BOARD OF STUDIES
NEW SOUTH WALES

2011 HSC Mathematics Extension 1
Marking Guidelines

Question 1 (a)

Criteria	Marks
• Correct coordinates	2
• Makes some progress	1

Question 1 (b)

Criteria	Marks
• Correct solution	2
• Uses quotient rule or chain rule, or equivalent merit	1

Question 1 (c)

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

Question 1 (d)

Criteria	Marks
• Correct solution	3
• Makes substantial progress to evaluate integral	2
• Correct change of limit or equivalent merit	1

Question 1 (e)

Criteria	Marks
• Correct answer	1

Question 1 (f)

Criteria	Marks
• Correct answer	1

Question 2 (a)

Criteria	Marks
• Correct solution	3
• Finds a, or equivalent merit	2
• Attempts to use the remainder theorem	1

Question 2 (b)

Criteria	Marks
• Correct answer	3
• Makes substantial progress in applying Newton's method	2
• Finds $f'(x)$, or equivalent merit	1

Question 2 (c)

Criteria	Marks
• Correct answer	2
• Attempts to use the binomial theorem, or equivalent merit	1

Question 2 (d)

Criteria	Marks
• Correct graph with y-intercept π	2
• Correct shape, or correct domain and range	1

Question	Marks	Content	Syllabus outcomes
5 (a) (ii)	1	5.1, 5.9	H5, HE7
5 (a) (iii)	1	2.3, 2.8	PE3
5 (a) (iv)	1	5.1	P4, PE2
5 (a) (v)	2	5.9	PE2, HE7
5 (b) (i)	2	14.2E	HE3, HE7
5 (b) (ii)	3	14.2E	HE3, HE7
6 (a)	3	7.4	HE2
6 (b) (i)	1	14.3E	HE3, HE7
6 (b) (ii)	2	14.3E	HE3, HE7
6 (c) (i)	1	18.2	HE3
6 (c) (ii)	1	18.2	HE3
6 (c) (iii)	2	9.1, 16.1, 18.2	HE3, HE7
6 (c) (iv)	2	9.3, 18.2	HE3, HE7
7 (a) (i)	1	1.3, 2.6	HE7
7 (a) (ii)	2	14.1	H5, HE5
7 (a) (iii)	2	14.1	H5, HE5, HE7
7 (b) (i)	2	17.3	HE3, HE7
7 (b) (ii)	2	17.3	HE3, HE7
7 (b) (iii)	3	17.3	HE3, HE7

Mathematics Extension 1

2011 HSC Examination Mapping Grid

Question	Marks	Content	Syllabus outcomes
1 (a)	2	6.7E	PE2
1 (b)	2	8.8, 13.5	HE7
1 (c)	3	1.4E	HE3
1 (d)	3	11.5	HE6
1 (e)	1	15.4	HE4
1 (f)	1	4.1, 12.3	P5, H3, HE7
2 (a)	3	16.2	PE3
2 (b)	3	16.4	HE4, HE7
2 (c)	2	17.3	HE3, HE7
2 (d)	2	4.1, 15.1, 15.2, 15.3	P5, HE4
2 (e) (i)	1	18.1	PE3, PE6
2 (e) (ii)	1	18.1	PE3, PE6
3 (a) (i)	1	14.4	HE3
3 (a) (ii)	2	14.3, 14.4	H5, HE3
3 (a) (iii)	1	14.3, 14.4	H5, HE3
3 (a) (iv)	1	14.3, 14.4	H5, HE3
3 (b) (i)	2	9.6, 10.7	H5, PE3, PE4
3 (b) (ii)	1	9.6, 10.7	H5, PE3, PE4
3 (b) (iii)	2	6.3, 9.6	P4, PE3
3 (b) (iv)	2	9.6	PE3
4 (a) (i)	1	12.5	H5, HE4
4 (a) (ii)	2	10.2, 12.5	H3, H6, HE4
4 (a) (iii)	1	12.2	H3, HE7
4 (a) (iv)	1	12.3	H3, HE7
4 (a) (v)	1	12.2	H3, HE7
4 (a) (vi)	2	10.1, 10.2, 10.5	H5, H6, H9, HE7
4 (b) (i)	1	2.8	PE3
4 (b) (ii)	2	2.9	PE2, PE3
4 (b) (iii)	1	2.9	PE2, PE3
5 (a) (i)	2	2.6, 5.1	H5, HE7

Question 2 (e) (i)

Criteria	Marks
• Correct answer	1

Question 2 (e) (ii)

Criteria	Marks
• Correct answer	1

Question 3 (a) (i)

Criteria	Marks
• Correct justification	1

Question 3 (a) (ii)

Criteria	Marks
• Correct solution	2
• Finds A or B	1

Question 3 (a) (iii)

Criteria	Marks
• Correct answer	1

Question 3 (a) (iv)

Criteria	Marks
• Correct answer	1

Question 3 (b) (i)

Criteria	Marks
• Correct solution	2
• Finds the slope of the tangent, or equivalent progress	1

Question 3 (b) (ii)

Criteria	Marks
• Correct equation	1

Question 3 (b) (iii)

Criteria	Marks
• Correct solution	2
• Attempts to solve relevant equations simultaneously, or equivalent merit	1

Question 3 (b) (iv)

Criteria	Marks
• Correct locus	2
• Partial description of locus	1

Question 4 (a) (i)

Criteria	Marks
• Correct answer	1

Question 4 (a) (ii)

Criteria	Marks
• Correct solution	2
• Attempts to solve $f'(x) = 0$, or equivalent merit	1

Question 7 (a) (iii)

Criteria	Marks
• Correct solution	2
• Writes down relevant equation to solve, or equivalent merit	1

Question 7 (b) (i)

Criteria	Marks
• Correct solution	2
• Correctly differentiates the given binomial theorem	1

Question 7 (b) (ii)

Criteria	Marks
• Correct solution	2
• Correctly differentiates the expression in part (i)	1

Question 7 (b) (iii)

Criteria	Marks
• Correct proof	3
• Recognises that sum of odd terms = sum of even terms, and correctly substitutes $x = -1$, or equivalent merit	2
• Substitute $x = -1$ in the expression obtained in working in part (ii), or equivalent merit	1

Question 6 (c) (i)

Criteria	Marks
• Correct solution	1

Question 6 (c) (ii)

Criteria	Marks
• Correct solution	1

Question 6 (c) (iii)

Criteria	Marks
• Correct solution	2
• States correct inequality and makes progress towards solution	1

Question 6 (c) (iv)

Criteria	Marks
• Correct solution	2
• Obtains $4p^3 - 7p^2 + 2p = 0$, or equivalent	1

Question 7 (a) (i)

Criteria	Marks
• Correct justification	1

Question 7 (a) (ii)

Criteria	Marks
• Correct solution	2
• Forms $\frac{dV}{dt} = \frac{dV}{d\ell}\,\frac{d\ell}{dt}$, or equivalent merit	1

Question 4 (a) (iii)

Criteria	Marks
• Correct value	1

Question 4 (a) (iv)

Criteria	Marks
• Correct description	1

Question 4 (a) (v)

Criteria	Marks
• Correct value	1

Question 4 (a) (vi)

Criteria	Marks
• Correct graph	2
• Correct shape with indicating at least two features from parts (ii)–(v)	1

Question 4 (b) (i)

Criteria	Marks
• Correct justification	1

Question 4 (b) (ii)

Criteria	Marks
• Correct proof	2
• Finds $\angle ADC = 2x$, including justification, or equivalent merit	1

Question 4 (b) (iii)

Criteria	Marks
• Correct justification	1

Question 5 (a) (i)

Criteria	Marks
• Correct solution	2
• States $TQ = \cos\theta$ and $TN = 1 - \sin\theta$, or equivalent merit	1

Question 5 (a) (ii)

Criteria	Marks
• Correct solution	1

Question 5 (a) (iii)

Criteria	Marks
• Correct justification	1

Question 5 (a) (iv)

Criteria	Marks
• Correct justification	1

Question 5 (a) (v)

Criteria	Marks
• Correct solution	2
• Finds $\tan^{-1}\sqrt{3}$, or equivalent progress	1

Question 5 (b) (i)

Criteria	Marks
• Correct solution	2
• Forming the equation $5 + 25e^{-k} = 20$ and attempting to solve it	1

Question 5 (b) (ii)

Criteria	Marks
• Correct solution	3
• Makes correct use of data to find t, or equivalent merit	2
• Writes equation for a new model in form $T = A + Be^{-kt}$ with one of A, B or T correct; or equivalent merit	1

Question 6 (a)

Criteria	Marks
• Correct proof	3
• Makes substantial progress	2
• Verifies equality for $n = 1$, or equivalent merit	1

Question 6 (b) (i)

Criteria	Marks
• Correct justification	1

Question 6 (b) (ii)

Criteria	Marks
• Correct solution	2
• Makes some progress using that angle at which the ball strikes is 45°, or equivalent merit	1