UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2010 question paper

for the guidance of teachers

0580 MATHEMATICS

0580/42 Paper 42 (Extended), maximum raw mark 130

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.

- CIE will not enter into discussions or correspondence in connection with these mark schemes.

CIE is publishing the mark schemes for the May/June 2010 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

UNIVERSITY of CAMBRIDGE
International Examinations

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 ÷ 8 × 3 or 240 ÷ 8 × 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 ÷ 0.6 oe
(c)	162.24 final answer cao	2	**M1** for 150 × 1.04 × 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	2**ft**	**ft** their 15 and their 8. **M1** for (their 15)^2 + (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 **v** – their **(i)** or **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)** – $\frac{1}{3}$ **v** or $\frac{2}{3}\mathbf{v}$ – their **(b)(ii)**

© UCLES 2010

3			**Throughout this question isw any cancelling 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.**
(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 × $\frac{4}{6}$ 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

© UCLES 2010

(c) (i)	$\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$	2	**B1** each column
(ii)	$\begin{pmatrix} 1 & 0 \\ 0 & 3 \end{pmatrix}$ ft	2**ft**	**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	1**ft**	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) $\frac{180^2 + 115^2 - 90^2}{2 \times 180 \times 115}$	M2	**M1** for correct implicit expression $90^2 =$ ……
	24.98 – 24.99	A2	**A1** for (cos) = 0.9064…
(b) (i)	125(.0….) ft	1**ft**	**ft** 150 – their **(a)**
(ii)	305(.0….) ft	1**ft**	**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	M2	**B1** for 54.98 to 55 or 35 to 35.02 soi in correct position. Provided either angle is acute
	147(.4….) cao www 3	A1	
(d)	$\frac{90 \sin 30}{\sin 70}$	M2	**M1** for $\frac{TR}{\sin 30} = \frac{90}{\sin 70}$ or other correct implicit equation
	47.9 (47.88 – 47.89) cao www 3	A1	
(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)	$\frac{4}{3}\pi \times 2.4^3$	M1	**Must see method**
	57.87 – 57.92 to at least 4 figures	A1	
(b) (i)	14.4, 9.6, 4.8	1, 1, 1	Any order
(ii)	664 (663.5 – 663.6) ft	1**ft**	
(iii)	315 or 316 or 317 (315.2 – 316.8) ft	1**ft**	**ft** their **(b)(ii)** – 6 × '57.9' (only if positive)
(iv)	507 (506.8 – 506.9) ft	2**ft**	**M1** for (14.4 × 9.6 + 14.4 × 4.8 + 9.6 × 4.8) × 2 or their 3 lengths.

© UCLES 2010

(c) (i)	Height seen or implied as 6×4.8 or better	M1	
	$\pi \times 2.4^2 \times$ their height	M1	Indep
	521 (520.8 – 521.3) www 3	A1	
(ii)	174 or 173 (173.2 – 174.1) ft	1**ft**	**ft** their **(c)(i)** – 6 × '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
	$\div 200$	M1	Depend on second M
	21.9 www 4	A1	
(b)	155, 180	1	
(c)	8 points plotted ft, ignoring (0, 0)	P3**ft**	**P2ft** for 6 or 7 plotted , **P1ft** for 4 or 5 plotted
	Reasonable <u>increasing</u> curve or polygon through their 8 points	C1**ft**	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
	$3a + 2c = 139$ oe	B1	or **M3** for $3a + 2(52 - a) = 139$ or $3(52 - c) + 2c = 139$ o.e.
	Correctly eliminating a or c.	M1	Allow one numerical slip.
	35	A1	If A0**, SC1** for 17, 35
	17	A1	

© UCLES 2010

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	1**ft**	**ft** 0.5 their **(b)(i)**
(iii)	97 ft	1**ft**	**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	1**ft**	**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	

© UCLES 2010