UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2011 question paper

for the guidance of teachers

0607 CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/04 Paper 4 (Extended), maximum raw mark 120

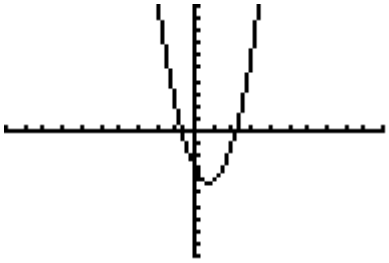
This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

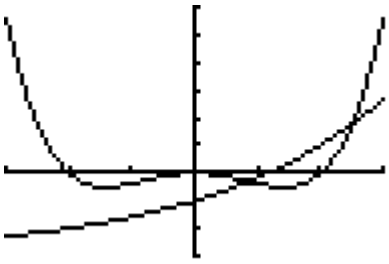
Mark schemes must be read in conjunction with the question papers and the report on the examination.

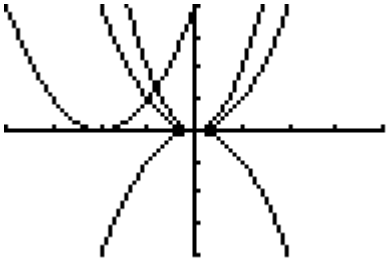
- Cambridge will not enter into discussions or correspondence in connection with these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2011 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

1 (a) (i)	12 22	**1**	
(ii)	1.95 oe	**1**	
(iii)	574 (574.3 to 574.4)	**2 FT**	**M1** for 1120 ÷ *their* **(a)(ii)** FT *their* **(a)(ii)**
(b)	7 h 30 min	**3 FT**	**M1** for dividing *their* **(a)(ii)** by 0.26 oe in minutes by 0.26 **M1** (dependent) on correct conversion of *their* time, if seen, into hours and minute, but number of minutes remaining not zero FT *their* **(a)(ii)** but could recover and be a correct time.
2 (a)	*CBX* oe	**1**	Allow *CBA* and *B*
(b)	10.5	**2**	**M1** for $\frac{XC}{6} = \frac{7}{4}$ oe (*XC* can be a denominator)
(c)	10.7 (10.67 – 10.68)	**2**	**M1** for $\left(\frac{4}{7}\right)^2$ or $\left(\frac{7}{4}\right)^2$ oe seen
3 (a)	65.73	**4**	**M2** for 480×1.026^5 oe **M1** for 480×1.026^n oe $n > 1$ **M1** for *their* amount – 480 (dependent on at least **M1** already) Allow **B4** also for 65.7 or 65.73…. Allow 66 but only if 546 seen for amount
(b)	$480 \times 1.026^x = 800$ oe	**M1**	May be implied by next **M**
	Any correct way of solving this e.g. $x = \frac{\log(800/480)}{\log 1.026}$	**M1**	(19.90… implies **M2** but with working). Allow clear and organised trial and improvement for **M**'s
	or graph sketched 20	**A1**	www 3 but **only allow SC2** for correct answer **without any working**

4	**(a)**	8.95 (8.951 to 8.952) www 3	**3**	**M2** for $(BC =)\frac{12\sin 48}{\sin 95}$ oe i.e. explicit (**M1** for $\frac{\sin 48}{BC} = \frac{\sin 95}{12}$ oe i.e. implicit)
	(b)	$(\cos D) = \frac{11^2 + 7^2 - 12^2}{2.11.7}$ 80.3 (80.28…) www 3	**M2** **A1**	**M1** for correct full implicit statement (12^2 = …..)
5	**(a)**	 – 0.69, 2.19	**M1** **A1** **A1**	for any complete method e.g. correct curve(s) which lead to 2 correct answers e.g. full explicit formula with values substituted If **A0**, with or without working, **SC1** for – 0.7 or – 0.686 or – 0.6861… **and** 2.2 or 2.186 or 2.1861. Without working – **maximum score of SC2** for both answers correct **SC1** for one correct
	(b)	30	**3**	**SC2** for – 30 If **B0**, **SC0**, **M1** for substituting $2x - 3$ for x in f(x) **B1** for $4x^2 - 6x - 6x + 9$ oe soi
6	**(a)**	$\frac{260}{360} \times \pi \times 4.7^2$ Angle at centre for triangle = 100° 0.5 × 4.7 × 4.7 × sin (their 100°) 61(.0) (60.97 to 61.00..)	**M2** **B1** **M1** **A1**	**M1** for a fraction $\times \pi \times 4.7^2$ (50.12) Could be on diagram Only allow if use acute/obtuse angle i.e. this area is + ve (10.87..)
	(b)	146 000 (146 300 to 146 500)	**2 FT**	FT *their* **(a)** × 2400 **M1** for *their* **(a)** × figs 24 (implied by figs 146…)
	(c)	220 000	**3 FT**	FT *their* **(b)** × 1.53 **M1 (b)** × figs 1530 (implied by figs 224 or 2238.. or 2239.. or 2240..) A1 **B1** (independent) for correct 2sf rounding from *their* answer, seen with more than 2 figures

7	**(a)**	150, 100	**2**	
	(b)	70.9 (70.86 to 70.87)	**2 FT**	**M1** for mid-values seen, at least 2 correct FT *their* table in **(a)**
8	**(a) (i)** and **(b) (i)**		**2**	**Only penalise rounding not to 4 sf once, but must be at least 2 sf.** **B1** for correct curve but poor quality, ignoring axes
	(ii)	(– 1, 0), (0, 0), (1, 0)	**2**	**B1** for 2 correct
	(iii)	$x = 0$	**1**	
	(iv)	(– 0.7071, – 0.25), (0.7071, – 0.25),	**2**	
	(v)	(f(x)) $\geq$ – 0.25	**1 FT**	FT *their* min point, if both y's the same. Condone $x \geq -0.25$. Also condone strict inequality
	(b) (i)	Correct sketch	**2**	**B1** for correct curve but poor quality, ignoring axes
	(ii)	0.6781	**1**	
	(c) (i)	0.4988, 1.221	**2**	
	(ii)	$0.4988 < x < 1.221$	**1 FT**	Condone $\leq$ or in words FT *their* **(i)**
9	**(a)**	548	**2**	**M1** for 2 (12 × 10 + 12 × 7 + 10 × 7)
	(b)	35(.0) (34.98 to 34.99..)	**2**	**M1** for tan = 7/10 oe
	(c)	17.1 (17.11 to 17.12)	**3**	**M2** for $\sqrt{12^2 + 10^2 + 7^2}$ oe or **M1** for Pythag oe in one face

10 (a) (i)	96	**1**	
(ii)	154	**2**	**M1** for using angles of pentagon total 540°
(b)	61	**2**	**SC1** for angle $DBC = 35$ (may be on diagram)
(c) (i)	parallelogram	**1**	
(ii)	84	**1**	
(d) (i)	26	**1**	
(ii)	For example, angle $DXB \neq$ angle DYB	**1**	Reasonable evidence of contradiction of a circle property
11 (a)		**4**	Ignore values on axes since sketches are asked for Penalty of one if 2 or more labels omitted
(b) (i)	Translation $\begin{pmatrix} -2 \\ 0 \end{pmatrix}$ oe	**2**	No other words allowed Allow worded description in place of vector
(ii)	Stretch x-axis invariant oe factor 2 oe	**3**	Allow y-axis inv with factor $1/\sqrt{2}$ **factor B1 dependent on inv line B1**
(iii)	Reflection, x-axis oe	**2**	Allow rotation then **B1** for (0, 0) and **B1** for 180° or Enlargement then **B1** for (0, 0) and **B1** for (factor) – 1

12 (a)	Tree diagram drawn one pair branches followed by two pairs of branches Indication of raining and bike rides 0.15 and 0.85, 0.3 and 0.7, and 0.9 and 0.1 correctly placed	**B1** **B3**	**B1** each pair in correct place
(b) (i)	0.765 oe ft	**2 FT**	**M1** for *their* 0.85 × 0.9 ft *their* diagram if labelled
(ii)	0.81 oe cao	**2**	**M1** for **(i)** + 0.15 × 0.3 or correct re-start
(c)	12 ft	**1 FT**	FT *their* **(b)(ii)** × 15. Allow 12.15 or 12.1 or 12.2
13 (a)	$y = 3$ oe	**1**	
(b)	$x + y = 4$ oe	**2**	**M1** for gradient of – 1 or equation of line with gradient of – 1
(c)	$y = 2x - 4$ oe	**2**	Must be full equation then **B1** for 2x and **B1** for – 4
(d)	$\left(2\frac{2}{3}, 1\frac{1}{3}\right)$	**2**	Allow correct values of x and y if not in co-ordinate form Allow 2.6 rec or 2.66 to 2.67, 1.3 rec or 1.33…. **SC1** for 2.6 **and** 1.3 or 2.7 **and** 1.3
(e)	$y \leq 3 \quad x + y \geq 4 \quad y \leq 2x - 4$	**2 FT**	**SC1** for 2 correct FT *their* lines if reasonable. Condone strict inequalities.
14 (a)	(10, 11), (20, 20), (17, 15), (9, 8) plotted	**2**	**P1** for 3 correct
(b)	Positive	**1**	
(c) (i)	13.2	**1**	
(ii)	0.879x + 1.07	**2**	Allow 0.8792 to 0.8793 and 1.065 to 1.066 **SC1** for 0.88x + 1.1
(iii)	Ruled line through (13.8, 13.2) or (20, 18.65 to 18.7) and (0, 0.5 to 1.5)	**2**	Must be ruled with positive gradient then **B1** through each point. Point on y-axis need not be indicated but other one must be
(iv)	17 cao	**1**	Integer answer only

15 (a) (i)	$\frac{360}{n}$	**1**	
(ii)	$\frac{360}{n+3}$	**1**	
(b)	$\frac{360}{n} - \frac{360}{n+3} = 4$ oe	**B1 FT**	ft *their* **(i)** – *their* **(ii)**
		B1	lhs = $\frac{360(n+3)-360n}{n(n+3)}$ oe implied by next line
		M1	$360(n + 3) – 360n = 4n(n+3)$ (could still be all over $n(n+3)$) and, if first **A1** line not seen, give **A2**
		A1	$4n^2 + 12n – 1080 = 0$ or better
	15 cao www 5	**A1**	e.g. $(n + 18)(n – 15) = 0$
			Use of GDC – allow **B2** for a correct graph or two correct graphs **M1** (dependent) for finding zeros or x-coordinates of points of intersection then **A1** for 15 **Correct but no working SC2**
			Only FT case as follows: $\frac{360}{n+3} - \frac{360}{n} = 4$ which is **B0** but then
		B1	lhs = $\frac{360n-360(n+3)}{n(n+3)}$ oe implied by next line
		M1	$360n – 360(n+3) = 4n(n+3)$ (could still be all over $n(n + 3)$) and, if first **A1** line not seen, give **A2**
		A1	$4n^2 + 12n + 1080 = 0$ then **A0**