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CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 (Extended) **May/June 2017**

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 will not enter into discussions about these mark schemes.

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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.

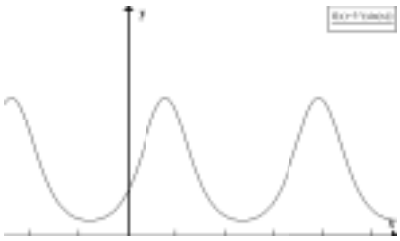
When a part of a question has two or more 'method' steps, the M marks are in principle independent unless the scheme specifically says otherwise; and similarly where there are several B marks allocated. The notation '**dep**' is used to indicate that a particular M or B mark is dependent on an earlier 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
1(a)	1598 final answer	**3**	**M2** for (23 970 × 0.8) ÷ 12 oe or **M1** for 23 970 × 0.2 or better or for 23 970 ÷ 12
1(b)(i)	23 500 nfww	**3**	**M2** for 23 970 ÷ 1.02 oe or **M1** for 23 970 = 102%
1(b)(ii)	2024 nfww	**3**	**M2** for $\frac{\log\left(\frac{30000}{23970}\right)}{\log 1.03}$ oe soi by 7.59...or sketch leading to 7.59 or 2 trials, one giving 7 and one giving 8 or **M1** for $23970 \times \left(1+\frac{3}{100}\right)^n$ [= 30 000] oe seen or reasonable sketch or 3 trials of 23970×1.03^n or 1 trial giving 8.
2(a)(i)	Reflection, $y = x$	**1**	
2(a)(ii)	Enlargement [with centre] (2, 1) [scale factor] $\frac{1}{4}$ oe	**2**	**B1** for each
2(a)(iii)	Translation $\begin{pmatrix} 3 \\ -5 \end{pmatrix}$	**2**	**B1** for each
2(b)(i)	Correct triangle (0, 0), (0, 2), (–2, 3)	**2**	**SC1** for rotation 90° clockwise about (0, 0) or rotation 90° anti-clockwise about different centre
2(b)(ii)	Correct triangle (0, 0), (4, 0), (6, 2)	**2**	**SC1** for stretch with s.f. = 2, x-axis invariant or stretch with y-axis invariant with different scale factor.
3(a)	6 points correct	**3**	**B2** for 4 or 5 correct or **B1** for 2 or 3 correct
3(b)	Positive	**1**	
3(c)(i)	$y = 0.787x + 0.356$ final answer	**2**	0.7874 to 0.7875, 0.3555 to 0.3556 **B1** for one correct or for $y = 0.79x + 0.36$ final answer
3(c)(ii)	5.4[0]	**1**	**FT** from *their* (c)(i)

Question	Answer	Marks	Partial Marks
4(a)(i)	$\begin{pmatrix}-1.5\\1\end{pmatrix}$ oe	**1**	
4(a)(ii)	$\begin{pmatrix}10\\-1\end{pmatrix}$	**2**	**B1** for each
4(a)(iii)	$\sqrt{13}$ final answer	**2**	**M1** for $(-3)^2 + 2^2$ oe soi by 3.61 or 3.605 to 3.606 $\sqrt{13}$ in working implies M1
4(b)	Correct *B* clearly indicated	**2**	**B1** for vector $\begin{pmatrix}1\\5\end{pmatrix}$ drawn not from *A* or $\begin{pmatrix}1\\5\end{pmatrix}$ seen or correctly following through, from *A*, their incorrect vector seen. or either $\begin{pmatrix}-3\\2\end{pmatrix}$ or $\begin{pmatrix}4\\3\end{pmatrix}$ correctly drawn **only** if one starts from *A*.
5(a)	2500	**2**	**M1** for 119 050 ÷ 47.62
5(b)(i)	[0]6 10 or 6 10 am oe	**2**	**B1** for [0]0 25 or [0]3 40 or 28 h 130 min oe seen
5(b)(ii)	722 or 721.7 ...	**3**	**M1** for 4150 ÷ *their* 5h 45 min **B1** for 5.75 oe
5(b)(iii)	5 h 32 (or 31.8 to 32[.0]) min	**3**	**M1** for 4150 ÷ 750 soi by 5.53 or 5.53 ... **B1FT** for correct conversion to hours and minutes
6(a)(i)	[x =] cv oe	**1**	
6(a)(ii)	[y =] kv^2 oe	**1**	
6(a)(iii)	[d =] $cv + kv^2$ or $v(c + kv)$ oe	**1**	**FT**
6(b)(i)	$750 = 12c + 12^2 k$ oe	**M1**	isw any cancelling
6(b)(ii)	$2050 = 20c + 20^2 k$ oe	**1**	isw any cancelling
6(c)	[c =] 2.5 oe cao [k =] 5 cao	**3**	**M1** for correctly eliminating one variable from *their* equations in this part. or sketches of lines **A1** for either solution If zero scored **SC1** for *their* values satisfying one equation.
6(d)	8100	**2**	**M1** for correct substitution of 40 into *their* (a)(iii) containing *their* values of c and k.

Question	Answer	Marks	Partial Marks
7(a)	Correct sketch showing bearings and distances	**3**	**B1** for 310° bearing approx correct (270 to 360) and marked **B1** for 250° bearing approx correct (180 to 270) and marked **B1** for distances correctly marked
7(b)	120	**1**	
7(c)	$40^2 + 65^2 - 2\times40\times65\times\cos$ *their* 120	**M1**	*their* 120 must be between 0 and 180 Allow $\cos120 = \frac{40^2 + 65^2 - [\ ]^2}{2\times40\times65}$
	91.78 to 91.79	**A2**	**A1** for 8425 or $5\sqrt{337}$
7(d)	288 or 287.8...	**4**	**M2** for $\frac{40\sin(their120)}{91.8}$ oe or **M1** for $\frac{\sin\theta}{40} = \frac{\sin(their120)}{91.8}$ oe If cosine rule used, **M2** for explicit expression or **M1** for implicit. **A1** for 22.2 or 22.16 to 22.17… If 0 scored **SC2** for answer 108 or 107.8…
8(a)	 Correct sketch	**3**	With correct shape with **t**wo max on right of *y*-axis and one on left, all above *x*-axis and reasonable quality or **B2** for correct shape and all above *x*-axis or **B1** for correct shape
8(b)	–270, 90, 450	**3**	**B1** for each **SC2** for all correct but with *y* co-ords or **SC1** for two correct with *y* co-ords
8(c)	750, 870	**2**	**B1** for each
8(d)	$x < 54.7$	**1**	54.74 to 54.75
	$164 < x < 267$	**2**	163.5 to 163.6 , 266.6... **B1** for one inequality or **B1** for both values seen If 0 scored, **B1** for straight line with negative gradient crossing curve three times between $x = 0$ and $x = 400$. May be freehand.

Question	Answer	Marks	Partial Marks
9(a)(i)	$\frac{1}{2}\times x\times(x+2)\times\frac{\sqrt{3}}{2}$ oe or better final answer	**2**	**M1** for $\frac{1}{2}\times x\times(x+2)\times\sin 60$
9(a)(ii)	equating to $18\sqrt{3}$ and correct elimination of $\sqrt{3}$	**M1**	**Dependent on correct answer used from (a)(i) or answer to (a)(i) contains sin60 but is otherwise correct.**
	Completion with at least one step	**A1**	No errors or omissions
9(b)(i)	7.54 or 7.544... , –9.54 or –9.544...	**2**	**B1** for each If 0 scored, **M1** for substitution in formula or sketch or $(x + 1)^2 – 73$ or better
9(b)(ii)	6.53 or 6.54 or 6.529 to 6.536...	**2**	**M1** for sin 60 = $\frac{[\ ]}{their\,7.54}$ oe
10(a)(i)	[y =] $\frac{1}{2}x + 1$	**3**	**M1** for gradient = $\frac{8-2}{14-2}$ oe **M1** for correct substitution of (2, 2) or (14, 8) into y = (*their m*)$x + c$ oe soi
10(a)(ii)	[y =] $–2x + 26$	**3**	**M1** for gradient = $\frac{-1}{their\ \frac{1}{2}}$ **M1**for substituting (11, 4) into y = (*their* – 2)$x + c$ oe soi
10(b)	Correct substitution and completion of (10, 6) for both lines oe	**2**	**B1** for either OR **M1** for correct elimination of x or y from equations **A1** for completion to solution (10, 6)
10(c)	(9, 8)	**1**	
10(d)	30 cao	**4**	**M3** for $\left[\frac{1}{2}\right]\times\sqrt{12^2+6^2}\ \times\ \sqrt{2^2+4^2}$ oe or **B2** for two of $\sqrt{12^2+6^2}$ oe (AC), $\sqrt{2^2+4^2}$ oe (BD or MC), $\sqrt{8^2+4^2}$ oe (AM), $\sqrt{2^2+1^2}$ oe (MD or MB) or **B1** for one of these. (M is the intersection of AC and BD) OR **M3** for full area e.g. [0.5 × 12 × 6 – 0.5 × 6 × 7] × 2 or **B2** for 2 correct areas evaluated or **B1** for 1 correct area evaluated

Question	Answer	Marks	Partial Marks
11(a)	12.9 or 12.86 to 12.87	**2**	**M1** for evidence of at least three mid-interval values 9.5, 11, 13, 15.5 soi by 95, 550, 845, 697.5 or 2187.5
11(b)	Correct Histogram	**4**	**B1** for correct bar widths no gaps **B3** for 4 correct heights and corresponding scale from 0 or **B2** for 3 correct heights and corresponding scale from 0 or **B1** for 2 correct heights and corresponding scale from 0 or **B1** for 3 correct frequency densities soi
11(c)(i)	$\frac{198}{2873}$ oe	**2**	**M1** for $\frac{45}{170} \times \frac{44}{169}$
11(c)(ii)	$\frac{100}{2873}$ oe	**3**	**M2** for $\frac{10}{170} \times \frac{50}{169} + \frac{50}{170} \times \frac{10}{169}$ oe or **M1** for $\frac{10}{170} \times \frac{50}{169}$
12(a)	11	**1**	
12(b)	6	**2**	**B1** for h(2) = 1 soi or $4(x^2 - 3) + 2$ or better
12(c)	–3	**2**	**M1** for $4x = -10 - 2$
12(d)	$h(x) \geqslant -3$	**1**	Allow $y \geqslant -3$
12(e)	$\frac{x-2}{4}$ oe final answer	**2**	**M1** for $y - 2 = 4x$ or $x = 4y + 2$ or $\frac{y}{4} = x + \frac{2}{4}$
12(f)	Stretch *x*-axis invariant [Scale factor] 2 OR Reflection $y = -2.70 + 6.75$ OR Rotation (2.5, 0) 167 (167.47) or 12.5 (12.53) clockwise	**3** **M1** **A2** **M1** **A1** **A1**	**B1** for each
12(g)	[$y =$] $x^2 - 4x + 1$	**3**	**M2** for $y = (x - 2)^2 - 3$ or **M1** for $x - 2$ seen in a quadratic If 0 scored, **SC1** for $y = x^2 + 4x + 1$