BOARD OF STUDIES
NEW SOUTH WALES

2012 HSC Mathematics Extension 2
Marking Guidelines

Section I

Multiple-choice Answer Key

Question	Answer
1	D
2	D
3	A
4	A
5	C
6	B
7	A
8	B
9	C
10	B

Section II

Question 11 (a)

Criteria	Marks
• Correct solution	2
• Writes $\dfrac{2\sqrt{5}+i}{\sqrt{5}-i} \times \dfrac{\sqrt{5}+i}{\sqrt{5}+i}$, or equivalent merit	1

Question 11 (b)

Criteria	Marks
• Correct diagram	2
• Two correct circles or correct region for one of the inequalities, or equivalent merit	1

Question 11 (c)

Criteria	Marks
• Correct solution	2
• Correct completion of square, or equivalent merit	1

Question 11 (d) (i)

Criteria	Marks
• Correct answer	2
• Correct modulus or argument, or equivalent merit	1

Question 11 (d) (ii)

Criteria	Marks
• Correct answer	1

Question 11 (e)

Criteria	Marks
• Correct solution	3
• Correct primitive or correct substitution of limits into primitive of the form $\ln\left(e^{2x}+1\right)$, or equivalent merit	2
• Primitive of the form $\ln\left(e^{2x}+1\right)$, or equivalent merit	1

Question 11 (f) (i)

Criteria	Marks
• Correct graph	1

Question 11 (f) (ii)

Criteria	Marks
• Correct graph	2
• Graph correct for $x > 0$, or equivalent merit	1

Question 12 (a)

Criteria	Marks
• Correct solution	3
• Correct integrand in terms of t, or equivalent merit	2
• Correct $d\theta$ or $\cos\theta$ in terms of t, or equivalent merit	1

Question 12 (b) (i)

Criteria	Marks
• Correct solution	2
• Finds $\dfrac{dy}{dx}$, or equivalent merit	1

Question 12 (b) (ii)

Criteria	Marks
• Correct solution	2
• Substitutes $y = 0$ into equation of the normal, or equivalent merit	1

Question 12 (b) (iii)

Criteria	Marks
• Correct solution	2
• Finds correct x-coordinate of T, or equivalent merit	1

Question 12 (c)

Criteria	Marks
• Correct solution	3
• Correct integration by parts, or equivalent merit	2
• Attempts a relevant integration by parts, or equivalent merit	1

Question 12 (d) (i)

Criteria	Marks
• Correct explanation	1

Question 12 (d) (ii)

Criteria	Marks
• Correct locus	2
• Correct expression for w_2, or equivalent merit	1

Question 13 (a) (i)

Criteria	Marks
• Correct solution	4
• Correct expression of e^t in terms of v, or equivalent merit	3
• Correctly integrates $\frac{dt}{dv}$, or equivalent merit	2
• Correct expression for $\frac{dt}{dv}$, or equivalent merit	1

Question 13 (a) (ii)

Criteria	Marks
• Correct solution	2
• Correct expression for $\frac{dx}{dv}$, or equivalent merit	1

Question 13 (a) (iii)

Criteria	Marks
• Correct solution	2
• Correct value of v, or equivalent merit	1

Question 13 (b) (i)

Criteria	Marks
• Correct proof	1

Question 13 (b) (ii)

Criteria	Marks
• Correct proof	2
• Uses properties of similar triangle or intercepts on parallel lines, or equivalent merit	1

Question 13 (c) (i)

Criteria	Marks
• Correct solution	1

Question 13 (c) (ii)

Criteria	Marks
• Correct solution	2
• Obtains a correct equation for the x-coordinate of Q, or equivalent merit	1

Question 13 (c) (iii)

Criteria	Marks
• Correct solution	1

Question 14 (a)

Criteria	Marks
• Correct primitive	3
• Correct partial fraction decomposition of integrand	2
• Attempts to use partial fractions, or equivalent merit	1

Question 14 (b) (i)

Criteria	Marks
• Correct graph	2
• Correct asymptotes, or equivalent merit	1

Question 14 (b) (ii)

Criteria	Marks
• Correct solution	2
• Correct m or b	1

Question 14 (c)

Criteria	Marks
• Correct solution	4
• Correct primitive, or equivalent merit	3
• Correct definite integral for volume, or equivalent merit	2
• Correct width or height or cross-section, or equivalent merit	1

Question 14 (d) (i)

Criteria	Marks
• Correct proof	2
• Finds a pair of corresponding equal angles with justification, or equivalent merit	1

Question 14 (d) (ii)

Criteria	Marks
• Correct solution	2
• Finds a second pair of relevant similar triangles, or a relevant ratio	1

Question 15 (a) (i)

Criteria	Marks
• Correct proof	1

Question 15 (a) (ii)

Criteria	Marks
• Correct proof	2
• Makes some progress	1

Question 15 (a) (iii)

Criteria	Marks
• Correct proof	2
• Proves one of the two inequalities	1

Question 15 (a) (iv)

Criteria	Marks
• Correct proof	1

Question 15 (b) (i)

Criteria	Marks
• Correct explanation	1

Question 15 (b) (ii)

Criteria	Marks
• Correct solution	1

Question 15 (b) (iii)

Criteria	Marks
• Correct solution	2
• Recognises that both terms in part (ii) are zero, or equivalent merit	1

Question 15 (b) (iv)

Criteria	Marks
• Correct solution	2
• Makes some progress	1

Question 15 (b) (v)

Criteria	Marks
• Correct proof	1

Question 15 (b) (vi)

Criteria	Marks
• Correct solution	2
• Attempts to use discriminant or perpendicular distance formula, or equivalent merit	1

Question 16 (a) (i)

Criteria	Marks
• Correct answer	1

Question 16 (a) (ii)

Criteria	Marks
• Correct answer	1

Question 16 (b) (i)

Criteria	Marks
• Correct solution	1

Question 16 (b) (ii)

Criteria	Marks
• Complete induction proof	3
• Makes some progress in the induction step, or equivalent merit	2
• Proves case $n = 1$, or equivalent merit	1

Question 16 (b) (iii)

Criteria	Marks
• Correct answer	1

Question 16 (c) (i)

Criteria	Marks
• Correct explanation	2
• Partial explanation	1

Question 16 (c) (ii)

Criteria	Marks
• Correct solution	2
• Attempts to solve $\dfrac{(n-1)!k}{n^k(n-k)!} \geq \dfrac{(n-1)!(k-1)}{n^{k-1}(n-k+1)!}$	1

Question 16 (c) (iii)

Criteria	Marks
• Correct solution	2
• Obtains $n > k^2 - k$, or equivalent merit	1

Question 16 (c) (iv)

Criteria	Marks
• Correct solution	2
• Finds that k is the largest integer less than or equal to $\dfrac{1+\sqrt{1+4n}}{2}$, or equivalent merit	1

Mathematics Extension 2

2012 HSC Examination Mapping Grid

Section I

Question	Marks	Content	Syllabus outcomes
1	1	2.1	E3
2	1	1.8	E6
3	1	2.2	E3
4	1	1.6	E6
5	1	7.5	E4
6	1	3.2	E4
7	1	6.3	E5
8	1	7.2, 8.0	HE4, E4
9	1	5.1	E7
10	1	4.1	E8

Section II

Question	Marks	Content	Syllabus outcomes
11 (a)	2	2.1	E3
11 (b)	2	2.5	E3
11 (c)	2	4.1	E8
11 (d) (i)	2	2.2	E3
11 (d) (ii)	1	2.4	E3
11 (e)	3	4.1	E8
11 (f) (i)	1	1.3	E6
11 (f) (ii)	2	1.4	E6
12 (a)	3	4.1	E8
12 (b) (i)	2	3.1	E3, E4
12 (b) (ii)	2	3.1	E4
12 (b) (iii)	2	3.1	E3, E4
12 (c)	3	4.1	E8
12 (d) (i)	1	2.2	E3
12 (d) (ii)	2	2.1, 2.2	E3
13 (a) (i)	4	6.2.3	E5
13 (a) (ii)	2	6.2.3	E5
13 (a) (iii)	2	6.2.3	E5
13 (b) (i)	1	8.0	H5, E2
13 (b) (ii)	2	8.0	H5, E2
13 (c) (i)	1	3.2	E3
13 (c) (ii)	2	3.2	E4
13 (c) (iii)	1	3.2	E4

Question	Marks	Content	Syllabus outcomes
14 (a)	3	4.1, 7.6	E8
14 (b) (i)	2	1.5	E6
14 (b) (ii)	2	1.5, 7.6	E4
14 (c)	4	5.1	E7
14 (d) (i)	2	8.1	PE3, E2, E9
14 (d) (ii)	2	8.1	PE3, E2, E9
15 (a) (i)	1	8.3	PE6, E2
15 (a) (ii)	2	8.3	PE6, E2
15 (a) (iii)	2	8.3	PE6, E9
15 (a) (iv)	1	8.3	PE6, E9
15 (b) (i)	1	7.4	E3, E4
15 (b) (ii)	1	7.4, 8.0	PE3, E2
15 (b) (iii)	2	7.4	E3, E4
15 (b) (iv)	2	7.5	E3
15 (b) (v)	1	7.5	E3
15 (b) (vi)	2	2.5	E2, E9
16 (a) (i)	1	8.0	PE3, E2, E9
16 (a) (ii)	1	8.0	PE3, E2, E9
16 (b) (i)	1	8.0	HE4, E2
16 (b) (ii)	3	8.2	HE2, E2, E9
16 (b) (iii)	1	8.0	HE7, E2
16 (c) (i)	2	8.0	PE3, E9
16 (c) (ii)	2	8.3	PE6, E2
16 (c) (iii)	2	8.3	PE6, E9
16 (c) (iv)	2	8.0, 8.3	PE6, E9