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

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 $\dfrac{258.75}{4.6}$
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** $\dfrac{19}{15}$ **M1** $\dfrac{6}{15}$ or $\times \dfrac{15}{6}$ seen **E1** $= \dfrac{19}{6} = 3\dfrac{1}{6}$
5	**(a)** 7853 to 7855 or 7850 or 7860 www	2	**M1** for $\pi \times 50^2$
	(b) 0.7853 to 0.7855 or 0.785 or 0.786	1ft	Their **(a)** ÷ 10 000 evaluated
6	135 cao	3	**M1** for 720 or $(6-2) \times 180$ oe seen in working and **M1** for equation $180 + 4x =$ their 720 or **M1** for $(360-180) \div 4 \ (=45)$ oe seen in working and **M1** dep for $180 -$ their 45
7	**(a)** $(y=)$ 80	1	
	(b) $(z=)$ 40	1	
	(c) $(t=)$ 10	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	2	**B1** correct line **B1** correct construction arcs
	(b) 60°	1	
10	0.38 or $\dfrac{19}{50}$	4	**B1** 0.8, 0.6 or 0.55 then **M1** $0.45 \times$ their 0.6 **M1** $0.2 \times$ their 0.55 or **M2** $1 - (0.45 \times 0.4 + 0.55 \times$ 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)	$\frac{1}{2}\mathbf{a} + \frac{1}{2}\mathbf{b}$ oe	2	**M1** unsimplified or any correct route e.g $\mathbf{a} + \frac{1}{2}(\mathbf{b} - \mathbf{a})$ or $\mathbf{OA} + \mathbf{AC}$
	(b)	$-1\frac{1}{2}\mathbf{a} + 1\frac{1}{2}\mathbf{b}$ oe	2	**M1** unsimplified or any correct route e.g. $\mathbf{CD} = 1\frac{1}{2}\mathbf{AB}$ or $\mathbf{b} - \mathbf{a} + \frac{1}{2}(\mathbf{b} - \mathbf{a})$
14	(a)	2.84	2	**M1** correct substitution of g and l seen
	(b)	$\dfrac{4\pi^2 l}{T^2}$ 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)	$^3\sqrt{(x-1)}$ or $\sqrt[3]{x-1}$	2	**M1** $x - 1 = y^3$ or $^3\sqrt{(y-1)}$
	(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 $V_n = 4T_n$

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