June 2004

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 130

SYLLABUS/COMPONENT: 0580/04, 0581/04

MATHEMATICS

Paper 4 (Extended)

UNIVERSITY *of* CAMBRIDGE
International Examinations

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Q1(a)(i)	$\underline{60} \times 120$ 100 o.e.	**M1**	Implied by 72 seen and not spoilt.
	($) 132 c.a.o.	**A1**	ww2
(ii)	$\dfrac{\text{their(a)(i)}}{120} \times 100$ o.e.	**M1**	
	110(%) Final answer, but may be explained using 10.	**A1 √**	$\sqrt{}$ **ft** $\dfrac{\text{their (a)(i)}}{120} \times 100$ **Sc1** for 10 <u>or</u> their extra % <u>or</u> $\dfrac{\text{their(a)(i)} - 120}{120} \times 100$
(b)	$\dfrac{159.10 \,(\times 100)}{\text{their } 86}$ o.e.	**M1**	
	($) 185 c.a.o.	**A1**	Allow any statement that equates 159.10 with 86% provided it is not contradicted later.
(c)	$\dfrac{156 \times 52}{169}$ o.e.	**M1**	ww2
	48(cm) c.a.o.	**A1**	**Alt. Method** $\dfrac{156}{156+169} = \dfrac{x}{x+52}$ o.e.
(d)(i)	$\dfrac{11 \times 36}{20}$ o.e.	**M1**	ww2
	19.8(km) c.a.o.	**A1**	Method not spoilt by also doing $\dfrac{9 \times 36}{20}$
(ii)	$36 \times \dfrac{23}{2}$ o.e.	**M1**	ww2 Condone 19.8:16.2 16.2:19.8 is M1A0
	414(km) c.a.o.	**A1**	ww2 **12**
Q2(a)(i)	**p = 9 q = −3 r = 9**	**1+1+1**	Must be seen. No feedback from graph.
(ii)	Scales correct	**S1 √**	x from −3 to 4. y to accommodate their values.
	Their 8 points plotted correctly (1mm)	**P2 √**	**P1 √** for 6 or 7 of their points correct.
	Reasonable curve through all 8 of their points (1mm tolerance)	**C1 √**	Condone ruled line for $x = 3$ to 4 or −3 to −2. **ft** provided correct shape maintained.
(iii)	Tangent drawn at $x = −1$ on curve **−3.5**	**T1**	**Or** a parallel line drawn.
	to −2.5 Condone fractions	**B2**	If **B2** not scored, give **B1** for 2.5 to 3.5 after M1.
(b)(i)	**u = 6.33 or better v = 6**	**1+1**	Allow $u = 19/3$
(ii)	Their 6 points plotted correctly (1mm)	**P3 √**	**P2** for 5 correct (√). **P1** for 4 correct (√).
	Reasonable curve through all 6 of their points (1mm tolerance)	**C1 √**	Condone ruled line for $x = 2$ to 3. **ft** provided correct shape maintained
(c)(i)	$x^2 − x − 3 = 6 − x^3/3$ o.e. to $x^3 + 3x^2 −3x −27 = 0$	**E1**	At least 1 intermediate step and no errors seen.
(ii)	**2.3 to 2.7** c.a.o.	**B1**	<u>Not</u> coordinates **18**
Q3(a)(i)	Median **36 to 37 (cm)**	**B1**	
(ii)	IQR **19 to 21 (cm)**	**B2**	**Sc1** for 45.5 to 46.5 <u>or</u> 25.5 to 26.5 seen.
(iii)	Evidence of using 146 (approx)	**M1**	
	32 to 33 (cm)	**A1**	ww2
(iv)	**275 to 281**	**B2**	**Sc1 for 84 to 90 seen**
(b)(i)	**350 − 303**	**B1**	
	365 −350	**B1**	
(ii)	Midpoints **5,15,25,35,45,55,65**	**M1**	At least 6 correct s.o.i.
	Σfx attempted (13065)	**M1***	Dep. on first M1 <u>or</u> using midpoints ±0.5
	Σfx / 365	**M1**	Dep. on second M1*
	35.8 or 36 or 35.79 www	**A1**	www4 [35.79452055]
(c)	**2.9 (cm)** c.a.o	**B1**	ISW subsequent rounding to 3 or 5 once seen.
	Evidence of dividing by 30 o.e	**M1**	eg a factor of 1.5 used constructively.
	4.9 (cm) c.a.o..	**A1**	**16**

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Q4(a)	$(AC^2 =) 9.5^2 + 11.1^2 - 2 \times 9.5 \times 11.1 \cos 70$	M2	Allow **M1** for $\dfrac{9.5^2 + 11.1^2 - AC^2}{2 \times 9.5 \times 11.1} = \cos 70$
	square root of correct combination (141.3279…) or 11.888…	M1	Dep. on previous M2. Must be convinced that errors are due to slips <u>not</u> incorrect combination.
	11.9 (cm)	A1	www4 Scale drawing gets M0A0.
(b)	(Opp. angles of) **cyclic quadrilateral** (add to 180)	B1	Condone $180 - 70 = 110$ o.e. (not spoilt)
(c)	$70 - 37$ attempted s.o.i.	M1	e.g. 32 or 34 or 43, but be convinced.
	$\dfrac{AD}{\sin 33} = \dfrac{their(a)}{\sin 110}$ o.e.	M1	Dep. on first M1
	$(AD=) \dfrac{their\ (a) \times \sin 33}{\sin 110}$	M1	Dep. on M2 Would imply M3 if nothing incorrect seen earlier.
	art 6.89 or 6.90 (cm)	A1	Condone 6.9 www4 Scale drawing gets M0A0
(d)(i)	**70**	B1	If not 70, ft for method in (ii), but not from 90 or60
(ii)	$(h =) \dfrac{their(a) \times \tan 55}{2}$ or $\dfrac{their(a)}{2 \times \tan 35}$ $(8.497..)$	M1	$(EC\ or\ EA=) \dfrac{their(a)}{2 \sin 35}$ **or** $\dfrac{their(a)}{2 \cos 55}$ $(10.37…)$
	$(area =) 0.5 \times their(a) \times their(h)$ o.e.	M1	Dep. on first M1 $(area =) 0.5 \times EC \times EA \times \sin 70$ <u>**or**</u> Hero's Method
	50.4 to 50.8 (cm²)	A1	www3 **13**

Q5(a)	$10/x$ or $10 \div x$ o.e.	B1	**Ignore all units in answers to Question 5.** Not $x = 10/x$
(b)	$\dfrac{10}{x} - \dfrac{10}{x+1} = \dfrac{1}{2}$ o.e.	M2	Condone 30 for ½ If M0 give **Sc1** for $\dfrac{10}{x+1}$ s.o.i.
	$20(x+1) - 20x = x(x+1)$ o.e.	MA1	Dep on M2. No longer condoning 30 o.e. **Sc1** for $20x - 20(x+1) = x(x+1)$ o.e. after B1Sc1
	$x^2 + x - 20 = 0$	E1	No error of any kind at any stage <u>and</u> sufficient working to convince you (at least 1 extra step)
(c)	$(x+5)(x-4)$ $(= 0)$	M1	$\dfrac{-1 \pm \sqrt{[1^2 - 4.1.(-20)]}}{2}$ No errors or ambiguities
	−5 <u>and</u> 4 c.a.o.	A1	www2
(d)	Rejects negative solution	R1	May be explicit or implicit and could be in (c)
	2.5 (hours) c.a.o.	B1	Condone 2 hrs 30 (mins) or 150 mins
			9

PMT

Q6(a)(i)	$\dfrac{2 \times \pi \times 7^3}{3}$ + $\dfrac{\pi \times 7^2 \times 13}{3}$	M1	
	1384.7 to 1386 or 1380 or 1390 (cm³)	A1	www2
(ii)	their(a)(i) x 0.94	M1	
			√ ft $\dfrac{\text{their(a)(i) x 0.94}}{1000}$
	1.3 (kg)	A2√	www3 If A2 not scored, allow **A1** √ for 1.30…
(b)	(L =) √(13² + 7²)	M1	Implied by √218 or 14.7….. or 14.8
	π x 7 x theirL	M1	Dep. on first M1.
	324 to 326 (cm²)	A1	www3
(c)	CSA of hemisphere=2 x π x 7² s.o.i.	M1	307.7 to 308 if no working
	their(b) + their CSA	M1	Dep. on first M1
	631.7 to 634	A1	Seen or implied by subsequent working.
	411.58 s.o.i.	M1	Dep. on a total
	their total		
	($)0.649 to 0.652 or 64.9 to 65.2 cents	A1	www5 **13**
			NB M1M1A0M1A1 is not possible.
Q7(a)(i)	Venn Diagram with **12, 8, 7, 3**	B2	-1 each error/omission. Condone lack of labels.
	or with **20 – x, x, 15 – x, 3**		
(ii)	**8**	B1√	√ ft their 8 on diagram, but not x
(iii)	$\dfrac{12}{30}$ o.e	B2√	√ ft (their 12)/30 from (i) or (ii)
			Sc1 for k/30 where k < 30
(iv)	$\dfrac{12}{20}$ o.e.	B2√	√ ft (their 12)/20 from (i) or (ii) if their12<20
			Sc1 for m/20 where m < 20
(b)(i)	3/9 x 4/10	M1	**In all of Q7,** accept fractions, decimals or %.
	$\dfrac{12}{90}$ o.e. c.a.o.	A1	Mark as ISW for wrong cancelling. Dec. or % need to be exact or accurate to 3 sf. **No ratios.** Other inappropriate notation is −1 once.
(ii)	1 – their(b)(i)	M1	**or** 6/9 x 6/10 + 6/9 x 4/10 + 3/9 x 6/10
	$\dfrac{78}{90}$ o.e. c.a.o.	A1√	√ ft 1 – their (b)(i)
(iii)	5/8 **or** 5/9 seen	M1	
	6/9 x 5/8 x 6/10 x 5/9 seen	M1	
	$\dfrac{900}{6480}$ o.e. c.a.o.	A1	Allow a slip in 1 digit, but must use 4 fractions multiplied.
			Simplest 5/36
(iv)	p(4 blacks) 3/9 x 2/8 x 4/10 x 3/9 (=1/90)	M1	**Alt. method**. Must see all 14 combinations.
	1 – their(b)(iii) – their p(4 blacks)	M1	Dep. on first M1. Must add them
	$\dfrac{5508}{6480}$ o.e. c.a.o.	A1	
			Simplest 17/20 **17**

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			"**only**" --- no other transformation mentioned. Ignore all matrices, except in (v).
Q8(a)(i)	**Rotation** (only)	**B1**	Do not allow "turn" for rotation
	90 (anticlockwise)(about O) or ¼ turn	**B1**	Accept 270 <u>clockwise</u> or –270
(ii)	**Translation** (only)	**B1**	<u>Not</u> translocation,transformation,transportation.
	$\begin{pmatrix} -2 \\ -5 \end{pmatrix}$ o.e.	**B1**	eg 2 to left and 5 down. Condone (–2 -5) and lack of brackets.
(iii)	**Reflection** (only)	**B1**	
	$y = -x$ o.e.	**B1**	
(iv)	**180** (or ½ turn) **Rotation** (only)	**B1**	Enlargement sf= –1 earns **B2**
	Centre (1, –1)	**B1**	**Sc1** for "Point Symmetry"
(v)	**Enlargement** (only)	**B1**	Accept 2 0 for scale factor 2
	Scale Factor 2 (centre O)	**B1**	0 2
(vi)	**Shear** (only)	**B1**	
	y axis invariant <u>or</u> parallel to y axis	**B1**	Ignore any mention of scale factor.
(b)	**B**	**B2**	
(c)(i)	$\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$	**B2**	**Sc1** for a correct column
(ii)	$\begin{pmatrix} 1 & 0 \\ 1 & 1 \end{pmatrix}$	**B2**	**Sc1** for a correct column
			18
Q9 (a)	**15x + 25y ≤ 2000** seen	**B1**	Allow 0.15x + 0.25y ≤ 20 but no others.
(b)	**y ≤ x** o.e. c.a.o.	**B2**	**Sc1** for any other sign between x and y
(c)	**y ≥ 35** o.e. c.a.o.	**B1**	
(d)(i)	Scales correct and full length.	**S1**	Reversed scales S0
(ii)	**3x + 5y = 400** correct (1mm) at (0,80) and (100,20) <u>and</u> long enough.	**B2**	**Sc1** for either point correct.
	y = x correct	**L1**	
	y = 35 correct	**L1**	
	Shading correct (in **or** out)	**B1** √	√ **ft** from slips in lines that do not compromise the idea of the triangle.
(e)	**38** c.a.o.	**B1**	
(f)	Identifying any point(s) in **their area** (enclosed by 3 lines or 3 lines and 1 axis).	**M1**	
	(75 , 35) s.o.i. c.a.o.	**A1**	Implies M1
	(\$) 6.2(0) or 620 (cents)	**B1** √	√ **ft** their (75, 35) evaluated for whole numbers only. Condone lack of units but not wrong units. www3 **14**