

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Pre-U Certificate

MARK SCHEME for the May/June 2013 series

9794 MATHEMATICS

9794/01

Paper 1 (Pure Mathematics 1), maximum raw mark 80

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

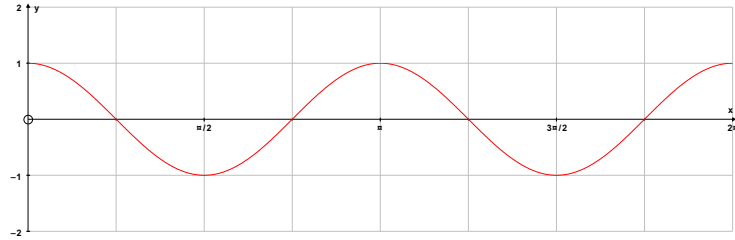
Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2013 series for most IGCSE, Pre-U, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

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|---|--|--|-------------------|
| 1 | State midpoint as $x = 6, y = 4$ Attempt Pythagoras on 8 and 6 Obtain 10 | B1 M1 A1 | [3] |
| 2 | State 10 State $(-2)^3$ Attempt product of binomial coefficient and power of 2 Obtain -80 Or Attempted expansion of 3 brackets Obtain $-32x^3 - 48x^3$ Obtain -80 | B1 B1 M1 A1 [M1 A1 A1] | [4] |
| 3 | (i) Attempt correct cosine or sine rule Obtain unsimplified form $PQ^2 = 7^2 + 7^2 - 2(7)(7)\cos 1.7$ Obtain 10.5 (ii) Use 7θ Obtain 22.4 | M1 A1 A1 M1 A1 | [3] [2] [5] |
| 4 | Introduce logarithms Use power law Obtain $5x \ln 2 = \ln 15$ Obtain $x = 0.781$ | M1 M1 A1 A1 | [4] |
| 5 | (i) Attempt integration Obtain at least $x^3 - 2x^2 + 8x$ Obtain $x^3 - 2x^2 + 8x + c$ (ii) Attempt use of limits Obtain 26 | M1* A1 B1* M1 A1 | [3] [2] [5] |

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| 6 | (i) Two 'cos' curves shown in the range +1 and -1 shown on y -axis and x values for at least stationary points indicated on fully correct curve. (For the second B1, curves must show the stationary point at 2π clearly.)  | B1 B1 | |
| | (ii) State 'stretch' parallel to the x -axis scale factor 0.5 | B1 B1 B1 | [2] [3] |
| 7 | (i) Attempt use of Pythagoras Obtain $ z = 29$ | M1 A1 | [2] |
| | (ii) Attempt fully correct argument for $\arg z$ using tan ratio or equivalent. State 134° or 2.33 rad | M1 A1 | [2] |
| | (iii) Show or imply multiplication by conjugate or equivalent method Obtain $(-20 - 21i)/841$ | M1 A1 | [2] |
| 8 | (i) Attempt $f(1)$ and $f(2)$ Obtain -1 and 5 and conclude correctly including reference to a root | M1 A1 | [2] |
| | (ii) State derivative = $3x^2 - 1$ Use correct Newton-Raphson formula Obtain 1.5 and 1.3478 (or 1.348) 1.5, 1.3478, 1.3252, 1.3247, (1.3247) State 1.325 | B1 M1* A1 A1 | [4] |

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| 9 | (i) | State or imply use of $R\sin\theta\cos\alpha + R\cos\theta\sin\alpha$ | M1 | | |
| | | Obtain $R\cos\alpha = 1$ and $R\sin\alpha = \sqrt{3}$ | A1 | | |
| | | Obtain $\alpha = \frac{\pi}{3}$ or 60° | A1 | | |
| | | Obtain $R = 2$ | A1 | [4] | |
| | (ii) | State $2\sin(\theta + \pi/3) = 0.8$ | B1 | | |
| | | Attempt to solve (correct order of operations) | M1 | | |
| | | Obtain either: -0.636 or 1.68 | A1 | | |
| | | Obtain 1.68 only | A1 | [4] | [8] |
| 10 | | Attempt to equate at least two of $5 + 4\lambda = 9 - 2\mu$ $11 + 3\lambda = 4 + \mu$ $7 - 5\lambda = -4 + 4\mu$ | M1 | | |
| | | Obtain at least two correct | A1 | | |
| | | Attempt to solve two eqns | M1* | | |
| | | Obtain $\lambda = -1$ $\mu = 4$ | A1 | | |
| | | Attempt to substitute <i>their</i> value for λ or μ | M1* | | |
| | | Obtain $(1, 8, 12)$ | A1 | | [6] |
| 11 | (i) | Obtain $dy/d\theta = -2\sin 2\theta$ | B1 | | |
| | | Obtain $dx/d\theta = 2\cos\theta$ | B1 | | |
| | | Use $dy/dx = (dy/d\theta)/(d\theta/dx)$ and use identity for $\sin 2\theta$ | M1 | | |
| | | Obtain $-2\sin\theta$ NIS | A1 | [4] | |
| | (ii) | Obtain $m = -2, x = 2$ and $y = -1$ | B1 | | |
| | | Attempt equation of line | M1 | | |
| | | Obtain $y = 3 - 2x$ | A1 | [3] | |
| | (iii) | Attempt $\cos 2\theta = \cos^2\theta - \sin^2\theta$ or equivalent | M1 | | |
| | | Attempt to eliminate θ | M1 | | |
| | | Obtain $y = 1 - x^2/2$ | A1 | [3] | [10] |

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| <p>12 (i)</p> <p>Attempt to form LCM and cross multiply</p> <p>Attempt to expand bracket and simplify</p> <p>Obtain given answer</p> <p>(ii) State</p> <p>$\frac{1}{h} \left(\frac{1}{(x+h)^2} - \frac{1}{x^2} \right)$ or equivalent form</p> <p>Attempt to substitute the AG and obtain $\frac{-2x-h}{x^2(x+h)^2}$</p> <p>Obtain $-2x^{-3}$ with full and accurate notation in the proof throughout.</p> | <p>M1</p> <p>M1</p> <p>A1 [3]</p> <p>M1</p> <p>M1</p> <p>A1 [3]</p> | <p>[3]</p> <p>[3]</p> | <p>[6]</p> |
| <p>13</p> <p>Identify a correct factor</p> <p>Attempt division or coefficient matching for their factor</p> <p>Obtain a quadratic quotient</p> <p>Obtain $(x+3)(x-1)^2$</p> <p>State partial fractions of form</p> <p>$\frac{A}{x+3} + \frac{B}{x-1} + \frac{C}{(x-1)^2}$</p> <p>Attempt to remove fractions from partial fractions in the form above or as in the SR (see below)</p> <p>Attempt to find A, B and C</p> <p>Obtain any two of $A = 1, B = 1$ and $C = 1$</p> <p>Obtain all three values</p> <p>Obtain $A \ln(x+3)$</p> <p>$B \ln(x-1)$</p> <p>$-\frac{c}{x-1}$</p> <p>SR partial fractions may also be of the form $\frac{A}{x+3} + \frac{Bx+c}{(x-1)^2}$</p> | <p>B1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>M1*</p> <p>M1*</p> <p>A1*</p> <p>A1*</p> <p>B1</p> <p>B1</p> <p>B1</p> | <p>[12]</p> | <p>[12]</p> |