

June 2003

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 130

SYLLABUS/COMPONENT: 0580/04, 0581/04

MATHEMATICS

Paper 4 (Extended)



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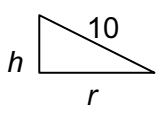
Marks in brackets are totals for questions or part questions.

1	(a)	(\$) 3490	B1 (1)	
	(b)	$16n + 1570 = 4018$ o.e. $n = 153$ c.a.o.	M1 A1 (2)	ww2
	(c)	$x + y = 319$ o.e. $10x + 16y = 3784$ o.e. Correct method s.o.i. $x = 220$ $y = 99$	B1 B1 M1 A1 A1 (5)	e.g. $1^{\text{st}} \times 10$ and subtraction. Condone arith. error (available on wrong eqtns provided coefficients not equal.) or 220 \$10 tickets or 99 \$16 tickets (ww Correct answer $\Rightarrow$ M1)
	(d)	$0.85 \times \$16$ o.e. (\$) 13.6(0) c.a.o.	M1 A1 (2)	[\$16 – 0.15 $\times$ \$16] ww2
	(e)	$\frac{100}{125} \times \$10$ o.e. (\$) 8	M1 A1 (2)	ww2
		TOTAL	12	
2	(a)	$120^2 = 77^2 + 55^2 - 2.55.77 \cos x$ $\cos x = \frac{77^2 + 55^2 - 120^2}{2.55.77}$ or - $\frac{5446}{8470} = \cos x = -0.64(29752)$ s.o.i. (-0.643) $x = 130(.0)$	M1 M1 A1 A1 (4)	Implied by next line Implied by correct answer which rounds to 130° Scale drawing $\Rightarrow$ M0. ww $\Rightarrow$ SC2
	(b)	$\sin y = \frac{55 \sin 45^\circ}{60}$ $\sin y = 0.648 (1812)$ s.o.i. $y = 40.4$	M2 A1 A1 (4)	If not scored, allow M1 for correct implicit eqtn Implied by answer 40° after some working Accept more accuracy but not less. www4 ($40.39^\circ - 40.41^\circ$; 40° ww $\Rightarrow$ SC2)
	(c)	(i) 225° (ii)* 275°	B2 B2 $\checkmark$ (4)	Correct method seen <u>OR</u> answer $222-224^\circ$, allow Sc1 $\checkmark 405^\circ$ – their x (provided $< 360^\circ$). Answer $291-293^\circ$, allow SC1
		TOTAL	12	

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3	(a)		B1 B1 B1 (3)	Accept percentages or fractions but not ratios
	(b)	(i) 0.4×0.65 <u>ONLY</u> 0.26 c.a.o. (ii)* <u>Either</u> $0.4 \times 0.35\sqrt{}$ <u>or</u> $0.6\sqrt{} \times 0.45$ $0.4 \times 0.35\sqrt{} + 0.6\sqrt{} \times 0.45$ <u>ONLY</u> 0.41 c.a.o. (iii)* <u>Either</u> $1 - (.6\sqrt{} \times .55\sqrt{})$ <u>or</u> $.26 + .14\sqrt{} + .27\sqrt{}$ 0.67 c.a.o.	M1 A1 M1 M1 A1 M1 A1 (7)	www2 Accepting their $\sqrt{}$ values for M marks www3 www2
	(c)	(i) 18 c.a.o. (ii) $12 \div (\text{his } 18 + 6)$ o.e. 30 c.a.o.	B1 M1 A1 (3)	SC1 for 34.3 after 18 in (c) (i)
	(d)	(i) 22.5 (ii)* Realises probability "STOP. STOP" 0.33	B1 M1 dep. A1 $\sqrt{}$ (3)	Accept 22min 30sec Implied by correct answer after correct work. Dep. On 18 and 22.5 (approx.) $\sqrt{1 - \text{their (b) (iii)}}$ or $(\text{their } 0.6) \times (\text{their } 0.55)$
		TOTAL	16	
4	(a)	Scales correct 9 points correctly plotted (1mm) Reasonable curve through 9 points	S1 P3 C1 $\sqrt{}$ (5)	$-4 \leq x \leq 4$ and $-8 \leq y \leq 8$ Allow P2 for 7 or 8 correct, P1 for 5 or 6 correct $\sqrt{}$ provided shape maintained, curvature OK and <u>not</u> ruled
	(b)	$-3.6 \leq x \leq -3.3, x = 0, 3.3 \leq x \leq 3.6$	B2 (2)	Allow B1 for 1 correct non-zero solution; condone $(-3.5, 0)$ (answers must be in range <u>and</u> correct for their graph)
	(c)	Line from $(-4, -3)$ to $(4, 5)$, and ruled	B2 (2)	If B0, allow B1 for gradient 1 <u>or</u> intercept 1 on single line
	(d)	$g(1) = 2$ $fg(1) = -8$ $g^{-1}(4) = 3$ $3.75 \leq x \leq 3.9$	B1 B1 B1 B1 (4)	Not $(1, 2)$ Lost if y-coordinate given. Answer must be OK for their graph

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	(e)	Tangent drawn at $x = 3$ on curve Vert./Horiz. using scale Answer in range 5-10 and OK for theirs	B1 M1 A1 (3)	Not chord or daylight Dep. on reasonable approx to tangent used at $x = 3$ (N.B. Gradient = 4.5 + y-value of tangent at $x = 4$)
		TOTAL	16	
5	(a)	$\frac{1}{2} 10 \cdot 10 \cdot \sin 60^\circ$ o.e. 43.3 cm² or $25\sqrt{3}$	M1 A1 (2)	Any complete method including $\sqrt{15.5.5.5}$ ww2
	(b)	$2\pi r = 10$ s.o.i. $r = 1.59$ (15494cm)	M1 A1 (2)	Accept $\pi D = 10$ ww2
	(c)	(i) Tetrahedron or Triangular Pyramid 4 (his (a)) * 173(.2cm²) or $100\sqrt{3}$ (ii) Cylinder Uses π (any r)² × 10 <u>ONLY</u> Uses π (his (b))² × 10 Correct or $\sqrt{}$ in range 79.35-79.65cm³ (iii) Cone  Appreciates hypotenuse = 10 $h = \sqrt{10^2 - (his(b))^2}$ 9.87(25362cm)	B1 M1 $\sqrt{A1}$ (3) B1 M1 M1 dep. A1 (4) B1 M1 M1 A1 (4)	If not his (a) then correct Δ area method needed $\sqrt{4}$ (a) to 3s.f. Accept circular (based) prism <u>Not</u> $2\pi r^2 10$ or any other modifications Implies M2 Accept circular/round (based) pyramid e.g. right-angled Δ drawn or $\cos$ $x = \frac{\dots}{10}$
		TOTAL	15	
6	(a)	$2x(x + 4)(x + 1)$ (cm³) $2x^3 + 10x^2 + 8x$ (cm³)	B1 B1 (2)	Must see this. Ignore further <u>correct</u> work.

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	(b)	$2x - 2, x + 2, x$ Internal volume = $2x^3 + 2x^2 - 4x$ Wood = his (a) – his(Int. Vol.) Correctly simplifies to $8x^2 + 12x$	B3 B1 M1 A1 (6)	B1 each correct answer, any order <u>but in this form</u> (Both could be wrong) No errors
	(c)	(i) $\left. \begin{array}{l} 8x^2 + 12x = 1980 \\ 2x^2 + 3x - 495 = 0 \end{array} \right\}$ $\frac{p \pm \sqrt{q}}{r} \text{ form} \Rightarrow p = -3 \text{ and } r = 4 \text{ or}$ 2×2 $\Downarrow$ $\Rightarrow q = 3^2 - 4 \cdot 2 - 495$ $\Rightarrow x = 15 \quad \text{www}$ $\Rightarrow x = -16.5 \text{ or } -\frac{33}{2} \quad \text{www}$	B1 (1) B1 B1 B1 B1 (4)	No error seen. Needs = 0 Alt. method B2 $(x - 15)(2x + 33)$ or SC1 for sign error(s) in brackets Or $q = 3969$ or $\sqrt{q} = 63$. Allow for $p \mp \frac{\sqrt{q}}{r}$ If factorising method used, answers only score if correct <u>and</u> from correct bracket
		(ii) Uses +ve answer * 30 by 19 by 16	B1 √B1 (2)	Rejects –ve solution explicitly or implicitly √2(his), (his) + 4, (his) + 1
		TOTAL	15	
7	(a)	(i) $\overrightarrow{OS} = 3\mathbf{a}$ www (ii) $\overrightarrow{AB} = \mathbf{b} - \mathbf{a}$ www (iii) $\overrightarrow{CD} = \mathbf{a}$ www (iv) $\overrightarrow{OR} = 2\mathbf{a} + 2\mathbf{b}$ www (v) $\overrightarrow{CF} = 2\mathbf{a} - 2\mathbf{b}$ www	B1 B1 B1 B2 B2 (7)	 If B0, allow SC1 for correct but unsimplified seen If B0, allow SC1 for correct but unsimplified seen
	(b)	(i) $ \mathbf{b} = 5$ (ii) $ \mathbf{a} - \mathbf{b} = 5$ www	B1 B1 (2)	

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	(c)	(i) Enlargement , S.F. 3, Centre <i>O</i>	B2	Allow SC1 for Enlargement or (S.F. 3 <u>and</u> Centre <i>O</i>)
		(ii) Reflection In line CF o.e.	M1 A1 (4)	} SC1 for 'Mirrored in CF' o.e.
	(d)	(i) 6 c.a.o.	B1	
		(ii) 60°	B1 (2)	
		TOTAL	15	
8	(a)	(i) \$60-80 (ii) Midpoints 10, 30, 50, 70, 90 + 120 Σfx attempted (12880) $\Sigma fx \div 200$ Final answer \$64.40 c.a.o.	B1 M1 M1* M1 A1 (5)	Needs at least 4 correct s.o.i. Dep. on previous M1 or their midpoints ± 0.5 Dep. on M1* Needs 2 d.p., www4 (64.4 $\Rightarrow$ M3 AO)
	(b)	(i) ($\leq$)20, ($\leq$)40, ($\leq$)60, ($\leq$)80, ($\leq$)100, ($\leq$)140 10, 42, 90, 144, 180, 200 (ii) Scales correct and labelled or used to 140 and 200 6 plots correct (20, 10) $\rightarrow$ (140, 200) Graph from (0, 0), line or curve	B1 B1 S1 P2 C1 (6)	<u>Not</u> for $\frac{20-40}{42}$ type Vert. 20cm $\equiv$ 200 and Horiz. $\equiv$ 14cm 140. Reversed axes SO P1 for 4 or 5 correct. 1mm accuracy Through all 6 points. Dep. on P1
	(c)	(i) Median (\$63-64 (ii) U.Q. (\$82-84 (iii) IQR (\$38-41 (iv) Using \$75 reading on Cum. Freq. Graph – 67 or 68 or 69 or 70 or 71 or 72	B1 B1 B1 M1 A1 (5)	<u>All</u> answers in (c) must <u>also</u> be correct for their graph (1mm) e.g. answer 130 implies this Must be integer answer and OK for their graph
		TOTAL	16	
9	(a)	Diagram 1 $\Rightarrow$ 25% c.a.o. Diagram 2 $\Rightarrow$ 12½% o.e. Diagram 3 $\Rightarrow$ 37½% o.e. Diagram 4 $\Rightarrow$ 60% o.e.	B1 B2 B2 B2 (7)	<u>For whole section reversed (a)</u> <u>or (b)</u> , treat as MR-1 per section For Diagrams 2-4 accept non% equivalents Also in each case if 2 not scored, allow SC1 if correct idea seen (e.g. $\frac{1}{2}h \div 4h$ for Diagram 2)

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	(b)	Diagram 5 $\Rightarrow$ 1/9 o.e. fraction Diagram 6 $\Rightarrow$ 1/25 o.e. Diagram 7 $\Rightarrow$ 5/9 o.e.	B1 B2 B3 (6)	In Diagrams 6 and 7, accept non-fraction equivalents. If B0, allow SC1 for $(\pi)5^2$ seen If B0, allow SC1 for $(k\pi)2^2$ and SC1 for $(k\pi)3^2$ seen ($k = 1$ or $x/360$) N.B. 4π <u>must</u> be from $\pi 2^2$ and not $2\pi 2$
		TOTAL	13	
		FINAL TOTAL	130	