MARK SCHEME for the May/June 2011 question paper

for the guidance of teachers

0607 CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/22 Paper 2 (Extended), maximum raw mark 40

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.

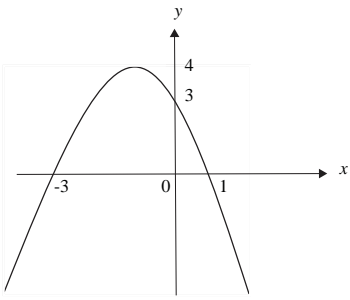Mark schemes must be read in conjunction with the question papers and the report on the examination.

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1	(a)	9	B1	
	(b)	$3c^2$	B2	B1 for $3c^k$ or kc^2
				[3]
2	(a)	81	B1	Ignore extra terms
	(b)	3^{n-1} oe	B2	If B0 award SC1 for any power of 3 in terms of n E.g. 3^n or 3^{n+1}
				[3]
3		15	B2	If B0 award M1 for $360 \div 24$ soi or $\dfrac{(n-2) \times 180}{n} = 156$ oe seen
				[2]
4	(a)	1, 2, 3, 4, 6, 12	B1	
	(b)	3	B1ft	Strict ft from **(a)**.
				[2]
5	(a)	3	B1	
	(b)	For correct use of $n\log a = \log a^n$ For correct use of $\log a + \log b = \log ab$ or $\log a - \log b = \log \dfrac{a}{b}$	M1 M1	E.g. $\log 2^3$, $\log 8$, $\log 5^2$, $\log 25$ Using their figures
		$\log 50$ www3	A1	**[4]**
6		$\dfrac{3a}{(a-3)(a+3)} \times \dfrac{(a-3)}{a}$	M1M1	M1 for correct factorizing of $a^2 - 9$, M1 for inverting second fraction (with x)
		$\dfrac{3}{a+3}$ final answer www3	A1	**[3]**
7	(a)	$\begin{pmatrix} 3 \\ -4 \end{pmatrix}$	B2	Award B1 for each correct number
	(b)	5	B2ft	Not ±5 If B0 award M1 for their 3^2 + their $(\pm4)^2$ Ignore absence of brackets. Final answer of ±5 or 25 implies M1.
				[4]
8	(a)	$12\sqrt{2}$	B2	If B0 award B1 for $4\sqrt{2}$ seen
	(b)	$\dfrac{9\sqrt{2}+6}{7}$ or $\dfrac{3(3\sqrt{2}+2)}{7}$	B2	If B0 award M1 for intention of multiplying numerator and denominator by $3 + \sqrt{2}$
				[4]

9	$a = 1$, $b = 2$, $d = 8$ or positive multiples of the above. E.g. $a = 2$, $b = 4$, $d = 16$	B3	After B0, award wwwSC2 for a, b, d such that a:b:d = 1:2:8. E.g. $a = \frac{1}{2}$, $b = 1$, $d = 4$ or $a = -1$, $b = -2$, $d = -8$. After SC0, award M1 for $a : b = 1 : 2$, **OR** M1 for gradient = $\frac{-1}{2}$, (implied by $y = \frac{d}{b} - \frac{1}{2}x$ oe or $y = -\frac{1}{2}x + c$ oe (condone $c = d$) or $a = \pm\frac{1}{2}$) **OR** M1 for substitution of (2, 3) in their equation form E.g. $2a + 3b = d$, (oe) or $3 = -\frac{1}{2}x2 + c$, (oe) **[3]**
10 (a)	$2m + 3p$	B1	
(b)	$m = 2$, $p = 3$	B4	B1 for $6m + 2p = 18$ seen M1ft for correct method to eliminate one letter. Allow one numerical slip. A1, A1 www for answers **[5]**
11	$\dfrac{-\sqrt{3}}{2}$	B2	If B0 scored, award B1 for ($x =$) 150, or SC1 for $\dfrac{\sqrt{3}}{2}$ or 0.866 **[2]**
12 (a)	Sketch	P2	For P marks condone absence of numbers only if axes are sectioned. P1 for x and y intercepts given P1 for smooth curve with maximum at $y = 4$. (Curve must go below $y = 0$ and be the correct shape) If P0, P0 scored then award SC1 for correct shape correctly positioned.

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(b)	$a = -1$	B1	If B0, B0, award M1 for two of $9a - 3b + 3 = 0$ oe,
	$b = -2$	B1	$a + b + 3 = 0$ oe or $4 = a - b + 3$ and correct method to eliminate a or b. (Allow one numerical slip.) OR M1 for complete correct alternative method to evaluate a or b. (Allow one numerical slip.) E.g. $y = a(x - p)(x - q)$ $\quad\ y = a(x - -3)(x - 1)$ $\quad\ 3 = ax3x - 1$ $\quad\ a = -1$
(c)	f(x) ≤ 4		Accept $y \le 4$ Not $x \le 4$ or $y < 4$
			[5]