UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2010 question paper for the guidance of teachers

0607 CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/04 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.

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1	**(a)**	5h 21 min seen 5.35 h seen 340 ÷ 5.35 seen 63.551… or $63\frac{59}{107}$	M1 M1 M1 B1 [4]	Subtracting times (321 Converting minutes part to hours (may b later) (340 ÷ 321 M1) 340 ÷ their time (× 60 M1)
	(b) **(i)**	54.0 (54.01 – 54.02)	B2 [2]	If B0, M1 for 0.85 × 63.55 oe
	(ii)	19 18 ft	B3 **ft** [3]	ft 340 ÷ their **(i)** changed to hours and minutes added to 13 00 If B0, M1 for 340 ÷ their **(i)** (6.29…) or 5.35 ÷ 0.85 or 321 ÷ 0.85 ÷ 60 M1 (dep) for changing decimal part to minutes **[9]**
2	**(a)** **(i)**	93 312	B1 [1]	Accept 93 300 or 93 310
	(ii)	9.3312×10^4 ft	B1 **ft** [1]	ft their **(i)** B1 for 9.331, 9.33 or 9.3 all $\times 10^4$
	(b)	9.69(0) to 9.691×10^{-3}	B2 [2]	B1 for 0.00969(0) to 0.009691 implied by 9.69^{-03} SC1 for 9.7×10^{-3} or 9.69×10^3
	(c)	4.57 or 4.573….	B1 [1]	
	(d)	4.72 or 4.722 to 4.723	B2 [2]	If B0, M1 for log2000 ÷ log5 or graph clearly sketched showing intersection **[7]**
3	**(a)**	Sketch of U-shaped parabola intersecting x-axis twice or full correct use of formula with $a = 1$, $b = 2$ and $c = -4$ $\left(\frac{-2 \pm \sqrt{20}}{2}\right)$ or correct use of completing the square –3.24, 1.24	M1 A1 A1 [3]	If M1 A0, SC1 for –3.2 or – 3.236… **and** 1.2 or 1.236… If M0, SC2 for – 3.24 **and** 1.24 or SC1 for –3.2 or – 3.236… **and** 1.2 or 1.236…
	(b)	$-3.24 \leq x \leq 1.24$ ft	B1 **ft** B1 **ft** [2]	ft only if two solutions to part **(a)** Condone < used and allow in words, if clear **[5]**
4	**(a)**	Line joining 5 on each axis approx Horizontal line roughly through 1 Line through origin at more than 45° to x-axis	B1 B1 B1 [3]	All may be freehand
	(b)	R in correct region oe	B1dep [1]	dep on B3 **[4]**

5	**(a)**	5 2 3 2.875 (allow 2.87, 2.88 or 2.9) 4	B1 B1 B1 B1 B1 [5]		
	(b)	2	B2 [2]		If B0, M1 for attempting to find a fraction with denominator 72
	(c) **(i)**	$\frac{1}{8}$ cao	B2 [2]		If B0, B1 for $\frac{9}{72}$ o.e.
	(ii)	45 ft	B1**ft** [1]		ft their **(i)** if answer is integer accept $\frac{45}{360}$ **[10]**
6	**(a)**	1.15	B3 [3]		If B0, M1 for $20t + 8(3t - 1)$ and M1 (dep) for this equal to 42.6
	(b) **(i)**	$\frac{15}{y} + \frac{9}{y+2} = 8$	M2		Allow M1 for l.h.s.
		$15(y+2) + 9y = 8y(y+2)$ or $15y + 30 + 9y = 8y^2 + 16y$	M1		Could still be all over $y(y+2)$ and not expanded or partly or fully expanded
		$8y^2 - 8y - 30 = 0$ $\therefore 4y^2 - 4y - 15 = 0$	E1 [4]		Correctly established. Need to see 1 correct line and final answer
	(ii)	$(2y - 5)(2y + 3)$	B2 [2]		Allow SC1 for any other $(2y \pm 5)(2y \pm 3)$
	(iii)	2.5(0) ft	B1**ft** [1]		ft a positive root from **(ii)** if the only one from two possible roots. **[10]**
7	**(a)**	Real numbers oe	B1 [1]		
	(b)	3, 90	B1 B1 [2]		Allow either way round
	(c) **(i)**	Stretch Factor 2 x-axis invariant	B1 B1 B1 [3]		Independent
	(ii)	Translation $\begin{pmatrix} -60 \\ 0 \end{pmatrix}$	B1 B1 [2]		**Must** be translation Independent – Allow description in words **[8]**
8	**(a)** **(i)**	Triangle at (–4, 4), (–1, 4), (–1, 5)	B2 [2]		If B0, SC1 for any translation
	(ii)	Triangle at (–1, –2), (–1, –5), (–2, –5)	B2 [2]		If B0, SC1 if two vertices correct
	(b)	Enlargement , (factor) 2, (centre) (4, 0)	B1 B1 B1 [3]		Each B is independent
	(c)	Translation $\begin{pmatrix} 6 \\ -3 \end{pmatrix}$	B1 B1 [2]		B's independent **Must** be translation but allow description in words **[9]**

9	**(a)**	2, 3, 5, 7, 11, 13, 17, 19	B1 [1]	
	(b)	All 8 points correctly placed	B3 [3]	B2 for 7 correct and B1 for 6 correct isw extras
	(c)	3, 11, 17, 19 ft	B1 **ft** [1]	ft their Venn diagram
	(d)	3 ft	B1 **ft** [1]	ft their Venn diagram
	(e)	*B* only shaded (i.e. parts in *A* and *C* not shaded)	B1 [1]	**[7]**
10	**(a)** **(i)**	One pair of angles equal with reason Second pair of angles equal with reason Angles of triangles equal	R1 R1 R1 [3]	Reasons can only be angles in same segment oe and vertically opposite oe, the second only used once Accept anything suggesting angles same Each R is independent
	(ii)	18	B2 [2]	If B0, M1 for 2^2 or 0.5^2 seen
	(b) **(i)**	50	B1 [1]	
	(ii)	98	B2 [2]	If B0, M1 for 180 – (32 + their **(i)**) or for angle QPR = 32 seen or for angle PQY = 58 seen (may be on diagram)
	(iii)	5.14 (2…)	B2 [2]	If B0, M1 for cos50 = $RY \div 8$ oe
	(iv)	4	B1 [1]	**[11]**
11	**(a)**	3 points correct 2mm accuracy	P2 [2]	P1 for 2 correct
	(b)	Negative	B1 [1]	Allow description e.g. cold goes down as hot goes up
	(c) **(i)**	$y = -0.565x + 58.5$	B1 B1 [2]	Must be in form $mx + c$, allow –0.57 or –0.5652 to –0.5651 for m and 58 or 58.48…. for c
	(ii)	30 or 31 cao	B2 [2]	Must be integer If B0, M1 for using their linear regression equation with $x = 50$ **[7]**
12	**(a)**	0.8333	B3 [3]	SC2 for $\frac{5}{6}$, 0.83, 0.833, 0.8333…. isw if angle given If B0 and SC0, M1 for $\frac{\sin C}{10} = \frac{\sin 30}{6}$ oe (can be implicit)
	(b) **(i)**	Two accurate points marked C_1 and C_2	B1 B1 [2]	2 mm accuracy
	(ii)	56.4, 123.6	B1 B1 [2]	
	(iii)	67.2 ft	B1**ft** [1]	ft the difference between their answers in **(ii)** **[8]**

13	**(a)**	982 (981.7 – 981.9)	B2 [2]	If B0, M1 for $0.5 \times \pi \times 25^2$
	(b)	295 000 (294 500 – 294 600) ft	B2 **ft** [2]	ft their **(a)** × 300 If B0, M1 for their **(a)** × 300
	(c) **(i)**	106.3 (106.2 – 106.3)	B3 [3]	Allow 106 If B0, M1 for cos = $\frac{15}{25}$ oe then M1 dep for × 2
	(ii)	299.9 to 300.4 ft	B2 **ft** [2]	ft their **(i)** If B0, M1 for $0.5 \times 25^2 \times \sin(\text{their}\mathbf{(i)})$ or for $0.5 \times 2 \times 20 \times 15$ oe
	(iii)	577.8 to 580 ft	B2 **ft** [2]	ft their **(i)** If B0, M1 for their **(i)** ÷ $360 \times \pi \times 25^2$
	(iv)	277 – 280.1 ft	B1**ft** [1]	ft their **(iii)** – their **(ii)**
	(v)	83.1 to 84.03 ft	B2 **ft** [2]	ft their **(ii)** × 0.3 oe If B0, M1 for their **(ii)** × 0.3 oe **[14]**
14	**(a)**	One curve reasonable shape, roughly approaching $y = 1$ both ends One max in negative x region One minimum just to right of y-axis or on it	B1 B1 B1 [3]	
	(b)	(–5.19, 1.24) (–5.193 to –5.192, 1.238 to 1.239)	B2 [2]	Allow –5.2 and 1.2
	(c)	0.161 to 1.24 (0.1614 to 0.1615 and 1.238 to 1.239)	B3 [3]	Allow 0.16 and 1.24 If B0, B1 for top value their y-coord of **(b)** and M1 (indep) for evidence of finding minimum point
	(d)	$y = 1$	B1 [1]	
	(e)	–1.62(4…)	B2 [2]	If B0, M1 for line with $c = 1$ and positive gradient added to sketch (may be freehand) **[11]**