

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

<p style="text-align: center;">0580 MATHEMATICS</p> <p>0580/41 Paper 41 (Extended), maximum raw mark 130</p>

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

Qu.	Answers	Mark	Part Marks
1 (a)	11:14	1	
(b)	50	2	M1 for $(220 + 280) \div 10$ o.e.
(c)	12	2	M1 for $21 \div (4 + 3) \times 4$ (or 3) o.e.
(d)	280	3	M1 for $0.35 \times$ their 500 (175) M1 dependent $\times 1.60$
(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 $1 \times 2 + 1 \times 3 + 17 \times 4 + 12 \times 5 + 6 \times 6 + 3 \times 7$ condone one slip then M1 dependent result $(190) \div 40$
(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)	2ft	SC1 for 2 correct ft vertices. Can also be correct regardless of (i)
(iii)	Reflection cao y -axis or $x = 0$ cao	2	B1 Independent of (i) or (ii) Extra transformations lose all marks B1 Independent of (i) or (ii)
(c) (i)	Translation $\begin{pmatrix} -10 \\ -10 \end{pmatrix}$ o.e.	2	B1 Extra transformations lose all marks
(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

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4	(a)	B and $\frac{2}{5}, \frac{1}{4}$ oe		1	In (b) and (c) isw any cancelling or change to other forms, after correct answer seen. Penalty of – 1 for 2 sf decimals or percentages. Do not accept ratio or worded forms.
	(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	$\frac{1}{30}, 0.0333(3\dots\dots)$ 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 $0.5 \times 24 \times 26 \sin 40$ 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) $\times \sin 40$ oe

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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 $\div 60$ 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	2ft	M1 for their (a) \times 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 $360 \div 3$ scores 0
(ii)	0.649 (0.6492 to 0.6493)	2	M1 for $\pi \times \text{figs } 62 \div 3$
(iii)	7.53 (7.527 or 7.528....)	3	M1 for their (ii) $\times 3$ M1 (indep) for $18 \times \text{figs } 31$ This M is spoiled by extra lengths.
(iv)	112.9 to 113 ft	1ft	ft their (iii) $\times 15$
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	P2ft C1ft	P1 for 5 or 6 points ft ft only if exponential shape
(ii)	6 points plotted ft Curve through all 6 points parabola shape	P2ft C1ft	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.

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(b) (i)	$(u-10)(u+1)$	2	SC1 for $(u+a)(u+b)$ where $ab = -10$ and $a+b = -9$
(ii)	-1, 10	1ft	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	1ft	ft their positive x squared
10 (a)	$20x + 100y \leq 1200$	1	
(b)(i)	$x + y \geq 40$	1	
(ii)	$y \geq 2$	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 1ft	B1 B1 ft $5 \times$ their $x + 10 \times$ 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	1ft	ft 10101 \times their k