Cambridge Assessment International Education

Cambridge Pre-U

MATHEMATICS **9794/01**

Paper 1 Pure Mathematics 1 **For examination from 2020**

MARK SCHEME

Maximum Mark: 80

Specimen

This specimen paper has been updated for assessments from 2020. The specimen questions and mark schemes remain the same. The layout and wording of the front covers have been updated to reflect the new Cambridge International branding and to make instructions clearer for candidates.

This syllabus is regulated for use in England, Wales and Northern Ireland as a Cambridge International Level 3 Pre-U Certificate.

This document has **8** pages. Blank pages are indicated.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

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
D Dependent mark (dependent on an earlier mark in the scheme)

Question	Answer	Marks	Notes
1(a)	Centre (4, –7)	B1	
	Radius 8	B1	
		2	
1(b)	Attempt to form midpoint	M1	
	Obtain (8, −3)	A1	
		2	

Question	Answer	Marks	Notes
2(a)	Attempt differentiation of at least one term	M1	
	Obtain $3x^2 – 4x – 4$	A1	
		2	
2(b)	State derivative equal to 0	B1	
	Attempt to solve quadratic	M1	
	Obtain $x = -\frac{2}{3}$ and 2	A1	
	Obtain $y = 4.48$ and –5	A1	
		4	

Question	Answer	Marks	Notes
3(a)	Many-one function or equivalent	B1	
		1	
3(b)	Attempt to form gf(x)	M1	
	Obtain $7x^2 – 2$ only	A1	
		2	
3(c)	Attempt to make x the subject	M1	
	Obtain $\frac{1}{7}(x+2)$ only	A1	
		2	
3(d)	Reflection	B1	
	In line $y = x$	B1	
		2	

Question	Answer	Marks	Notes
4(a)	f(–2) = 0 clearly shown	B1	
		1	
4(b)	Method shown e.g. division	M1	
	Obtain $2x^2 + 3x - 9$	A1	
	Attempt to solve quadratic ($(2x – 3)(x + 3)$)	M1	
	$x = \frac{3}{2}$	B1	B1ft
	$x = 2$ and $x = –3$	B1	B1ft
		5	

Question	Answer	Marks	Notes
5	${}^5C_2 2^2 a^3$ or equivalent seen	B1	
	${}^4C_2 \frac{a^2}{9}$ or equivalent seen	B1	
	Attempt to solve correct relationship	M1	
	$a = \frac{1}{6}$	A1	
		4	

Question	Answer	Marks	Notes
6	Substitute for y (or x)	M1	
	Obtain quadratic equation in x (or y)	A1	
	Solve their quadratic equation	M1	
	Obtain $x = 2$ and $–1$ (or $y = –1$ and 2)	A1	
	Substitute back into linear or quadratic expression to find y (or x)	M1	
	Obtain $y = –1$ and 2 (or $x = 2$ and $–1$)	A1	A1ft
		6	

Question	Answer	Marks	Notes
7(a)	Attempt to eliminate fractions	M1	
	Obtain $8x - 1 = A(x + 1) + B(2x - 1)$	A1	
	Obtain $A = 2$	B1	
	Obtain $B = 3$	B1	
		4	
7(b)	Attempt integration to obtain at least one ln term	M1	
	Obtain $P\ln\lvert 2x-1\rvert + Q\ln\lvert x+1\rvert$	A1	
	Use limits in correct order	M1	
	Attempt use of log laws	M1	DM1
	Obtain ln24 **AG**	A1	
		5	

Question	Answer	Marks	Notes
8	State derivative	B1	
	Use of the correct Newton-Raphson formula	M1	
	State 1 and at least one other correct value (1.8, 1.59249, 1.56922, 1.56895, 1.56895)	A1	
	State 1.569	A1	
		4	

Question	Answer	Marks	Notes
9(a)	$z^* = 3 + 4\text{i}$ seen or implied	B1	
	$9 - 4\text{i}$ obtained	B1	
		2	
9(b)	Multiply by conjugate	M1	
	$\frac{3}{5}+\frac{4}{5}\text{i}$ or equivalent	A1	
		2	
9(c)	Show $3 - 4\text{i}$ on an Argand diagram	B1	
	Show $3 + 4\text{i}$ on an Argand diagram	B1	B1ft
		2	

Question	Answer	Marks	Notes
10(a)	Dealing with cot	B1	
	Adding fractions in terms of sin and cos	M1	
	Use of $\cos^2 + \sin^2$	M1	
	Simplification to given answer	A1	
		4	
10(b)	Substituting $\text{cosec}\left(\theta + \frac{\pi}{4}\right)$	M1	
	Converting equation in sin	M1	
	$\theta + \frac{\pi}{4} = 0.4115, 2.730, 6.695$	M1	
	$\theta = 1.94, 5.91$	A1	
		4	

Question	Answer	Marks	Notes
11(a)	State nth term of an AP for at least one term. (a, $a + 8d$ and $a + 13d$)	M1	
	Equate to ar and ar^2 ($a + 8d = ar$, $a + 13d = ar^2$)	A1	
	State an expression for r, d or r^2	B1	
	Equate 2 expressions and make at least one step to solve	M1	
	Obtain an expression for d or a $d = \frac{-3a}{64}$	A1	
	Substitute their value for d or a to find r	M1	
	Obtain $r = \frac{5}{8}$ **AG**	A1	
		7	
11(b)	Substitute r into correct formula	M1	
	Obtain $S = \frac{8a}{3}$	A1	
		2	

Question	Answer	Marks	Notes
12(a)	Use $f' = 1$ and $g = \ln x$ and apply the correct formula for integration by parts	M1	
	Obtain **AG** correctly	A1	
		2	
12(b)(i)	$f' = \ln x$ and $g = \ln x$	B1	
	Obtain $(\ln x)(x \ln x - x) - \int f(x)\,dx$	B1	
	Attempt to simplify integral and substitute result from **(a)**	M1	
	Obtain $\int (\ln x - 1)\,dx = x \ln x - x - x$ and hence $x(\ln x)^2 - 2x \ln x + 2x$ (+ c).	A1	
		4	
12(b)(ii)	Attempt integration by parts as $g(x) - \int f(x)\,dx$	M1	
	Obtain $(\ln x)(\ln(\ln x)) - \int f(x)\,dx$	A1	
	Obtain $g(x) - \int \frac{1}{x}\,dx$	A1	
	Obtain $(\ln x)(\ln(\ln x)) - \ln x + c$	A1	
	Sight of + c in last two parts	B1	
		5	