

Gradients and Area Under Graphs

ANSWERS

Calculator | 30 minutes | Total marks: 22

Name

Class

1

A distance time graph is a straight line from (0, 0) to (4, 60)

Time is in seconds and distance is in metres.

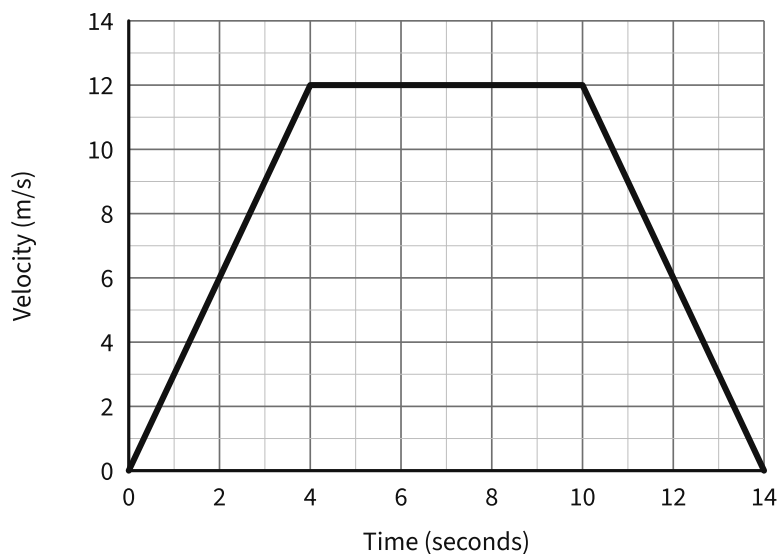
Work out the speed.

$$60 \div 4 \text{ (1)}$$

Answer 15 (1) m/s [2 marks]

2

Here is a velocity time graph for a tram.



- (a) Work out the acceleration of the tram in the first 4 seconds.

$$12 \div 4 \text{ (1)}$$

Answer 3 (1) m/s² [2 marks]

- (b) Work out the total distance the tram travels.

$$\frac{1}{2} \times 4 \times 12 = 24 \text{ and } 6 \times 12 = 72 \text{ (1)}$$

$$24 + 72 + 24 \text{ (1)}$$

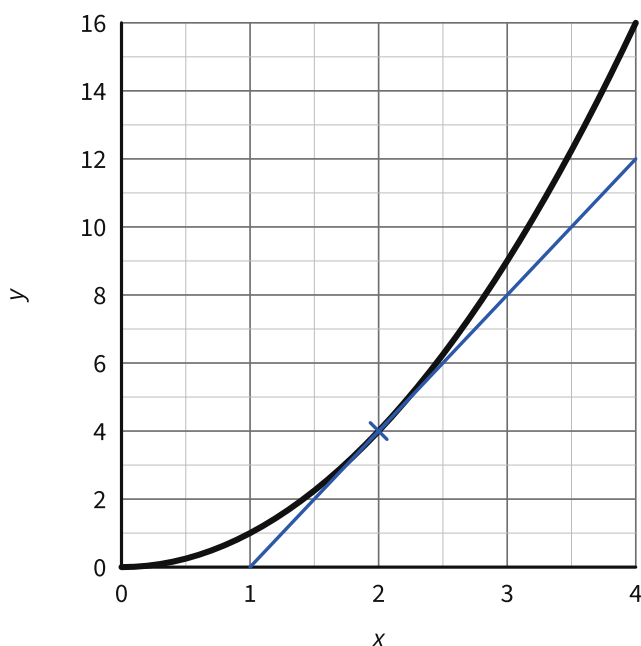
Answer 120 (1) m [3 marks]

- (c) Write down the deceleration of the tram in the last 4 seconds.

Answer 3 (1) m/s² [1 mark]

3

Here is the graph of $y = x^2$ for values of x from 0 to 4



- (a) Draw a tangent to the curve at the point where $x = 2$

Use your tangent to estimate the gradient of the curve at this point.

tangent drawn at (2, 4) (1), rise ÷ run (1)

Answer 4 (1) accept 3.5 to 4.5 [3 marks]

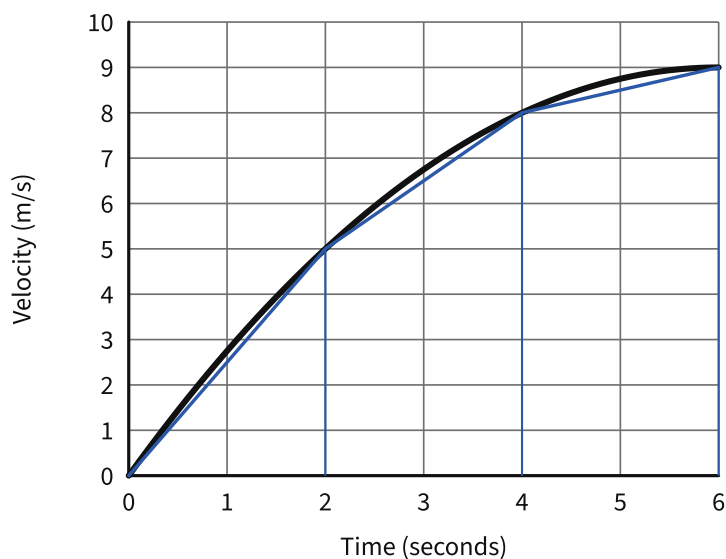
- (b) Work out the gradient of the chord joining the points on the curve where $x = 1$ and $x = 3$

$$\frac{9 - 1}{3 - 1} \text{ (1)}$$

Answer 4 (1) [2 marks]

4

Here is a velocity time graph for a cyclist.



- (a) Use three strips of equal width to estimate the distance the cyclist travels in the 6 seconds.

velocities 0, 5, 8 and 9 at 0, 2, 4 and 6 seconds (1)

$$\frac{1}{2} \times 2 \times (0 + 5) + \frac{1}{2} \times 2 \times (5 + 8) + \frac{1}{2} \times 2 \times (8 + 9) \quad (1)$$

Answer 35 (1) m [3 marks]

- (b) Is your answer an underestimate or an overestimate?

Give a reason for your answer.

Underestimate, the strips lie below the curve (1)

[1 mark]

- (c) Work out the average acceleration of the cyclist between 2 seconds and 6 seconds.

$$\frac{9 - 5}{6 - 2} \quad (1)$$

Answer 1 (1) m/s² [2 marks]

5

- (a) What does the gradient of a velocity time graph represent?

Answer acceleration (1) [1 mark]

- (b) What does the area under a velocity time graph represent?

Answer distance travelled (1) [1 mark]

6

A graph shows the value, in pounds, of an investment against time, in years.

The tangent to the graph at 5 years has a gradient of 120

Explain what this tells you.

After 5 years the value is going up at £120 per year (1)

[1 mark]

Question	Topic	RAG
1	I can find a speed from a distance time graph	
2	I can find acceleration and distance from a velocity time graph	
3	I can estimate the gradient of a curve using a tangent and a chord	
4	I can estimate the area under a curve	
5	I know what the gradient and area of a velocity time graph represent	
6	I can interpret a gradient in context	