

**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 $\times 1.03$ 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

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

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	1ft	ft 90 – their (i) if (i) is acute
(iii)	61 ft	1ft	ft their (ii) if their (ii) is acute, but can recover
(iv)	119 ft	1ft	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	P1ft C1ft 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

<p>7 (a)</p> <p>(Mode) = 11 (Median) = 12.5 (Mean) = 12.8 (0)</p> <p>(b) (i) 15, 27, 30,</p> <p>(ii) 9.67 (9.674 to 9.675) cao www 4</p>		<p>1</p> <p>2</p> <p>3</p> <p>3</p> <p>4</p>	<p>B1</p> <p>M1 for evidence of finding mid-value e.g. $(126 + 1) \div 2$ oe, (condone $126 \div 2$)</p> <p>M1 for correct use of Σfx (allow one slip)</p> <p>M1 (dependent) for $\div 126$</p> <p>B1 B1 B1</p> <p>M1 for mid-values, condone one error or slip</p> <p>M1 for use of Σfx, with x's anywhere in intervals and their frequencies (allow one slip)</p> <p>M1 (dependent on second M) for $\div 126$ (or their Σf)</p> <p>isw any conversion into hours and minutes</p>
<p>8 (a)</p> <p>40 \div 10 and 12 \div 6 (or 12 \div 3) and 6 \div 3 (or 6 \div 6) oe 4 \times 2 \times 2 = 16 reducing (seen) to 16</p> <p>(b) 180</p> <p>(c) (i) 23 640 (allow 23 600)</p> <p>(ii) 23.64 (or 23.6) ft</p> <p>(d) (i) 216</p> <p>(ii) 8.64</p> <p>(e) 75.3 (75.26 to 75.33....)</p> <p>(f) 0.842 (0.8419 – 0.8421)</p>		<p>E2</p> <p>1</p> <p>2</p> <p>1ft</p> <p>2</p> <p>3</p> <p>3</p> <p>3</p>	<p>M1 Allow drawing for M1 but must see reaching 16 for E2</p> <p>Reaching 16 without any errors or omissions</p> <p>SC1 for $\frac{40 \times 12 \times 6}{\text{their (b)}}$ even if = 16</p> <p>or 4 \times 2 \times 2 = 16 or 4 \times 4 \times 1 = 16 without other working</p> <p>M1 for their 180 \times 8 \times 16 + 600</p> <p>ft their (i) \div 1000</p> <p>M1 for $(10 \times 6 + 10 \times 3 + 6 \times 3) \times 2$ oe</p> <p>M1 for their (i) \times 16 \times 25</p> <p>M1(indep) for $\div 100^2$</p> <p>Figs 864 imply M1 only</p> <p>M1 for $\frac{4}{3}\pi \times 0.5^3$ (0.5235..) Implied also by 104.7....</p> <p>then M1 (dep) for their (b) – 200 \times their $\frac{4}{3}\pi \times 0.5^3$ must be giving positive answer</p> <p>M1 for $(\frac{4}{3}\pi r^3) = 50 \div 20$</p> <p>then M1 for $\frac{50 \div 20}{\frac{4}{3}\pi}$ (0.5966 to 0.5972)</p> <p>After 0 scored SC1 for $\sqrt[3]{\frac{50}{\frac{4}{3}\pi}}$ (implied by 2.29)</p>

<p>9 (a)</p>	<p>$8w + 2j = 12$ $12w + 18j = 45$ Correctly eliminating one variable Water 1.05, Juice 1.8(0)</p>	<p>5</p>	<p>B1 condone consistent use of other variables B1 M1 allow one numerical slip A1 A1 If A0, SC1 for 1.80, 1.05</p>
<p>(b) (i)</p>	<p>$\frac{2}{y} + \frac{4}{y-4} = \frac{40}{60}$ oe</p>	<p>M2</p>	<p>M2 If M0, SC1 for $\frac{2}{y}$ or $\frac{4}{y-4}$</p>
	<p>$\frac{2 \times 3(y-4)}{3y(y-4)} + \frac{3 \times 4y}{3y(y-4)} = \frac{2y(y-4)}{3y(y-4)}$ oe or better $6(y-4) + 12y = 2y(y-4)$ oe $6y - 24 + 12y = 2y^2 - 8y$ oe $0 = 2y^2 - 26y + 24$ $y^2 - 13y + 12 = 0$</p>	<p>E2</p>	<p>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.</p>
<p>(ii)</p>	<p>$(y-1)(y-12)$</p>	<p>2</p>	<p>SC1 for $(y+a)(y+b)$ where $ab = 12$ or $a+b = -13$</p>
<p>(iii)</p>	<p>1, 12 ft</p>	<p>1ft</p>	<p>Only ft SC1 but can recover to correct answer with new working or if (ii) not attempted</p>
<p>(iv)</p>	<p>8 ft</p>	<p>1ft</p>	<p>ft a positive root -4 if positive answer</p>
<p>(c)</p>	<p>$\frac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(-4)}}{2(1)}$</p>	<p>2</p>	<p>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</p>
	<p>-1.56, 2.56</p>	<p>2</p>	<p>B1 B1 If B0, SC1 for -1.6 or -1.562 to -1.561 and 2.6 or 2.561 to 2.562</p>
<p>10 (a)</p>	<p>Dots all correctly placed in Diagram 4</p>	<p>1</p>	
<p>(b)</p>	<p>Column 4 16, 25, 16, 41 Column 5 25, 41, 20, 61 Column n: n^2, $4n$, $n^2 + (n+1)^2$ oe</p>	<p>7</p>	<p>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</p>
<p>(c)(i)</p>	<p>79 601 cao</p>	<p>1</p>	
<p>(ii)</p>	<p>800 ft</p>	<p>1ft</p>	<p>ft their $4n$ linear expression only</p>
<p>(d)</p>	<p>12 cao</p>	<p>1</p>	