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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

0580/43

Paper 43 (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) (i)	2:3	1	
(ii)	$30 \div 2 \times 3$ o.e.	E1	Allow 2 : 3 (oe) = 30 : 45
(iii)	60	2	M1 for $3 \div 5 \times 100$ oe
(b)	31.83	3	SC2 for 31.827 as final answer or not spoiled. or M1 for × 1.03 twice oe
(c)	1.5	2	M1 for $\frac{30 \times r \times 5}{100} = 2.25$ oe or for $2.25 \div 5$ then $\div 30 \times 100$
2 (a)	5.83 (5.830 to 5.831)	2	M1 for $3^2 + 5^2$ Any other method must be complete
(b)	113. 6 (114 or 113.5 to 113.6) www 4	4	M2 for $(\cos C) = \frac{5^2 + 8^2 - 11^2}{2 \times 5 \times 8}$ or M1 for correct implicit expression A2 (A1 for -0.4 or $-\frac{2}{5}$)
(c)	25.8 (25.77 to 25.85) cao www 3	3	M1 for $0.5 \times 5 \times 8 \times \sin$ (their angle C) o.e must be full method e.g. Hero's formula. M1 for $0.5 \times 3 \times 5$ oe

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3			Throughout this question isw any cancelling or changing to other forms, after correct answer seen. Do not accept ratio or worded forms.
(a)	0.4, 0.1 oe	1	
(b) (i)	1	1	
(ii)	0.7 oe ft	1 ft	ft their first three probabilities
(c) (i)	0.04 oe	1	
(ii)	0.03 oe ft	2ft	M1 for their 0.1×0.3
(iii)	0.12 oe ft	3ft	ft their 0.1, their 0.4 and their (c)(i) M2 for their 0.4 × their 0.1 + their 0.1 × their 0.4 + 0.2 × 0.2 (or their (c)(i)) or M1 for any two of these products added or two of each
(d)	0.147 oe ft	2ft	ft their (b)(ii). M1 for their 0.7 × their 0.7 × (1 – their 0.7)
4 (a)	Triangle drawn, vertices (6, 10), (10, 10), (10, 8)	2	SC1 reflects correctly in $x = 6$
(b)	Triangle drawn, vertices (2, 8), (6, 8), (6, 10)	2	SC1 for translation $\begin{pmatrix} -4 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 6 \end{pmatrix}$
(c)	Translation	2	B1 All part marks spoiled if extra transformation
	$\begin{pmatrix} 4 \\ -6 \end{pmatrix}$ o.e.		B1 Indep. Allow other clear forms or words
(d) (i)	Enlargement	3	B1 All part marks spoiled if extra transformation
	(centre) (4, 6) (factor) 0.5		B1 Indep. B1 Indep.
(ii)	$\frac{1}{4}$ or 0.25 oe	1	
(e) (i)	Stretch y-axis o.e invariant (factor) 0.5	3	B1 All part marks spoiled if extra transformation B1 Indep B1 Indep
(ii)	$ \begin{pmatrix} 0.5 & 0 \\ 0 & 1 \end{pmatrix} ft $	2ft	ft their factor in (e)(i) only if stretch SC1 (also ft) for left-hand column

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5 (a) (i)	Similar	1	Accept enlargement
5 (a) (i)	Similar	1	Accept enlargement
(ii)	2.7	2	M1 for $\frac{PQ}{3.6} = \frac{3}{4}$ oe
(iii)	3.15	2	M1 for $\left(\frac{3}{4}\right)^2$ or $\left(\frac{4}{3}\right)^2$ o.e seen
			If $\frac{1}{2}ab\sin C$ used or base and height used then
			must be full method for M1
(b) (i)	29	1	
(ii)	61 ft	1 ft	ft 90 – their (i) if (i) is acute
(iii)	61 ft	1 ft	ft their (ii) if their (ii) is acute, but can recover
` '	119 ft	1ft	ft 180 – their (iii)
(iv)	119 11	111	1 180 – then (m)
(c) (i)	20	1	
(ii)	110	3	M1 for adding 6 angles going up 4 each time
			and
			M1 (indep) for 720 seen and not spoiled $(6A + 60 = 720 \text{ o.e. scores M2})$
6 (a)	-2.5, -2, 2, 2.5	2	B1 for 3 correct
(b)	4 points correct ft	P1 ft	
	Correct shape curve through at least 9	C1 ft	ft only if correct shape and isw any curve
	points over full domain Two branches either side of <i>y</i> -axis and	B1	outside domain (including crossing <i>y</i> -axis) Independent
	not touching it	Б	macpendent
(c)	-1, 0, 1	2	B1 for two correct, each extra –1
(d)	(x) < -1 and $(x) > 1$ as final answer	2	B1 B1 Condone inclusive inequality, allow in words, condone inclusion of -4 and $+4$ as limits. $1 < x < -1$ or $-1 > x > 1$ SC1 $-1 < x < 1$ scores 0 . Each extra -1 if more than two answers.
(e) (i)	Correct ruled line though $(-2, -3)$ to $(1, 3)$	2	SC1 for ruled line gradient 2 or <i>y</i> -intercept 1 from $x = -2$ to 1 or correct line but short or good freehand full line.
(ii)	Some reasonable indication on graph for both points	1	e.g. points of intersection marked, or, lines drawn from point of intersection to <i>x</i> -axis etc
(iii)	$x^{2} + 1 = 2x^{2} + x$ oe then $x^{2} + x - 1 = 0$	3	E2 Must be intermediate step before answer – no errors or omissions
	or $\frac{1}{x} = x + 1$ then $1 = x^2 + x$ then $x^2 + x - 1 = 0$		or E1 Either no intermediate step or one error or omission.
	1, -1		В1
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	T	ı	<u> </u>
7 (a)	(Mode) = 11	1	B1
	(Median) = 12.5	2	M1 for evidence of finding mid-value
	(A) 12.0 (O)	2	e.g. $(126 + 1) \div 2$ oe, (condone $126 \div 2$)
	(Mean) = 12.8 (0)	3	M1 for correct use of Σfx (allow one slip)
			M1 (dependent) for ÷ 126
(b) (i)	15, 27, 30,	3	B1 B1 B1
(ii)	9.67 (9.674 to 9.675) cao www 4	4	M1 for mid-values, condone one error or slip
(11)	3.07 (3.07 1 to 3.073) cu o www.i	'	M1 for use of Σfx , with x's anywhere in
			intervals and their frequencies (allow one slip)
			M1 (dependent on second M) for ÷ 126 (or
			their Σf)
			isw any conversion into hours and minutes
8 (a)	$40 \div 10$ and $12 \div 6$ (or $12 \div 3$) and	E2	M1 Allow drawing for M1 but must see
	$6 \div 3 \text{ (or } 6 \div 6) \text{ oe}$		reaching 16 for E2
	$4 \times 2 \times 2 = 16$ reducing (seen) to 16		Reaching 16 without any errors or omissions
			SC1 for $\frac{40 \times 12 \times 6}{\text{their}(\mathbf{b})}$ even if = 16
			or $4 \times 2 \times 2 = 16$ or $4 \times 4 \times 1 = 16$ without
			other working
(b)	180	1	
(c) (i)	23 640 (allow 23 600)	2	M1 for their $180 \times 8 \times 16 + 600$
(ii)	23.64 (or 23.6) ft	1 ft	ft their (i) ÷ 1000
(d) (i)	216	2	M1 for $(10 \times 6 + 10 \times 3 + 6 \times 3) \times 2$ oe
			` ´
(ii)	8.64	3	M1 for their (i) \times 16 \times 25 M1(indep) for \div 100 ²
			Figs 864 imply M1 only
			Tigo oo i impiy ii ii omy
	750(7506) 7500		M 6 4 0.5 ³ (0.5225) V 1: 1 1 1
(e)	75.3 (75.26 to 75.33)	3	M1 for $\frac{4}{3}\pi \times 0.5^3$ (0.5235) Implied also by
			104.7
			then M1 (dep) for their (b) $-200 \times$ their
			$\frac{4}{3}\pi \times 0.5^3$ must be giving positive answer
			3
(6)	0.042 (0.0410 - 0.0421)	2	M16 (4 3) 50 20
(f)	0.842 (0.8419 – 0.8421)	3	M1 for $(\frac{4}{3}\pi r^3) = 50 \div 20$
			then M1 for $50 \div 20$ (0.5066 to 0.5072)
			then M1 for $\frac{50 \div 20}{\frac{4}{\pi}}$ (0.5966 to 0.5972)
			$\frac{3}{3}^n$
			50
			After 0 scored SC1 for $\frac{50}{4\pi}$ (implied by 2.29)
			$\sqrt{\frac{\pi}{3}}$
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0 (a)	9 + 2i = 12	5	P1 condens consistent use of other verichles
9 (a)	8w + 2j = 12 $12w + 18j = 45$	3	B1 condone consistent use of other variables B1
	Correctly eliminating one variable		M1 allow one numerical slip
	Water 1.05, Juice 1.8(0)		A1 A1 If A0, SC1 for 1.80, 1.05
	, , ,		
	2 4 40		2 4
(b) (i)	$\frac{2}{v} + \frac{4}{v-4} = \frac{40}{60}$ oe	M2	M2 If M0, SC1 for $\frac{2}{y}$ or $\frac{4}{y-4}$
			y y- 4
	$\frac{2 \times 3(y-4)}{3y(y-4)} + \frac{3 \times 4y}{3y(y-4)} = \frac{2y(y-4)}{3y(y-4)}$	E2	E2 Correct conclusion reached without any
	3y(y-4) $3y(y-4)$ $3y(y-4)$	22	errors or omissions including at least 3
	oe or better		intermediate steps.
	6(y-4) + 12y = 2y(y-4) oe		or E1 if any one slip, error or omission that is
	$6y - 24 + 12y = 2y^2 - 8y$ oe		recovered or correct with only two steps.
	$0 = 2y^2 - 26y + 24$ $y^2 - 13y + 12 = 0$		
/** \		2	SC1 for (+)(+ 1)1, 1 12
(ii)	(y-1)(y-12)	2	SC1 for $(y + a)(y + b)$ where $ab = 12$ or $a + b = -13$
(iii)	1, 12 ft	1 ft	Only ft SC1 but can recover to correct answer
			with new working or if (ii) not attempted
(iv)	8 ft	1 ft	ft a positive root –4 if positive answer
	$-(-1) \pm \sqrt{(-1)^2 - 4(1)(-4)}$	2	B1 for $\sqrt{(-1)^2 - 4(1)(-4)}$ or better
(c)	$\frac{-(-1)\pm\sqrt{(-1)^2-4(1)(-4)}}{2(1)}$	2	B1 for $\sqrt{(-1)}$ -4(1)(-4) or better
	2(1)		If in form $\frac{p+\sqrt{q}}{r}$ or $\frac{p-\sqrt{q}}{r}$
			then B1 for $-(-1)$ and $2(1)$ or better
			Brackets and full line may be implied later
	-1.56, 2.56	2	B1 B1 If B0, SC1 for -1.6 or -1.562 to
			-1.561 and 2.6 or 2.561 to 2.562
10 (a)	Dots all correctly placed in Diagram 4	1	
(b)	Column 4 16, 25, 16, 41	7	B2 or B1 for three correct
	Column 5 25, 41, 20, 61		B2 or B1 for three correct
	Column <i>n</i> : n^2 , $4n$, $n^2 + (n+1)^2$ oe		B1 B1 B1 oe likely to be $(n-1)^2 + n^2 + 4n$ or
			$2n^2 + 2n + 1$
			After any correct answer for column n , apply isw
(a)(i)	79 601 cao	1	
(c)(i)		1	
(ii)	800 ft	1 ft	ft their $4n$ linear expression only
(d)	12 cao	1	