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

0580/41 Paper 41 (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.

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)	11:14	1	
(b)	50	2	**M1** for (220 + 280) ÷ 10 o.e.
(c)	12	2	**M1** for 21 ÷ (4 + 3) × 4 (or 3) o.e.
(d)	280	3	**M1** for 0.35 × their 500 (175) **M1** dependent × 1.60
(e)	240	2	**M1** for dividing 264 by 1.1 oe
2 (a) (i)	4	1	
(ii)	5	1	
(iii)	4.75	3	**M1** for $1\times2+1\times3+17\times4+12\times5+6\times6+3\times7$ condone one slip **then M1** dependent result (190) ÷ 40
(b)	$\frac{190+3n}{40+n}$	2	**SC1** for their 190 + 3n
3 (a)	Triangle drawn with co-ords at (1, 4), (4, 2), (4, 4)	2	**SC1** for 2 correct vertices or an enlargement sf $\frac{1}{2}$ with wrong centre
(b) (i)	$\begin{pmatrix}-8 & -8 & -2\\ 4 & 8 & 8\end{pmatrix}$	2	**B1** each row
(ii)	Triangle drawn at (–8, 4), (–8, 8), (–2, 8) ft **(i)**	2**ft**	**SC1** for 2 correct ft vertices. Can also be correct regardless of **(i)**
(iii)	Reflection cao		**B1** Independent of **(i)** or **(ii)** Extra transformations lose all marks
	y – axis or $x = 0$ cao	2	**B1** Independent of **(i)** or **(ii)**
(c) (i)	Translation		**B1** Extra transformations lose all marks
	$\begin{pmatrix}-10\\-10\end{pmatrix}$ o.e.	2	**B1**
(ii)	Rotation (0, 0) 90° clockwise oe	3	**B1** Extra transformations lose all marks **B1** Allow word origin for (0, 0) **B1** Allow – 90° or 270° (anti-clockwise)
(d)	$\begin{pmatrix}0 & 1\\-1 & 0\end{pmatrix}$	2	**B1** each column

4				**In (b) and (c) isw any cancelling or cha to other forms, after correct answer seen. Penalty of – 1 for 2 sf decimals or percentages. Do not accept ratio or worded forms.**
(a)	B and $\frac{2}{5}, \frac{1}{4}$ oe		1	Allow any reasonable explanation, e.g. 2 out of 5 greater than 1 out of 4.
(b) (i)	$\frac{1}{3}, \frac{3}{4}, \frac{2}{5}, \frac{3}{5}$		4	**B1 B1 B1 B1**
(ii)	$\frac{6}{12}$ oe cao	www 2	2	$\frac{1}{2}$, 0.5 etc **M1** for $\frac{2}{3} \times$ their $\frac{3}{4}$ i.e. product of correct branches on their tree
(iii)	$\frac{42}{60}$ oe cao	www2	2	$\frac{7}{10}$, 0.7 etc **M1** for their **(ii)** + their $\frac{1}{3} \times$ their $\frac{3}{5}$ from their tree
(c)	$\frac{2}{60}$ oe cao	www2	2	$\frac{1}{30}$, 0.0333(3……..) etc **M1** for $\left(\frac{2}{3} \times \frac{1}{4} \times 0\right) + \frac{1}{3} \times \frac{2}{5} \times \frac{1}{4}$
5 (a)	200.5… to 201	www 2	2	**M1** for 0.5 × 24 × 26 sin 40 oe **A1**
(b)	17.2 (0….)	www 4	4	**M2** for $26^2 + 24^2 - 2 \times 26 \times 24 \cos 40$ **or M1** for $\cos 40 = \frac{26^2 + 24^2 - BD^2}{2 \times 24 \times 26}$ **A2 or A1** for 295.976..
(c)	12.8 (12.77…)	www 4	4	**B1** for Angle $C = 110$ soi accept on diagram **M2** for $(BC) = \frac{24 \sin 30}{\sin 110}$ oe **or** **M1** $\frac{\sin 110}{24} = \frac{\sin 30}{BC}$ oe i.e. a correct implicit statement soi **A1**
(d)	8.208 to 8.230	www 2	2	**M1** for their **(c)** × sin40 oe

6 (a)	32.5 cao www4	4	**M1** for mid-values seen **M1** for use of Σfx with x's anywhere in each interval $(10 \times 15 + 30 \times 30 + 20 \times 45)$ **M1** ÷ 60 dependent on second M1
(b)	Histogram drawn	3	**B1** Bars correct positions and widths – no gaps **B2** Heights of bars 1, 1.5 and 2 (**B1** for any two correct or for heights in the ratio 2:3:4)
7 (a)	4.53 or 4.526 – 4.530….	3	**SC2** for figs 453 or 4526 – 4530 If SC0, **M1** for $\pi \times (\text{figs } 31)^2 \times 15$
(b)	3.62 to 3.624 ft	2**ft**	**M1** for their **(a)** × figs 8 oe
(c) (i)	$360 - 2 \times 90 - 60$ oe	2	**E2** The 90's and the 60 must be clearly justified. Accept in diagram. **SC1** for 60 or two 90's soi in correct positions oe e.g 360 ÷ 3 scores 0
(ii)	0.649 (0.6492 to 0.6493)	2	**M1** for $\pi \times$ figs 62 ÷ 3
(iii)	7.53 (7.527 or 7.528….)	3	**M1** for their **(ii)** × 3 **M1** (indep) for 18 × figs 31 This M is spoiled by extra lengths.
(iv)	112.9 to 113 ft	1**ft**	**ft** their **(iii)** × 15
8 (a)	0.25, 8, 16	3	**B1 B1 B1**
(b)	– 5, 4	2	**B1 B1**
(c) (i)	7 points plotted ft Curve through all 7 points exponential shape	P2**ft** C1**ft**	**P1** for 5 or 6 points ft **ft** only if exponential shape
(ii)	6 points plotted ft Curve through all 6 points parabola shape	P2**ft** C1**ft**	**P1** for 5 points ft **ft** only if parabola shape
(d) (i)	3.2 to 3.4	1	
(ii)	0.3 to 0.4 and 2	2	**B1 B1**
(iii)	3.1 to 3.4	1	
9 (a) (i)	–2.5 oe	2	**M1** for $5(w + 1) = 3w$
(ii)	–3 or 1	2	**B1 B1** (If 0, **SC1** for $y + 1 = \pm 2$)
(iii)	9.5 oe	B3	**M2** for $5x + 5 - 3x + 6 = 2 \times 15$ Condone one slip (sign or numerical) on left hand side **or M1** for $\frac{5(x+1)}{15} - \frac{3(x-2)}{15}$ or better, condoning one sign or numerical slip.

(b) (i)	$(u-10)(u+1)$	2	**SC1** for $(u+a)(u+b)$ where $ab = -10$ or $a+b=-9$
(ii)	–1, 10	1**ft**	Only **ft B2** or **SC1** in **(i)** but can recover to correct answer only if new working or if **(i)** not attempted
(c) (i)	$\frac{(x+1)(x+2)}{2} = x^2$ oe	M1	
	$((x+1)(x+2) =) x^2 + x + 2x + 2$	B1	Allow $3x$ for $x + 2x$
	$x^2 + x + 2x + 2 = 2x^2$		
	$x^2 - 3x - 2 = 0$	E1	Established without any omissions or errors
(ii)	$\frac{-(-3) \pm \sqrt{(-3)^2 - 4(1)(-2)}}{2(1)}$	2	**B1** for $\sqrt{(-3)^2 - 4(1)(-2)}$ or better seen anywhere. If in form $\frac{p+\sqrt{q}}{r}$ or $\frac{p-\sqrt{q}}{r}$ then **B1** for $-(-3)$ **and** 2(1) or better Brackets and full line may be implied later
	–0.56, 3.56	2	**B1 B1** **SC1** for –0.6 or –0.562 to –0.561 **and** 3.6 or 3.561 to 3.562
(iii)	12.7 or 12.67 to 12.69 ft	1**ft**	**ft** their positive x squared
10 (a)	$20x + 100y \leqslant 1200$	1	
(b)(i)	$x + y \geqslant 40$	1	
(ii)	$y \geqslant 2$	1	
(c)	$x + y = 40$ cao	L1	Each line ruled and long enough to enclose required region.
	$y = 2$ cao	L1	If **L0, SC1** if freehand but otherwise accurate and enclose region
	Required region only region left not shaded or otherwise clearly indicated cao	R2	**SC1** if one boundary error – see diagrams
(d)	5 cao	1	
(e)	50 cao, 2 cao 270 **ft**	2 1**ft**	**B1 B1** **ft** 5 × their x + 10 × their y
11 (a)	Reasonable diagram, 25, 13, 62	4	**B1 B1 B1 B1** diagram may be freehand
(b)	64, 19, 146	3	**B1 B1 B1**
(c)	n^2 oe $2n + 3$ oe	 2	**B1** **B1**
(d)(i)	2	1	
(ii)	20202 **ft**	1**ft**	**ft** 10101 × their k