

Gradients and Areas Under Graphs

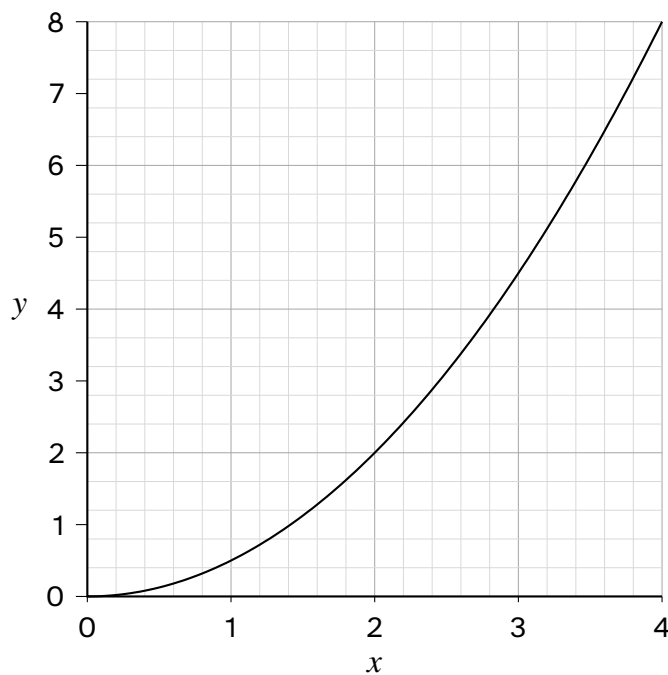
For AQA GCSE Mathematics (8300) • Higher tier

Name _____

Total marks: **28**

Answer **all** questions in the spaces provided. Show your working: marks are given for correct method. You may use a calculator.

- 1 Here is the graph of $y = \frac{1}{2}x^2$ for $0 \leq x \leq 4$



- (a) Work out the gradient of the chord joining the points on the curve where $x = 1$ and $x = 4$

[2 marks]

Answer _____

- (b) By drawing a tangent, estimate the gradient of the curve at $x = 3$

[2 marks]

Answer _____

- (c) Use 4 strips of equal width to estimate the area under the curve between $x = 0$ and $x = 4$

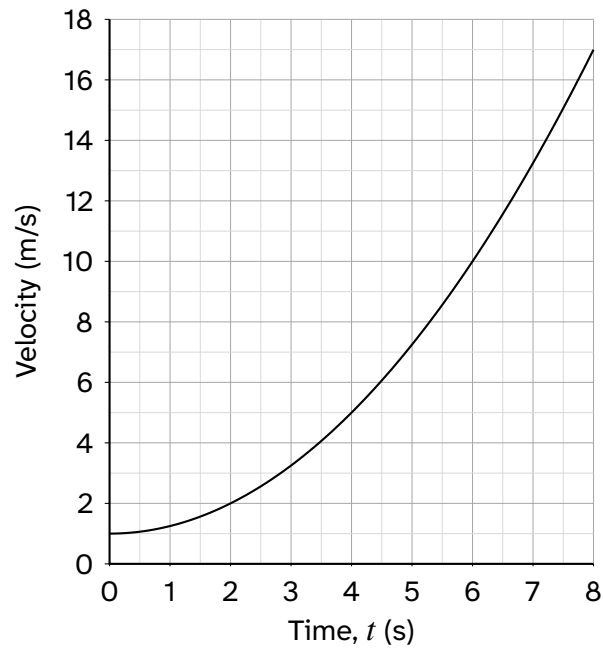
[3 marks]

Answer _____

- (d) Is your answer to part (c) an overestimate or an underestimate?
Give a reason for your answer.

[1 mark]

- 2 The graph shows the velocity, v m/s, of an object for the first 8 seconds.



- (a) Use 4 strips of equal width to estimate the area under the graph between $t = 0$ and $t = 8$

[3 marks]

Answer _____

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

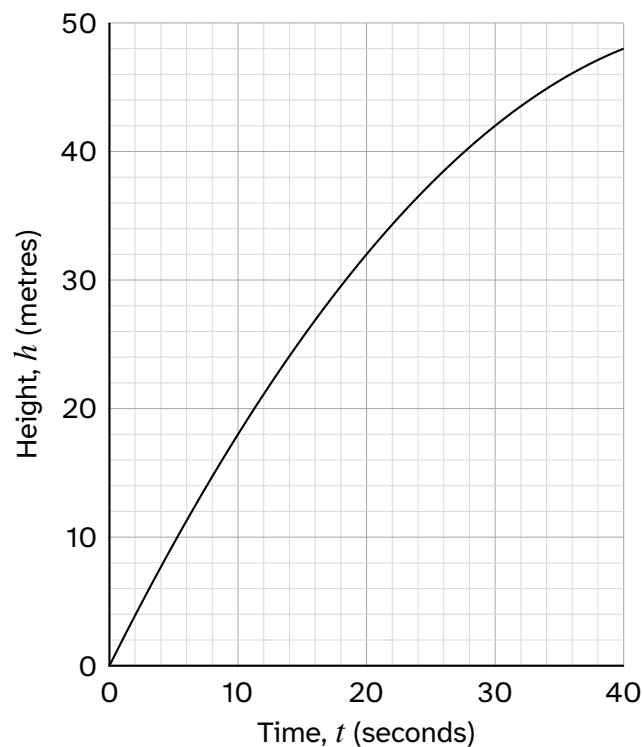
[1 mark]

- (c) Estimate the acceleration at $t = 4$
You must show your working.

[2 marks]

Answer _____ m/s^2

- 3** A drone takes off from the ground and rises vertically.
The graph shows its height, h metres, t seconds after take-off.



- (a) Work out the average rate at which the height of the drone increases between $t = 10$ and $t = 40$
Give the units of your answer.

[2 marks]

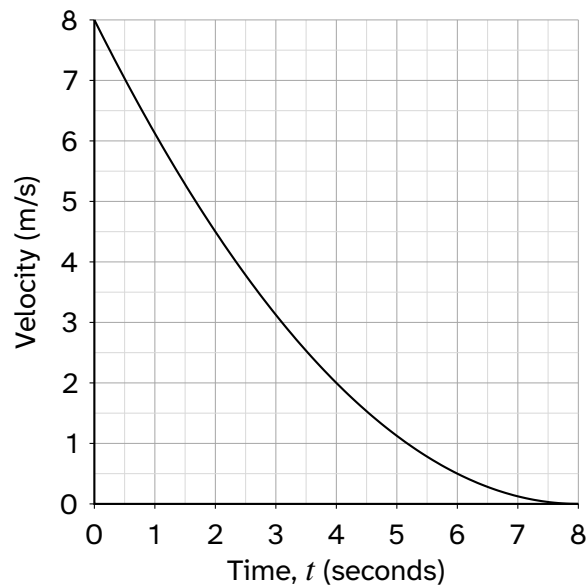
Answer _____

- (b) Estimate a value of t at which the instantaneous rate of increase of the height is the same as your answer to part (a).
You must show your working on the graph.

[2 marks]

Answer _____ seconds

- 4 A sledge slides across flat snow and slows down.
The graph shows the velocity of the sledge t seconds after it reaches the flat snow.



- (a) Work out an estimate for the deceleration of the sledge at $t = 4$
You must show your working.

[2 marks]

Answer _____ m/s^2

- (b) Use 4 strips of equal width to work out an estimate for the distance the sledge travels before it stops.

[3 marks]

Answer _____ m

- (c) Is your estimate from part (b) an overestimate or an underestimate?

Tick a box.

Give a reason for your answer.

[1 mark]

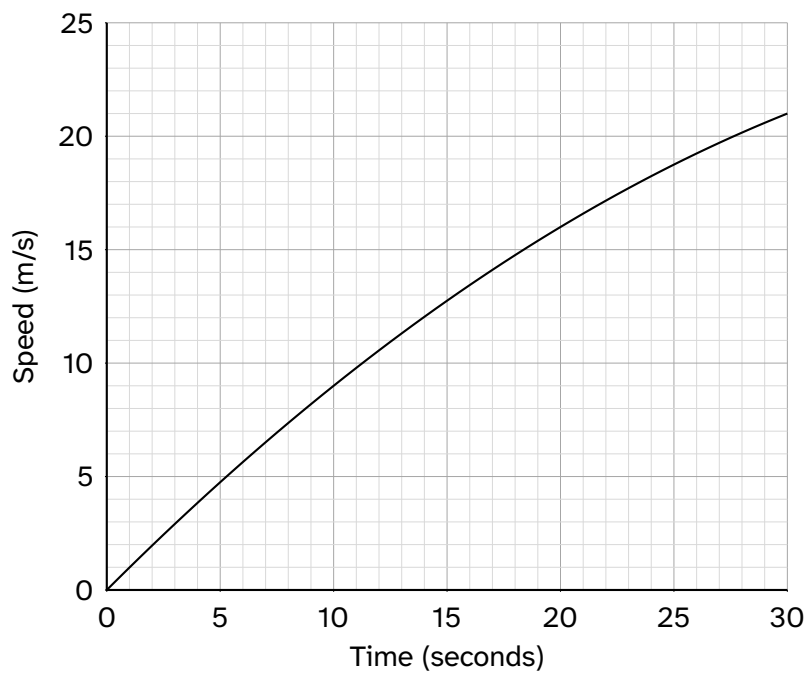
☐

Overestimate

☐

Underestimate

- 5 A train leaves a station.
The speed-time graph shows the first 30 seconds of its journey.



- (a) Use 3 strips of equal width to estimate the distance the train travels in these 30 seconds.

[3 marks]

Answer _____ m

- (b) Mira says,
"If you used 6 strips of equal width instead of 3, the estimate would be larger."

Is Mira correct?

Tick **one** box.

Give a reason for your answer.

[1 mark]

☐

Yes

☐

No

☐

Cannot tell
