Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 (Extended) **October/November 2019**

MARK SCHEME

Maximum Mark: 120

Published

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 International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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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.

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MARK SCHEME NOTES

The following notes are intended to aid interpretation of mark schemes in general, but individual mark schemes may include marks awarded for specific reasons outside the scope of these notes.

Types of mark

M Method marks, awarded for a valid method applied to the problem.

A Accuracy mark, awarded for a correct answer or intermediate step correctly obtained. For accuracy marks to be given, the associated Method mark must be earned or implied.

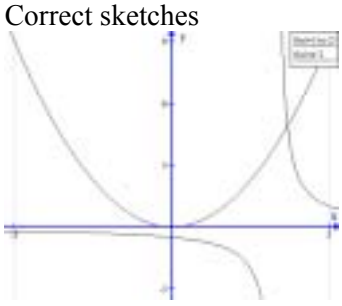
B Mark for a correct result or statement independent of Method marks.

When a part of a question has two or more 'method' steps, the M marks are in principle independent unless the scheme specifically says otherwise; and similarly where there are several B marks allocated. The notation '**dep**' is used to indicate that a particular M or B mark is dependent on an earlier mark in the scheme.

Abbreviations

awrt	answers which round to
cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
nfww	not from wrong working
oe	or equivalent
rot	rounded or truncated
SC	Special Case
soi	seen or implied

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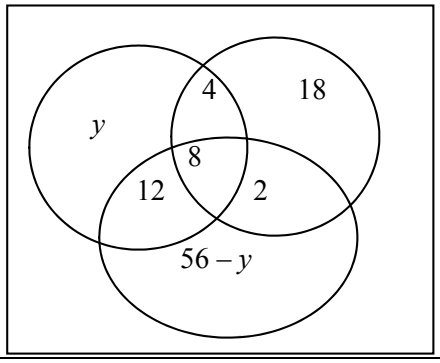
Question	Answer	Marks	Partial Marks
1(a)	Correct triangle with vertices (3, –5), (5, –5), (5, –4)	**1**	
1(b)	Correct triangle with vertices (3, 2), (5, 2), (5, 1)	**1**	
1(c)	Reflection $y = -1.5$ oe	**2**	**B1** for each
1(d)	Correct triangle with vertices (–5, 3), (–5, 5), (–4, 5)	**2**	**B1** for correct rotation with incorrect centre of rotation. or **B1** for clockwise rotation with correct centre of rotation.
1(e)	Reflection $y = x$ oe	**2**	**B1** for each
2(a)	0.25 oe	**1**	
2(b)	1.5	**2**	**M1** for $1 = -2(x-2)$ or $\frac{1}{-2} = x - 2$
2(c)	$(x+2)^2$	**1**	
2(d)	–0.5 or $-\frac{1}{2}$	**4**	**B1** for $x^2 + 4x + 4$ **M2** for $4x + 4 = 2$ or **M1** for $their(c) = x^2 + 2$ or **M2** for correct sketch or **M1** for any U-shaped parabola
2(e)	$\frac{1}{x} + 2$ oe final answer	**3**	**M2** for $x = \frac{1}{y} + 2$ or $xy = 1 + 2y$ or $y - 2 = \frac{1}{x}$ or **M1** for $x - 2 = \frac{1}{y}$ or $y(x-2) = 1$ or $x = \frac{1}{y-2}$
2(f)(i)	Correct sketches 	**3**	**B1** for correct quadratic shape through origin **B2** for correct rectangular hyperbola shape or **B1** for one branch

Question	Answer	Marks	Partial Marks
2(f)(ii)	$x = 0$	**1**	
2(f)(iii)	$2 < x < 2.21$ or 2.205 to 2.206	**2**	**B1** for each part or 2 and 2.21 or 2.205 to 2.206 seen
3(a)	$160 \times \frac{4}{5}$ oe	**1**	
3(b)	57.60	**3**	**M2** for $128 \times \frac{4}{5}$ or $\frac{160-x}{128} = \frac{4}{5}$ or **M1** for $\frac{128}{5}$ or $\frac{160-x}{4}$ or $160-x : 128 = 4 : 5$
3(c)(i)	25	**1**	
3(c)(ii)	40	**3**	**M2** for $32 \times \frac{100}{80}$ oe or **M1** equating 32 to 80%
4(a)(i)	–4	**2**	**M1** for $2x = -11 + 3$ or $x - \frac{3}{2} = \frac{11}{2}$ oe
4(a)(ii)	–9	**2**	**M1** for $36 = -4x$ or $\frac{36}{-4} = x$ oe
4(a)(iii)	0.5 oe	**2**	**M1** for $6x + 2x = 17 - 13$ oe
4(b)	Correctly equating one set of coefficients OR $x =$ … or $y =$ … from one equation	**M1**	Allow correct sketches, i.e. two lines with negative gradients
	Correct method for eliminating one variable OR correct substitution into other equation	**M1**	
	$[x =] -2$ $[y =] -3$	**B2**	**B1** for each If 0 scored, **SC1** for correct substitution in one of the original equations to find other variable
5(a)(i)	140	**2**	**B1** for angle $OBA = 20$ soi
5(a)(ii)	70	**1**	**FT** $0.5 \times$ *their*(i)
5(a)(iii)	110	**1**	**FT** $180 -$ *their*(ii)

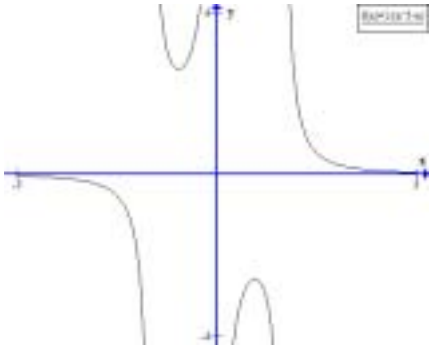
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Question	Answer	Marks	Partial Marks
5(a)(iv)	45	**1**	
5(a) (v)	25	**1**	
5(a)(vi)	40	**1**	
5(b)	Cyclic [quadrilateral]	**1**	
6(a)	0 cao	**1**	
6(b)	$\frac{5}{6}$ oe	**1**	
6(c)	$\frac{4}{24}$ oe	**2**	**M1** for $\frac{1}{4}\times\frac{1}{6}$ or **B1** for $\frac{k}{24}$ soi k integer from 1 to 23
6(d)	$\frac{12}{24}$ oe	**3**	**M2** for $\frac{2}{4}\times\frac{3}{6}+\frac{2}{4}\times\frac{3}{6}$ oe or for 12 pairs listed or indicated or **M1** for $\frac{2}{4}\times\frac{3}{6}$ oe or for 10 or 11 pairs listed or indicated
6(e)	$\frac{4}{24}$ oe	**2**	**M1** for $\frac{1}{4}\times\frac{1}{6}$ or for (1, 5) (2, 4) (3, 3) (4, 2) listed or indicated
7(a)(i)	$(2x+1)(x-6)$ final answer	**2**	**M1** for $(2x + a)(x + b)$ where $ab = -6$ or $a + 2b = -11$ or $2x(x-6) + x - 6$ or $x(2x+1) - 6(2x+1)$ or correct answer seen
7(a)(ii)	$-0.5 < x < 6$	**2**	**FT** *their* **(i)** only from factors giving positive x^2 term **B1** for each or –0.5 and 6 seen
7(b)	Appropriate sketch indicating answers (one positive and one negative) or correct substitution in formula or correct completion of square	**M1**	Allow $\sqrt{61}$ for $\sqrt{(-1)^2-4(3)(-5)}$
	1.47 –1.14	**B2**	**B1** for each or both correct but not rounded to 2dp 1.468… , –1.135…

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Question	Answer	Marks	Partial Marks
8(a)	Correct Venn diagram  	**2**	**B1** for 2, 4, 12, 18 correct **B1** for y and $56 - y$ correct oe
8(b)(i)	8	**2**	**M1** for $100 = 74 + 18 + x$ oe
8(b)(ii)	40	**2**	**M1** for $16 + their(x) + y = 2(24 + their(x))$ oe
8(b)(iii)	16	**1**	**FT** $56 - their$ **(b)(ii)** ($their$ **(b)(ii)** $\leqslant 56$)
9(a)	$[(14 \times 18) + 0.5 \times 14 \times 8] \times 24$ oe or $18 \times 14 \times 24 + 0.5 \times 14 \times 8 \times 24$ oe leading to 7392	**M3**	i.e. area × length volume + volume **M2** for $14 \times 18 + 0.5 \times 14 \times 8$ or **M1** for 14×18 or $0.5 \times 14 \times 8$ or $0.5 \times (18 + 26) \times 7$
9(b)	12 cao	**3**	**M2** for $24 \div \sqrt[3]{\frac{7392}{924}}$ oe or **M1** for $\sqrt[3]{\frac{7392}{924}}$ soi
9(c)	12.1 or 2.08…	**2**	**M1** for $r^3 = \frac{3}{4} \times \frac{7392}{\pi}$ oe
9(d)	48.2 or 48.3 or 48.4 or 48.20 to 48.37…	**2**	**M1** for $h = \frac{3 \times 7392}{\pi \times (their 12.1)^2}$
9(e)	$\pi r^2 \sqrt{17}$ final answer	**3**	**M2** for $\pi r \sqrt{r^2 + (4r)^2}$ or **M1** for $l^2 = r^2 + (4r)^2$ If 0 scored , **SC1** for $\pi r^2 \sqrt{5}$
10(a)	129.25	**2**	**M1** for at least 3 of 50, 110, 130, 150, 205 seen
10(b)	$140 [< m \leqslant] 160$	**1**	
10(c)	$\frac{189}{1580}$	**3**	**B2** for 0.12[0] or 0.1196... or $\frac{756}{6320}$ oe or **M1** for $\frac{28}{80} \times \frac{27}{79}$

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Question	Answer	Marks	Partial Marks
10(d)(i)	0.06, 1.1, 1.55, 0.65, 0.0889 or 0.08888 to 0.08889	**2**	**B1** for 3 or 4 correct
10(d)(ii)	Correct histogram	**3**	**B1** for correct widths **B2 FT** for all heights correct or **B1 FT** for 3 or 4 correct heights
11(a)	$8^2 + 9^2 - 2 \times 8 \times 9 \times \cos 64$	**M1**	
	9.048… [= 9.05]	**A1**	
11(b)(i)	[Area ABD] = $0.5 \times 8 \times 9 \times \sin 64$	**M1**	
	Area BDC = 57.3 – *their* ABD	**M1**	
	their 24.94 = $0.5 \times 6.5 \times 9.05 \times \sin BDC$	**M1**	
	Angle BDC = 57.98 to 58.02	**A1**	If 58.0… must see 58.0 not 58 alone
11(b)(ii)	77.4 to 77.54…	**5**	**M1** for $6.5^2 + 9.05^2 - 2 \times 6.5 \times 9.05 \times \cos 58$ **A2** for $\sqrt{61.8}$ or 7.86 or **A1** for 61.8 seen **M1** for $\frac{\textit{their}7.86}{\sin 58} = \frac{9.05}{\sin BCD}$ oe or $\frac{1}{2} \times \textit{their}7.86 \times 6.5 \times \sin BCD = \textit{their}\ 24.94$ or $9.05^2 = 6.5^2 + (\textit{their}7.86)^2 -$ $2 \times 6.5 \times (\textit{their}7.86) \times \cos BCD$ or better
12(a)	Correct sketch 	**4**	**B1** for each branch
12(b)	$x = 0$ $x = 1$ $x = -1$ $y = 0$	**3**	**B2** for three correct or **B1** for one correct
12(c)	(0.577, –2.6[0]) or (0.5773 to 0.5774, –2.598…)	**2**	**B1** for each
12(d)	[x =] –1.24 or –1.242 to –1.241 [x =] 1.13 or 1.127 to 1.128	**2**	**B1** for each

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