

**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.

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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 $\frac{750 \times 2 \times 8}{100}$ oe seen or SC1 870 as final answer
3	(a) 3.26077... (b) 3.261	1 1ft	seen their (a) to 4 significant figures
4	$y \neq -1.25$	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) \div 4.5 or (their 42 – 10.5) \div 4.5
9	$\frac{a(2-t)}{3}$ 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 $280 \times (1 + \frac{3}{100})^2$ oe M1 subtracting 280 from $280(1 + \frac{k}{100})^2$ any k A1 for 17.052 or SC2 297.05 on answer line

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12 (a)	$\frac{11}{12} - \frac{4}{12}$ oe $\frac{7}{12}$ cao ww 0	2	M1 correct use of a common denominator A1
(b)	$\frac{1}{4} \times \frac{13}{11}$ oe $\frac{13}{44}$ cao ww 0	2	M1 inversion and operation change A1
13 (a)	71	2	M1 for $7 \times 8 - 3 \times -5$ 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 $64p^uq^v$ or kp^3q^6
(b)	$0.5x^{-2}$ or $\frac{1}{2x^2}$ oe	2	B1 $\frac{1}{2x^u}$ oe or $\frac{1}{kx^2}$ 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 $\frac{p + (or-)q}{r}$, for $p = -6$ and $r = 2 \times 2$ 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 $8 \times 15 +$ 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

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20	$\frac{x+4}{x(x-5)}$ 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 $\sin(B) = \frac{5}{(a)}$ or $\tan(B) = \frac{5}{\text{their } MB}$ or $\cos(B) = \frac{\text{their } MB}{(a)}$ or M1 recognition of angle PBM