BOARD OF STUDIES
NEW SOUTH WALES

2012 HSC Mathematics Extension 1
Marking Guidelines

Section I

Multiple-choice Answer Key

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

Section II

Question 11 (a)

Criteria	Marks
• Correct solution	3
• Correct primitive, or equivalent merit	2
• Obtains primitive of the form a $\tan^{-1}\left(\frac{x}{3}\right)$, or equivalent merit	1

Question 11 (b)

Criteria	Marks
• Correct solution	2
• Attempts to use product rule	1

Question 11 (c)

Criteria	Marks
• Correct solution	3
• Makes significant progress OR • Obtains $3 < x < 6$, or equivalent merit	2
• Obtain $x > 6$ or $x < 3$, or equivalent merit	1

Question 11 (d)

Criteria	Marks
• Correct solution	3
• Correct primitive, or equivalent merit	2
• Correct integrand in terms of u, or equivalent merit	1

Question 11 (e)

Criteria	Marks
• Correct answer	1

Question 11 (f) (i)

Criteria	Marks
• Correct expression	2
• Correct expression for the general term or identifies the relevant term	1

Question 11 (f) (ii)

Criteria	Marks
• Correct value	1

Question 12 (a)

Criteria	Marks
• Correct proof	3
• Attempts to do the induction step	2
• Proves case for $n = 1$, or equivalent merit	1

Question 12 (b) (i)

Criteria	Marks
• Correct domain	1

Question 12 (b) (ii)

Criteria	Marks
• Correct solution	2
• Attempts to solve $y = f\left(x\right)$ for x, or equivalent merit	1

Question 12 (b) (iii)

Criteria	Marks
• Correct solution	1

Question 12 (b) (iv)

Criteria	Marks
• Correct graphs	2
• Correct general shape, symmetric with respect to $x = y$, or equivalent merit	1

Question 12 (c) (i)

Criteria	Marks
• Correct answer	1

Question 12 (c) (ii)

Criteria	Marks
• Correct answer	2
• Makes some progress	1

Question 12 (d) (i)

Criteria	Marks
• Correct solution	2
• Makes some progress	1

Question 12 (d) (ii)

Criteria	Marks
• Correct solution	1

Question 13 (a)

Criteria	Marks
• Correct solution	2
• Finds $\sin\left(\cos^{-1}\left(\frac{2}{3}\right)\right) = \frac{\sqrt{5}}{3}$, or equivalent merit OR • Uses $\sin 2\alpha = 2\sin\alpha\cos\alpha$	1

Question 13 (b) (i)

Criteria	Marks
• Correct asymptote	1

Question 13 (b) (ii)

Criteria	Marks
• Correct graph	2
• Obtains symmetric graph showing the asymptote, or equivalent merit	1

Question 13 (c) (i)

Criteria	Marks
• Correct solution	2
• Correct differentiation, or equivalent merit	1

Question 13 (c) (ii)

Criteria	Marks
• Correct solution	3
• Obtains equation $\sin(2t+\alpha) = -\frac{1}{2}$, or equivalent merit	2
• Attempts to write x in the form $5 + A\sin(2t+\alpha)$, or equivalent merit	1

Question 13 (d) (i)

Criteria	Marks
• Finds correct time	3
• Obtains correct equation $C'(t) = 0$, or equivalent merit	2
• Attempts to use the product rule to differentiate $C(t)$, or equivalent merit	1

Question 13 (d) (ii)

Criteria	Marks
• Correct solution	2
• Attempts to use Newton's method	1

Question 14 (a) (i)

Criteria	Marks
• Correct solution	1

Question 14 (a) (ii)

Criteria	Marks
• Correct proof	2
• Obtains two corresponding equal sides with justification, or equivalent merit	1

Question 14 (a) (iii)

Criteria	Marks
• Correct proof	1

Question 14 (b) (i)

Criteria	Marks
• Correct solution	2
• Solves $\dot{y} = 0$, or equivalent merit	1

Question 14 (b) (ii)

Criteria	Marks
• Correct solution	1

Question 14 (b) (iii)

Criteria	Marks
• Correct solution	3
• Obtains $15° < \theta < 23.05°$, or equivalent merit	2
• Attempts to solve $125 < 250\sin 2\theta < 180$ or $250\sin^2\theta > 150$, or equivalent merit	1

Question 14 (c) (i)

Criteria	Marks
• Correct solution	3
• Makes substantial progress, two of the triangles used to get u or r	2
• Makes some progress, cosine rule for AG or using the right angles for u or r	1

Question 14 (c) (ii)

Criteria	Marks
• Correct solution	2
• Finds $\frac{dr}{du}$, or equivalent merit	1

Mathematics Extension 1

2012 HSC Examination Mapping Grid

Section I

Question	Marks	Content	Syllabus outcomes
1	1	1.3	P3
2	1	6.7E	PE6
3	1	16.3E	PE3
4	1	15.3 E	HE4
5	1	18.1 E	PE3
6	1	14.4 E	HE3
7	1	13.6 E	HE4
8	1	16.2 E	PE3
9	1	15.5 E	HE4
10	1	2.10 E	PE3

Section II

Question	Marks	Content	Syllabus outcomes
11 (a)	3	15.5 E	HE4
11 (b)	2	8.8, 13.5	P7
11 (c)	3	1.4E	PE3
11 (d)	3	11.5	HE6
11 (e)	1	18.1E	PE3
11 (f) (i)	2	17.3 E	HE3
11 (f) (ii)	1	17.3 E	HE3
12 (a)	3	7.4 E	HE2
12 (b) (i)	1	4.1	P5
12 (b) (ii)	2	15.1E	HE4
12 (b) (iii)	1	4.2, 6.2	P5
12 (b) (iv)	2	15.1 E	HE4
12 (c) (i)	1	18.2 E	HE3
12 (c) (ii)	2	18.2 E	HE3
12 (d) (i)	2	9.6 E	PE4
12 (d) (ii)	1	9.6 E	PE4
13 (a)	2	15.4 E	HE4
13 (b) (i)	1	10.5E	H9, HE7

Question	Marks	Content	Syllabus outcomes
13 (b) (ii)	2	10.5E	H9, HE7
13 (c) (i)	2	14.4 E	HE3
13 (c) (ii)	3	14.4 E	HE3
13 (d) (i)	3	10.6	H5, HE7
13 (d) (ii)	2	16.4 E	HE7
14 (a) (i)	1	2.10 E	PE2, PE3
14 (a) (ii)	2	2.10 E	H5, PE2, PE3
14 (a) (iii)	1	2.10 E	PE2, PE3
14 (b) (i)	2	14.3E	HE3
14 (b) (ii)	1	14.3E	HE3
14 (b) (iii)	3	14.3E	HE3
14 (c) (i)	3	5.6 E	PE6
14 (c) (ii)	2	14.1	HE7