

**MARK SCHEME for the May/June 2010 question paper
for the guidance of teachers**

0581 MATHEMATICS

0581/42

Paper 42 (Extended), maximum raw mark 130

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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 (a)	$240 \div 8 \times 3$ or $240 \div 8 \times 5$ or $\frac{3}{8}$ of 240 or $\frac{5}{8}$ of 240 oe	1	Accept reverse e.g. $90 : 150 = 3 : 5$ and $90 + 150 = 240$
(b) (i)	5 www 2	2	M1 for $\frac{100 \times 9}{90 \times 2}$ oe
(ii)	165 www 2	2	M1 for $99 \div 0.6$ oe
(c)	162.24 final answer cao	2	M1 for $150 \times 1.04 \times 1.04$ oe implied by answer 162.2
(d) (i)	58.67 final answer cao	3	SC2 for 58.7 or M1 for $\frac{150 \times 4 \times 20}{100}$ oe (120) then M1 (dependent on the first M1) $328.67 - 150 -$ their 120 oe Answers of 208.67 or 208.7 imply first M1
(ii)	219 (.1....) www 2	2	M1 for $\frac{328.67}{150} \times 100$ oe
2 (a) (i)	$\begin{pmatrix} 15 \\ 8 \end{pmatrix}$	2	B1 each component
(ii)	17 www 2	2ft	ft their 15 and their 8. M1 for $(\text{their } 15)^2 + (\text{their } 8)^2$
(b) (i)	$\frac{1}{2}\mathbf{v} - \frac{1}{2}\mathbf{c}$ or $\frac{1}{2}(\mathbf{v} - \mathbf{c})$ cao	2	M1 for $\frac{1}{2}\overrightarrow{CV}$ soi
(ii)	$\frac{1}{2}\mathbf{c} + \frac{1}{2}\mathbf{v}$ again allowing brackets cao	2	M1 for \overrightarrow{OM} e.g. $\overrightarrow{OC} + \overrightarrow{CM}$ or better seen or $\mathbf{v} -$ their (i) or $\mathbf{c} +$ their (i)
(iii)	$\frac{1}{6}\mathbf{v} - \frac{1}{2}\mathbf{c}$ again allowing brackets cao	2	M1 for any correct route e.g. $\overrightarrow{MV} + \overrightarrow{VL}$ or their (i) $-\frac{1}{3}\mathbf{v}$ or $\frac{2}{3}\mathbf{v} -$ their (b)(ii)

3			<p>Throughout this question isw any cand or changing to other forms, after correct answer seen. Penalty of –1 for 2 sf decimals or percentages. Do not accept ratio or worded forms.</p>
(a) (i)	$\frac{4}{6}$ oe (0.667)	1	Allow 0.6666 – 0.6667
(ii)	$\frac{3}{6}$ oe	1	
(iii)	$\frac{2}{6}$ oe (0.333)	1	Allow 0.3333...
(iv)	$\frac{5}{6}$ oe (0.833)	1	Allow 0.8333...
(b) (i)	$\frac{1}{36}$ oe (0.0278)	2	Allow 0.02777 – 0.02778, M1 for $\frac{1}{6} \times \frac{1}{6}$
(ii)	$\frac{6}{36}$ oe (0.167) www 2	2	Allow 0.1666 – 0.1667, M1 for $\frac{3}{6} \times \frac{1}{6} \times 2$ oe
(c) (i)	$\frac{1}{4}$ oe	1	
(ii)	$\frac{1}{2}$ oe	1	
(d)	5 (but not from rounding)	2	M1 for repeating $\times \frac{4}{6}$ oe e.g. $\left(\frac{2}{3}\right)^n$
4 (a) (i)	Triangle with vertices (–4, 4), (–1, 4), (–1, 6)	2	SC1 for translation $\begin{pmatrix} -7 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 3 \end{pmatrix}$
(ii)	Triangle with vertices (1, –3), (1, –6), (3, –6)	2	SC1 two correct vertices or 90° anticlockwise about (0, 0)
(b) (i)	Reflection only $y = -x$ oe	1 1	Marks independent but must be single transformation to score any marks
(ii)	Stretch only x -axis oe invariant (factor) 3	1 1 1	Marks independent but must be single transformation to score any marks

(c) (i)	$\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$	2	B1 each column
(ii)	$\begin{pmatrix} 1 & 0 \\ 0 & 3 \end{pmatrix}$ ft	2ft	ft factor in (b)(ii) only if stretch and can recover to correct matrix SC1ft for right-hand column
(iii)	$\begin{pmatrix} 1 & 0 \\ 0 & \frac{1}{3} \end{pmatrix}$ ft	1ft	ft $\begin{pmatrix} 1 & 0 \\ 0 & n \end{pmatrix}$ to $\begin{pmatrix} 1 & 0 \\ 0 & \frac{1}{n} \end{pmatrix}$ or $\begin{pmatrix} n & 0 \\ 0 & 1 \end{pmatrix}$ to $\begin{pmatrix} \frac{1}{n} & 0 \\ 0 & 1 \end{pmatrix}$ $n \neq 0, \pm 1$ for $\frac{1}{3}$, allow 0.33 or better
5 (a)	$(\cos) \frac{180^2 + 115^2 - 90^2}{2 \times 180 \times 115}$ 24.98 – 24.99	M2 A2	M1 for correct implicit expression $90^2 = \dots\dots$ A1 for $(\cos) = 0.9064\dots$
(b) (i)	125(.0....) ft	1ft	ft 150 – their (a)
(ii)	305(.0....) ft	1ft	ft 180 + their (b)(i)
(c)	180sin (54.98 to 55) or 180cos (35 to 35.02) oe or 180sin (360 – their (b)(ii)) or 180cos(their (b)(i) – 90) oe 147(.4....) cao www 3	M2 A1	B1 for 54.98 to 55 or 35 to 35.02 soi in correct position. Provided either angle is acute
(d)	$\frac{90 \sin 30}{\sin 70}$ 47.9 (47.88 – 47.89) cao www 3	M2 A1	M1 for $\frac{TR}{\sin 30} = \frac{90}{\sin 70}$ or other correct implicit equation
(e)	2 000 000 oe	2	Allow 1 : 2 000 000 as answer. SC1 figs 2 in answer which could be a ratio.
6 (a)	$\frac{4}{3} \pi \times 2.4^3$ 57.87 – 57.92 to at least 4 figures	M1 A1	Must see method
(b) (i)	14.4, 9.6, 4.8	1, 1, 1	Any order
(ii)	664 (663.5 – 663.6) ft	1ft	
(iii)	315 or 316 or 317 (315.2 – 316.8) ft	1ft	ft their (b)(ii) – $6 \times '57.9'$ (only if positive)
(iv)	507 (506.8 – 506.9) ft	2ft	M1 for $(14.4 \times 9.6 + 14.4 \times 4.8 + 9.6 \times 4.8) \times 2$ or their 3 lengths.

(c) (i)	Height seen or implied as 6×4.8 or better	M1	Indep
	$\pi \times 2.4^2 \times$ their height	M1	
	521 (520.8 – 521.3) www 3	A1	
(ii)	174 or 173 (173.2 – 174.1) ft	1ft	ft their (c)(i) – $6 \times '57.9'$ only if positive
(iii)	470 – 471 cao www 3	3	M1 for $2 \times \pi \times 2.4^2$ (36.17 to 36.2), and M1 indep for $\pi \times 4.8 \times$ their height from (c)(i)
7 (a)	$12 \times 2.5 + 15 \times 7.5 + 23 \times 12.5 + 30 \times 17.5 + 40 \times 22.5 + 35 \times 27.5 + 25 \times 32.5 + 20 \times 37.5$	M1 M1	mid-values any three soi Use of Σfx dep on x anywhere in each interval (including lower bound) – allow 2 slips or omissions
	$\div 200$ 21.9 www 4	M1 A1	Depend on second M
(b)	155, 180	1	
(c)	8 points plotted ft, ignoring (0, 0) Reasonable <u>increasing</u> curve or polygon through their 8 points	P3ft C1ft	P2ft for 6 or 7 plotted, P1ft for 4 or 5 plotted Condone starting at (5, 12) and ft only if shape correct.
(d)	Either horizontal or vertical line at least 1 cm long at $y = 50$ on the curve	1	
(e) (i)	22 – 23	1	
	(ii) 13.5 – 14.5	1	
	(iii) 25.5 – 26.5	1	
	(iv) 136 – 140 must be integer	2	SC1 for 60 – 64 seen and must be integer
8 (a)	$(p + q)^2 - 5$ oe final answer	2	SC1 for $(p + q)^2$ oe seen
(b)	$6x + 9(x - 3) = 51$ or better	B3	B2 for $6x + 9(x - 3)$ or B1 for $6x$ or $9(x - 3)$
	5.2(0) final answer	B1	5.2(0) ww is B1 only
(c)	$a + c = 52$ oe	B1	Condone consistent use of other variables or M3 for $3a + 2(52 - a) = 139$ or $3(52 - c) + 2c = 139$ o.e. Allow one numerical slip. If A0, SC1 for 17, 35
	$3a + 2c = 139$ oe	B1	
	Correctly eliminating a or c .	M1	
	35	A1	
	17	A1	

9	(a) (i)	Similar	1	Allow enlargement
	(ii)	4.5	2	M1 for $\frac{AX}{3} = \frac{9}{6}$ oe
	(iii)	13.5 cao	2	M1 for $\left(\frac{3}{2}\right)^2$ or $\left(\frac{2}{3}\right)^2$ oe e.g. using base and height but other methods must be complete
	(iv)	$180 - x - y$ oe $180 - x$ oe	B1 B1	
	(b) (i)	96	1	
	(ii)	48 ft	1ft	ft 0.5 their (b)(i)
	(iii)	97 ft	1ft	ft 145 – their (b)(ii)
	(iv)	35	1	
	(c)	$20n = 360$ oe or $\frac{180(n-2)}{n} = 160$ oe or $180(n-2) = 8 \times 360$ oe or $8\left(\frac{360}{n}\right) = 180 - \frac{360}{n}$	M2	M1 for $9e = 180$ oe allow diagram to show this if reasonably clear or M1 for 8×360 or $\frac{8 \times 360}{n}$
		18 www 3	A1	
10	(a)	Pentagon Octagon 20	1 1, 1	
	(b)(i)	35	1	
	(ii)	54	1	
	(c)(i)	$p = 2, q = 3$	3	M1 for substituting a value of n e.g. $\frac{1}{p}4(4-q) = 2 \quad n \geq 3$ or M1 for number of diagonals from one vertex is $n - 3$ (allow in words) and B1 for one correct value. If 0, SC1 for $\frac{n}{2}(n-3)$ seen.
	(ii)	4850 ft	1ft	ft their (c)(i) allow only if ft calculates to a positive integer.
	(iii)	20 cao	2	SC1 for answer of 17 or M1 for their formula = 170
	(d)	31 cao	1	