



**Cambridge International Examinations**  
Cambridge Pre-U Certificate

---

**MATHEMATICS (PRINCIPAL)**

**9794/01**

Paper 1 Pure Mathematics 1

**For Examination from 2016**

SPECIMEN MARK SCHEME

**2 hours**

---

**MAXIMUM MARK: 80**

---

The syllabus is approved in England, Wales and Northern Ireland as a Level 3 Pre-U Certificate.

This document consists of **5** printed pages and **1** blank page.

**Mark Scheme Notes**

Marks are of the following three types:

- M Method mark, awarded for a valid method applied to the problem. Method marks are not lost for numerical errors, algebraic slips or errors in units. However it is not usually sufficient for a candidate just to indicate an intention of using some method or just to quote a formula; the formula or idea must be applied to the specific problem in hand, e.g. by substituting the relevant quantities into the formula. Correct application of a formula without the formula being quoted obviously earns the M mark and in some cases an M mark can be implied from a correct answer.
- A Accuracy mark, awarded for a correct answer or intermediate step correctly obtained. Accuracy marks cannot be given unless the associated method mark is earned (or implied).
- B Mark for a correct result or statement independent of method marks.

The following abbreviations may be used in a mark scheme:

- AG Answer Given on the question paper (so extra checking is needed to ensure that the detailed working leading to the result is valid)
- CAO Correct Answer Only (emphasising that no “follow through” from a previous error is allowed)
- aef Any equivalent form
- art Answers rounding to
- cwo Correct working only (emphasising that there must be no incorrect working in the solution)
- ft Follow through from previous error is allowed
- o.e. Or equivalent

1	(i)	Centre (4, -7) Radius 8	B1 B1
	(ii)	Attempt to form midpoint Obtain (8, -3)	M1 A1
2	(i)	Attempt differentiation of at least one term Obtain $3x^2 - 4x - 4$	M1 A1
	(ii)	State derivative equal to 0 Attempt to solve quadratic Obtain $x = -\frac{2}{3}$ and 2 Obtain $y = 4.48$ and -5	B1 M1 A1 A1
3	(i)	Many-one function or equivalent	B1
	(ii)	Attempt to form $gf(x)$ Obtain $7x^2 - 2$ only	M1 A1
	(iii)	Attempt to make $x$ the subject Obtain $\frac{1}{7}(x + 2)$ only	M1 A1
	(iv)	Reflection In line $y = x$	B1 B1
4	(i)	$f(-2) = 0$ clearly shown	B1
	(ii)	Method shown e.g. division Obtain $2x^2 + 3x - 9$ Attempt to solve quadratic $(2x - 3)(x + 3)$ $x = \frac{3}{2}$ $x = 2$ and $x = -3$	M1 A1 M1 B1ft B1ft
5		${}^5C_2 2^2 a^3$ or equivalent seen	B1
		${}^4C_2 \frac{a^2}{9}$ or equivalent seen Attempt to solve correct relationship $a = \frac{1}{6}$	B1 M1 A1
6		Substitute for $y$ (or $x$ ) Obtain quadratic equation in $x$ (or $y$ ) Solve their quadratic equation Obtain $x = 2$ and $-1$ (or $y = -1$ and 2) Substitute back into linear or quadratic expression to find $y$ (or $x$ ) Obtain $y = -1$ and 2 (or $x = 2$ and $-1$ )	M1 A1 M1 A1 M1 A1ft

7	(i)	Attempt to eliminate fractions Obtain $8x - 1 = A(x + 1) + B(2x - 1)$ Obtain $A = 2$ Obtain $B = 3$	M1 A1 B1 B1
	(ii)	Attempt integration to obtain at least one $\ln$ term Obtain $P \ln 2x - 1  + Q \ln x + 1 $ Use limits in correct order Attempt use of log laws Obtain $\ln 24$ AG	M1 A1 M1 DM1 A1
8		State derivative Use of the correct Newton-Raphson formula State 1 and at least one other correct value (1.8, 1.59249, 1.56922, 1.56895, 1.56895) State 1.569	B1 M1 A1 A1
9	(i)	$z^* = 3 + 4i$ seen or implied $9 - 4i$ obtained	B1 B1
	(ii)	Multiply by conjugate $\frac{3}{5} + \frac{4}{5}i$ or equivalent	M1 A1
	(iii)	Show $3 - 4i$ on an Argand diagram Show $3 + 4i$ on an Argand diagram	B1 B1ft
10	(i)	Dealing with $\cot$ Adding fractions in terms of $\sin$ and $\cos$ Use of $\cos^2 + \sin^2$ Simplification to given answer	B1 M1 M1 A1
	(ii)	Substituting $\operatorname{cosec}\left(\theta + \frac{\pi}{4}\right)$ Converting equation in $\sin$ $\theta + \frac{\pi}{4} = 0.4115, 2.730, 6.695$ $\theta = 1.94, 5.91$	M1 M1 M1 A1
11	(i)	State $n$ th term of an AP for at least one term. ( $a, a + 8d$ and $a + 13d$ ) Equate to $ar$ and $ar^2$ ( $a + 8d = ar, a + 13d = ar^2$ ) State an expression for $r, d$ or $r^2$ Equate 2 expressions and make at least one step to solve Obtain an expression for $d$ or $a$ $d = \frac{-3a}{64}$ Substitute <i>their</i> value for $d$ or $a$ to find $r$ Obtain $r = \frac{5}{8}$ AG	M1 A1 B1 M1 A1 M1 A1
	(ii)	Substitute $r$ into correct formula Obtain $S = \frac{8a}{3}$	M1 A1

12	(i)	Use $f' = 1$ and $g = \ln x$ and apply the correct formula for integration by parts Obtain AG correctly	M1 A1
	(ii) (a)	$f' = \ln x$ and $g = \ln x$ Obtain $(\ln x)(x \ln x - x) - \int f(x)dx$ Attempt to simplify integral and substitute result from (i) Obtain $\int (\ln x - 1)dx = x \ln x - x - x$ and hence $x(\ln x)^2 - 2x \ln x + 2x (+ c)$ .	B1 B1 M1 A1
	(b)	Attempt integration by parts as $g(x) - \int f(x)dx$ Obtain $(\ln x)(\ln(\ln x)) - \int f(x)dx$ Obtain $g(x) - \int \frac{1}{x} dx$ Obtain $(\ln x)(\ln(\ln x)) - \ln x + c$ Sight of $+ c$ in last two parts	M1 A1 A1 A1 B1

