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

0580 MATHEMATICS

0580/21 Paper 2 (Extended), maximum raw mark 70

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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Abbreviations

cao correct answer only
cso correct solution only
dep dependent
ft follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
www without wrong working

Qu.	Answers	Mark	Part Marks
1	7.5(0) cao	**2**	**M1** for $\frac{258.75}{4.6}$
2	5.92×10^8	**2**	**M1** figs 592 on answer line or **M1** 296×10^6 oe in working
3	cos38 sin38 sin158 cos158	**2**	**M1** correct decimals seen 0.3(74..) –0.9(271..) 0.7(88..) 0.6(15..)
4	Answer given	**3**	**M1** $\frac{19}{15}$ **M1** $\frac{6}{15}$ or $\times \frac{15}{6}$ seen **E1** $= \frac{19}{6} = 3\frac{1}{6}$
5	**(a)** 7853 to 7855 or 7850 or 7860 www **(b)** 0.7853 to 0.7855 or 0.785 or 0.786	**2** **1ft**	**M1** for $\pi \times 50^2$ Their **(a)** ÷ 10 000 evaluated
6	135 cao	**3**	**M1** for 720 or (6 – 2) × 180 oe seen in working and **M1** for equation $180 + 4x =$ their 720 or **M1** for (360 – 180) ÷ 4 (= 45) oe seen in working and **M1** dep for 180 – their 45
7	**(a)** (y =) 80 **(b)** (z =) 40 **(c)** (t =) 10	**1** **1** **1ft**	 Follow through 90 – their y or 50 – their z
8	2.81(25)	**3**	**M1** $V = k/\sqrt{d}$ or **M1** $V = \sqrt{(k/d)}$ **A1** $k = 4.5$ **A1** $k = 20.25$
9	**(a)** Correct perpendicular bisector with arcs **(b)** 60°	**2** **1**	**B1** correct line **B1** correct construction arcs
10	0.38 or $\frac{19}{50}$	**4**	**B1** 0.8, 0.6 or 0.55 then **M1** 0.45 × their 0.6 **M1** 0.2 × their 0.55 **or M2** 1 – (0.45 × 0.4 + 0.55 × their 0.8)

11	**(a)** $\begin{pmatrix} 8 & 5 \\ 20 & 13 \end{pmatrix}$	**2**	**B1** two or three entries correct
	(b) $\begin{pmatrix} 1\frac{1}{2} & -\frac{1}{2} \\ -2 & 1 \end{pmatrix}$ oe	**2**	**B1** $\frac{1}{2}\begin{pmatrix} a & c \\ b & d \end{pmatrix}$ **B1** $(k)\begin{pmatrix} 3 & -1 \\ -4 & 2 \end{pmatrix}$
12	**(a)** Negative	**1**	Ignore embellishments
	(b) Correct point	**1**	
	(c) **(i)** Accurate ruled line	**1**	
	(ii) English mark	**1ft**	Follow through their **(c)(i)**
13	**(a)** $\frac{1}{2}$**a** + $\frac{1}{2}$**b** oe	**2**	**M1** unsimplified or any correct route e.g **a** + $\frac{1}{2}$ **(b – a)** or **OA + AC**
	(b) $-1\frac{1}{2}$**a** + $1\frac{1}{2}$**b** oe	**2**	**M1** unsimplified or any correct route e.g. **CD** = $1\frac{1}{2}$**AB** or **b** – **a** + $\frac{1}{2}$ **(b** – **a)**
14	**(a)** 2.84	**2**	**M1** correct substitution of g and l seen
	(b) $\frac{4\pi^2 l}{T^2}$ oe	**3**	**M1** each correct move but third move marked on answer line
15	**(a)** 156	**4**	**M1** intention to find area under graph **B2** completely correct area statement or **B1** two areas found correctly (or one trapezium area)
	(b) 12	**1ft**	Their **(a)**/13
16	**(a)** 3.61	**3**	**M1** $(3-1)^2 + (0-3)^2$ oe **M1** $\sqrt{2^2+3^2}$
	(b) $y = \frac{1}{2}x + 2\frac{1}{2}$ oe	**3**	**B2** $y = \frac{1}{2}x + k$ or $y = kx + 2\frac{1}{2}$ or **B1** $kx + 2\frac{1}{2}$ or $\frac{1}{2}x + k$ If 0 scored **B1** $m = \frac{1}{2}$ **B1** $c = 2\frac{1}{2}$ clearly identified in working

17	**(a)** $\frac{1}{2}$	**2**	**B1** f(–2) seen
	(b) $\sqrt[3]{(x-1)}$ or $\sqrt[3]{x-1}$	**2**	**M1** $x - 1 = y^3$ or $\sqrt[3]{(y-1)}$
	(c) 1 2	**3**	**M2** $(x-1)(x-2) = 0$ or **M1** $(x+a)(x+b) = 0$ where $ab = 2$ or $a + b = -3$ If 0 scored give **M1** for $x^2 - 3x + 2 = 0$
18	**(a)** 4324 cao	**2**	**M1** $\frac{1}{6} \times 23 \times 24 \times 47$ or better
	(b) **(i)** 4, 9	**2**	**B1** either correct
	(ii) $(n+1)^2$ or $n^2 + 2n + 1$	**1**	
	(c) $\frac{2}{3}n(n+1)(2n+1)$ oe	**2**	**M1** recognising $V_n = 4T_n$