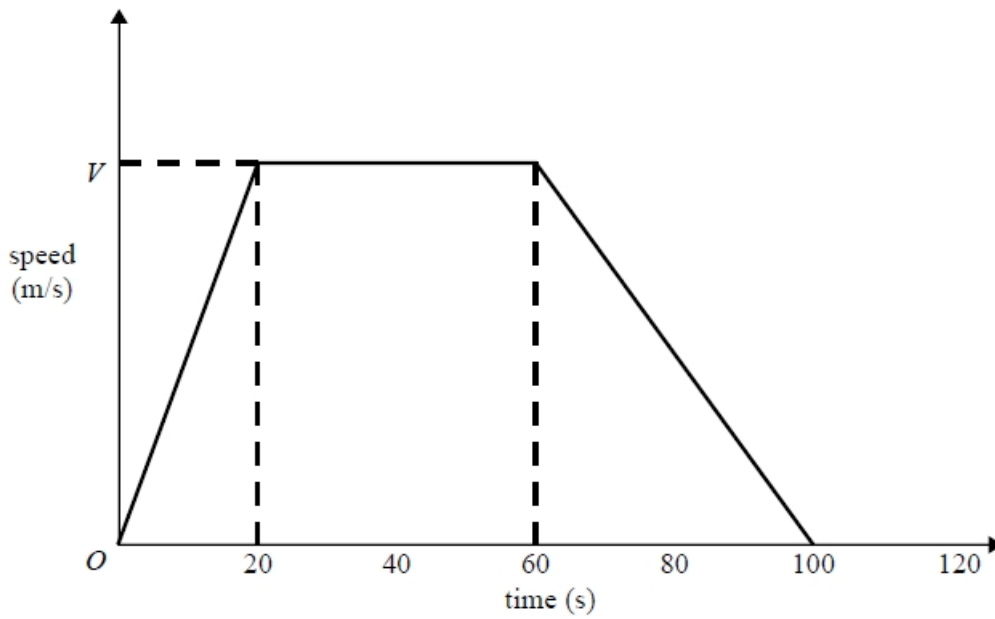
(b) Work out an estimate for the distance the car travels in the first 20 seconds of its journey. Use 4 strips of equal width.

..... m  
(3)

**(Total for question = 7 marks)**

**Q8.**

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



The car travelled 1.75km 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.

.....  
.....  
.....  
.....

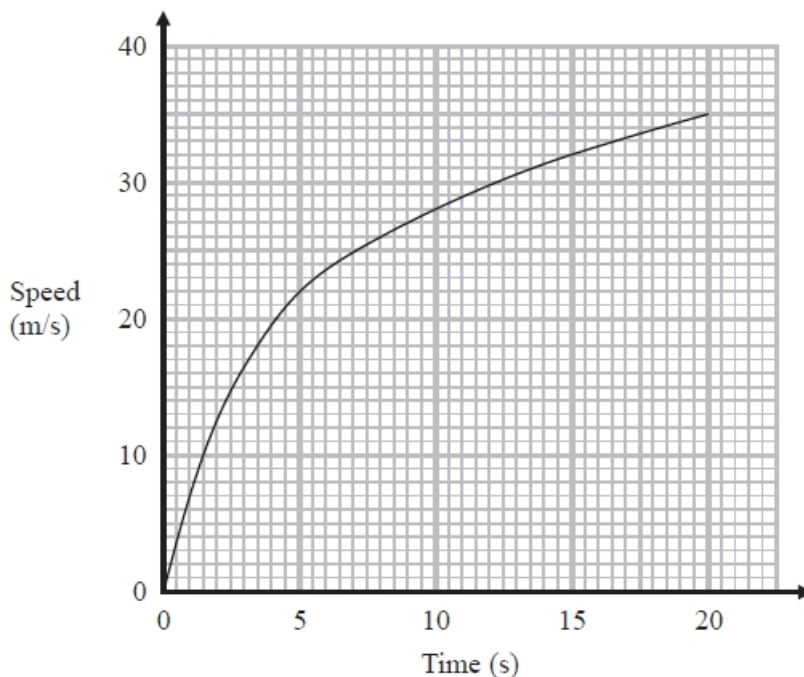
(2)

**(Total for question = 5 marks)**



**Q9.**

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.

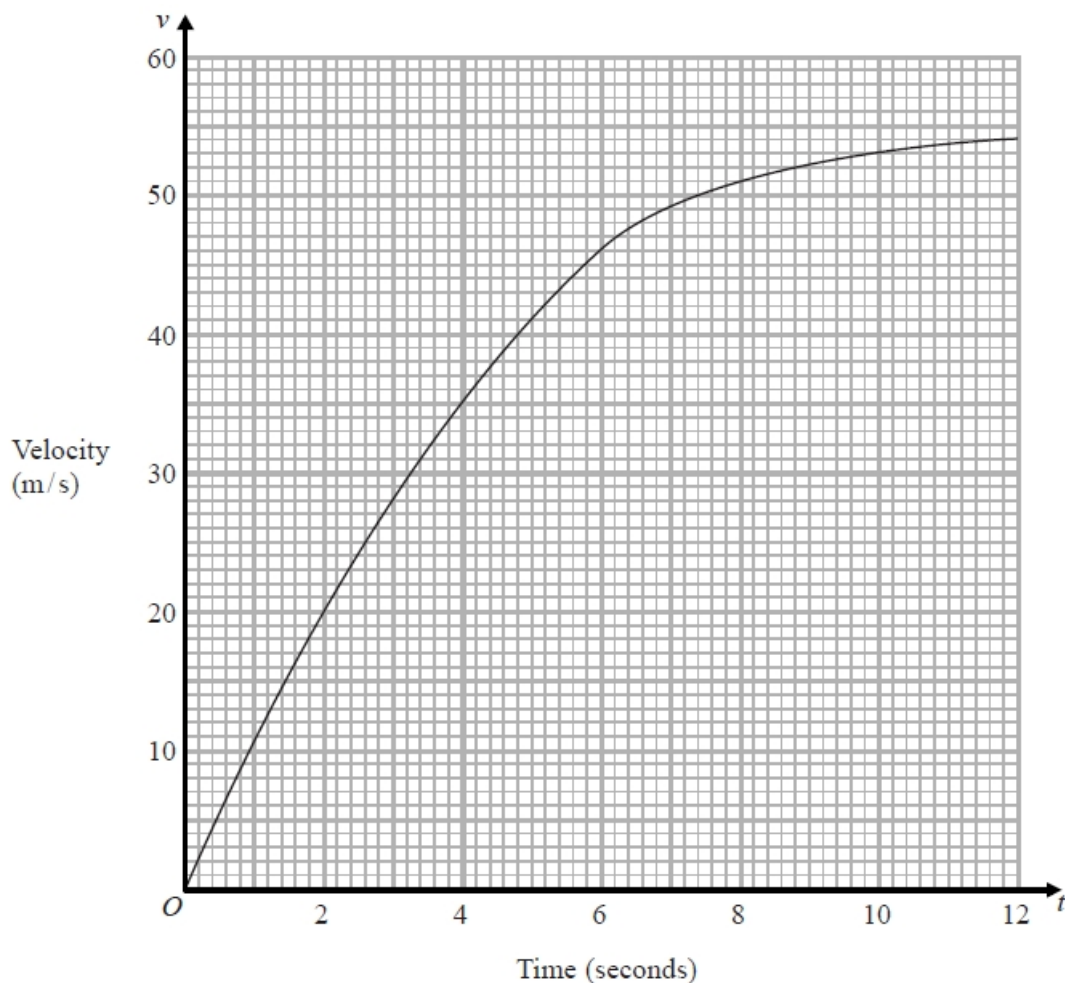
.....  
.....

(1)

**(Total for question = 4 marks)**

**Q10.**

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<sup>2</sup>  
(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 is 5 marks)**