BOARD OF STUDIES
NEW SOUTH WALES

2010 HSC Mathematics
Marking Guidelines

Question 1 (a)

Criteria	Marks
• Correct answer	2
• Obtains one of the solutions, or writes $x\left(x-4\right)=0$	1

Question 1 (b)

Criteria	Marks
• Correct answer	2
• Attempts to multiply by $\frac{\sqrt{5}+2}{\sqrt{5}+2}$	1

Question 1 (c)

Criteria	Marks
• Correct answer	1

Question 1 (d)

Criteria	Marks
• Correct answer	2
• Obtains two correct equations, or equivalent merit	1

Question 1 (e)

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

Question 1 (f)

Criteria	Marks
• Correct solution	2
• Identifies the common ratio or equivalent merit	1

Question 1 (g)

Criteria	Marks
• Correct answer	1

Question 2 (a)

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

Question 2 (b)

Criteria	Marks
• Correct solution	2
• Makes some progress	1

Question 2 (c)

Criteria	Marks
• Correct answer	2
• Attempts to find y', and substitutes $x = 2$, or equivalent merit	1

Question 2 (d) (i)

Criteria	Marks
• Correct primitive	2
• Obtains any expression of the form $A \cdot (5x + 1)^{\frac{3}{2}}$, or equivalent merit	1

Question 2 (d) (ii)

Criteria	Marks
• Correct primitive	2
• Obtains $\ln(4 + x^2)$, or equivalent merit	1

Question 2 (e)

Criteria	Marks
• Correct solution	2
• Makes some progress	1

Question 3 (a) (i)

Criteria	Marks
• Correct answer	1

Question 3 (a) (ii)

Criteria	Marks
• Correct answer	1

Question 3 (a) (iii)

Criteria	Marks
• Correct proof	2
• Shows that $MN \parallel BC$, or equivalent merit	1

Question 3 (a) (iv)

Criteria	Marks
• Correct equation	2
• Makes some progress	1

Question 3 (a) (v)

Criteria	Marks
• Correct answer	1

Question 3 (a) (vi)

Criteria	Marks
• Correct answer	1

Question 3 (b) (i)

Criteria	Marks
• Correct graph	1

Question 3 (b) (ii)

Criteria	Marks
• Correct answer	2
• Makes a reasonable attempt at using the trapezoidal rule	1

Question 3 (b) (iii)

Criteria	Marks
• Correct answer and correct justification	1

Question 4 (a) (i)

Criteria	Marks
• Correct answer	1

Question 4 (a) (ii)

Criteria	Marks
• Correct answer	1

Question 4 (a) (iii)

Criteria	Marks
• Correct solution	2
• Sums a relevant arithmetic series, or recognises that for another 13 weeks the distance run is 10 km per week	1

Question 4 (b)

Criteria	Marks
• Correct solution	3
• Obtains correct primitive	2
• Writes $\int_0^2 \left(e^{2x} - e^{-x}\right) dx$, or equivalent merit	1

Question 4 (c) (i)

Criteria	Marks
• Correct answer	1

Question 4 (c) (ii)

Criteria	Marks
• Correct answer (i.e. 3 times answer in part (i))	1

Question 4 (c) (iii)

Criteria	Marks
• Correct answer (i.e. 1 minus answer in part (ii))	1

Question 4 (d)

Criteria	Marks
• Correct proof	2
• Correctly uses $f\left(x\right)$ and $f\left(-x\right)$ in either side of the equation, or equivalent merit	1

Question 5 (a) (i)

Criteria	Marks
• Correct proof	2
• Identifying $\pi r^2 h = 10$, or equivalent merit	1

Question 5 (a) (ii)

Criteria	Marks
• Correct solution	3
• Finds r correctly OR • Shows that A has a minimum, or equivalent merit	2
• Differentiates correctly, or equivalent merit	1

Question 5 (b) (i)

Criteria	Marks
• Correct solution	1

Question 5 (b) (ii)

Criteria	Marks
• Correction solution	1

Question 5 (b) (iii)

Criteria	Marks
• Correct solution	2
• Attempts to integrate $\int_0^{\frac{\pi}{4}} \sec^2 x + \sec x \tan x \, dx$, or equivalent merit	1

Question 5 (c)

Criteria	Marks
• Correctly finds the values of a and b	3
• Correctly finds either a or b, or equivalent merit	2
• Makes some progress using an appropriate integral	1

Question 6 (a) (i)

Criteria	Marks
• Correct solution	2
• Finds $f'(x)$ correctly, or equivalent merit	1

Question 6 (a) (ii)

Criteria	Marks
• Correct solution	2
• Correctly relates the second derivative to concavity	1

Question 6 (a) (iii)

Criteria	Marks
• Correct graph, indicating the x and y intercepts	2
• Correct graph without correct intercepts marked, or equivalent merit	1

Question 6 (b) (i)

Criteria	Marks
• Correct answer	1

Question 6 (b) (ii)

Criteria	Marks
• Correct proof	2
• Makes some progress	1

Question 6 (b) (iii)

Criteria	Marks
• Correct solution	1

Question 6 (b) (iv)

Criteria	Marks
• Correct solution	2
• Attempts to find the difference between two appropriate areas or equivalent merit	1

Question 7 (a) (i)

Criteria	Marks
• Correct proof	2
• Makes some progress	1

Question 7 (a) (ii)

Criteria	Marks
• Correct solution	2
• Attempts to solve $\dot{x} = 0$	1

Question 7 (a) (iii)

Criteria	Marks
• Correct solution	2
• Makes some progress	1

Question 7 (b) (i)

Criteria	Marks
• Correct solution	2
• Finds the gradient of the tangent at A, or equivalent merit	1

Question 7 (b) (ii)

Criteria	Marks
• Correct solution	2
• Attempts to equate the gradient of AB with $\frac{d}{dx}\left(x^2\right)$, or equivalent merit	1

Question 7 (b) (iii)

Criteria	Marks
• Correct proof	2
• Finds the point T, or equivalent merit	1

Question 8 (a)

Criteria	Marks
• Correct solution	4
• Correctly finds $P = 102e^{\frac{t}{75}\ln\left(\frac{200\times10^6}{102}\right)}$ or equivalent correct expression	3
• Finds $P(0) = 102$ and attempts to find k or equivalent progress	2
• Recognises that $P = Ae^{kt}$, or equivalent merit	1

Question 8 (b)

Criteria	Marks
• Correct solution	2
• Finds P (a coin lands showing heads) = 0.6, or equivalent merit	1

Question 8 (c) (i)

Criteria	Marks
• Correct answer	1

Question 8 (c) (ii)

Criteria	Marks
• Correct answer	1

Question 8 (c) (iii)

Criteria	Marks
• Correct graph	2
• Sine curve showing correctly any two of period, amplitude, mean value	1

Question 8 (d)

Criteria	Marks
• Correct solution ($k > 3$ or $k \geq 3$)	2
• Attempts to solve $3x^2 - 6x + k \geq 0$, or equivalent merit	1

Question 9 (a) (i)

Criteria	Marks
• Correct solution	2
• Attempts to use an appropriate geometric series	1

Question 9 (a) (ii) (1)

Criteria	Marks
• Correct solution	3
• Makes substantial progress	2
• Makes some progress	1

Question 9 (a) (ii) (2)

Criteria	Marks
• Correct solution (174 or 175 months), or equivalent numerical expression	2
• Attempts to solve $A_n = 0$ (or $A_n > 0$)	1

Question 9 (b) (i)

Criteria	Marks
• Correct answer	1

Question 9 (b) (ii)

Criteria	Marks
• Correct answer	1

Question 9 (b) (iii)

Criteria	Marks
• Correct answer	1

Question 9 (b) (iv)

Criteria	Marks
• Correct graph	2
• Graph showing some relevant features	1

Question 10 (a) (i)

Criteria	Marks
• Correct proof	2
• Makes some progress	1

Question 10 (a) (ii)

Criteria	Marks
• Correct solution	1

Question 10 (a) (iii)

Criteria	Marks
• Correct proof	2
• Attempts to use cosine rule appropriately	1

Question 10 (a) (iv)

Criteria	Marks
• Correct deduction	1

Question 10 (b) (i)

Criteria	Marks
• Correct proof	3
• Obtains $\int_{r\sin\theta}^{r} \pi\left(r^2 - x^2\right) dx,$ or equivalent merit	2
• Obtains $\int_{A}^{B} \pi\left(r^2 - x^2\right) dx,$ or equivalent merit	1

Question 10 (b) (ii) (1)

Criteria	Marks
• Correct value for θ $\left(\text{or obtains } \sin\theta = \frac{1}{2}\right)$	1

Question 10 (b) (ii) (2)

Criteria	Marks
• Correct solution	2
• Attempts to substitute $\sin\theta = \frac{1}{2}$ (or their answer from part (ii) (1)) into V	1

Mathematics

2010 HSC Examination Mapping Grid

Question	Marks	Content	Syllabus outcomes
1 (a)	2	1.4	P4
1 (b)	2	1.1	P3
1 (c)	1	4.3	P4
1 (d)	2	1.2, 1.4	P4
1 (e)	2	8.8,13.5	P7, H5
1 (f)	2	7.3	H5
1 (g)	1	4.1	P5
2 (a)	2	8.8, 13.5	P7, H5
2 (b)	2	9.1	P4, P5
2 (c)	2	8.4, 12.5	P6, H3, H5
2 (d) (i)	2	11.2	H5
2 (d) (ii)	2	12.5	H5
2 (e)	2	11.1	H5
3 (a) (i)	1	6.7	P4
3 (a) (ii)	1	6.2	P4
3 (a) (iii)	2	2.3, 6.8	P4, H2
3 (a) (iv)	2	6.2	P4
3 (a) (v)	1	6.5	P4
3 (a) (vi)	1	2.3, 6.5, 6.8	P2, P4, H5
3 (b) (i)	1	12.3	H9
3 (b) (ii)	2	11.3	H3, H8
3 (b) (iii)	1	11.3	H2, H9
4 (a) (i)	1	7.1	H4, H5
4 (a) (ii)	1	7.1	H4, H5
4 (a) (iii)	2	7.1	H4, H5
4 (b)	3	11.4, 12.5	H3, H8
4 (c) (i)	1	3.3	H5
4 (c) (ii)	1	3.3	H5
4 (c) (iii)	1	3.3	H5
4 (d)	2	4.1, 12.1	H2, H3, H9
5 (a) (i)	2	10.6	H2, H4, H5, H9
5 (a) (ii)	3	10.6	H2, H4, H5, H9
5 (b) (i)	1	5.1	P3, P4, H2
5 (b) (ii)	1	5.2	P3, P4, H2
5 (b) (iii)	2	11.1, 11.2, 13.6	H2, H5
5 (c)	3	11.2, 11.4, 12.5	H2, H3, H5, H8, H9
6 (a) (i)	2	10.2	H5, H6

Question	Marks	Content	Syllabus outcomes
6 (a) (ii)	2	10.4	H5, H6
6 (a) (iii)	2	10.5	H5, H6, H9
6 (b) (i)	1	2.3, 13.1	H5
6 (b) (ii)	2	2.3, 2.5	P4, H2, H5
6 (b) (iii)	1	13.1	H5
6 (b) (iv)	2	13.1, 2.3	H2, H5, H9
7 (a) (i)	2	13.5, 13.6, 14.3	H2, H4, H5, H9
7 (a) (ii)	2	13.1, 14.3	H2, H4, H5, H9
7 (a) (iii)	2	13.6, 14.3	H2, H4, H5, H9
7 (b) (i)	2	8.4	P6, P7, P8
7 (b) (ii)	2	8.4	P6, P7, P8
7 (b) (iii)	2	8.4	P4, P6, P7, P8, H2
8 (a)	4	14.2	H2, H3, H4, H5, H9
8 (b)	2	3.2, 3.3	H2, H4, H5, H9
8 (c) (i)	1	13.3	H5
8 (c) (ii)	1	13.3	H5
8 (c) (iii)	2	13.3	H5, H9
8 (d)	2	9.2, 10.1	P4, H2, H6
9 (a) (i)	2	7.5	H2, H4, H5, H9
9 (a) (ii) (1)	3	7.5	H2, H4, H5, H9
9 (a) (ii) (2)	2	7.5	H2, H3, H4, H5, H9
9 (b) (i)	1	10.1	H2, H4, H5, H6, H9
9 (b) (ii)	1	10.1, 10.2, 10.8, 11.2	H2, H4, H5, H6, H9
9 (b) (iii)	1	10.1, 10.2, 10.8, 11.2	H2, H4, H5, H6, H9
9 (b) (iv)	2	10.1, 10.2, 10.8	H2, H4, H5, H6, H9
10 (a) (i)	2	2.3, 2.5	P2, P4
10 (a) (ii)	1	2.3, 2.5	H2, H5
10 (a) (iii)	2	5.5	P4, H5
10 (a) (iv)	1	5.2	H5
10 (b) (i)	3	11.4, 13.1	H4, H5, H8
10 (b) (ii) (1)	1	5.1, 5.3, 13.1, 13.2	H2, H4, H5, H9
10 (b) (ii) (2)	2	11.4	H2, H4, H5, H9