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 ${}^4C_2 \frac{a^2}{9}$ or equivalent seen Attempt to solve correct relationship $a = \frac{1}{6}$	B1 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 $P\ln\lvert 2x-1\rvert+Q\ln\lvert x+1\rvert$ Use limits in correct order Attempt use of log laws Obtain ln24 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 $\frac{3}{5}+\frac{4}{5}\text{i}$ 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 $\text{cosec}\left(\theta+\frac{\pi}{4}\right)$ 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 nth 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 *their* 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

BLANK PAGE