



BOARD OF STUDIES
NEW SOUTH WALES

2011 HSC Mathematics Marking Guidelines

Question 1 (a)

Criteria	Marks
• Correct answer	2
• Evidence of correct calculation	1

Question 1 (b)

Criteria	Marks
• Correct answer	1

Question 1 (c)

Criteria	Marks
• Correct solution	2
• Writes $32 = 2^5$ or takes logarithms on both sides, or equivalent merit	1

Question 1 (d)

Criteria	Marks
• Correct solution	2
• Obtains an answer of the form $\frac{\text{constant}}{5x + 2}$	1

Question 1 (e)

Criteria	Marks
• Correct answer	2
• Makes some progress	1

Question 1 (f)

Criteria	Marks
• Correct answer	2
• Evidence of multiplying by $\frac{\sqrt{5} + \sqrt{3}}{\sqrt{5} + \sqrt{3}}$, or equivalent merit	1

Question 1 (g)

Criteria	Marks
• Correct answer	1

Question 2 (a) (i)

Criteria	Marks
• Correct answer	1

Question 2 (a) (ii)

Criteria	Marks
• Correct answer	1

Question 2 (a) (iii)

Criteria	Marks
• Correct answer	1

Question 2 (b)

Criteria	Marks
• Correct solution	2
• Finds a correct exact solution to $2\sin x = \sqrt{3}$ or $2\sin x = -\sqrt{3}$ on any domain, or equivalent merit	1

Question 2 (c)

Criteria	Marks
• Correct solution	3
• Finds correct gradient and attempts to find equation of tangent	2
• Correctly differentiates or finds correct y for $x = -1$	1

Question 2 (d)

Criteria	Marks
• Correct solution	2
• Attempts to use the product rule, or equivalent merit	1

Question 2 (e)

Criteria	Marks
• Correct primitive	2
• Obtains an answer of the form $\frac{\text{constant}}{x}$, or equivalent merit	1

Question 3 (a) (i)

Criteria	Marks
• Correct solution	2
• Correctly identifies a and d in $a + (n - 1)d$, or equivalent merit	1

Question 3 (a) (ii)

Criteria	Marks
• Correct solution	2
• Sums a relevant arithmetic series, or equivalent merit	1

Question 3 (b)

Criteria	Marks
• Correct solution	2
• Finds one of the coordinates, or equivalent merit	1

Question 3 (c) (i)

Criteria	Marks
• Correct solution	1

Question 3 (c) (ii)

Criteria	Marks
• Correct solution	2
• Finds the gradients of l_1 and l_2 , or equivalent merit	1

Question 3 (c) (iii)

Criteria	Marks
• Correct solution	1

Question 3 (c) (iv)

Criteria	Marks
• Correct solution	1

Question 3 (c) (v)

Criteria	Marks
• Correct solution	1

Question 4 (a)

Criteria	Marks
• Correct solution	2
• Attempts to use the quotient rule, or equivalent merit	1

Question 4 (b)

Criteria	Marks
• Correct solution	2
• Obtains primitive of the form constant $\times \ln x$, or equivalent merit	1

Question 4 (c)

Criteria	Marks
• Correct solution	2
• Finds a correct primitive	1

Question 4 (d) (i)

Criteria	Marks
• Correct solution	2
• Attempts to use the chain rule, or equivalent merit	1

Question 4 (d) (ii)

Criteria	Marks
• Correct solution	2
• Attempts to use their result from part (i), or equivalent merit	1

Question 4 (e)

Criteria	Marks
• Correct solution	2
• Obtains one correct inequality, or equivalent merit	1

Question 5 (a) (i)

Criteria	Marks
• Correct answer	1

Question 5 (a) (ii)

Criteria	Marks
• Correct solution	2
• Sets up a relevant inequality or equation and attempts to solve	1

Question 5 (a) (iii)

Criteria	Marks
• Correct solution	2
• Sums a relevant geometric series, or equivalent merit	1

Question 5 (b) (i)

Criteria	Marks
• Correct answer	1

Question 5 (b) (ii)

Criteria	Marks
• Correct numerical expression	1

Question 5 (b) (iii)

Criteria	Marks
• Correct solution	2
• Identifies relevant cases or draws relevant tree diagram	1

Question 5 (c)

Criteria	Marks
• Correct solution	3
• Makes substantial progress with five function values	2
• Attempts to use Simpson's rule	1

Question 6 (a) (i)

Criteria	Marks
• Correct answer	1

Question 6 (a) (ii)

Criteria	Marks
• Correct proof	2
• Finds $\angle CEP$ or $\angle CPE$, or equivalent merit	1

Question 6 (b)

Criteria	Marks
• Correct solution	3
• Forms an equation describing the locus	2
• Finds one of the distances AP or BP in terms of x and y	1

Question 6 (c) (i)

Criteria	Marks
• Correct answer	1

Question 6 (c) (ii)

Criteria	Marks
• Correct solution	2
• Correct primitive	1

Question 6 (c) (iii)

Criteria	Marks
• Correct answer C	1

Question 6 (c) (iv)

Criteria	Marks
• Correct answer	1

Question 6 (c) (v)

Criteria	Marks
• Correct answer	1

Question 7 (a) (i)

Criteria	Marks
• Correct solution	3
• Attempts to determine the nature of the stationary points	2
• Finds $f'(x)$ and attempts to solve $f'(x) = 0$	1

Question 7 (a) (ii)

Criteria	Marks
• Correct graph, showing stationary points	2
• Correct general shape of graph	1

Question 7 (b) (i)

Criteria	Marks
• Correct solution	1

Question 7 (b) (ii)

Criteria	Marks
• Correct justification	1

Question 7 (b) (iii)

Criteria	Marks
• Correct argument	2
• States that $e^{-2t} < 1$ for $t > 0$, or equivalent merit	1

Question 7 (b) (iv)

Criteria	Marks
• Correct answer	1

Question 7 (b) (v)

Criteria	Marks
• Correct graph	2
• Shows increasing function with $x(0) = 0$ or correct asymptote as $t \rightarrow \infty$	1

Question 8 (a) (i)

Criteria	Marks
<ul style="list-style-type: none">• Correct application of cosine rule using $\cos 60^\circ = \frac{1}{2}$	1

Question 8 (a) (ii)

Criteria	Marks
<ul style="list-style-type: none">• Correct answer with justification of positive solution	2
<ul style="list-style-type: none">• Solves quadratic from part (i)	1

Question 8 (b) (i)

Criteria	Marks
<ul style="list-style-type: none">• Correct solution	2
<ul style="list-style-type: none">• Sets up $\pi \int_0^h y dy$ correctly, or equivalent merit	1

Question 8 (b) (ii)

Criteria	Marks
<ul style="list-style-type: none">• Correct ratio	1

Question 8 (c) (i)

Criteria	Marks
<ul style="list-style-type: none">• Correct solution	2
<ul style="list-style-type: none">• Attempts to use an appropriate geometric series	1

Question 8 (c) (ii) (1)

Criteria	Marks
<ul style="list-style-type: none">• Correct explanation for A_2	1

Question 8 (c) (ii) (2)

Criteria	Marks
• Correct solution	3
• Makes M the subject or uses GP sum formula from correct A_{240} , or equivalent merit	2
• Establishes correct series for A_{240} , or equivalent merit	1

Question 9 (a) (i)

Criteria	Marks
• Correct explanation	1

Question 9 (a) (ii)

Criteria	Marks
• Correct proof	2
• Proves $\triangle BFC$ is similar to $\triangle EFD$, or equivalent merit	1

Question 9 (b) (i)

Criteria	Marks
• Correct solution	1

Question 9 (b) (ii)

Criteria	Marks
• Correct solution	2
• Attempts to integrate a rate	1

Question 9 (c)

Criteria	Marks
• Correct graph	3
• Gets general shape of graph including asymptote	2
• Identifies $f'(1) = 0$, or equivalent merit	1

Question 9 (d) (i)

Criteria	Marks
• Correct expression	1

Question 9 (d) (ii)

Criteria	Marks
• Correct solution	2
• Makes substantial progress towards a sum in which cancellation could be used	1

Question 10 (a) (i)

Criteria	Marks
• Correct numerical answer	1

Question 10 (a) (ii)

Criteria	Marks
• Correct solution	2
• Attempts to solve an appropriate equation for L	1

Question 10 (a) (iii)

Criteria	Marks
• Correct solution	2
• Makes some progress	1

Question 10 (b) (i)

Criteria	Marks
• Correct solution	1

Question 10 (b) (ii)

Criteria	Marks
• Correct solution	1

Question 10 (b) (iii)

Criteria	Marks
• Correct solution	2
• Solves $\frac{dA}{dr} = 0$ for r	1

Question 10 (b) (iv)

Criteria	Marks
• Correct solution	1

Question 10 (b) (v)

Criteria	Marks
• Complete justification	2
• Justifies one of the restrictions on r , or equivalent progress	1

Mathematics

2011 HSC Examination Mapping Grid

Question	Marks	Content	Syllabus outcomes
1 (a)	2	1.1	P3
1 (b)	1	1.3	P3
1 (c)	2	12.2	H3
1 (d)	2	12.4, 12.5	H5
1 (e)	2	1.4	P3
1 (f)	2	1.1	P3
1 (g)	1	3.1	H5
2 (a) (i)	1	9.2	P4
2 (a) (ii)	1	9.2	P4
2 (a) (iii)	1	9.2	P4
2 (b)	2	5.2, 5.3, 13.1	P3, H5
2 (c)	3	10.7	H5
2 (d)	2	8.8, 12.5	H3, H5
2 (e)	2	11.2	H5
3 (a) (i)	2	7.1, 7.5	H4, H5
3 (a) (ii)	2	7.1, 7.5	H4, H5
3 (b)	2	9.5	P5
3 (c) (i)	1	6.1	P5
3 (c) (ii)	2	6.2	P4
3 (c) (iii)	1	6.5	P3, P4
3 (c) (iv)	1	1.4, 2.3	P4
3 (c) (v)	1	2.3	P4
4 (a)	2	8.8, 13.5	H5
4 (b)	2	11.1, 12.5	H5
4 (c)	2	10.7, 11.2	H5
4 (d) (i)	2	8.8	P7
4 (d) (ii)	2	11.2	H5
4 (e)	2	1.2, 4.4	P4
5 (a) (i)	1	7.2, 7.5	H4, H5
5 (a) (ii)	2	7.2, 7.5	H4, H5
5 (a) (iii)	2	7.2, 7.5	H4, H5
5 (b) (i)	1	3.1	H4, H5
5 (b) (ii)	1	3.2	H4, H5
5 (b) (iii)	2	3.2	H4, H5
5 (c)	3	11.3, 14.3	H4, H5
6 (a) (i)	1	2.3	P4

Question	Marks	Content	Syllabus outcomes
6 (a) (ii)	2	2.3	P4
6 (b)	3	4.3	P5
6 (c) (i)	1	13.2	H5
6 (c) (ii)	2	11.1, 13.7	H5
6 (c) (iii)	1	11.1, 11.4	H8, H9
6 (c) (iv)	1	11.4, 13.3	H2, H8
6 (c) (v)	1	11.1, 13.6	H5, H8
7 (a) (i)	3	10.2, 10.3, 10.4	H5, H6
7 (a) (ii)	2	10.5	H5, H6
7 (b) (i)	1	12.3, 14.3	H3, H4
7 (b) (ii)	1	12.3, 14.3	H3, H4
7 (b) (iii)	2	12.3, 14.3	H2, H3, H4, H9
7 (b) (iv)	1	8.2, 12.3, 14.3	H3, H4
7 (b) (v)	2	10.5, 12.3, 14.3	H3, H4
8 (a) (i)	1	5.5	H4, H5
8 (a) (ii)	2	1.4	H2
8 (b) (i)	2	11.4	H8
8 (b) (ii)	1	11.4	H4
8 (c) (i)	2	7.2, 7.5	H4, H5
8 (c) (ii) (1)	1	7.2, 7.5	H4, H5
8 (c) (ii) (2)	3	7.2, 7.5	H4, H5
9 (a) (i)	1	2.3, 2.5	P4, H2, H9
9 (a) (ii)	2	2.3, 2.5	P4, H2, H9
9 (b) (i)	1	14.1	H4, H5
9 (b) (ii)	2	11.2	H4, H5
9 (c)	3	10.1, 10.5, 10.8	H5, H7, H9
9 (d) (i)	1	1.1	P3
9 (d) (ii)	2	1.1, 7.0	H5
10 (a) (i)	1	14.2	H3, H4, H5
10 (a) (ii)	2	14.2	H3, H4, H5
10 (a) (iii)	2	14.2	H3, H4, H5
10 (b) (i)	1	13.1	H4, H5
10 (b) (ii)	1	13.1	H5
10 (b) (iii)	2	10.6, 13.1	H2, H5, H9
10 (b) (iv)	1	13.1	H5
10 (b) (v)	2	13.1	H2, H9