

Name:

Exam Style Questions

## Rates of Change



Equipment needed: Ruler, Pencil, Calculator and Pen

### Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

Video Tutorial

[www.corbettmaths.com/contents](http://www.corbettmaths.com/contents)

Videos 390a, 390b



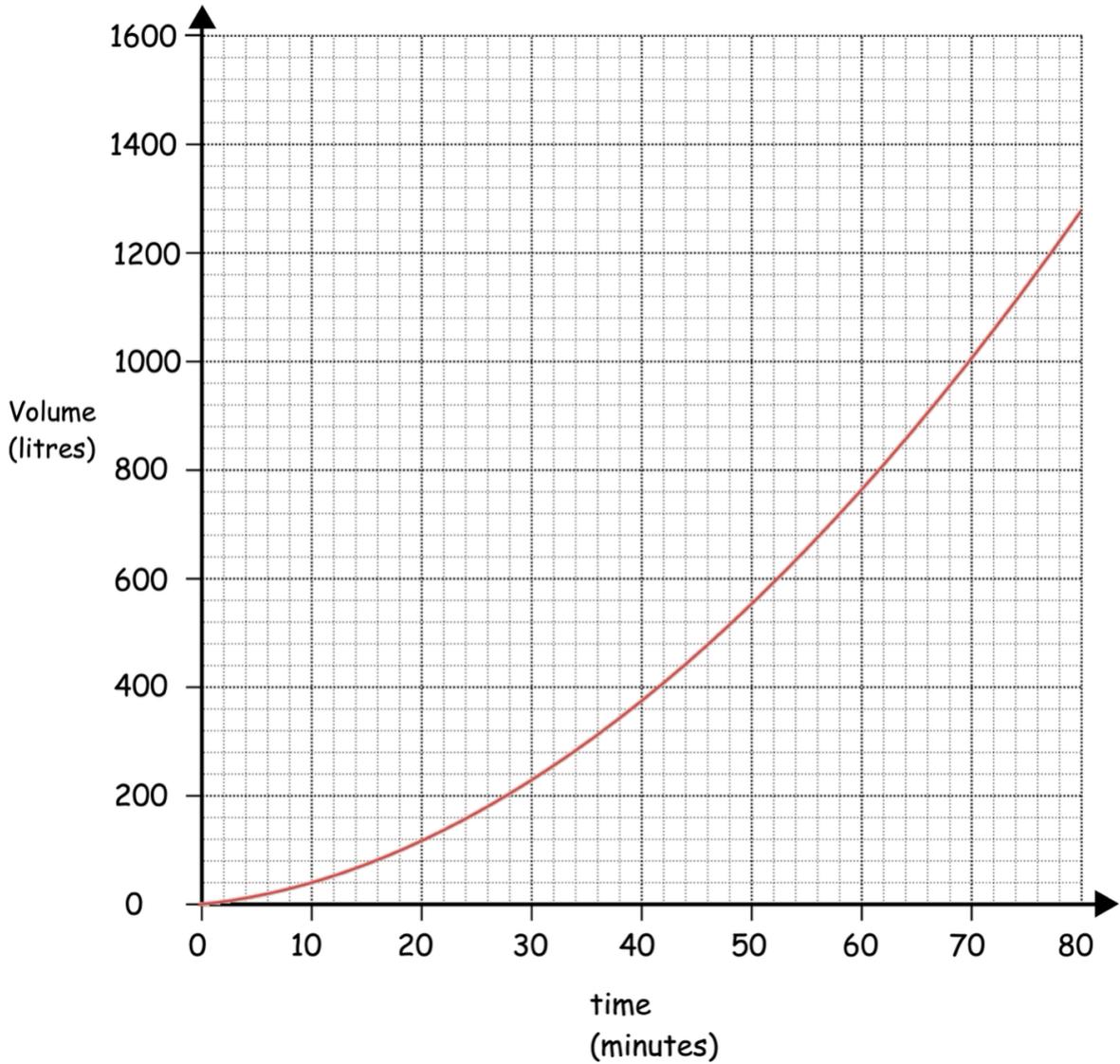
Answers and Video Solutions



1. A family are filling a large paddling pool.



The graph shows the volume, in litres, of the water in the paddling pool as it is being filled.



(a) Calculate an estimate for the gradient of the graph when the time is equal to 50 minutes.

.....  
(3)

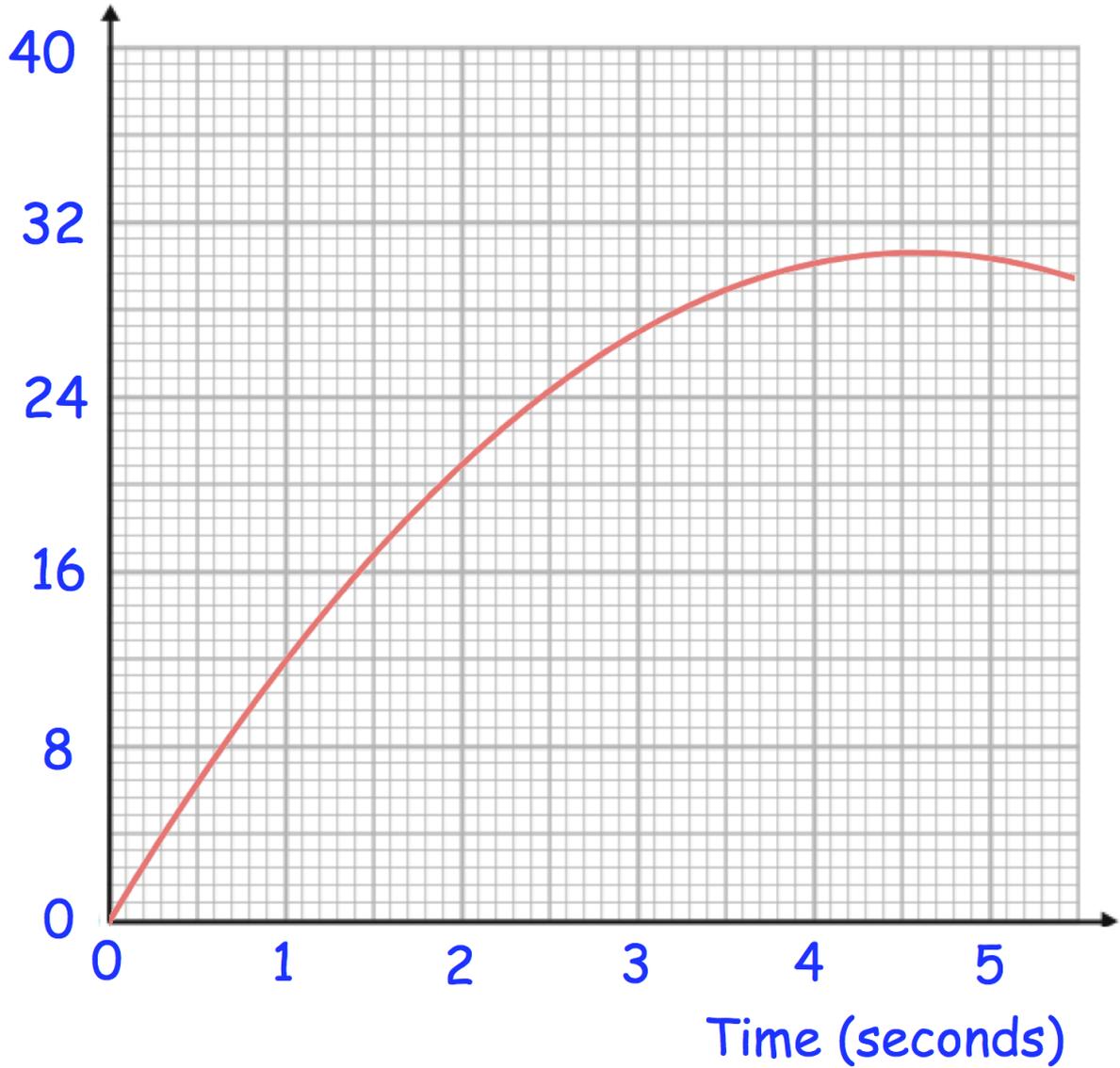
(b) Describe fully what the gradient in part (a) represents.

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

2. A rocket is fired upwards as part of a science experiment.  
The graph shows the height of the rocket above the ground.



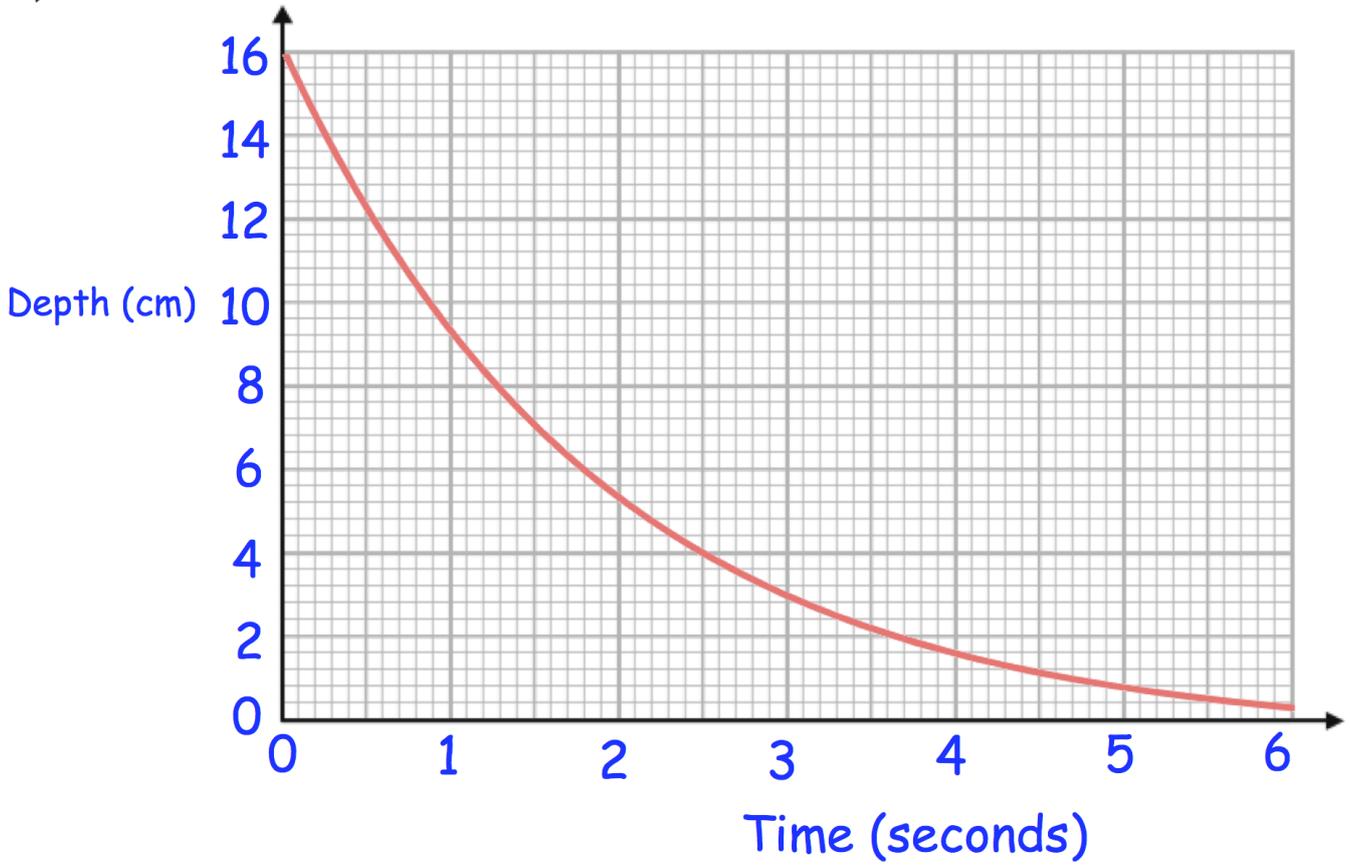
Height (metres)



Work out the average speed between 1 and 4 seconds.

.....m/s  
(3)

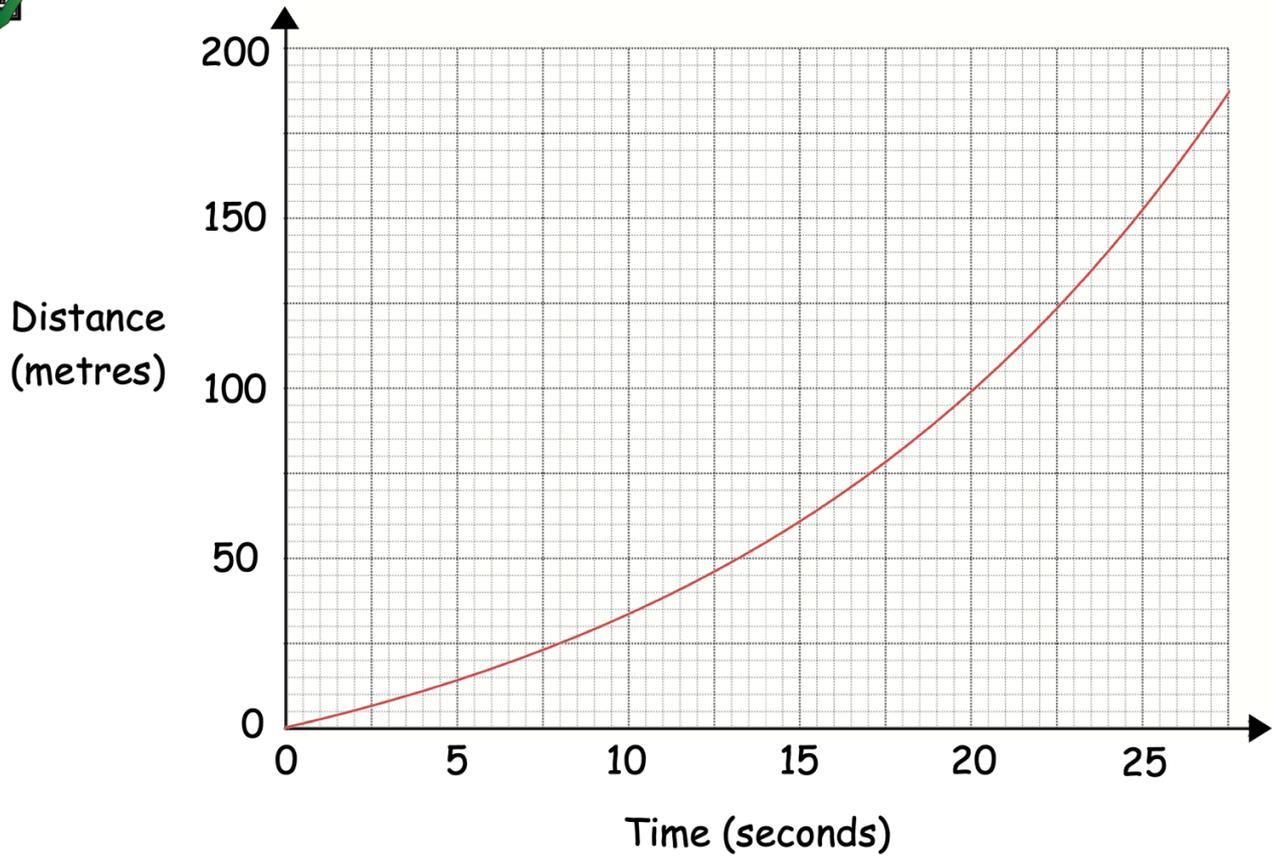
3. Water is being emptied out of a bath.  
The graph shows the depth of the water for the first 6 seconds.



Use the graph to work out an estimate of the rate of decrease of depth at 1 second.

.....cm/s  
(3)

4. This graph shows the distance travelled by a runner.



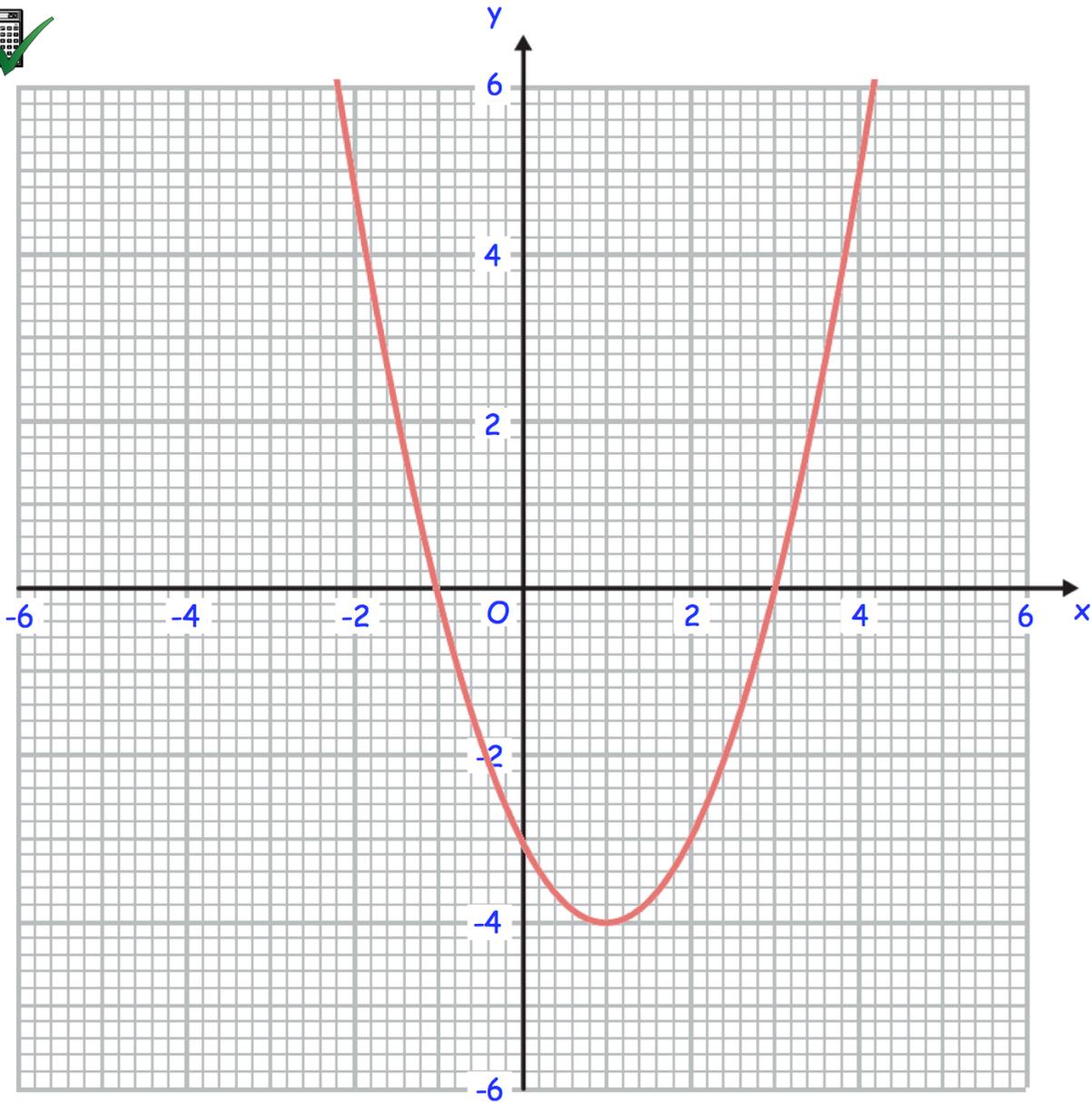
(a) Work out an estimate of the speed of the runner at 10 seconds.

.....m/s  
**(3)**

(b) Work out the average speed of the runner between 19 and 24 seconds.

.....m/s  
**(3)**

5. The diagram shows part of the graph of  $y = x^2 - 2x - 3$



P is a point on the graph of  $y = x^2 - 2x - 3$  where  $x = 2$

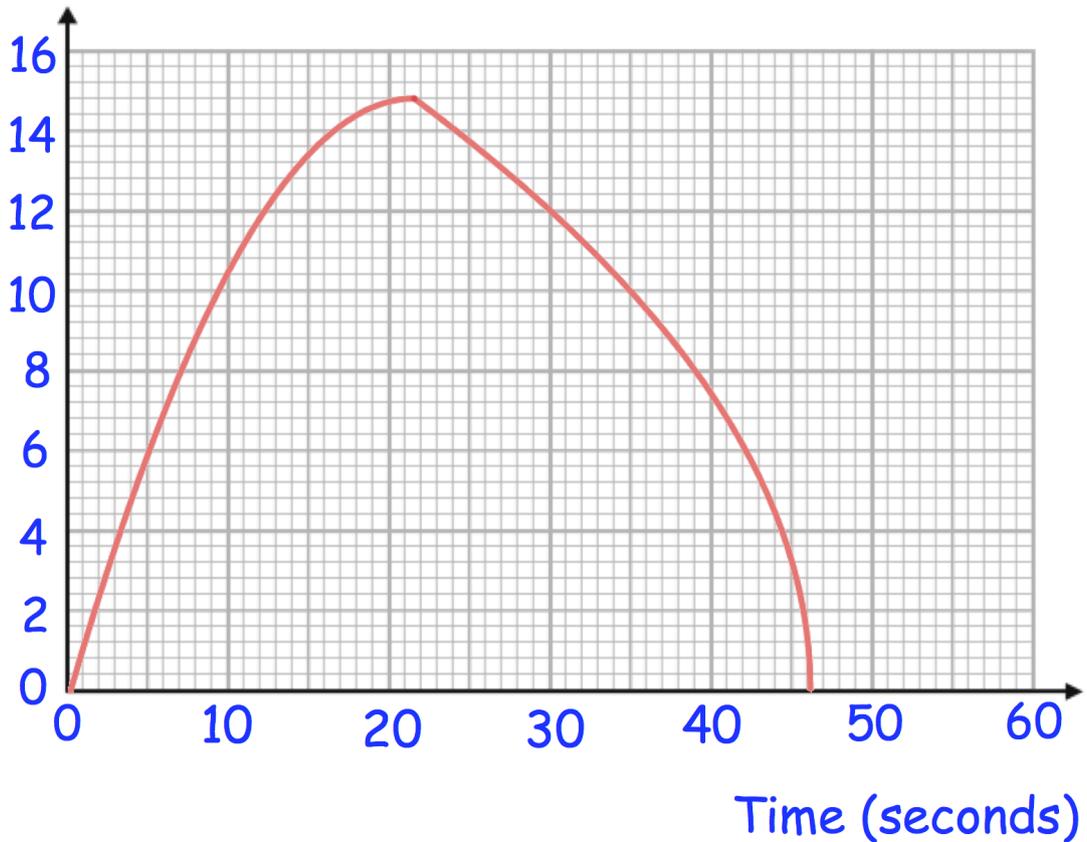
Calculate an estimate for the gradient of the graph at the point P.

.....  
(3)

6. Below is the velocity-time graph of a car journey



Velocity  
(m/s)



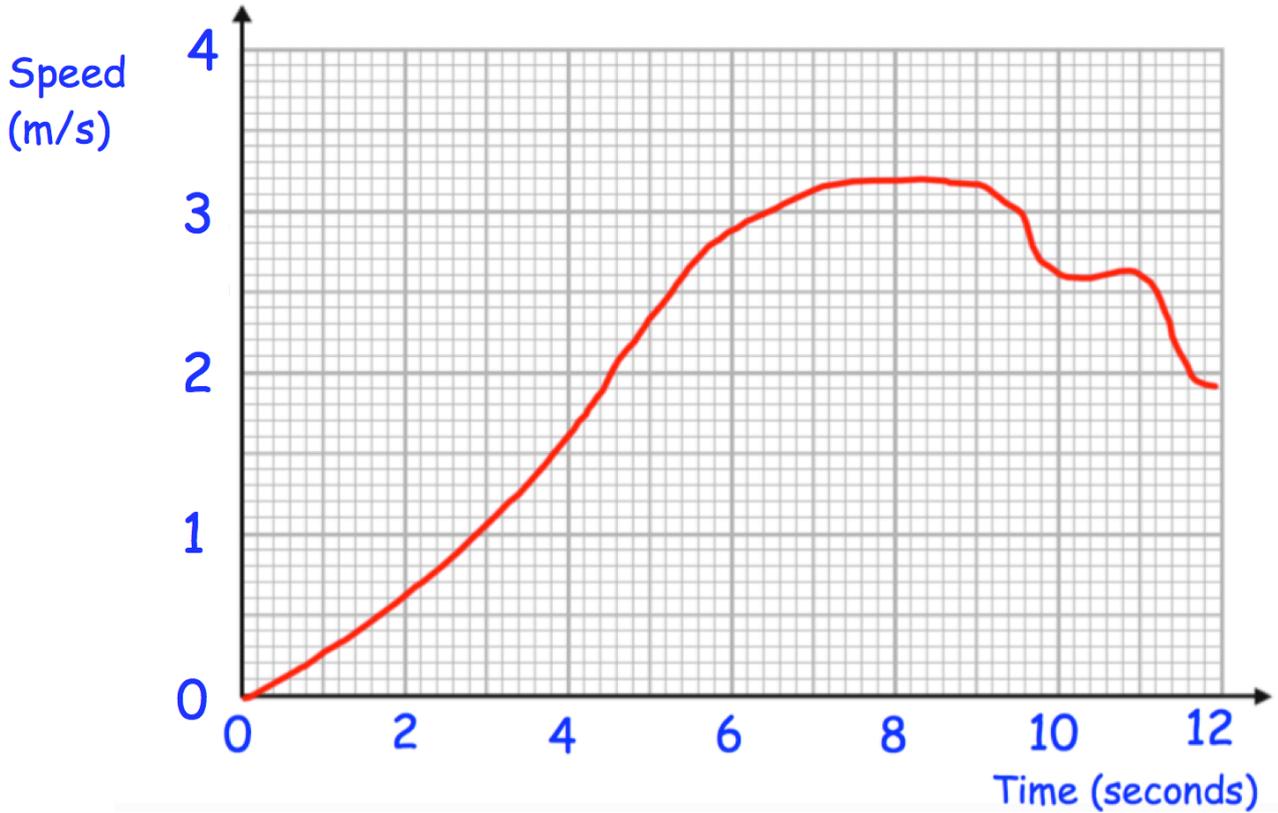
- (a) Work out the average acceleration over the first 20 seconds of the journey.  
State the units of this acceleration.

.....  
(4)

- (b) Use the graph to calculate an estimate for the deceleration of the car  
when  $t = 35$  seconds  
State the units of this deceleration.

.....  
(4)

7. Some students carry out an experiment.  
They record the speed of a toy car during 12 seconds.



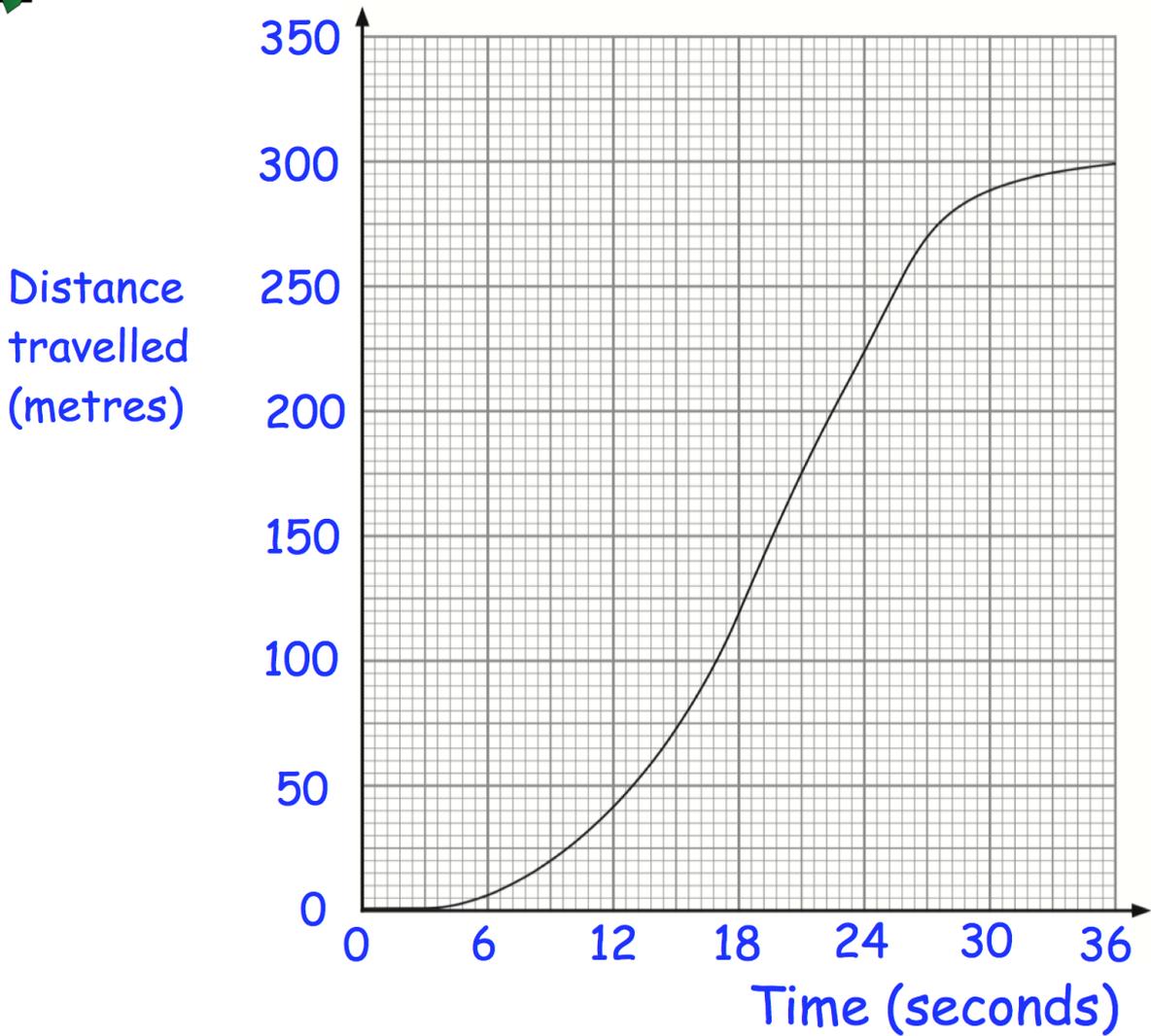
- (a) Calculate the acceleration of the toy car at 3 seconds.

.....m/s<sup>2</sup>  
(3)

- (b) Write down a time when the toy car was not accelerating.

.....seconds  
(1)

8. The graph shows the distance travelled by a train over 36 seconds.



(a) Work out the average speed of the train between 6 and 18 seconds.

.....m/s  
(3)

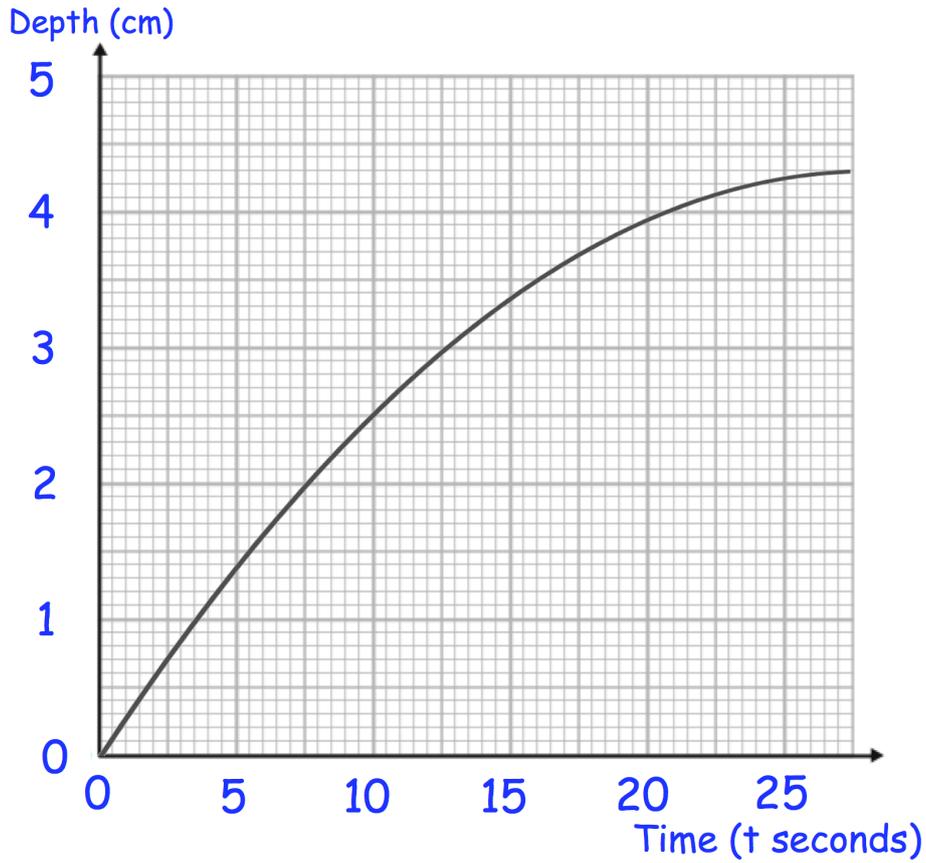
(b) Estimate the highest speed reached by the train on the journey.  
Give your answer in kilometres per hour.

.....km/h  
(4)

9. Jack is filling a container with water.



The graph shows the depth of the water, in centimetres,  $t$  seconds after the start of filling the container.



(a) Calculate an estimate for the gradient of the graph when  $t = 15$  seconds.

.....  
(3)

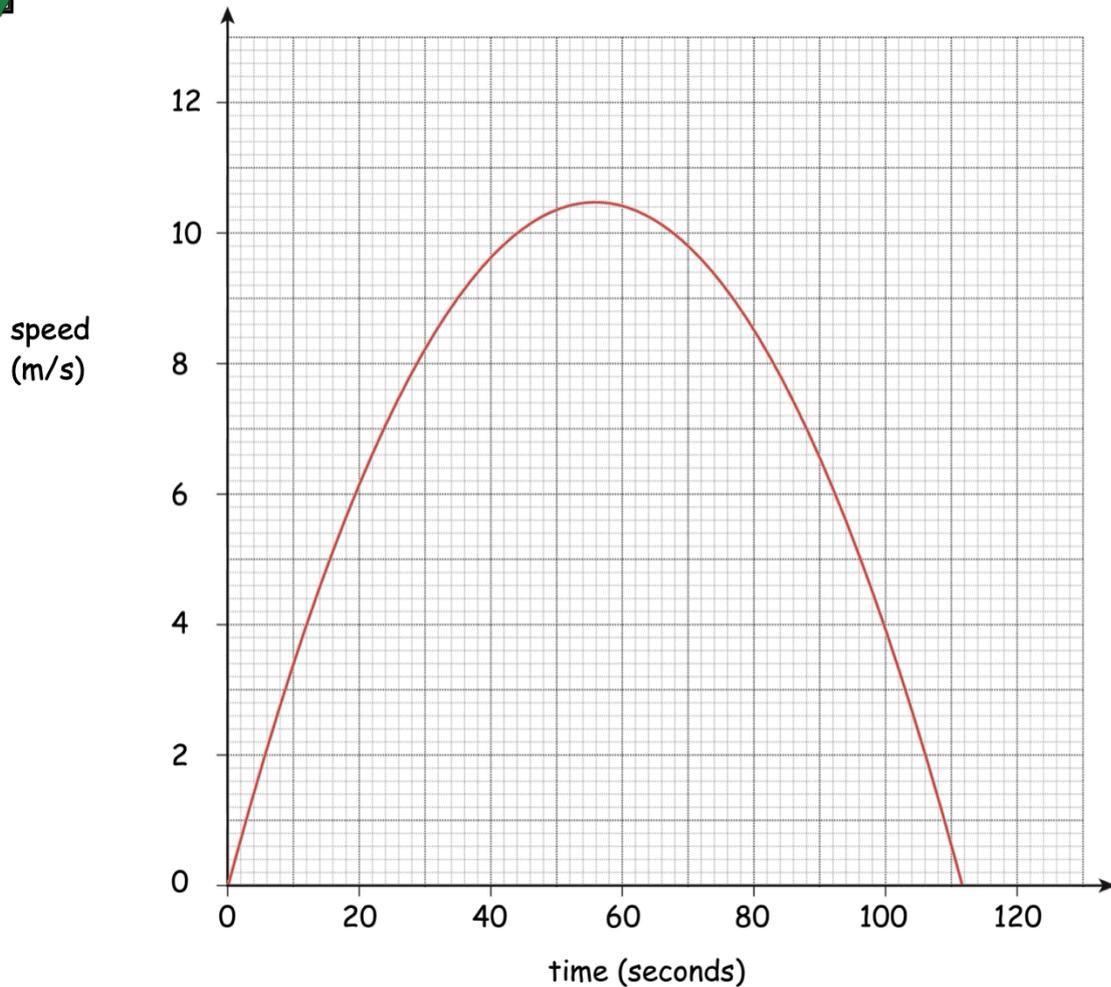
(b) Describe fully what your answer to (a) represents

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

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

.....  
(1)

10. The speed-time graph shows information about a tram journey between two stops.



(a) Work out an estimate of the gradient of the graph at  $t = 40$

.....  
**(3)**

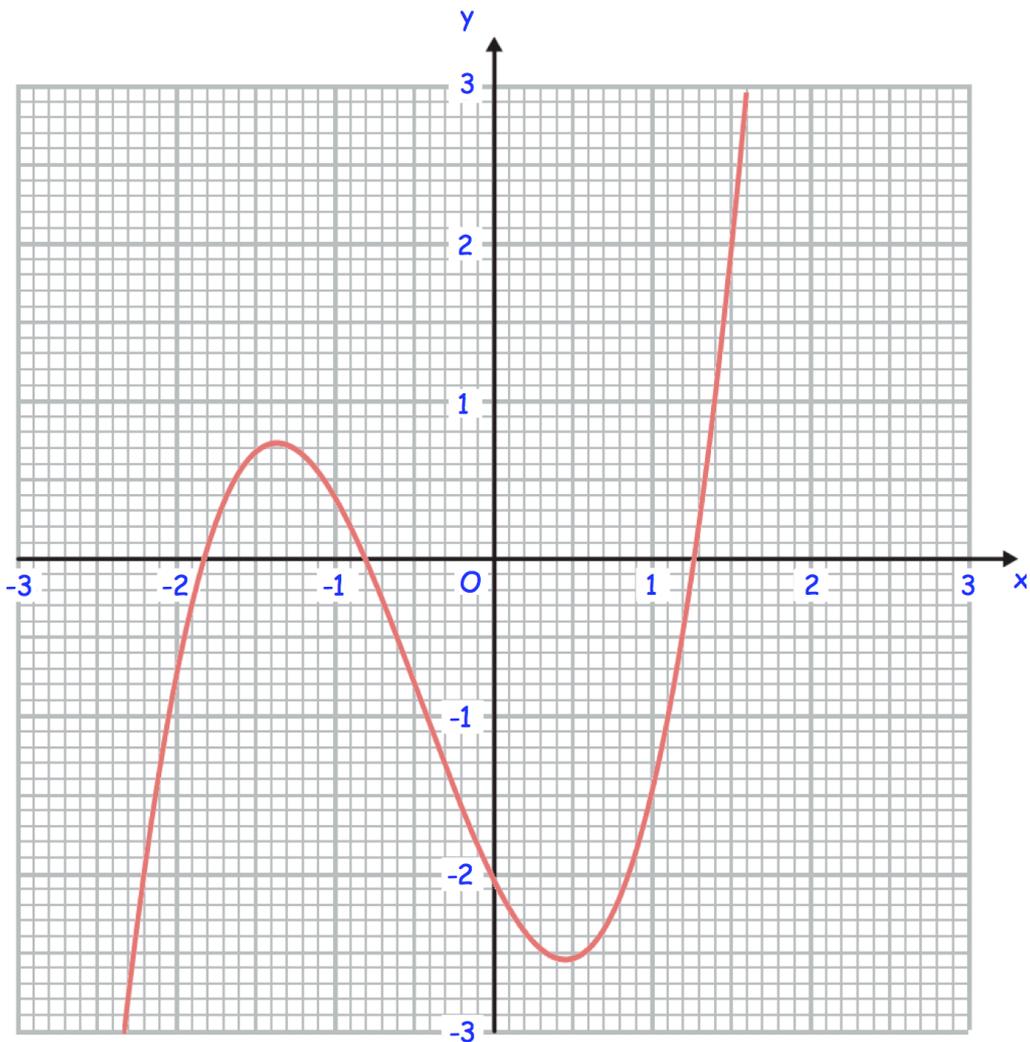
(b) Describe fully what your answer to (a) represents

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

(c) Describe what the area under the graph represents.

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

11. The graph of  $y = f(x)$  is drawn on the grid.



(a) Write down the coordinates of the two turning points of the graph.

(....., ..... ) and (....., ..... )  
(2)

(b) Write down the estimates for the roots of  $f(x) = 0$

.....  
(2)

(c) Use the graph to find  $f(1.5)$

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

P is a point on the graph of  $y = f(x)$  where  $x = -2$

Calculate an estimate for the gradient of the graph at the point P.

.....  
**(3)**