CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2013 series

0607 CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/42 Paper 4 (Extended), maximum raw mark 120

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.

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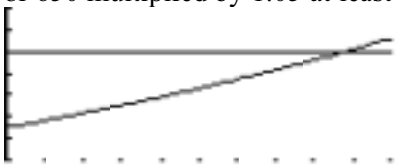
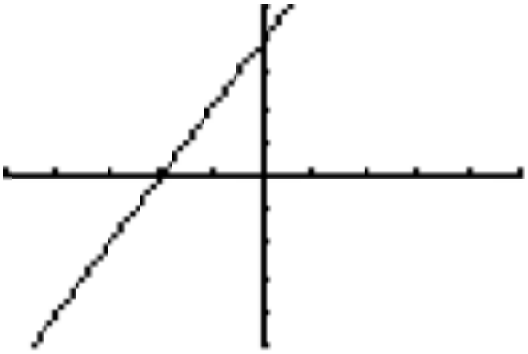
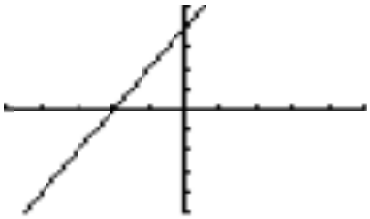
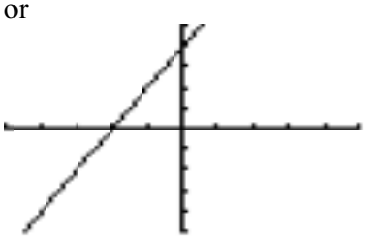
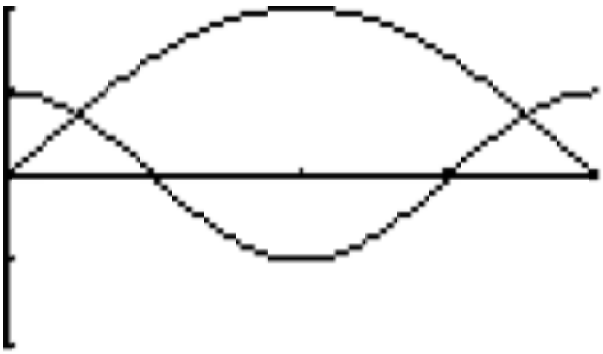
CAMBRIDGE
International Examinations

1 (a) (i)	27.2 (27.22…)	**1**	
(ii)	49 : 45 final answer	**2**	**SC1** for answer 45:49 or 1.09 (1.088 to 1.089) or **B1** for 180 seen (may be implied by their ratio answer) or 27.2 (27.22..) : 25 o.e.
(iii)	500	**3**	**M2** for 720 ÷ 1.44 o.e. or **M1** for 720 = 144% seen
(iv)	748.8[0] cao final answer	**2**	**M1** for 720 × 1.04 o.e. implied by 749. ÷ 12 does not spoil method
(b)	9 or 8.83 (8.829 to 8.830)	**3**	**SC2** for answer 8.85 **M2** for log (1000/650) ÷ log(1.05) Allow 1.54 for 1000/650 in methods. or **M1** for $650 \times 1.05^n = 1000$ or 650 multiplied by 1.05 at least twice correctly  **M2** for graphs that intersect as shown or **M1** for graph of $y = 1.05^x$
2 (a)	$2x(2x+1) = 3x(x+3)$ o.e.	**M2**	If **M0**, **B1** for $2x(2x+1)$ or $3x(x+3)$ Condone missing brackets if correct expansions follow
	7	**B2**	**B1** for $x^2 = 7x$ o.e. or $2(2x + 1) = 3(x + 3)$ o.e. or final answer 0, 7
(b)	$\frac{2y}{y+1} = \frac{1}{3}$	**M1**	
	$3 \times 2y = y + 1$ o.e. or better	**B1**	i.e correct equation without fractions leading to $y = \frac{1}{5}$
	$\frac{1}{5}$ o.e.	**B1**	

(c) (i)	$\frac{10}{w}$ soi $\frac{10}{w+9}$ soi $2\times10(w+9)-2\times10w=5w(w+9))$ o.e. or better or $\frac{90}{w(w+9)}=2\frac{1}{2}$ o.e. $w^2+9w-36=0$	**B1** **B1** **M1** **E1**	If not seen only implied by further working. e.g. $wx = 10$ is not sufficient. i.e. correct multiplication of an equation in the correct format allow $10(w + 9) – 10w = 2.5w(w + 9)$ o.e. also allow over common denominator i.e. correct collection of two terms Established with at least one more intermediate line with no errors or omissions
(ii)	3 h 20 min www	**4**	**B3** for $w = 3$ or for $w = 3$ or $– 12$ www **M2** for $(w+12)(w-3)$ or good sketch of quadratic showing zeros or quadratic formula or completing square reaching $\frac{-9\pm\sqrt{225}}{2}$ or **M1** for $(w+a)(w+b)$ with $ab = – 36$ or $a + b = 9$ or sketch of quadratic or correct substitutions in quadratic formula before simplifying or $(w+\frac{9}{2})^2-\frac{81}{4}=36$ o.e. Trial and improvement – allow **M2** for at least 3 trials for comparison of distances and times (unless correct answer found with 1 or 2 trials) **B1 FT** for $10 \div$ *their* positive root correctly into hours and minutes
3 (a)	$y=-x-1$ o.e. final answer	**2**	**B1** for $y=-x+c$ o.e. or $y=kx-1$ o.e. seen
(b) (i)	Ruled line through (– 2, 0) and (0, 4)	**2**	**B1** for ruled line through (0, 4) or gradient of 2
(ii)		**2FT**	**B1** for  or  or tiny part not shaded **FT** only if positive gradient and cuts x-axis **SC1** for correct area unshaded

	(c)	$y = 3x - 7$ o.e.	**3**	**B2** for $y = 3x + c$ o.e. or $y = kx - 7$ o.e. or **M1** for rise/run = $\frac{2--4}{3-1}$ o.e. and **M1** for correct method for finding c Answer $3x - 7$ implies **M1 M1**
4	**(a)**	125.7 or 126	**2**	**M1** if at least 2 mid-values seen (60, 125 and 195) or 2 from 1680, 5625, 5265 or sum of 12570
	(b)	Columns from 100 to 150 and 150 to 240 Heights 0.9 and 0.3	**1** **1,1**	Accept freehand
5	**(a)**	534.6… www 3	**3**	**M1** for $988^2 + 1060^2 - 2 \times 988 \times 1060 \cos 30$ **A1** for 285800 to 285802 or 286000
	(b)	$[\cos =] \frac{1185^2 + 998^2 - 535^2}{2 \times 1185 \times 998}$ 26.6 (26.62 to 26.65)	**M2** **A1**	Allow use of 534.6… for 535 **M1** for correct implicit statement **Strictly dependent on at least M1** **SC2** if correct without working
	(c)	353 (353.3 to353.4)	**1FT**	**FT** 380 – *their* (b) **only** if answer between 270 and 360.
6	**(a)**	720	**2**	**M1** for $0.5 \times 12 \times 6 \times 20$ o.e.
	(b) (i)	700 (700.2 to 700.4)	**4**	Allow $432 + 120\sqrt{5}$ as final answer for full marks **M1** for $[BC^2] = 12^2 + 6^2$ **M2** for $BC \times 20 + 12 \times 20 + 6 \times 20 + 2 \times$ area triangle ABC or **M1** if one of the five areas missing or is incorrect
	(ii)	3.5[0] (3.501 to 3.502)	**1FT**	**FT** *their* (i) × 0.005
	(c)	14.4 (14.42 to 14.43)	**3**	**M1** for $20^2 + 12^2$ (544) or $20^2 + 12^2 + 6^2$ (580) (Square roots 23.323…, 24.08…) **M1** for tan = $\frac{6}{\textit{their}\sqrt{20^2 + 12^2}}$ or sin = $\frac{6}{\textit{their}\sqrt{20^2 + 12^2 + 6^2}}$ or cos = $\frac{\textit{their}\sqrt{20^2 + 12^2}}{\textit{their}\sqrt{20^2 + 12^2 + 6^2}}$ o.e.

7 (a)	[0]6 30 o.e., [Feb] 9th	**3**	**B1** for [Feb] 9th. **B2** for [0]6 30 o.e. or **M1** for $27\frac{1}{2} + 13$ soi or **B1** for 17 30 or 03 00 seen
(b)	669 (669.0 to 669.1)	**1**	
(c) (i)	7524 cao final answer	**1**	
(ii)	0.41	**2FT**	**FT** *their* (d)(i) ÷ 18400 **B1FT** for 0.409 or 0.4089…i.e not 2 dp
8 (a)		**B2**	**B1** for poor quality sketch Sketch could be with different window. or a different function e.g. $y = \frac{2}{x} - x^3 - 2$ 
	– 1.49 (– 1.496 to – 1.494) 0.798 (0.7976…)	**B1** **B1**	
(b)	$x \leqslant -1.49$ or –1.496 to –1.494 $x > 0$ $x \leqslant 0.798$ or 0.7976…	**1FT** **1** **1FT**	Condone < for ⩽ etc **FT** *their* (a) if one negative root **FT** *their* (a) if one positive root **[14]**
9 (a)	9.18 (9.177…)	**3**	**M2** for $2 \times 8 \times \sin 35$ o.e. e.g. $\sqrt{8^2 + 8^2 - 2.8.8\cos 70}$ ($\sqrt{84.22....}$) or **M1** for $\frac{\frac{AB}{2}}{8} = \sin 35$ o.e. or above expression without square root
(b)	9.77 or 9.78 (9.773 to 9.775….)	**2**	**M1** for $\frac{70}{360} \times \pi \times 16$ o.e. Allow $\frac{28\pi}{9}$ o.e. as final answer but must be exact
(c)	9.02 to 9.03 www 4	**4**	**M3** for $\frac{70}{360} \times \pi \times 8 - 0.5 \times 8 \times 8 \sin 70$ o.e. or **M1** for $\frac{70}{360} \times \pi \times 8$ and **M1** for $0.5 \times 8 \times 8 \sin 70$ o.e. (39.09 to 39.10…) (30.1 or 30.07…..)

10 (a) (i)		**2**	**B1** for inaccurate sketch of cos$x$
(ii)		**2**	**B1** for inaccurate sketch of $2\sin(\frac{x}{2})$
(b)	$x = 180$	**1**	Condone π for 180
(c)	(180, – 1)	**1,1**	Condone π for 180
(d)	720 2	**1** **1**	Condone 4π for 720
(e) (i)	$0 \leqslant g(x) \leqslant 2$	**1**	Condone strict inequalities, allow x or y for g(x) and allow separate inequalities in parts (i) and (ii)
(ii)	$-2 \leqslant g(x) \leqslant 2$	**1**	
(f)	42.9 (42.94…), 317 (317.0 to 317.1)	**1,1**	
(g)	Correct area shaded.	**1**	
11 (a) (i)	$\frac{4}{6}$ o.e.	**1**	**For all parts accept decimals or percentages with the usual rules for 3 sf.** **Do not penalise incorrect cancelling or converting.** **Do not accept ratios or words.**
(ii)	$\frac{2}{6}$ o.e.	**1**	**SC1** for 0.33 if no fraction seen
(iii)	1 o.e.	**1**	
(b) (i)	$\frac{5}{6}$, $\frac{1}{6}$ and $\frac{5}{6}$, $\frac{1}{6}$ and $\frac{5}{6}$	**2**	**B1** for any one of the $\frac{5}{6}$ in a correct position
(ii)	$\frac{1}{36}$ cao	**2**	**M1** for $\textit{their}\,\frac{1}{6} \times \textit{their}\,\frac{1}{6}$ (0.0278 or $0.02\overline{7}$ or 0.02777 to 0.02778)

(iii)	$\frac{11}{36}$ cao	**2**	**M1** for $1 - their\frac{5}{6} \times their\frac{5}{6}$ (0.306 or $0.30\overline{5}$ or 0.3055 to 0.3056) or $\frac{1}{6} + \frac{1}{6} \times \frac{5}{6}$ or (ii) + 2 × $their\frac{1}{6} \times their\frac{5}{6}$ or $their\frac{1}{6} \times their\frac{1}{6}$ + 2 × $their\frac{1}{6} \times their\frac{5}{6}$
(c)	5	**2**	**SC1** for answer of 4 or $6^5 = 7776$ seen or $5^4 = 625$ seen or **M1** for attempted products of $\left(their\frac{5}{6}\right)^k \times their\frac{1}{6}$, $k > 1$
12 (a)	18.75 (18.7 or 18.8) 18.5 23.5 13	**1** **1** **1** **1**	
(b) (i)	$r = -4.31t + 120$	**2**	– 4.313…., 120.0…. **B1** for $r = -4.31t + c$ or $r = kt + 120$ Allow x for t
(ii)	Negative	**1**	
(iii)	25 (25.1 to 25.4)	**1FT**	**FT** their equation only if linear
13 (a)	$\frac{2}{3}\mathbf{p} + \frac{1}{3}\mathbf{q}$ o.e.	**2**	**M1** for correct route from O to X or $\overrightarrow{PQ} = \mathbf{q} - \mathbf{p}$ o.e. or correct unsimplified answer
(b)	$-\frac{2}{3}\mathbf{p} + \frac{5}{3}\mathbf{q}$ o.e.	**3**	**B2** for $k\mathbf{p} + \frac{5}{3}\mathbf{q}$ or $-\frac{2}{3}\mathbf{p} + k\mathbf{q}$, $k \neq 0$ or correct unsimplified expression or **M1** for correct route from X to Y or $-\frac{2}{3}\mathbf{p} + m\mathbf{q} + n\mathbf{q}$, $m \neq 0, n \neq 0$
(c)	± 4	**1,1**	If 0 scored , **M1** for $3^2 + k^2 = 5^2$ o.e.