Cambridge Assessment International Education

Cambridge IGCSE™

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 (Extended) **May/June 2022**

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 May/June 2022 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

This document consists of **10** printed pages.

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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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Maths-Specific Marking Principles	
1	Unless a particular method has been specified in the question, full marks may be awarded for any correct method. However, if a calculation is required then no marks will be awarded for a scale drawing.
2	Unless specified in the question, answers may be given as fractions, decimals or in standard form. Ignore superfluous zeros, provided that the degree of accuracy is not affected.
3	Allow alternative conventions for notation if used consistently throughout the paper, e.g. commas being used as decimal points.
4	Unless otherwise indicated, marks once gained cannot subsequently be lost, e.g. wrong working following a correct form of answer is ignored (isw).
5	Where a candidate has misread a number in the question and used that value consistently throughout, provided that number does not alter the difficulty or the method required, award all marks earned and deduct just 1 mark for the misread.
6	Recovery within working is allowed, e.g. a notation error in the working where the following line of working makes the candidate's intent clear.

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.

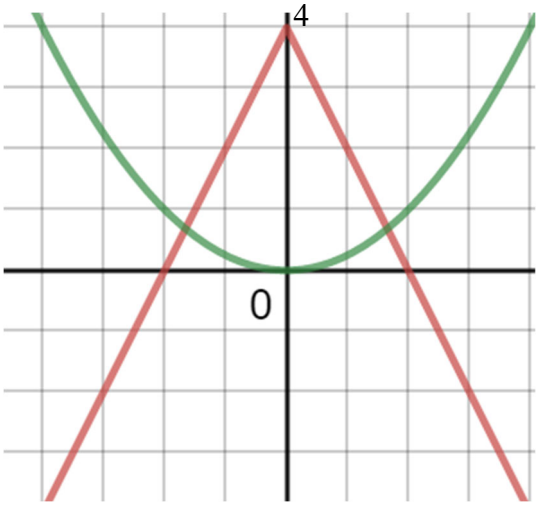
B Mark for a correct result or statement independent of Method marks.

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

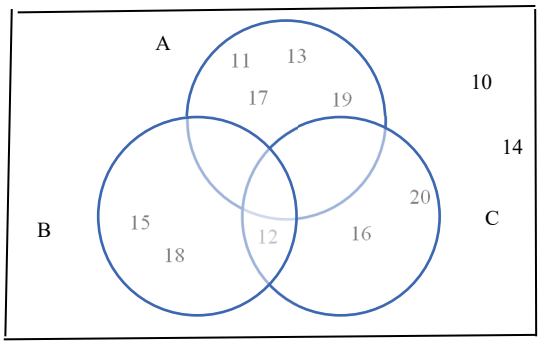
awrt answers which round to
cao correct answer only
dep dependent
FT follow through after error
isw ignore subsequent working
nfww not from wrong working
oe or equivalent
rot rounded or truncated
SC Special Case
soi seen or implied

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Question	Answer	Marks	Partial Marks
1(a)	Reflection $x = 1$ oe	**2**	**B1** for each
1(b)	Correct triangle (5, –4) (5, –7) (7, –7)	**2**	**B1** for correct rotation with incorrect centre or 90 rotation anticlockwise about correct centre
1(c)	Reflection $y = x – 1$ oe	**2**	**B1** for each
2(a)(i)	Correct points	**2**	**B1** for 4 or 5 points correct
2(a)(ii)	Positive	**1**	
2(b)	31.2	**1**	
2(c)(i)	$y = 3.01x + 15[.0]$	**2**	**B1** for $y = 3x + 15$ or $y = 3.01x + k$ or $y = kx + 15[.0]$
2(c)(ii)	Marks per hour oe	**1**	
2(d)(i)	45	**1**	**FT** *their* **(c)(i)** if linear and answer is positive
2(d)(ii)	7	**1**	**FT** *their* **(c)(i)** if linear and answer is positive
3(a)	$2x – 60$ or $2(x – 30)$ final answer	**1**	
3(b)	$330 – 3x$ or $3(110 – x)$ final answer	**3**	**M2** for $360 – 90 – x –$ (*their* **(a)**) oe or **B1** for $OAQ = 90$
3(c)	$240 – 3x$ or $3(80 – x)$ final answer	**3**	**M2** for $180 –90 –$ (180 – *their* **(b)**) oe or **B1** for $DCB = 90$
4(a)	Correct sketch  	**3**	**B1** for inverted ‘v’ **B1** for symmetrical about y-axis
4(b)	–2, 2	**1**	

Question	Answer	Marks	Partial Marks
4(c)	Correct sketch	**2**	Must touch x-axis at origin and without serious curl backs **B1** for a u-shaped parabola
4(d)	$x = 0$	**1**	
4(e)	–1.66 or –1.657 to –1.656 1.66 or 1.656 to 1.657	**2**	**B1** for each
4(f)	Correct region shaded	**1**	**Dependent** on at least B2 in **(a)** and at least B1 in **(c)**
5(a)(i)	$\frac{1240}{5} \times 3 [= 744]$	**1**	
5(a)(ii)	434	**3**	**M2** for $[x =] 992 - \frac{744 \times 3}{4}$ oe or **M1** for $\frac{744 \times 3}{4}$ oe (558) (186 × 3) or $\frac{3}{7} \times 1302$ seen or for 992 seen
5(b)(i)	73.6[0]	**2**	**M1** for $92 - \frac{20 \times 92}{100}$ oe or **B1** for 18.4
5(b)(ii)	165[.00]	**2**	**M1** for $x \times \frac{100 - 20}{100} = 132$ oe or better
5(c)(i)	894.78	**3**	**M2** for $\frac{1240 \times (100 - 18) \times (100 - 12)}{100 \times 100}$ oe or **M1** for $\frac{1240 \times (100 - 18)}{100}$ or $\frac{(their\ 1016.8) \times (100 - 12)}{100}$

Question	Answer	Marks	Partial Marks
5(c)(ii)	2033 nfww	**4**	**B3** for 9.3 or 9.288 to 9.29… OR 8.3 or 8.29 as final value or **M3** for $n\log 0.88 = \log\frac{310}{1240\times 0.82}$ or $n\log 0.88 = \log\frac{310}{\textit{their}\ 894.78}$ or correct trials reaching 9 and 10 or 8 and 9 or good sketch indicating value between 9 and 10 or between 8 and 9 or **M2** for $0.88^n = \frac{310}{1240\times 0.82}$ or $0.88^n = \frac{310}{\textit{their}\ 894.78}$ or at least 3 correct trials or sketch that could lead to solution e.g. $y = 0.88^x$ and $y = 0.3$ or **M1** for $1240 \times 0.82 \times 0.88^n = 310$ or *their* $894.78 \times 0.88^n = 310$ or at least 2 trials or suitable graph e.g. $y = 0.88^x$
6(a)	919	**2**	**M1** for at least 5 correct midpoints soi
6(b)	[4], 10, 22, 40, 56, 76, [80]	**1**	
6(c)	Correct curve or polygon and correct points plotted (870, 4) (890, 10) (900, 22) (920, 40) (940, 56) (950, 76) (1000, 80)	**3**	**M1** for at least 6 horizontal plots correct **M1FT** for at least 6 vertical plots correct
6(d)(i)	920	**1**	
6(d)(ii)	42 to 47	**2**	**M1FT** for [UQ =] 941 to 944 or [LQ =] 897 to 899
6(e)	72.5	**2**	**B1** for 18+16+20+4 or 80 – 22 soi (58) or **M1** for (80 – *their* 22)/80 × 100
7(a)(i)	118	**1**	
7(a)(ii)	298 cao	**1**	
7(b)	680 or 680.1 to 680.2	**2**	**M1** for $420^2 + 535^2$
7(c)	427 or 427.3 to 427.4	**3**	**M2** for $[CD =]\sqrt{420^2 + 750^2 - 2\times 420\times 750\times\cos 28}$ or **M1** for $\left[CD^2\right] = 420^2 + 750^2 - 2\times 420\times 750\times\cos 28$
7(d)	186000 or 186200 to 186300	**3**	**M1** for area $ABC = 0.5 \times 420 \times 535$ **M1** for area $ACD = 0.5 \times 420 \times 750$ x sin28

Question	Answer	Marks	Partial Marks
7(e)	145 or 145 to 146 nfww	**4**	**M2** for $\sin ACD = \frac{750 \times \sin 28}{theirCD}$ or **M1** for $\frac{750}{\sin ACD} = \frac{theirCD}{\sin 28}$ And **M1** for 360 – 90 – (180 – *their* acute *C*) OR **M2** for $\cos ACD = \frac{420^2 + 427.367^2 - 750^2}{2 \times 420 \times 427.367}$ or **M1** for $750^2 = 420^2 + 427.37^2 - 2 \times 420 \times 427.37 \cos C$ And **M1** for 360 – 90 – *their* obtuse *C*
8(a)	[A =] 11, 13, 17, 19	**1**	
8(b)		**2**	**B1** for at least 8 elements correct
8(c)	10, 14, 16, 20	**1**	**FT** their Venn diagram
8(d)	6	**1**	**FT** their Venn diagram
9(a)	55	**1**	
	109 – 9*n* oe	**2**	**M1** for $k - 9n$
9(b)	–2	**1**	
	$(-2)^{7-n}$ oe	**2**	**M1** for $c(-0.5)^k$ or $c \div (-2)^k$

Question	Answer	Marks	Partial Marks
9(c)	84	**1**	
	$2n^2 + 3n - 6$	**2**	**M1** for any 3 term quadratic or for 2nd differences of 4
10(a)	– 84	**3**	**M1** for correct substitution **B1** for answer 84
10(b)	$\frac{10y}{3}$ or $3\frac{1}{3}y$ or 3.3 (or 3.33 or 3.333…)y final answer	**2**	**B1** for $\frac{20xy}{6x}$ or $\frac{10xy}{3x}$ or $\frac{20y}{6}$ or $\frac{5y \times 2}{3}$ or correct answer seen
10(c)(i)	$5b(3a - 5c)$ final answer	**2**	**M1** for $b(15a - 25c)$ or $5(3ab - 5bc)$ or correct answer seen
10(c)(ii)	$2x^2y^3(3y^2 - 8x)$ final answer	**2**	**M1** for $x^2y^3(6y^2 - 16x)$ or $2y^3(3x^2y^2 - 8x^3)$ or $2x^2(3y^5 - 8xy^3)$ or better i.e. answers which are correct and have only one common factor left inside brackets e.g. $2x^2y(3y^4 - 8xy^2)$ or correct answer seen
10(c)(iii)	$(2c - 3)(3d + 1)$ final answer	**2**	**M1** for $2c(3d + 1) - 3(3d + 1)$ or $3d(2c - 3) + 2c - 3$ or correct answer seen
10(d)	$[x =]\frac{a+2}{3a^2+6a+2}$ oe final answer	**4**	**M1** for correctly eliminating fractions **M1** for correctly expanding brackets **M1** for correctly collecting **all** terms in x on one side and other terms on other side of equation **M1** for correctly isolating x by factorising and dividing Max 3 marks only if final answer is incorrect
10(e)	$-2 < x < 0.5$ final answer	**3**	**M2** for –2 and 0.5 SOI or **M1** for correct graph(s) sketched or **M1** for $\frac{1-2x}{2+x} > 0$ oe or **B1** for 0.5 soi
11(a)	$(1/3) \times 9^2 \times h$ or $\frac{1}{3}81h$ or $27h$ oe	**1**	
11(b)	$\frac{10}{h} = \frac{a}{9}, \frac{9}{h} = \frac{a}{10}\left[a = \frac{90}{h}\right]$ oe	**1**	
11(c)(i)	$\left[V =\right]\frac{1}{3}9^2h - \frac{1}{3}a^2 \times 10$ oe isw	**1**	**FT** their (a)

Question	Answer	Marks	Partial Marks
11(c)(ii)	$[V =]\frac{1}{3}b^2(h-1)$ oe isw	**1**	
11(c)(iii)	$\frac{1}{3}9^2h-\frac{1}{3}\left(\frac{90}{h}\right)^2\times10=\frac{1}{3}\left(\frac{h-1}{h}\right)^2 9^2(h-1)$ oe	**M2**	**M1** for $\frac{h-1}{h}=\frac{b}{9}$ oe
	$h-\frac{1000}{h^2}=\frac{(h-1)^3}{h^2}$, $h^3-1000=(h-1)^3$	**A1**	No errors or omissions seen
11(c)(iv)	18.8 or 18.75 to 18.76 cao	**2**	**B1** for 18.8 or 18.75 to 18.76 and negative root as final answers **M1** for [quadratic/cubic]sketch(es)
12(a)(i)	0	**1**	
12(a)(ii)	$\frac{7}{44}$ oe	**2**	**M1** for $\frac{7}{12}\times\frac{6}{11}\times\frac{5}{10}$
12(a)(iii)	$\frac{21}{55}$ oe	**3**	**M2** for $\frac{7}{12}\times\frac{6}{11}\times\frac{4}{10}\times3$ oe or **M1** for $\frac{7}{12}\times\frac{6}{11}\times\frac{4}{10}$ oe
12(b)	420	**1**	**FT (*their* part (a)(ii))** × 2640

Additional Guidance

5 (a) (i) allow $\frac{3}{5} = 0.6$ then $0.6 \times 1240 = 744$

allow $\frac{5x}{12} = 1240$ then $5x = 14880$ then $x = \frac{14880}{5} = 2976$ then $\frac{3}{12} = \frac{1}{4}$ then $\frac{1}{4} \times 2976 = 744$

but do not allow $\frac{5x}{12} = 1240$ then $5x = 14880$ then $x = 2976$ then $\frac{3}{12} = \frac{1}{4}$ then $\frac{1}{4} \times 2976 = 744$

(division by 5 not seen)

5 (b),(c) all parts use of e.g. 1 – 20% , do not allow M marks but correct answers can score.

7 (e) e.g. Finding angle *D* first

B2 for [*C* =] 180 – 28 – (27.4 to 27.5) (124.5 to 124.6)

or M1 for $\sin D = \frac{420 \sin 28}{\textit{their } CD}$ 27.4 to 27.5 (i.e. explicit expression for sin*D*) (note: cosine rule may be used for angle *D*.)

and M1 for 360 – 90 – (180 – *their* acute *C*) or 360 – 90 – *their* obtuse *C*)