MARK SCHEME for the May/June 2012 question paper

for the guidance of teachers

0580 MATHEMATICS

0580/23   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.

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

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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
soi	seen or implied

Qu		Answers	Mark	Part marks
1		95	2	**B1** for 85 seen or **M1** $x = 180$ – their angle ADC, if it is clearly seen
2		120	2	**M1** for $\dfrac{750 \times 2 \times 8}{100}$ oe seen or **SC1** 870 as final answer
3	**(a)**	3.26077…	1	seen
	(b)	3.261	1ft	their (a) to 4 significant figures
4		$y \varnothing -1.25$	2	**M1** inequality with y's and constants correctly collected
5		33 **cao www**	2	**M1** any two of 5.5, 9.5, 12.5 seen
6		31.7	2	**M1** $0.5 \times 9 \times 15 \times \sin 28$
7		$u = 24(.0)$, $v = 0.6$	2	**B1** each
8		7 cao	3	**B1** for 39.5(0) or 31.5(0) or 42 **M1** for (their 39.5 – 8) ÷ 4.5 or (their 42 – 10.5) ÷ 4.5
9		$\dfrac{a(2-t)}{3}$ cao oe	3	**M1** correct re-arrangement to isolate the term in w **M1** correct multiplication by a **M1** correct division by their 3 An incorrect answer scores a maximum of **M2**
10		10	3	**M1** $T = k\sqrt{l}$ **A1** for $k = 2$
11		17.05 **cao www**	4	**M1** for $280 \times (1 + \dfrac{3}{100})^2$ oe **M1** subtracting 280 from $280(1 + \dfrac{k}{100})^2$ any k **A1** for 17.052 or **SC2** 297.05 on answer line

12	(a)	$\dfrac{11}{12} - \dfrac{4}{12}$ oe	2	**M1** correct use of a common denominator
		$\dfrac{7}{12}$ **cao ww 0**		**A1**
	(b)	$\dfrac{1}{4} \times \dfrac{13}{11}$ oe	2	**M1** inversion and operation change
		$\dfrac{13}{44}$ **cao ww 0**		**A1**
13	(a)	71	2	**M1** for 7×8 – 3×–5 or **B1** 56 and –15
	(b)	$3v\,(u + 3w)$ final answer	2	**B1** for $3(uv + 3vw)$ or $v\,(3u + 9w)$ As final answer
14	(a)	$64p^3q^6$	2	**B1** $64p^{u}q^{v}$ or kp^3q^6
	(b)	$0.5x^{-2}$ or $\dfrac{1}{2x^2}$ oe	2	**B1** $\dfrac{1}{2x^{u}}$ oe or $\dfrac{1}{kx^2}$ oe
15		–3.44, 0.44 correct working must be shown	4	**B1** for $\sqrt{(6)^2 - 4(2)(-3)}$ or better seen **B1** if in form $\dfrac{p + (or -)q}{r}$, for $p = -6$ **and** $r = 2\times2$ oe **B1, B1** (**SC1** –3.4 or –3.436… **and** 0.4 or 0.436...)
16		359 www	4	**M1** $\pi \times 4^2$ or $\frac{1}{2}\pi \times 4^2$ **M1** for $0.5 \times \pi \times 8 \times 15$ oe **M1** for 8×15 + their 2 ends + their curved surface area
17	(a)	(4 10)	2	**B1** each element or correct without brackets
	(b)	$\frac{1}{2}\begin{pmatrix} 3 & -4 \\ -1 & 2 \end{pmatrix}$ oe	2	**B1** for $\frac{1}{2}\begin{pmatrix} a & c \\ b & d \end{pmatrix}$ or $k\begin{pmatrix} 3 & -4 \\ -1 & 2 \end{pmatrix}$ seen
18	(a)	$\mathbf{p} - \frac{1}{3}\mathbf{q}$ oe	2	**M1** $\overrightarrow{QR} + \overrightarrow{RX}$ oe or $-\mathbf{q} + \mathbf{p} + (\frac{2}{3})\mathbf{q}$ oe
	(b)	$\frac{1}{2}\mathbf{p} + \frac{5}{6}\mathbf{q}$ oe	2 ft	ft $\mathbf{q} + \frac{1}{2}$ their (a) but must be vectors or **M1** for $\overrightarrow{OQ} + \overrightarrow{QM}$ oe
19		6(.00) **www**	4	**M1** use of area = distance **M1** complete, correct set of area statements, ignoring units **M1** changing min to hours or km/h to km/min

20	$\dfrac{x+4}{x(x-5)}$ oe cao	5	**B2** $(x-5)(x+4)$ seen or **SC1** $(x+a)(x+b)$ where $ab = -20$ or $a+b = -1$ **B2** $x(x-5)(x-5)$ or **B1** one of $x(x^2 -10x + 25)$, $(x-5)(x-5)$, $(x-5)(x^2 - 5x)$ seen
21 **(a)**	7.55 www	3	**M2** $(\frac{1}{2}\sqrt{(8^2 + 8^2)})^2 + 5^2$ or $4^2 + 5^2 + 4^2$ seen **or M1** $8^2 + 8^2$ or $5^2 + 4^2$ or $4^2 + 4^2$ or $5^2 + (\text{their } MB)^2$ seen
(b)	41.5 www	3	**M2** $\sin(B) = \dfrac{5}{(a)}$ or $\tan(B) = \dfrac{5}{\text{their } MB}$ or $\cos(B) = \dfrac{\text{their } MB}{(a)}$ or **M1** recognition of angle PBM