Aberdare Community School

Mathematics Department

WJEC GCSE

Higher – Non Calculator

Algebra

Trapezium rule and gradient of a curve

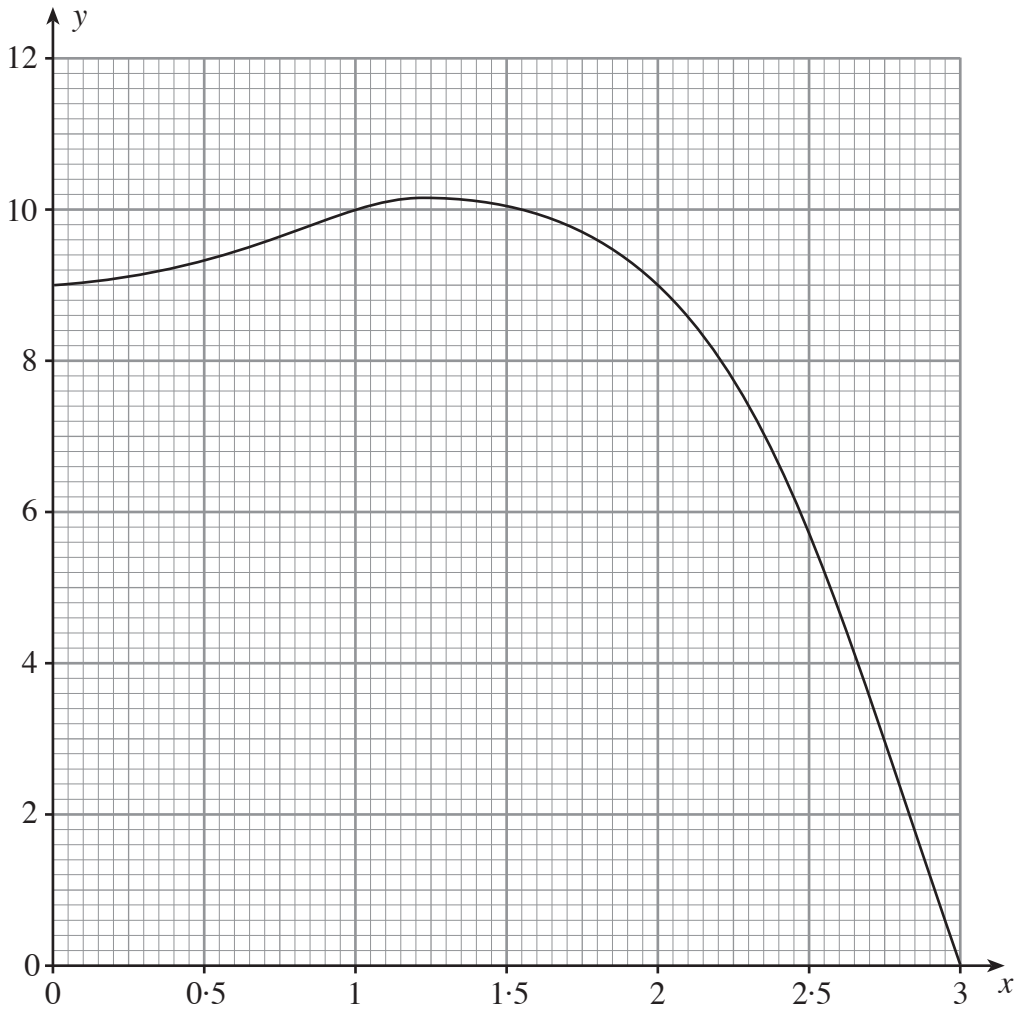
Name: .....

Set: .....

Date: .....

Teacher: .....

22. A sketch of $y = 9 + 2x^2 - x^3$ is shown in the diagram below for values of x from $x = 0$ to $x = 3$.



The following table of values of $y = 9 + 2x^2 - x^3$ for $x = 0, 1, 2$ and 3.

x	0	1	2	3
y	9	10	9	0

Use the values from the table and the trapezium rule with three strips to calculate an estimate for the area of the region bounded by the curve, the x-axis and the y-axis.

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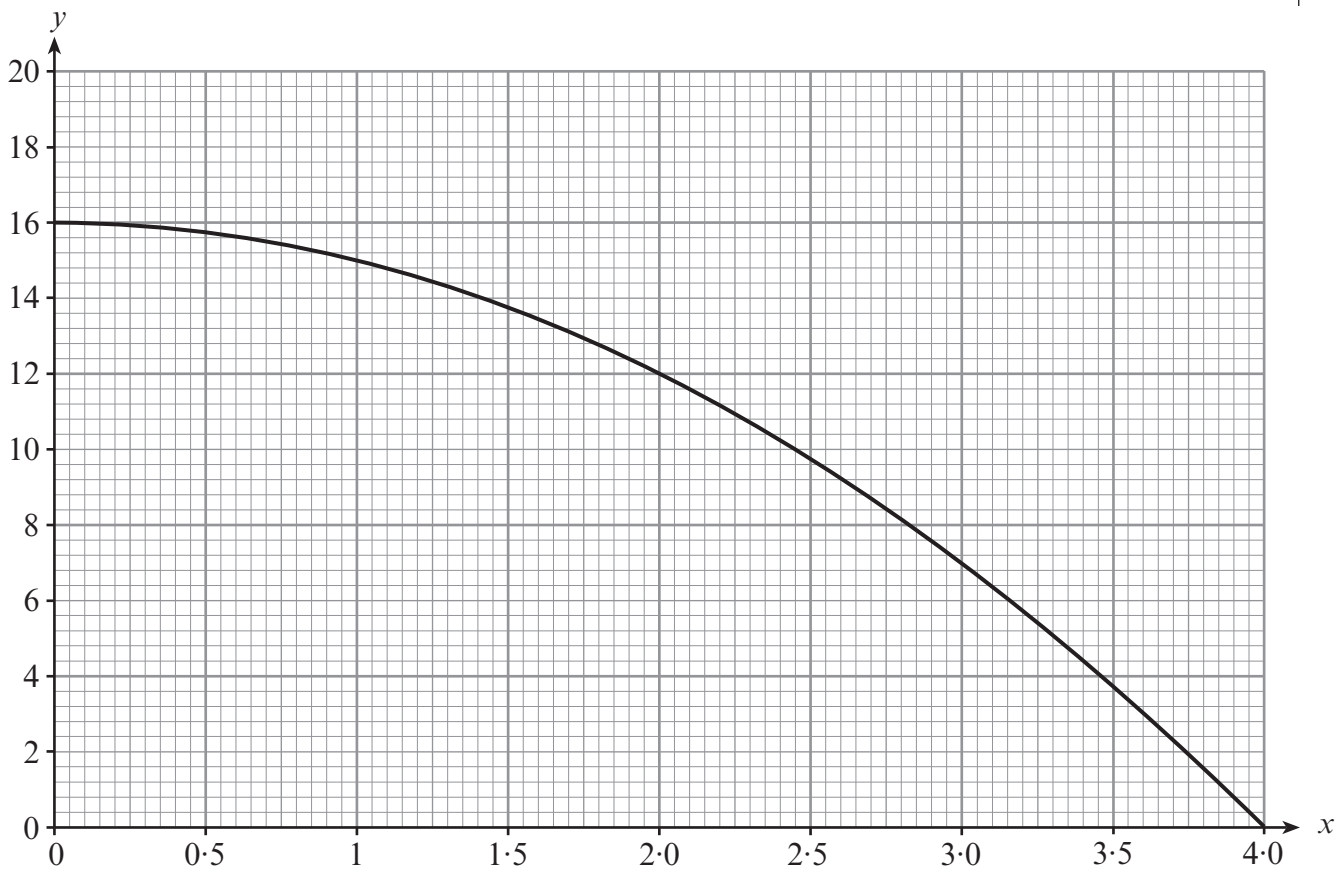
[3]

Examiner only

20. A sketch of $y = 16 - x^2$ is shown below for values of x from 0 to 4.



Use the trapezium rule, with the five ordinates $x = 0$, $x = 1$, $x = 2$, $x = 3$ and $x = 4$, to estimate the area of the region bounded by the curve, the x-axis and the y-axis.

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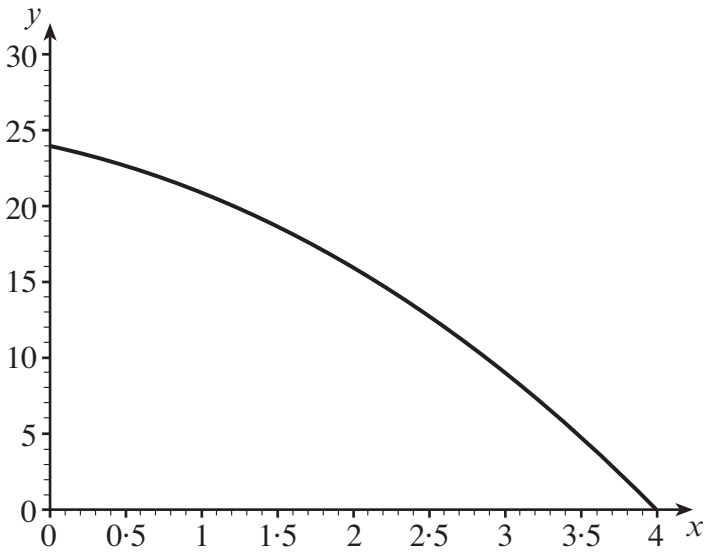
Examiner only

12. A sketch of $y = -x^2 - 2x + 24$ is shown in the diagram below for values of x from $x = 0$ to $x = 4$.



The following table gives values of $y = -x^2 - 2x + 24$ for $x = 0, 1, 2, 3$ and 4.

x	0	1	2	3	4
y	24	21	16	9	0

Use the values from the table and the trapezium rule with four strips to calculate an estimate for the area of the region bounded by the curve, the x-axis and the y-axis.

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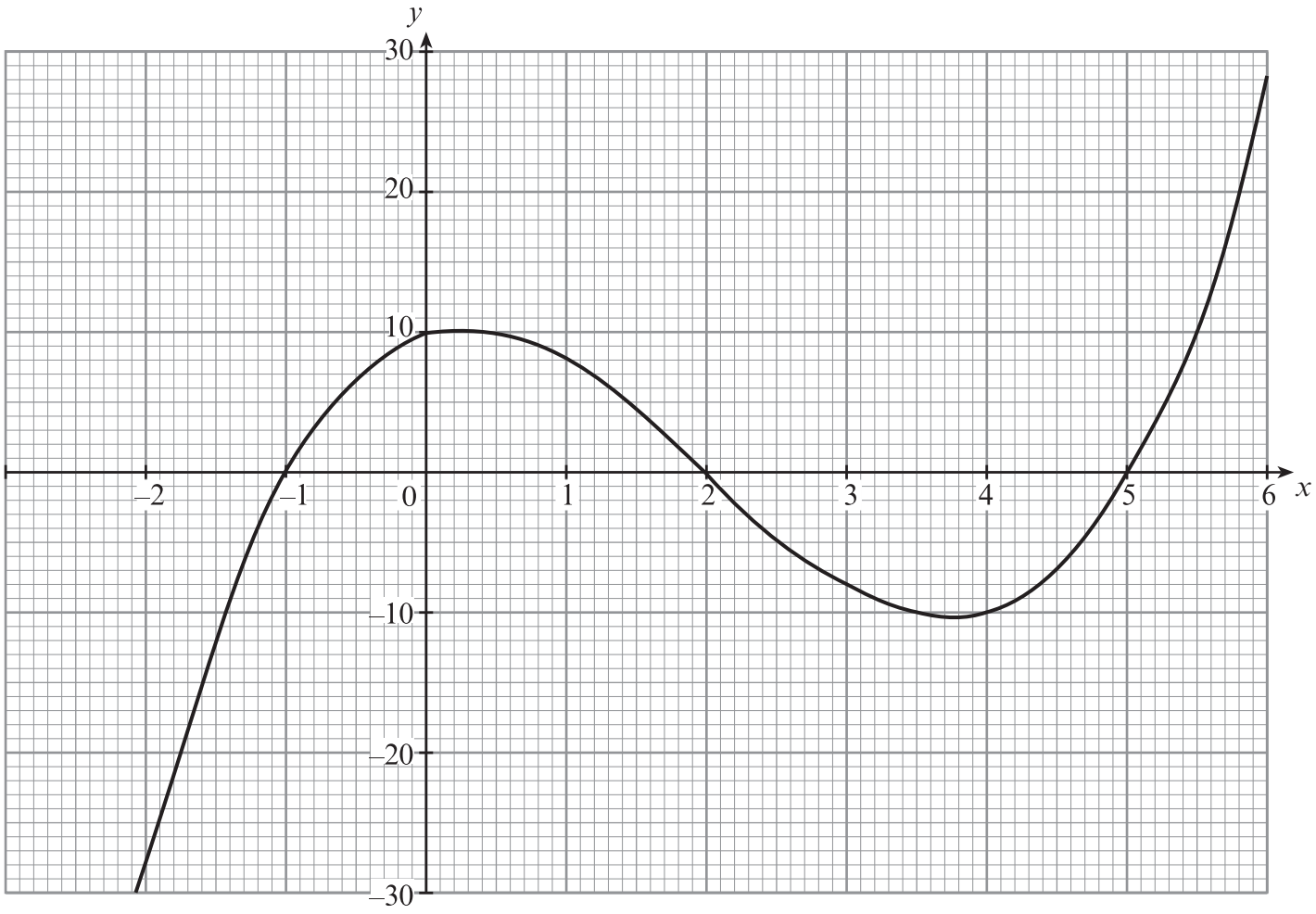
Examiner only

14. The graph of $y = x^3 - 6x^2 + 3x + 10$, for values of x between $x = -2$ and $x = 6$, is drawn below.



(a) Use the graph to solve $x^3 - 6x^2 + 3x + 10 = 0$.

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(b) Using the graph, estimate the gradient of the curve $y = x^3 - 6x^2 + 3x + 10$ when $x = 4{\cdot}5$.

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Examiner only

(c) By drawing an appropriate straight line on the graph, solve the equation

$$x^3 - 6x^2 + 2x + 10 = 0$$

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(d) Use the trapezium rule with three strips of equal width to estimate the area of the region enclosed by the curve $y = x^3 - 6x^2 + 3x + 10$ and the x-axis between $x = -1$ and $x = 2$.

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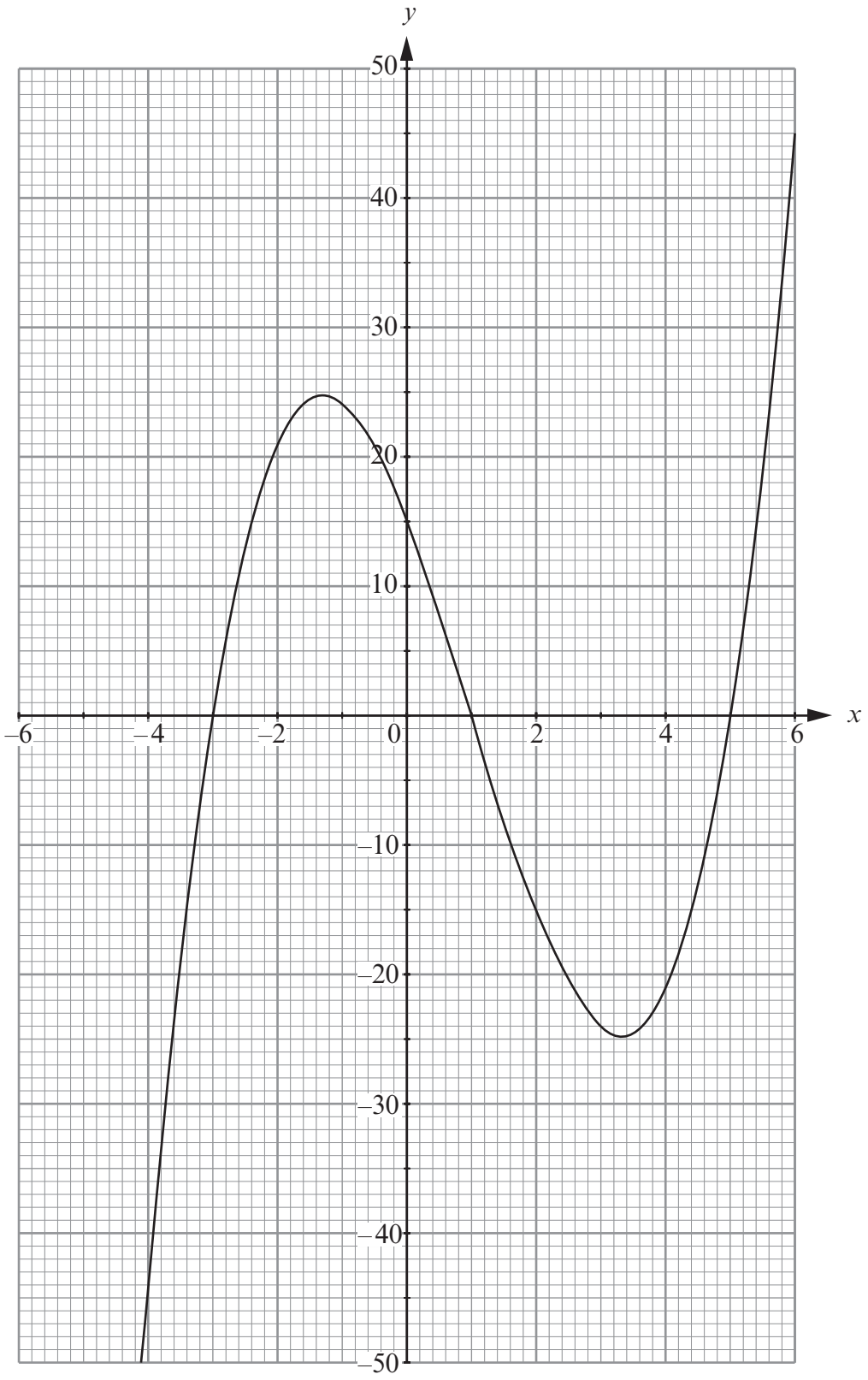
Examiner only

14. The graph of $y = x^3 - 3x^2 - 13x + 15$, for values of x between $x = -4$ and $x = 6$, has been drawn below.



Examiner only

(a) Use the graph to solve $x^3 - 3x^2 - 13x + 15 = 0$.

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(b) Using the graph, estimate the gradient of the curve $y = x^3 - 3x^2 - 13x + 15$ when $x = 4$.

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(c) By drawing an appropriate line on the graph, solve the equation

$$x^3 - 3x^2 - 13x + 5 = 0.$$

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[3]

(d) Use the trapezium rule with 4 strips to estimate the area of the region enclosed by the curve $y = x^3 - 3x^2 - 13x + 15$ and the x-axis between $x = -3$ and $x = 1$.

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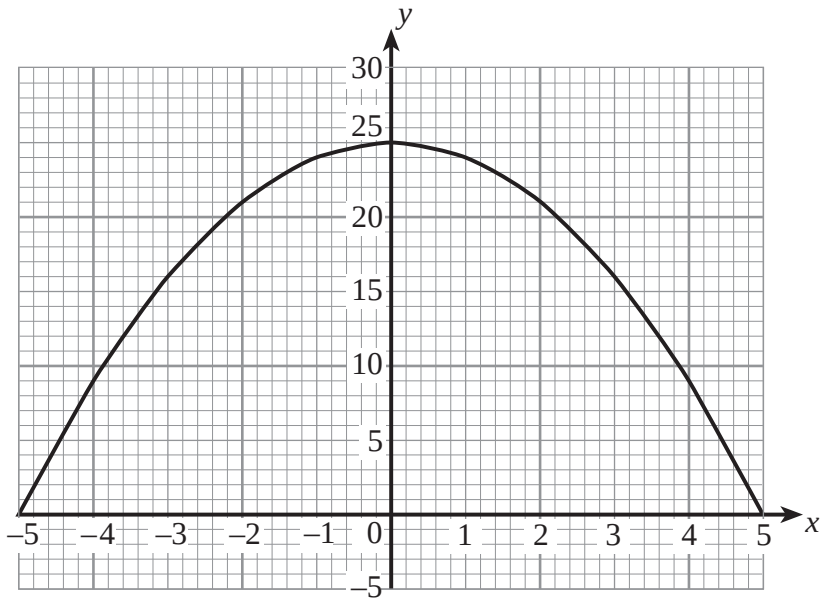
Examiner only

14. The graph of $y = 25 - x^2$ has been drawn below.



(a) Write down the gradient of the curve $y = 25 - x^2$ at $x = 0$.

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(b) Find an estimate for the gradient of the curve $y = 25 - x^2$ at $x = 2$.

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(c) Use the trapezium rule, with the ordinates $x = 0$, $x = 1$, $x = 2$, $x = 3$, $x = 4$ and $x = 5$, to estimate the area of the region bounded by the curve, the positive x-axis and the positive y-axis.

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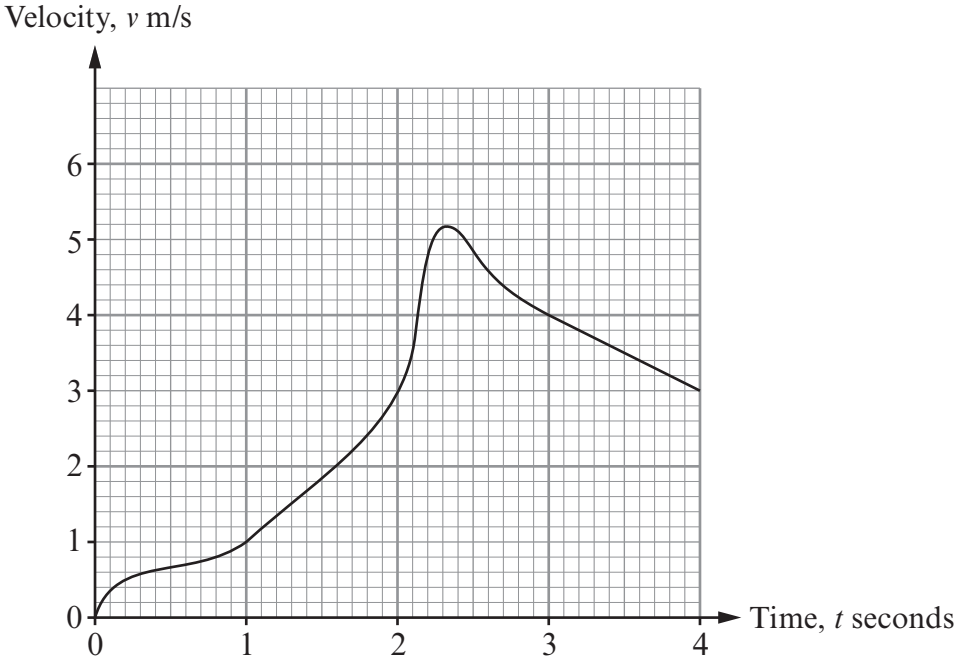
[4]

Examiner only

(b) A velocity-time graph for a different experiment is shown below.



(i) Based on this experiment, complete the following sentence. [1]

"The acceleration of this particle is zero when t = ..."

(ii) Find an approximation for the acceleration of the particle in this experiment when $t = 1$. Give the units of your answer. [4]

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(iii) Find an approximation for the distance travelled by the particle between $t = 0$ and $t = 4$. [3]

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