Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/62**

Paper 6 (Extended) **May/June 2019**

MARK SCHEME

Maximum Mark: 40

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 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U 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

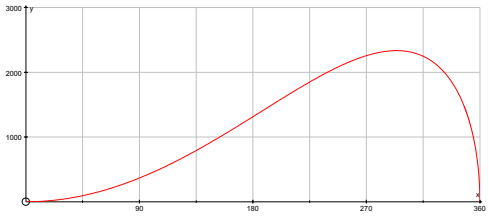
awrt answers which round to
cao correct answer only
dep dependent
FT follow through after error
isw ignore subsequent working
nfww not from wrong working
oe or equivalent
rot rounded or truncated
SC Special Case
soi seen or implied

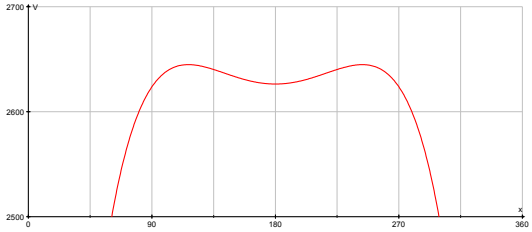
Question	Answer	Marks	Partial Marks
A	**INVESTIGATION SQUARE ROOTS WITHIN SQUARE ROOTS**		
1(a)	2.9995[…]	**1**	**C** opportunity
1(b)	3	**1**	
2(a)	5.4772[…] 5.9562[…] 5.9963[…]	**2**	 **FT** *their* 5.4772[…] **FT** *their* 5.9562[…] **B1** for two correct including FT If 0 scored, **SC1** for answer 5.477, 5.956, 5.996
2(b)	6	**1**	

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Question	Answer	Marks	Partial Marks
3(a)	1st term: $\sqrt{2}$ → Limit: 2 $\sqrt{6}$ → 3 $\sqrt{12}$ → 4 $\sqrt{20}$ → 5 $\sqrt{30}$ → 6 $\sqrt{42}$ → 7	**1**	
3(b)(i)	$\sqrt{56}$	**1**	**C** opportunity
3(b)(ii)	7.9999	**1**	**FT** *their* exact square root seen in part **(i)** with answer rounded correctly to 4 decimal places.
4(a)	$k = x^2 - x$ or $k = x(x - 1)$ final answer	**1**	
4(b)	$42 = 7^2 - 7 = 49 - 7$ oe or $\sqrt{42+7} = \sqrt{49} = 7$ or $42 = 7(7 - 1) = 7 \times 6$ or $x^2 - x = 42$ with working leading to $x = 7$	**1**	
5	$\frac{1+\sqrt{13}}{2}$ oe as final answer	**2**	**M1** for substitution of $a = 1$, $b = -1$, $c = -3$ soi If 0 scored **SC1** for $x^2 + x = 3$ leading to $\frac{-1+\sqrt{13}}{2}$ oe as final answer **C** opportunity
6(a)	3	**2**	**B1** for calculating a correct 2nd, 3rd, 4th or 5th term
6(b)	$x^2 = a + \sqrt{b + x}$	**1**	
6(c)(i)	$3^2 - 5 = 4 = \sqrt{13+3}$ oe	**1**	

Question	Answer	Marks	Partial Marks
6(c)(ii)	[a =] 1 [b =] 61 [a =] 2 [b =] 46 [a =] 3 [b =] 33 [a =] 4 [b =] 22 [a =] 7 [b =] 1	**3**	**B2** for three or four correct pairs and no incorrect or five correct and one or more incorrect or **B1** for one or two correct pairs and no incorrect or three or four correct pairs and one or more incorrect. **C** opportunity
Communication: seen in three of the following questions		**1**	
1(a)	$\sqrt{6+\sqrt{6+\sqrt{6+\sqrt{6+\sqrt{6}}}}}$ or $\sqrt{6+2.9974[...]}$		
3(b)(i)	8×7 [=] 56 or $42 + 14$ [=] 56 or $7^2 + 7$ [=] 56 or $8^2 - 8$ [=] 56 or, from the table, all first differences 4, 6, 8, 10, 12 or multiplications 1×2, 2×3, 3×4, 4×5, 5×6, 6×7 or $1^2 + 1$, $2^2 + 2$, $3^2 + 3$, $4^2 + 4$, $5^2 + 5$, $6^2 + 6$ or $2^2 - 2$, $3^2 - 3$, $4^2 - 4$, $5^2 - 5$, $6^2 - 6$, $7^2 - 7$		
3(b)(ii)	$\sqrt{56+\sqrt{56+\sqrt{56+\sqrt{56}}}}$ or 7.4833[…] or 7.9676[…] or 7.9979[…] or 7.998[0] used for the next term		
5	*their*$(x^2 - x) = 3$ oe		
6(c)(ii)	Substitution of a or b in $9 - a = \sqrt{b+3}$, or a correct rearrangement, with working leading to other variable or a statement about finding square number for $b + 3$. oe or $b = a^2 - 18a + 78$		

Question	Answer	Marks	Partial Marks
B	MODELLING MAKING CONES		
7(a)	$\frac{x}{360}\times 2\times\pi\times 18$ oe	**1**	
7(b)	$[r=]\frac{x}{20}$ oe	**1**	**C** opportunity
7(c)	$h^2 = 18^2 - r^2$ or $h = \sqrt{18^2 - r^2}$	**M1**	**C** opportunity
	Replacing r^2 by $\left(their\ \frac{x}{20}\right)^2$ and 18^2 by 324	**M1**	
7(d)(i)	$\frac{1}{3}\pi \div 400$ oe = 0.00261 to 0.00262	**1**	
7(d)(ii)	1310 or 1313 to 1313.2	**1**	**C** opportunity
7(e)	Correct sketch 	**2**	**B1** for any sketch with a single maximum to the right of $x = 240$ or correct sketch, except that the maximum is between $x = 180$ and $x = 240$. **C** opportunity
7(f)(i)	294	**1**	
7(f)(ii)	2330 or 2334 to 2335	**1**	
7(f)(iii)	awrt 831	**2**	**FT** *their* part **(i)** for $0 < x < 360$. **M1** for $\frac{x}{360}\times\pi\times 18^2$ or $\pi\times\frac{x}{20}\times 18$
	OR 828[**.** …] if volume formula used to find r	**2**	 **M1** for $\pi \times r \times 18$ where $14.6 \leqslant r \leqslant 14.7$
8(a)	$y = 360 - x$	**1**	

Question	Answer	Marks	Partial Marks
8(b)	$V = 0.0026x^2\sqrt{324-\frac{x^2}{400}} + 0.0026(360-x)^2\sqrt{324-\frac{(360-x)^2}{400}}$ oe isw	**1**	**FT** substituting *their y* from part **(a)**, only if y an expression in x with at least two terms.
8(c)	Correct sketch 	**1**	**C** opportunity
8(d)	116.6 to 117 243 to 243.4	**2**	**B1** for each
9(a)	17957 to 18900	**1**	**FT** 8×*their* **7(f)(ii)** **C** opportunity
9(b)	294	**1**	**FT** *their* positive **7(f)(i)** less than 360
Communication: seen in three of the following questions		**1**	
7(b)	$\frac{x\pi}{10} = 2\pi r$		
7(c)	$r^2 + h^2 = 18^2$ or uses the word "Pythagoras" or $a^2 + b^2 = c^2$ oe		
7(d)(ii)	Both substitutions of 180 seen		
7(e)	Appropriate scale indicated for V if approximately correct shape		
8(c)	Scale for x-axis e.g. 360 shown and gaps to 0 and soi 360 on $V = 2500$.		
9(a)	Factor of 2 or 8 seen, or implied from a written calculation. or $\frac{\pi}{300}\ x^2\sqrt{1296-\frac{x^2}{100}}$ oe		

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