Level 3 Algebra · Area Under a Curve

June 2013 - Question 14
Jan 2014 - Question 9
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June 2015 - Question 19
Jan 2016 - Question 14
June 2016 - Question 11
Jan 2017 - Question 12
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Jan 2018 - Question 12
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Jan 2019 - Question 12
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Jan 2022 - Question 14
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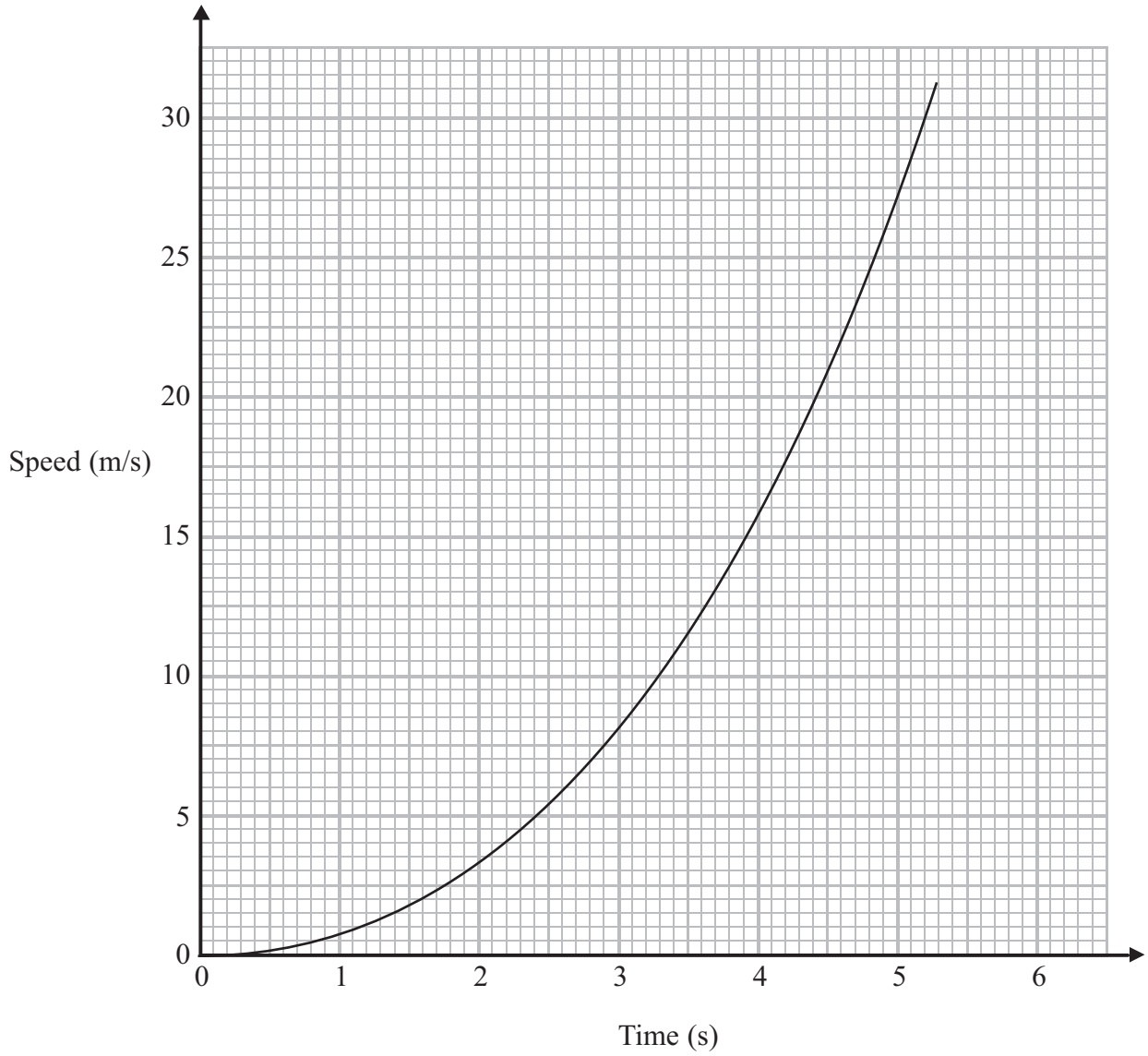
Jan 2023 - Question 16
June 2023 - Question 12
Jan 2024 - Question 19

14 Here is a speed-time graph.

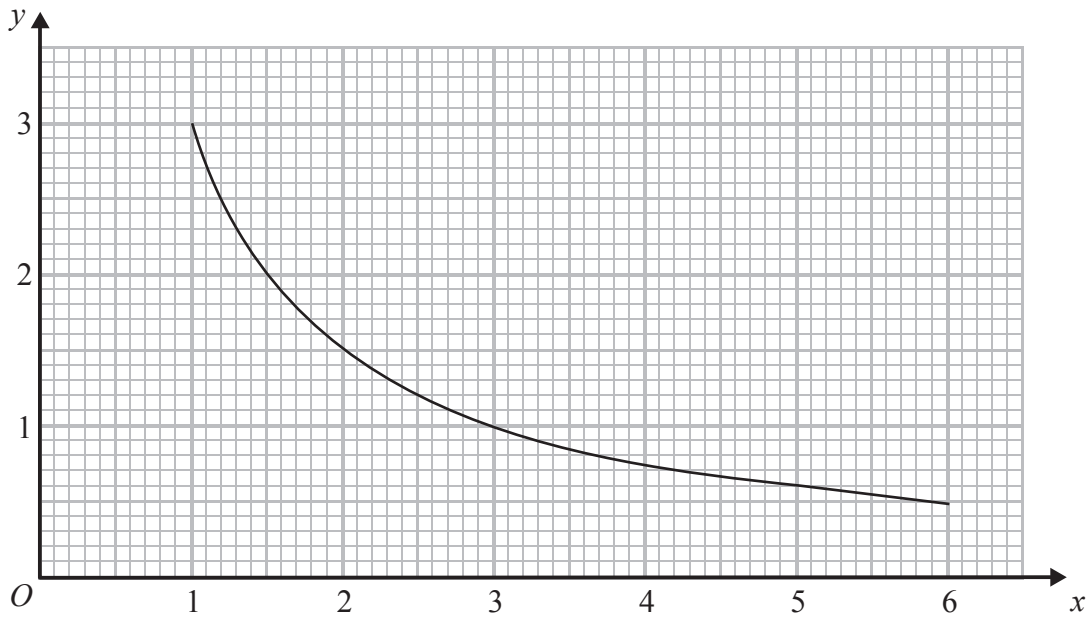


Use the trapezium rule to find an estimate for the distance travelled between 2 seconds and 5 seconds.
Use 3 strips of equal width.

..... metres

(Total for Question 14 is 4 marks)

9 Here is the graph of $y = \frac{3}{x}$ for values of x from 1 to 6



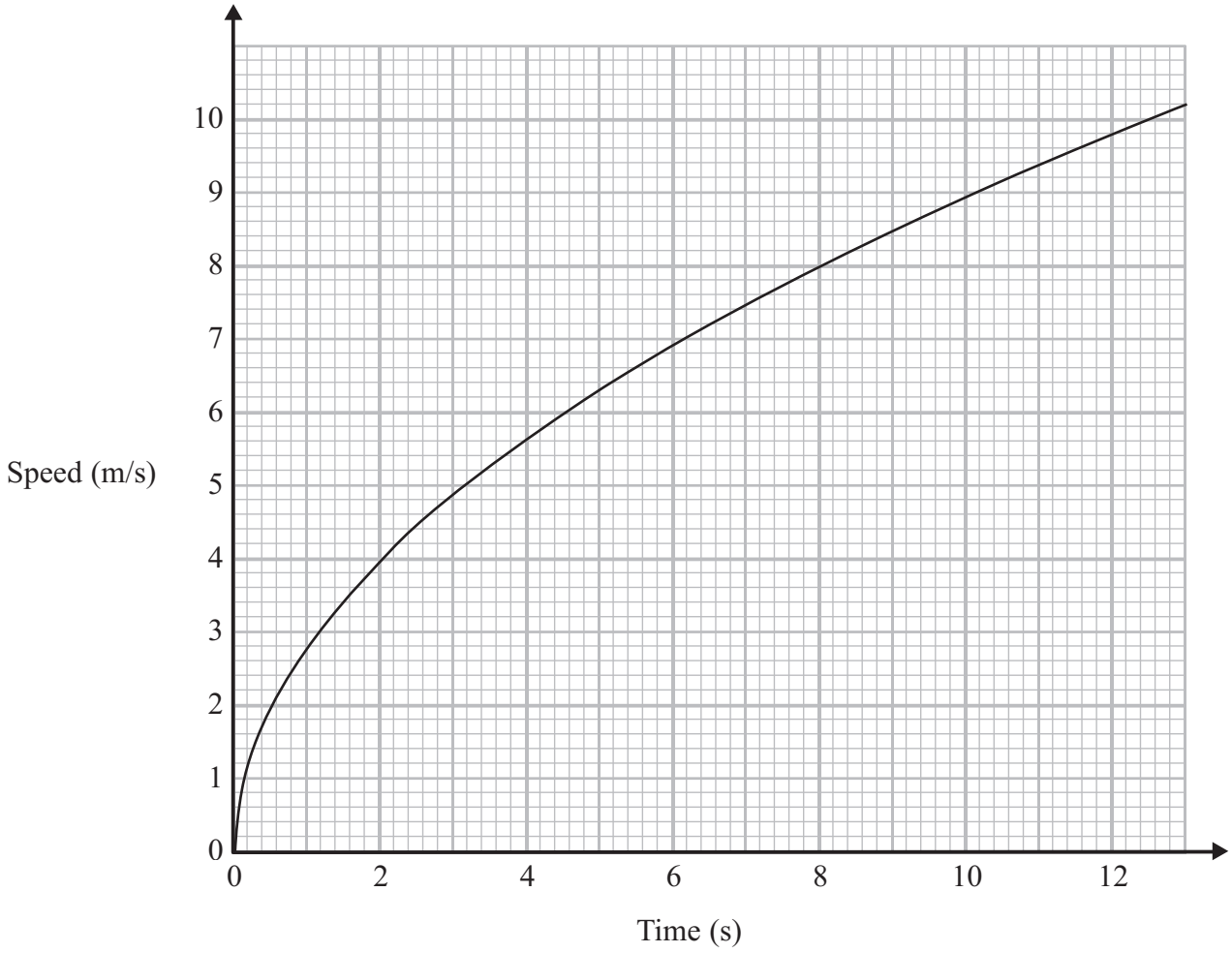
Use the trapezium rule to find the area of the region under the curve $y = \frac{3}{x}$ and between $x = 1$, $y = 0$ and $x = 6$

Use 5 strips of equal width.

.....

(Total for Question 9 is 3 marks)

16 Here is a speed-time graph.



(a) Use the trapezium rule to find the area under the graph between 2 seconds and 10 seconds. Use 4 strips of equal width.

.....

(3)

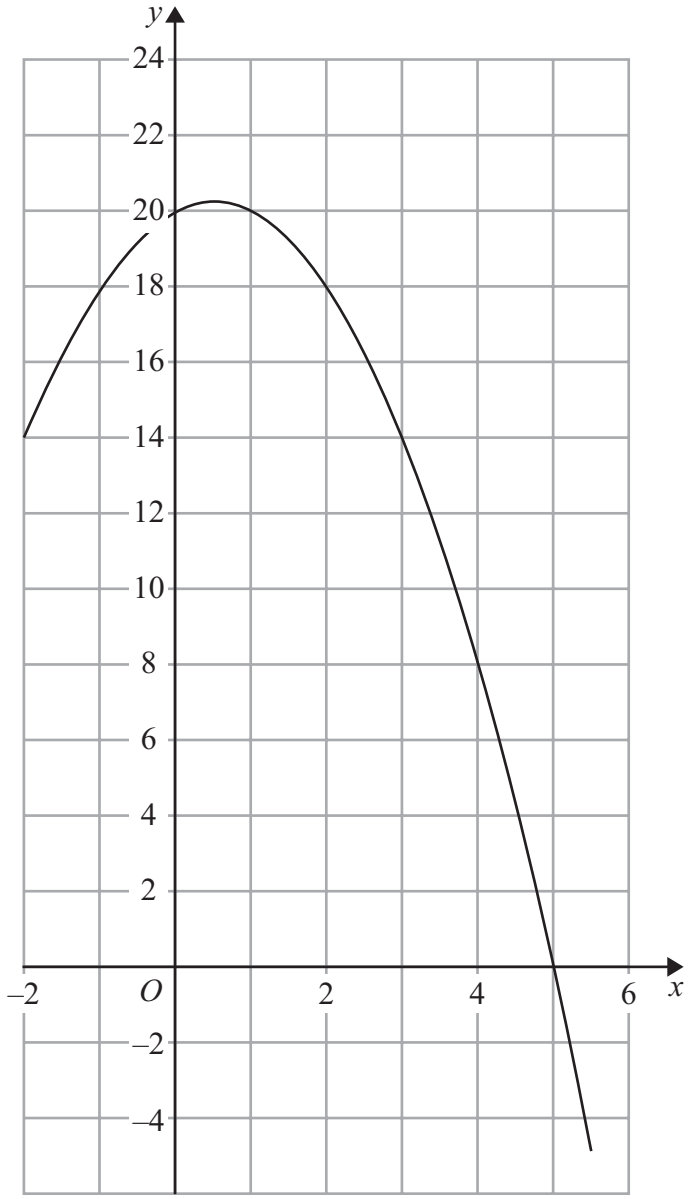
(b) What does this area represent?

.....

(1)

(Total for Question 16 is 4 marks)

19



Use the trapezium rule to find an estimate of the area of the region under the curve and between $x = 1$, $y = 0$ and $x = 5$

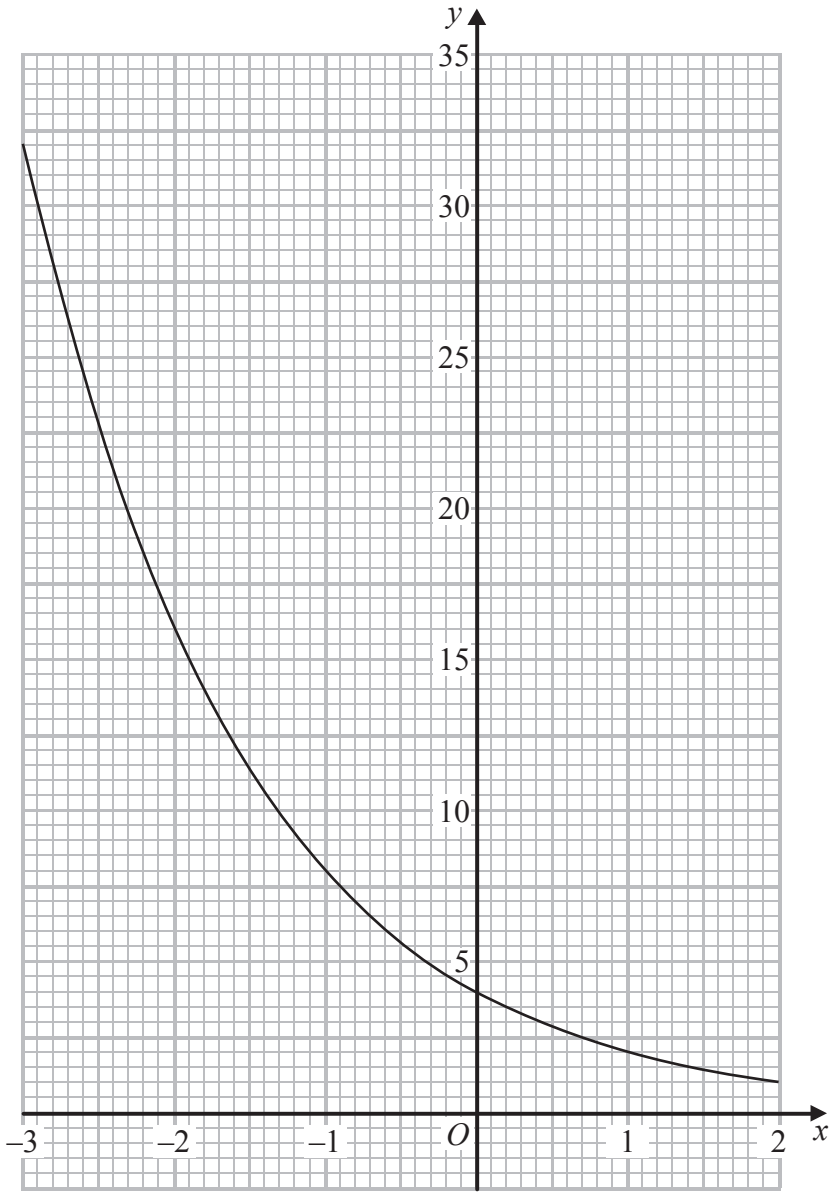
Use 4 strips of equal width.

.....

(Total for Question 19 is 3 marks)

TOTAL FOR PAPER IS 90 MARKS

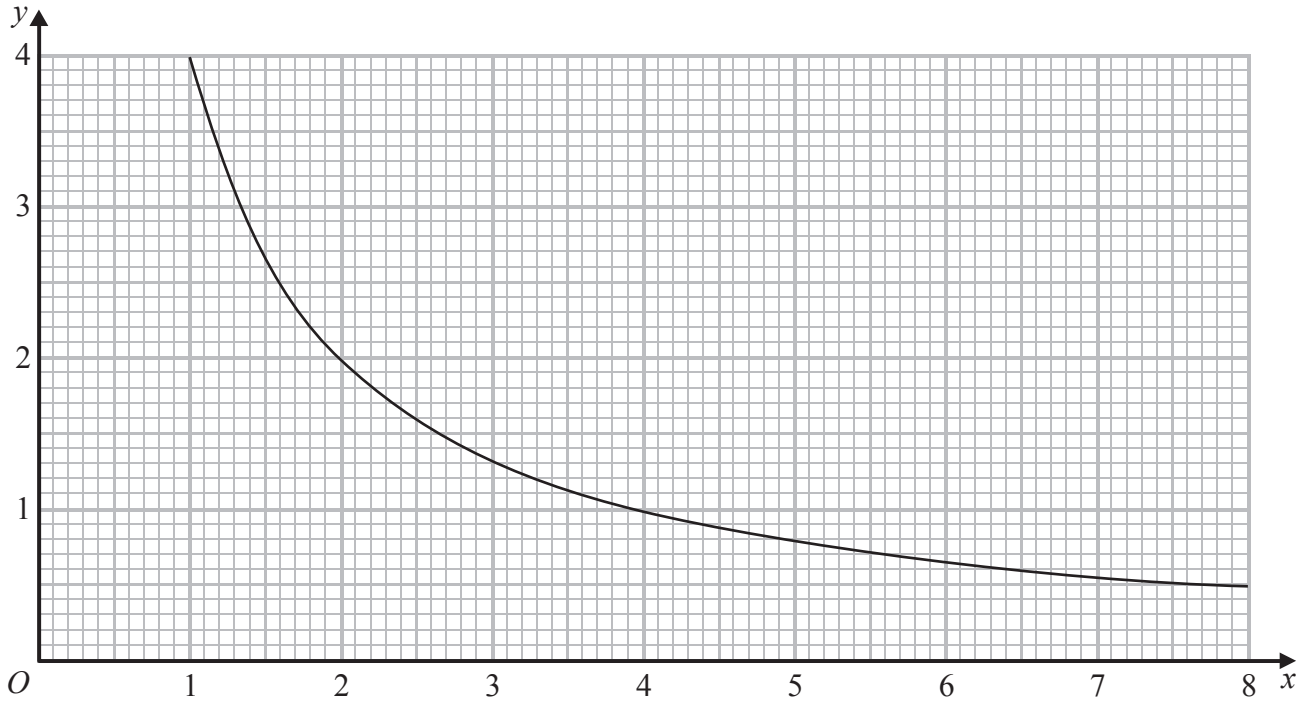
14 Here is the graph of $y = 4 \times 2^{-x}$ for values of x from -3 to 2



Use the trapezium rule to find the area of the region under the curve, between $x = -3$ and $x = 2$, and above $y = 0$
Use 5 strips of equal width.

(Total for Question 14 is 3 marks)

11 Here is a graph for values of x from 1 to 8



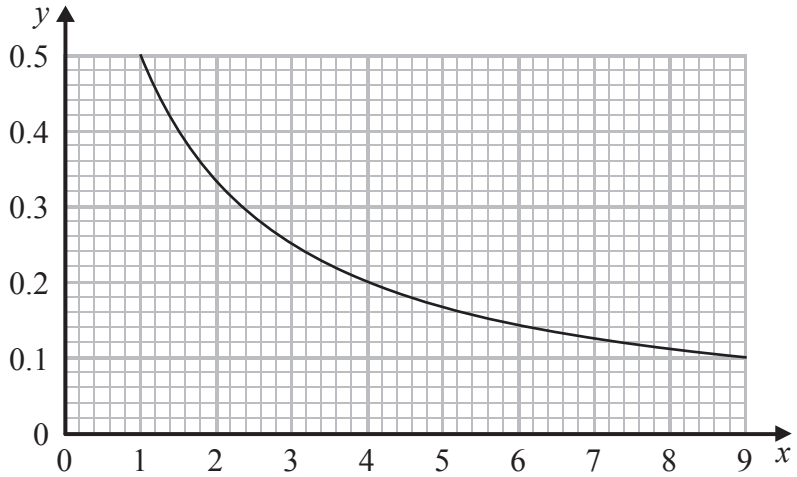
Use the trapezium rule to find an estimate of the area of the region under the curve, between $x = 2$ and $x = 6$, and above $y = 0$

Use 4 strips of equal width.

.....

(Total for Question 11 is 3 marks)

12 Here is part of the graph of $y = \dfrac{1}{1+x}$

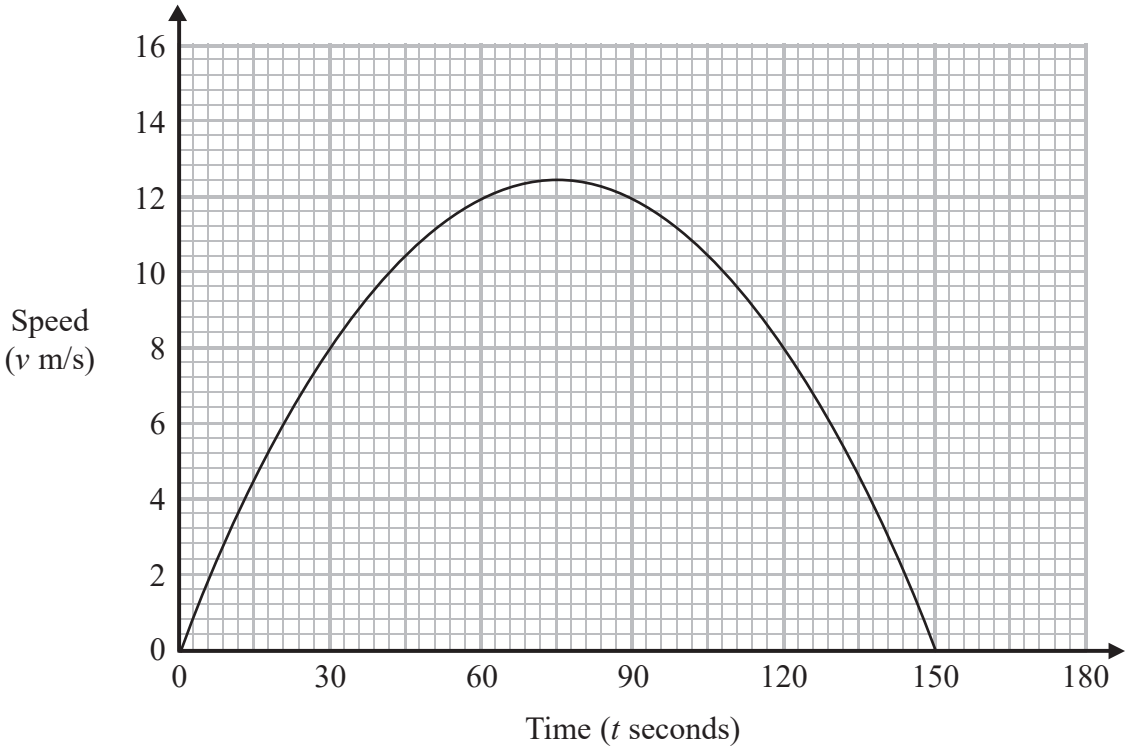


Use the trapezium rule to find an estimate of the area of the region under the curve and between $x = 1$, $y = 0$ and $x = 9$
Use 4 strips of equal width.

(Total for Question 12 is 3 marks)

17 A car is moving so that its speed is v m/s at time t seconds after starting from rest.

Here is the speed-time graph for the car.



(a) Find the speed of the car when $t = 99$

..... m/s

(1)

Sophia draws a tangent to the curve at the point where $t = 50$

(b) What does the gradient of this tangent represent?

.....

(1)

(c) Use the trapezium rule to find an estimate of the area of the region under the curve and between $t = 30$, $t = 120$ and the time axis.
Use 3 strips of equal width.

.....

(3)

(d) What does this area represent?

.....

(1)

(Total for Question 17 is 6 marks)

12 (a) Complete the table of values for $y = 3^x$

x	-1	0	1	2	3
y					

(2)

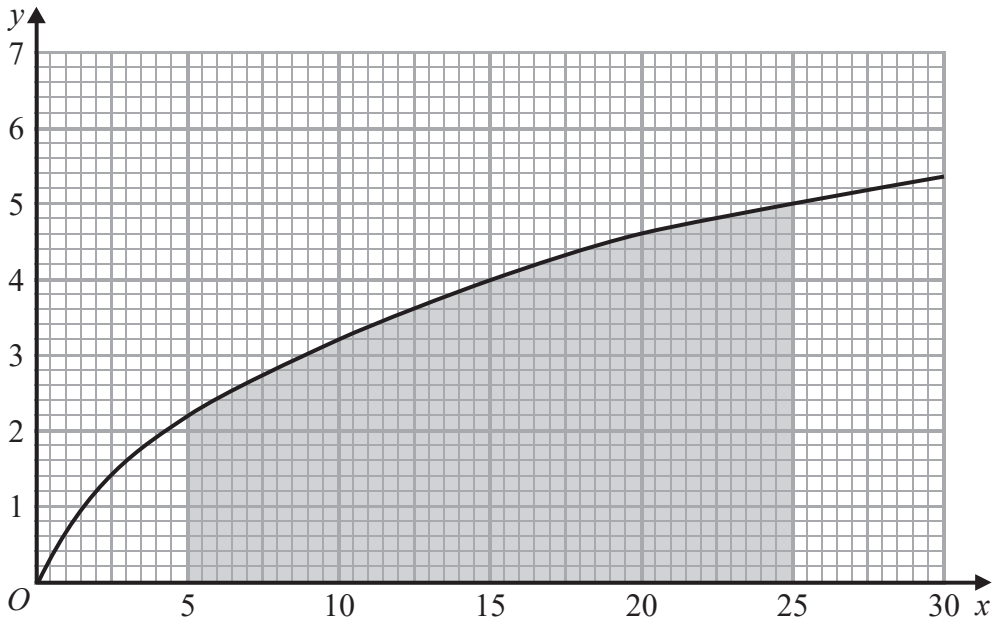
(b) Use the trapezium rule to find an estimate for the area of the region under the curve $y = 3^x$, between $x = -1$ and $x = 3$ and above $y = 0$
Use 4 strips of equal width.

.....

(3)

(Total for Question 12 is 5 marks)

20 Here is a graph for values of x from 0 to 30



Use the trapezium rule to find an estimate for the area of the shaded region.

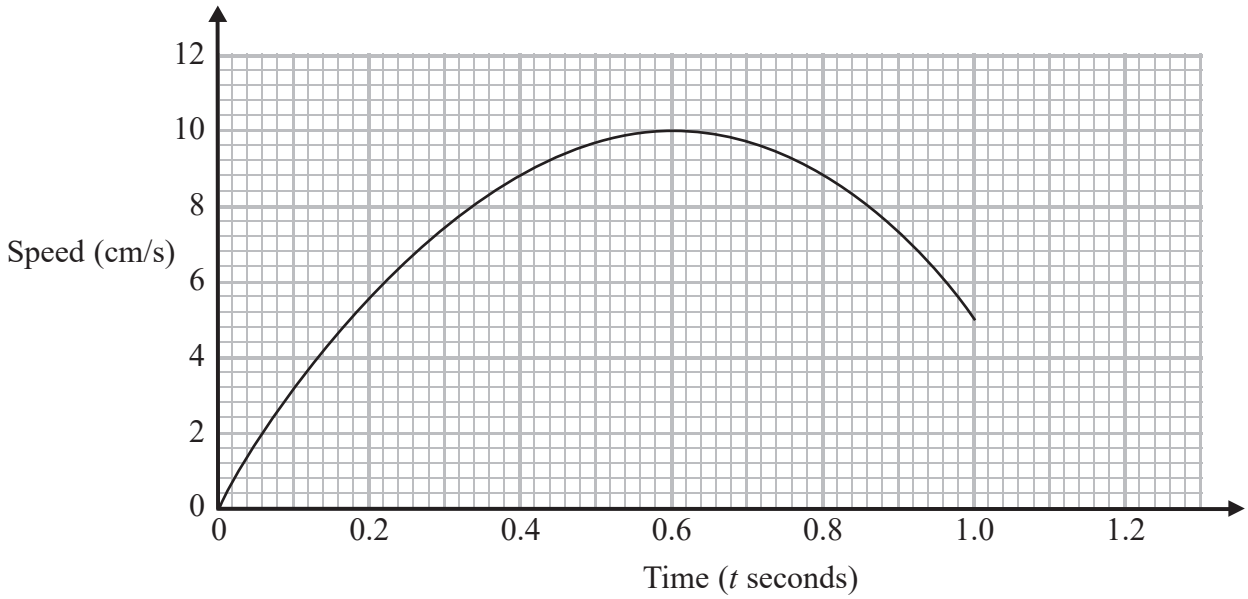
Use 4 strips of equal width.

.....

(Total for Question 20 is 3 marks)

TOTAL FOR PAPER IS 90 MARKS

12 Here is the speed-time graph for a point P that moves on a computer screen.



(a) Use the trapezium rule to find an estimate of the area of the region under the curve and between $t = 0$, $t = 1.0$ and the time axis.
Use 5 strips of equal width.

.....

(3)

(b) What does this area represent?

.....

(1)

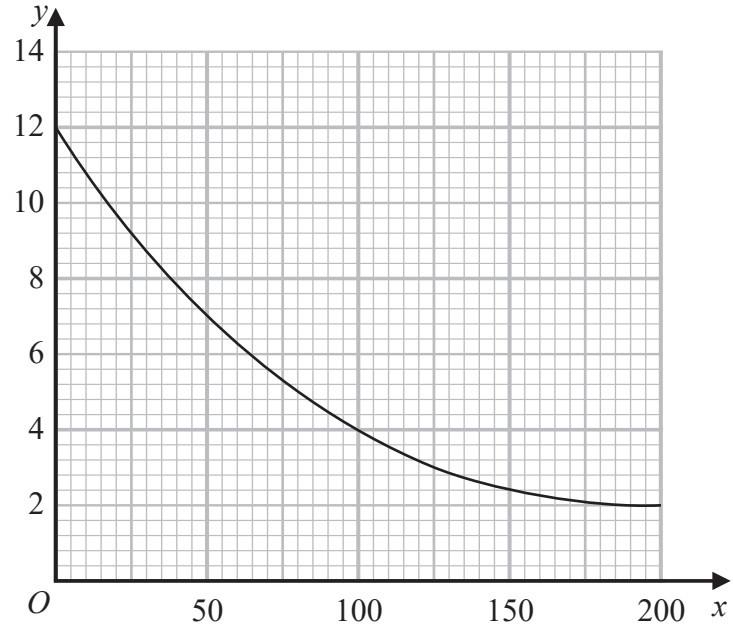
(c) For what value of t is the acceleration of P zero?

.....

(1)

(Total for Question 12 is 5 marks)

19 Here is a graph for values of x from 0 to 200



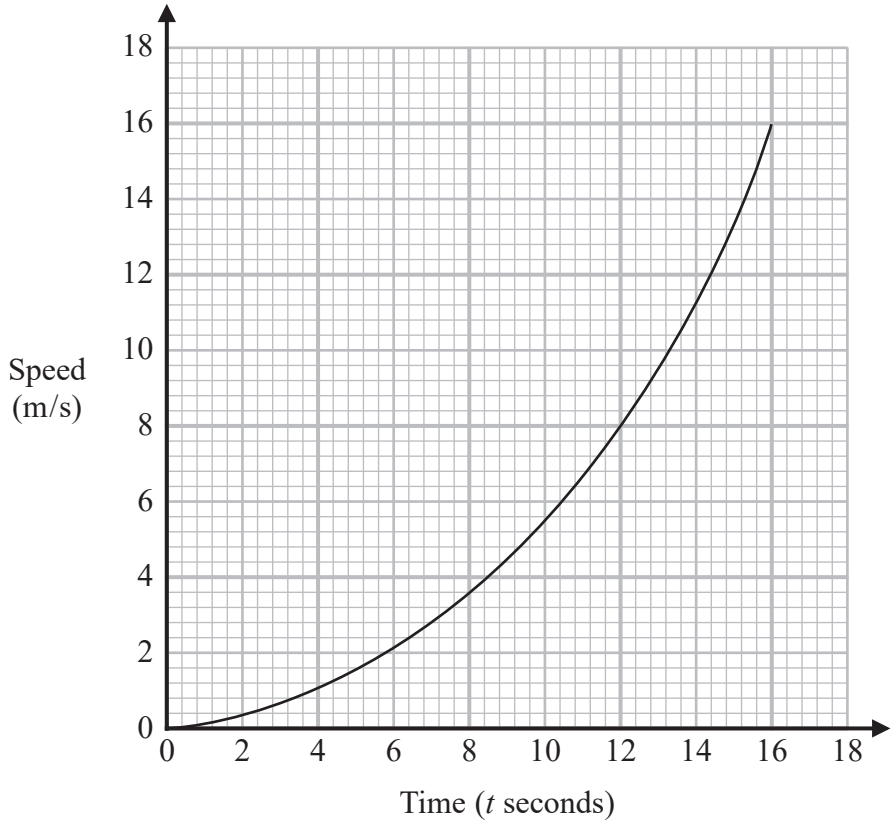
Use the trapezium rule to find an estimate of the area of the region under the curve and between $x = 0$, $x = 200$ and the x-axis.

Use 4 strips of equal width.

.....

(Total for Question 19 is 3 marks)

13 Here is a speed-time graph for a particle moving in a straight line.



(a) (i) Use the trapezium rule to find an estimate for the area of the region under the curve between $t = 0$, $t = 16$ and the time axis.
Use 4 strips of equal width.

.....

(3)

(ii) What does this area represent?

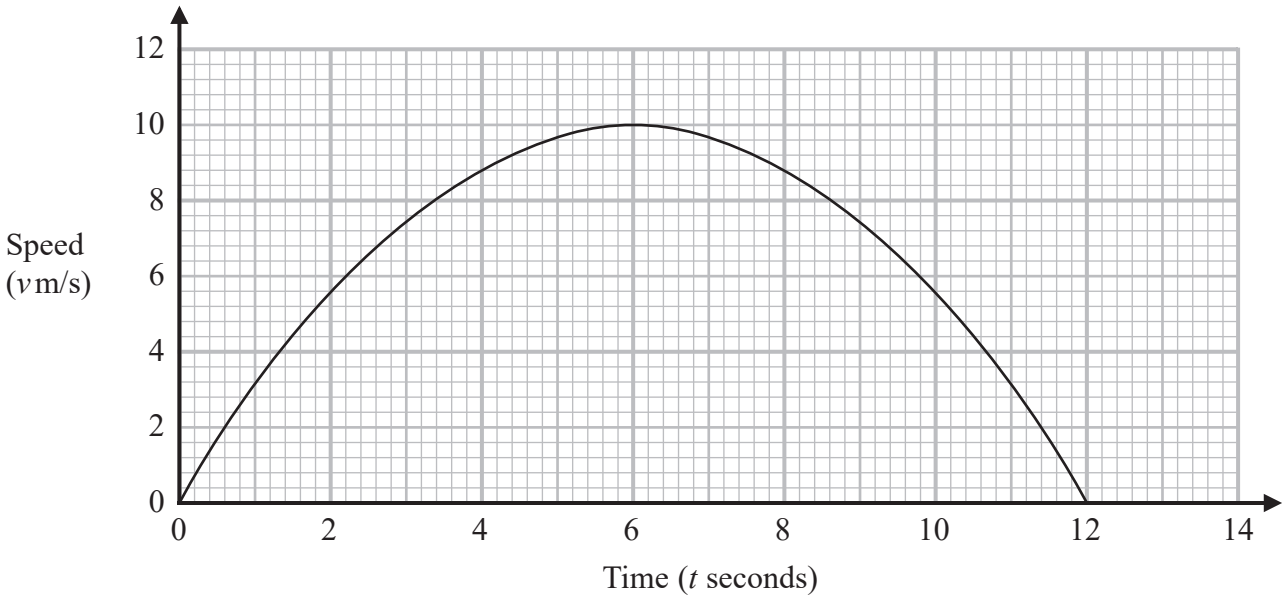
.....

.....

(1)

17 A ball moves so that its speed is v m/s at time t seconds after starting from rest.

The speed-time graph for the ball is drawn on the grid.



The ball is moving at its maximum speed at time T seconds.

(a) (i) Write down the value of T.

$T =$ .....

(1)

(ii) Write down the gradient of the tangent to the curve at the time when the ball is moving at its maximum speed.

.....

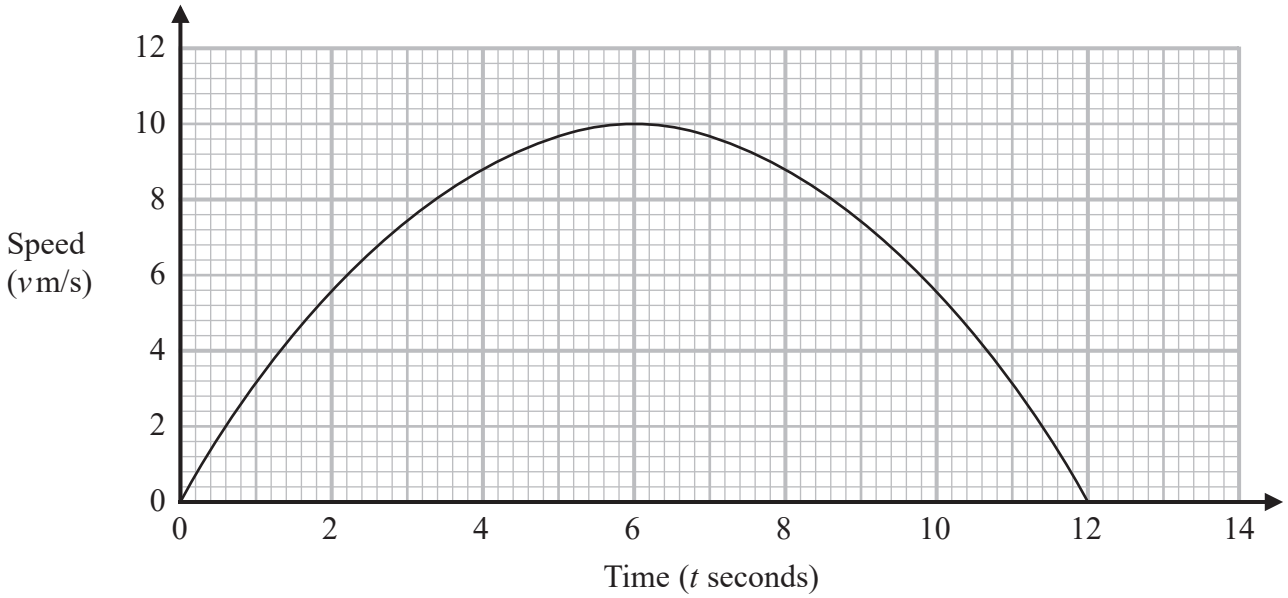
(1)

(b) Work out an estimate of the acceleration of the ball when $t = 3$

..... m/s^2

(2)

Here is the speed-time graph for the ball.



(c) Use the trapezium rule to find an estimate of the area of the region under the curve and between $t = 0$, $t = 10$ and the time axis.
Use 5 strips of equal width.

.....

(3)

(d) What does this area represent?

.....

(1)

(Total for Question 17 is 8 marks)

14 Here is a table of values for $y = 4^x$

x	0	0.5	1	1.5	2
y	1	2	4	8	16

Use the trapezium rule to find an estimate for the area of the region under the curve $y = 4^x$, between $x = 0$ and $x = 2$ and above $y = 0$
Use 4 strips of equal width.

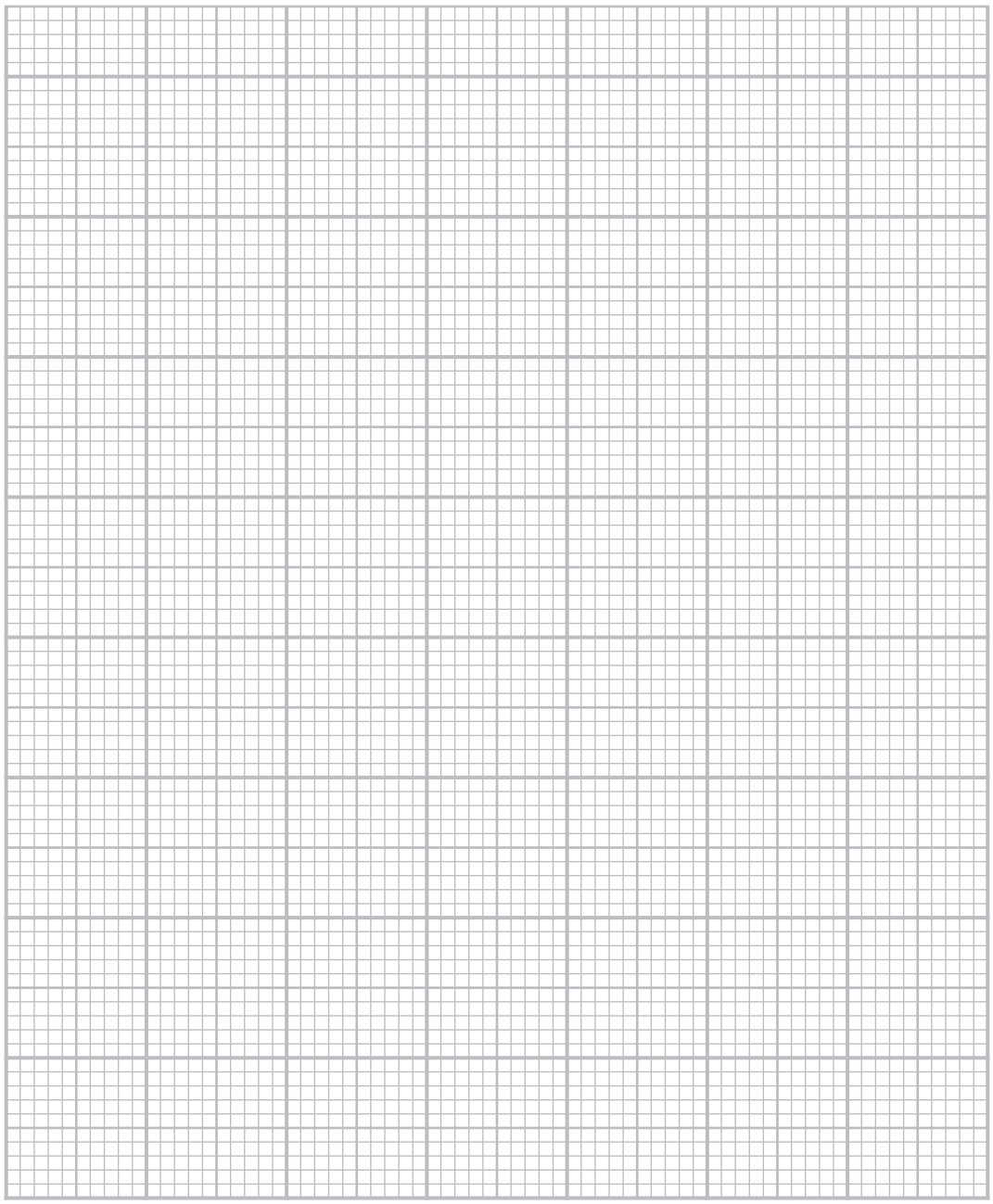
.....

(Total for Question 14 is 2 marks)

19 The table shows the values of $y = 2^{x-1}$ for integer values of x from –2 to 4

x	–2	–1	0	1	2	3	4
y	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8

(a) On the grid, draw the graph of $y = 2^{x-1}$ for values of x from –2 to 4



(2)

(b) Use your graph to find an estimate, to one decimal place, for the solution of $2^x = 12$

.....

(2)

(c) Use the trapezium rule to find an estimate for the area of the region under the curve and between $x = 1$, $x = 4$ and the x-axis.
Use 3 strips of equal width.

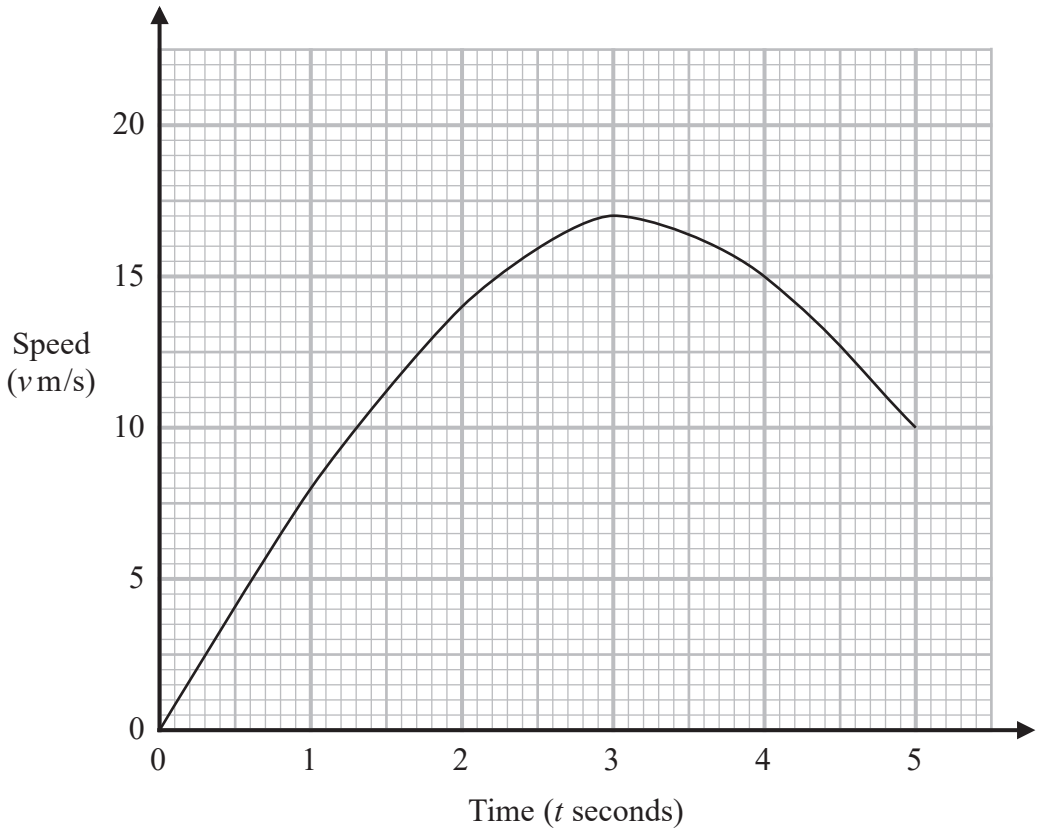
.....

(2)

(Total for Question 19 is 6 marks)

16 A car moves with speed v m/s at time t seconds after starting from rest.

Here is a speed-time graph for the first 5 seconds of the car's journey.



At time T seconds the acceleration of the car is zero.

(a) Write down the value of T.

.....

(1)

(b) Use the trapezium rule to find an estimate of the area of the region under the curve and between $t = 1$, $t = 5$ and the time axis.
Use 4 strips of equal width.

.....

(3)

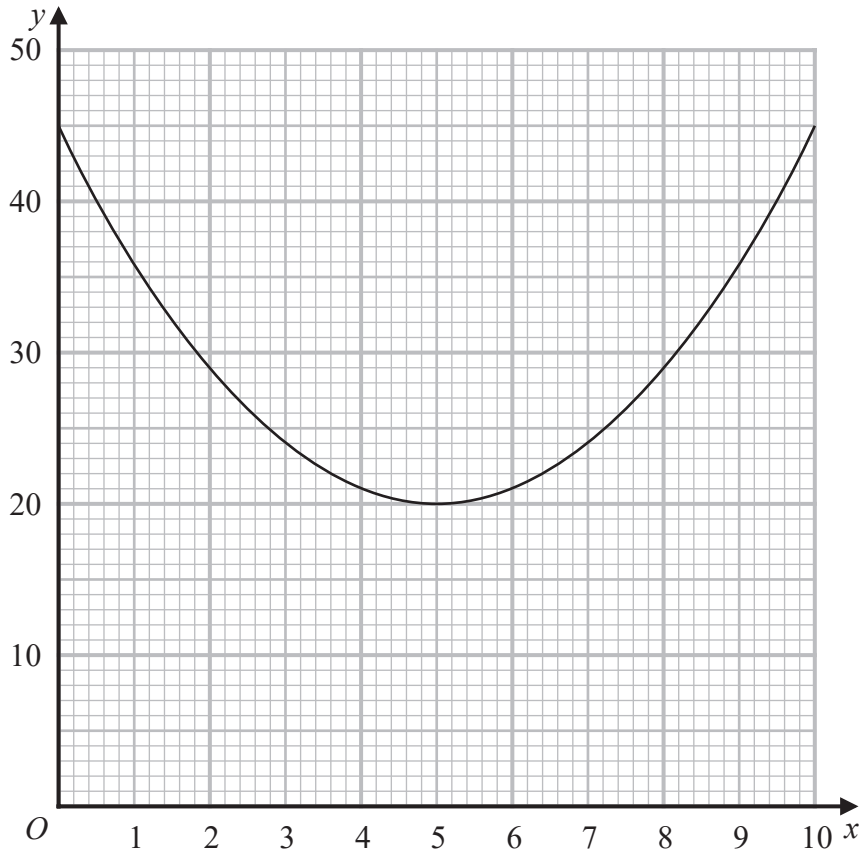
(c) What does this area represent?

.....

(1)

(Total for Question 16 is 5 marks)

12 Here is the graph of $y = x^2 - 10x + 45$ for values of x from 0 to 10



(a) Use the graph to find estimates for the solutions of $x^2 - 10x + 15 = 0$

.....

(2)

(b) Use the trapezium rule to find an estimate for the area of the region under the curve and between $x = 0$, $x = 9$ and the x-axis.

Use 3 strips of equal width.

.....

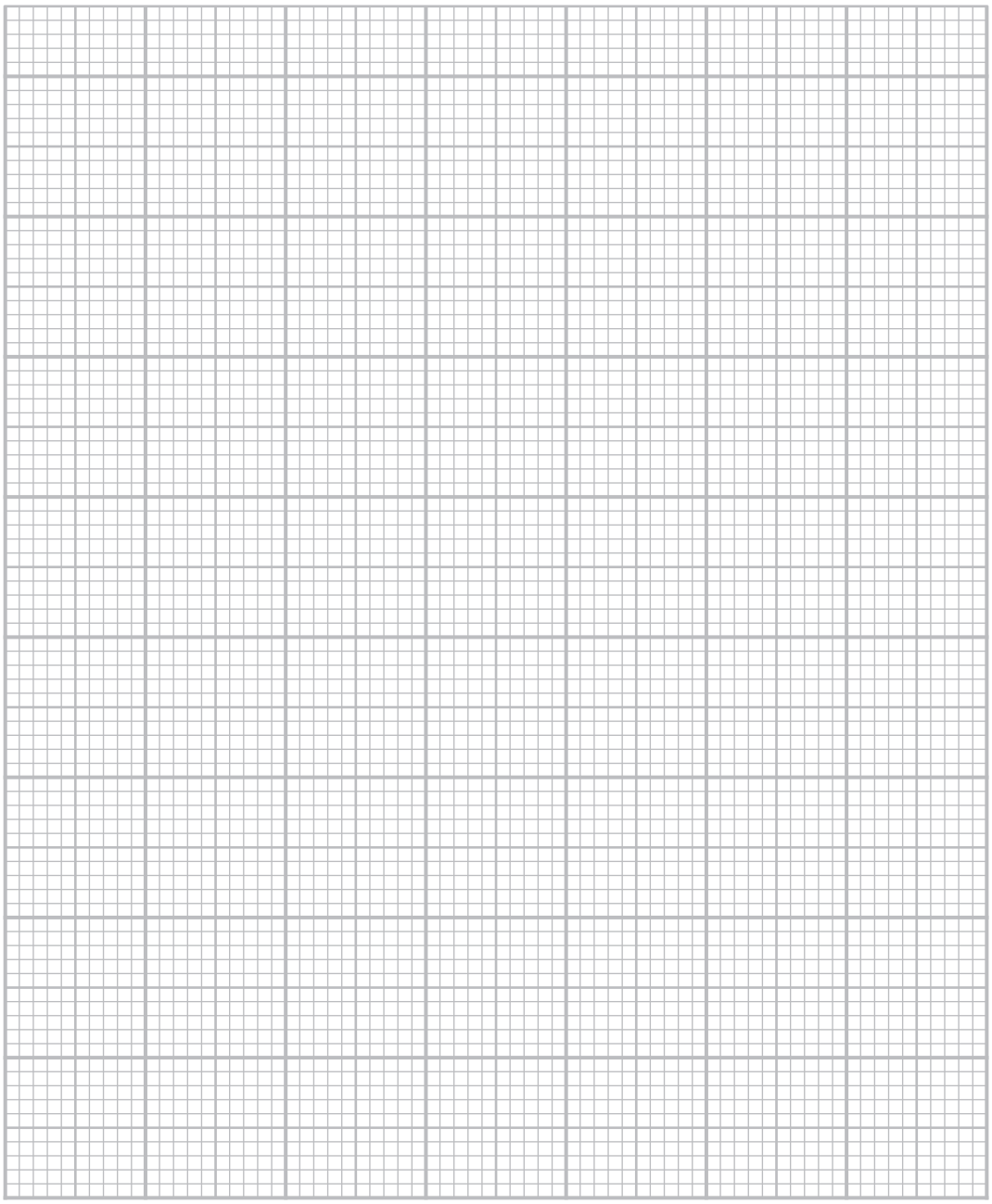
(3)

(Total for Question 12 is 5 marks)

19 The table shows the values of $y = 2^{1-x}$ for integer values of x from –2 to 4

x	–2	–1	0	1	2	3	4
y	8	4	2	1	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$

(a) On the grid, draw the graph of $y = 2^{1-x}$ for values of x from –2 to 4



(2)

(b) Use your graph to find an estimate, to one decimal place, for the solution of $2^{-x} = 3$

.....

(2)

(c) Use the trapezium rule to find an estimate for the area of the region under the curve and between $x = -1$, $x = 2$ and the x-axis.
Use 3 strips of equal width.

.....

(2)

(Total for Question 19 is 6 marks)