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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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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) (i)	2 : 3	1	
(ii)	30 ÷ 2 × 3 o.e.	E1	Allow 2 : 3 (oe) = 30 : 45
(iii)	60	2	**M1** for 3 ÷ 5 × 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 ÷ 5 then ÷ 30 × 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 × 5 × 8 × sin (their angle *C*) o.e must be full method e.g. Hero's formula. **M1** for 0.5 × 3 × 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	2**ft**	**M1** for their 0.1 × 0.3
(iii)	0.12 oe ft	3**ft**	**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	2**ft**	**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 $\begin{pmatrix} 4 \\ -6 \end{pmatrix}$ o.e.	2	**B1 All part marks** spoiled if extra transformation **B1** Indep. Allow other clear forms or words
(d) (i)	Enlargement (centre) (4, 6) (factor) 0.5	3	**B1 All part marks** spoiled if extra transformation **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	2**ft**	**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
(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
(iv)	119 ft	1**ft**	**ft** 180 – their **(iii)**
(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 ($6A + 60 = 720$ o.e. scores M2)
6 (a)	–2.5, –2, 2, 2.5	2	**B1** for 3 correct
(b)	4 points correct ft Correct shape curve through at least 9 points over full domain Two branches either side of y-axis and not touching it	P1**ft** C1**ft** B1	**ft** only if correct shape and isw any curve outside domain (including crossing y-axis) Independent
(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 y-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 x-axis etc
(iii)	$x^2 + 1 = 2x^2 + x$ oe then $x^2 + x - 1 = 0$ or $\frac{1}{x} = x + 1$ then $1 = x^2 + x$ then $x^2 + x - 1 = 0$ 1, –1	3	**E2** Must be intermediate step before answer – no errors or omissions **or E1** Either no intermediate step or one error or omission. **B1**

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7 (a)	(Mode) = 11 (Median) = 12.5 (Mean) = 12.8 (0 ….)	1 2 3	**B1** **M1** for evidence of finding mid-value e.g. (126 + 1) ÷ 2 oe, (condone 126 ÷ 2) **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 **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 ÷ 10 **and** 12 ÷ 6 (or 12 ÷ 3) **and** 6 ÷ 3 (or 6 ÷ 6) oe 4 × 2 × 2 = 16 reducing (seen) to 16	E2	**M1** Allow drawing for **M1** but must see reaching 16 for E2 Reaching 16 without any errors or omissions **SC1** for $\frac{40\times12\times6}{\text{their }\mathbf{(b)}}$ even if = 16 or 4 × 2 × 2 = 16 or 4 × 4 × 1 = 16 without other working
(b)	180	1	
(c) (i)	23 640 (allow 23 600)	2	**M1** for their 180 × 8 × 16 + 600
(ii)	23.64 (or 23.6) ft	1**ft**	**ft** their **(i)** ÷ 1000
(d) (i)	216	2	**M1** for (10 × 6 + 10 × 3 + 6 × 3) × 2 oe
(ii)	8.64	3	**M1** for their **(i)** × 16 × 25 **M1**(indep) for ÷ 100^2 Figs 864 imply **M1** only
(e)	75.3 (75.26 to 75.33….)	3	**M1** for $\frac{4}{3}\pi\times0.5^3$ (0.5235..) Implied also by 104.7…. **then M1** (dep) for their **(b)** – 200 × their $\frac{4}{3}\pi\times0.5^3$ must be giving positive answer
(f)	0.842 (0.8419 – 0.8421)	3	**M1** for $(\frac{4}{3}\pi r^3) = 50\div20$ **then M1** for $\frac{50\div20}{\frac{4}{3}\pi}$ (0.5966 to 0.5972) After 0 scored **SC1** for $\sqrt[3]{\frac{50}{\frac{4}{3}\pi}}$ (implied by 2.29)

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9 (a)	$8w + 2j = 12$ $12w + 18j = 45$ Correctly eliminating one variable Water 1.05, Juice 1.8(0)	5	**B1** condone consistent use of other variables **B1** **M1** allow one numerical slip **A1 A1** If A0**, SC1** for 1.80, 1.05
(b) (i)	$\frac{2}{y} + \frac{4}{y-4} = \frac{40}{60}$ oe	M2	**M2** If M0, **SC1** for $\frac{2}{y}$ or $\frac{4}{y-4}$
	$\frac{2\times3(y-4)}{3y(y-4)} + \frac{3\times4y}{3y(y-4)} = \frac{2y(y-4)}{3y(y-4)}$ oe or better $6(y-4) + 12y = 2y(y-4)$ oe $6y - 24 + 12y = 2y^2 - 8y$ oe $0 = 2y^2 - 26y + 24$ $y^2 - 13y + 12 = 0$	E2	**E2** Correct conclusion reached without any errors or omissions including at least 3 intermediate steps. **or E1** if any one slip, error or omission that is recovered or correct with only two steps.
(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
(c)	$\frac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(-4)}}{2(1)}$	2	**B1** for $\sqrt{(-1)^2 - 4(1)(-4)}$ or better 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 Column 5 25, 41, 20, 61 Column n: n^2, $4n$, $n^2 + (n + 1)^2$ oe	7	**B2 or B1** for three correct **B2 or B1** for three correct **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
(c)(i)	79 601 cao	1	
(ii)	800 ft	1**ft**	**ft** their $4n$ linear expression only
(d)	12 cao	1	

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