CAMBRIDGE
INTERNATIONAL EXAMINATIONS

June 2003

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 130

SYLLABUS/COMPONENT: 0580/04, 0581/04

MATHEMATICS

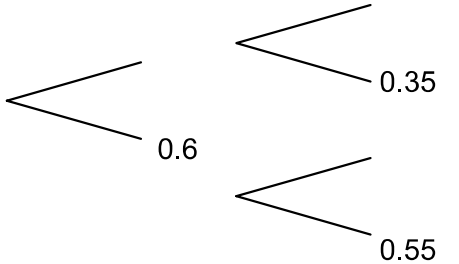
Paper 4 (Extended)

UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate

Page 1	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – JUNE 2003	0580/0581	4

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. $1^{st} \times 10$ **and** subtraction. Condone **arith**. error (available on wrong eqtns provided coefficients not equal.) or 220 $10 tickets or 99 $16 tickets (ww Correct answer ⇒ M1)
	(d)	$0.85 \times \$16$ o.e. **($)13.6(0)** c.a.o.	M1 A1 (2)	[$16 – 0,15 × $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 ⇒ M0. ww ⇒ **SC2**
	(b)	$\sin y = \frac{55 \sin 45^o}{60}$ $\sin y = 0.648$ (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° – 40.41°; 40°ww ⇒ **SC2**)
	(c)	**(i) 225°** **(ii)* 275°**	B2 B2 √ (4)	Correct method seen OR answer 222-224°, allow Sc1 √ 405° – their x (provided < 360°). Answer 291-293°, allow **SC1**
		TOTAL	**12**	

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

	(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)**	½ 10.10.sin60° 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)$^2 \times 10$ ONLY Uses π (his **(b)**)$^2 \times 10$ **Correct or √ in range 79.35-79.65cm³** **(iii) Cone** 10, h, r Appreciates hypotenuse = 10 $h = \sqrt{10^2 - (his(b))^2}$ **9.87**(25362cm)	B1 M1 √A1 (3) B1 M1 M1 dep. A1 (4) B1 M1 M1 A1 (4)	If not his **(a)** then correct Δ area method needed √4 **(a)** to 3s.f. Accept circular (based) prism Not $2\pi r^2 10$ or any other modifications Implies M2 Accept circular/round (based) pyramid e.g. right-angled Δ drawn or cos $x = \frac{\ldots}{10}$
		TOTAL	**15**	
6	**(a)**	**$2x(x + 4)(x + 1)$ (cm³)** **$2x^3 + 10x^2 + 8x$ (cm³)**	B1 B1 (2)	Must see this. Ignore further correct work.

	(b)	**$2x - 2$, $x + 2$, x**	B3	B1 each correct answer, any order but in this form
		Internal volume = $2x^3 + 2x^2 - 4x$	B1	
		Wood = his **(a)** – his(Int. Vol.)	M1	(Both could be wrong)
		Correctly simplifies to $8x^2 + 12x$	A1 (6)	**No** errors
	(c)	**(i)** $8x^2 + 12x = 1980$ $2x^2 + 3x - 495 = 0$ }	B1 (1)	No error seen. Needs = 0
		$\frac{p \pm \sqrt{q}}{r}$ form $\Rightarrow p$ = -3 **and** r = 4 **or**		
		2×2	B1	Alt. method B2 $(x - 15)(2x + 33)$ or **SC1** for sign error(s) in brackets
		$\Downarrow$		
		$\Rightarrow$ $q = 3^2 - 4.2 - 495$	B1	Or q = 3969 or $\sqrt{q}$ = 63. Allow for $p \mp \frac{\sqrt{q}}{r}$
		$\Rightarrow$ x = **15** www	B1	If factorising method used, answers only score if correct and from correct bracket
		$\Rightarrow$ x = -16.5 **or** $-33\frac{1}{2}$ www	B1 (4)	
		(ii) Uses +ve answer	B1	Rejects –ve solution explicitly or implicitly
		* **30** by **19** by **16**	√B1 (2)	√2(his), (his) + 4, (his) +1
		TOTAL	**15**	
7	**(a)**			
		(i) $\overrightarrow{OS}$ = **3a** www	B1	
		(ii) $\overrightarrow{AB}$ = **b – a** www	B1	
		(iii) $\overrightarrow{CD}$ = **a** www	B1	
		(iv) $\overrightarrow{OR}$ = **2a + 2b** www	B2	If B0, allow **SC1** for correct but unsimplified seen
		(v) $\overrightarrow{CF}$ = **2a – 2b** www	B2 (7)	If B0, allow **SC1** for correct but unsimplified seen
	(b)	**(i)** **$\|b\|$ = 5**	B1	
		(ii) **$\|a - b\|$ = 5** www	B1 (2)	

	(c)	**(i)** **Enlargement**, S.F. **3**, Centre *0*	B2	Allow **SC1** for Enlargement **or** (S.F. 3 and Centre *0*)
		(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**	B1	
		(ii) Midpoints **10, 30, 50, 70, 90 + 120**	M1	Needs at least 4 correct s.o.i.
		Σfx attempted (12880)	M1*	Dep. on previous M1 or their midpoints ± 0.5
		$\Sigma fx \div 200$	M1	Dep. on M1*
		Final answer **\$64.40** c.a.o.	A1 (5)	Needs 2 d.p., www4 (64.4 ⇒ M3 AO)
	(b)	**(i)** (≤)20, (≤)40, (≤)60, (≤)80, (≤)100, (≤)140	B1	Not for $\frac{20-40}{42}$ type
		10, 42, 90, 144, 180, 200	B1	
		(ii) Scales correct and labelled or used to 140 and 200	S1	Vert. 20cm ≡ 200 and Horiz. ≡ 14cm 140. Reversed axes SO
		6 plots correct (20, 10) → (140, 200)	P2	P1 for 4 or 5 correct. 1mm accuracy
		Graph from (0, 0), line or curve	C1 (6)	Through all 6 points. Dep. on P1
	(c)	**(i)** Median **(\$)63-64**	B1	All answers in **(c)** must also be correct for their graph (1mm)
		(ii) U.Q. **(\$)82-84**	B1	
		(iii) IQR **(\$)38-41**	B1	
		(iv) Using \$75 reading on Cum. Freq. Graph –	M1	e.g. answer 130 implies this
		67 or 68 or 69 or 70 or 71 or 72	A1 (5)	Must be integer answer and OK for their graph
		TOTAL	**16**	
9	**(a)**	Diagram 1 ⇒ **25%** c.a.o.	B1	For whole section reversed **(a)** or **(b)**, treat as MR-1 per section
		Diagram 2 ⇒ **12½%** o.e.	B2	For Diagrams 2-4 **accept** non% equivalents
		Diagram 3 ⇒ **37½%** o.e.	B2	Also in each case if 2 not scored, allow **SC1** if correct idea seen (e.g. ½*h* ÷ 4*h* for Diagram 2)
		Diagram 4 ⇒ **60%** o.e.	B2 (7)	

	(b)	Diagram 5 ⇒ **1/9** o.e. **fraction** Diagram 6 ⇒ **1/25** o.e. Diagram 7 ⇒ **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 must be from $\pi 2^2$ and not $2\pi 2$
		TOTAL	**13**	
		FINAL TOTAL	**130**	