

June 2004

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 130

SYLLABUS/COMPONENT: 0580/04, 0581/04

MATHEMATICS

Paper 4 (Extended)



Page 1	Mark Scheme	Syllabus	Paper
	MATHEMATICS – JUNE 2004	0580/0581	4

Q1(a)(i)	$\frac{60}{100} \times 120$	o.e.	M1	Implied by 72 seen and not spoilt.
	(S) 132	c.a.o.	A1	ww2
	(ii) $\frac{\text{their(a)(i)} \times 100}{120}$	o.e.	M1	$\sqrt{\text{ft } \frac{\text{their(a)(i)} \times 100}{120}}$
	110(%) Final answer, but may be explained using 10.		A1 $\sqrt{}$	Sc1 for 10 <u>or</u> their extra % <u>or</u> $\frac{\text{their(a)(i)} - 120}{x100}$
	(b) $\frac{159.10}{\text{their } 86} (x100)$	o.e.	M1	120 Allow any statement that equates 159.10 with 86% provided it is not contradicted later.
	(S) 185	c.a.o.	A1	
	(c) $\frac{156}{169} \times 52$	o.e.	M1	ww2 Alt. Method $\frac{156}{156+169} = \frac{x}{x+52}$ o.e.
	(d)(i) 48(cm)	c.a.o.	A1	
	$\frac{11}{20} \times 36$	o.e.	M1	ww2 Method not spoilt by also doing $\frac{9}{20} \times 36$
	(ii) 19.8(km)	c.a.o.	A1	
Q2(a)(i)	$36 \times \frac{23}{2}$	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)		1+1+1	Must be seen. No feedback from graph.
	(ii) Scales correct		S1 $\sqrt{}$	x from -3 to 4 . y to accommodate their values.
	Their 8 points plotted correctly (1mm)		P2 $\sqrt{}$	P1 $\sqrt{}$ for 6 or 7 of their points correct.
	Reasonable curve through all 8 of their points (1mm tolerance)		C1 $\sqrt{}$	Condone ruled line for $x = 3$ to 4 or -3 to -2 .
	(iii) Tangent drawn at $x = -1$ on curve -3.5 to -2.5 Condone fractions		T1	ft provided correct shape maintained.
			B2	Or a parallel line drawn.
				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 $u = 19/3$
Q3(a)(i)	(ii) Their 6 points plotted correctly (1mm)		P3 $\sqrt{}$	P2 for 5 correct ($\sqrt{}$). P1 for 4 correct ($\sqrt{}$). Condone ruled line for $x = 2$ to 3 .
	Reasonable curve through all 6 of their points (1mm tolerance)		C1 $\sqrt{}$	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	Not coordinates 18
	Q3(a)(i)		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
Q3(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.
	$\sum fx$ attempted (13065)		M1*	Dep. on first M1 <u>or</u> using midpoints ± 0.5
	$\sum fx / 365$		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

Page 2	Mark Scheme	Syllabus	Paper
	MATHEMATICS – JUNE 2004	0580/0581	4

Q4(a)	$(AC^2 =) 9.5^2 + 11.1^2 - 2 \times 9.5 \times 11.1 \cos 70$ square root of correct combination (141.3279...) or 11.888... 11.9 (cm)	M2	Allow M1 for $\frac{9.5^2 + 11.1^2 - AC^2}{2 \times 9.5 \times 11.1} = \cos 70$
(b)	(Opp. angles of) cyclic quadrilateral (add to 180)	M1	Dep. on previous M2. Must be convinced that errors are due to slips <u>not</u> incorrect combination.
(c)	70 – 37 attempted s.o.i. $\frac{AD}{\sin 33} = \frac{\text{their}(a)}{\sin 110}$ o.e. (AD =) $\frac{\text{their}(a) \times \sin 33}{\sin 110}$ art 6.89 or 6.90 (cm)	A1	www4 Scale drawing gets M0A0.
(d)(i)	70	B1	Condone $180 - 70 = 110$ o.e. (not spoilt)
(ii)	(h =) $\frac{\text{their}(a) \times \tan 55}{2}$ or $\frac{\text{their}(a)}{2 \tan 35}$ (8.497...) o.e. (area =) $0.5 \times \text{their}(a) \times \text{their}(h)$ o.e. 50.4 to 50.8 (cm²)	M1	e.g. 32 or 34 or 43, but be convinced. Dep. on first M1
		M1	Dep. on M2 Would imply M3 if nothing incorrect seen earlier.
		A1	Condone 6.9 www4 Scale drawing gets M0A0
		B1	If not 70, ft for method in (ii), but not from 90 or 60
		M1	(EC or EA =) $\frac{\text{their}(a)}{2 \sin 35}$ or $\frac{\text{their}(a)}{2 \cos 55}$ (10.37...)
		M1	Dep. on first M1 (area =) $0.5 \times EC \times EA \times \sin 70$ <u>or</u> Hero's Method
		A1	www3 13
Q5(a)	10/x or 10 ÷ x o.e.	B1	Ignore all units in answers to Question 5. Not $x = 10/x$
(b)	$\frac{10}{x} - \frac{10}{x+1} = \frac{1}{2}$ o.e. $20(x+1) - 20x = x(x+1)$ o.e. $x^2 + x - 20 = 0$	M2	Condone 30 for $\frac{1}{2}$ If M0 give Sc1 for $\frac{10}{x+1}$ s.o.i.
		MA1	Dep on M2. No longer condoning 30 o.e. Sc1 for $20x - 20(x+1) = x(x+1)$ o.e. after B1Sc1
		E1	No error of any kind at any stage <u>and</u> sufficient working to convince you (at least 1 extra step)
(c)	$(x+5)(x-4) (= 0)$ -5 and 4 c.a.o.	M1	$\frac{-1 \pm \sqrt{1^2 - 4.1.(-20)}}{2}$ No errors or ambiguities
		A1	www2
(d)	Rejects negative solution 2.5 (hours) c.a.o.	R1 B1	May be explicit or implicit and could be in (c) Condone 2 hrs 30 (mins) or 150 mins

Page 3	Mark Scheme	Syllabus	Paper
	MATHEMATICS – JUNE 2004	0580/0581	4

Q6(a)(i)	$\frac{2 \times \pi \times 7^3}{3} + \frac{\pi \times 7^2 \times 13}{3}$	M1	
	1384.7 to 1386 or 1380 or 1390 (cm ³)	A1	www2
	(ii) their(a)(i) x 0.94	M1	
	1.3 (kg)	A2√	√ ft $\frac{\text{their(a)(i)} \times 0.94}{1000}$ www3 If A2 not scored, allow A1 √ for 1.30...
(b)	(L =) $\sqrt{13^2 + 7^2}$	M1	Implied by $\sqrt{218}$ or 14.7..... or 14.8
	$\pi \times 7 \times \text{theirL}$ 324 to 326 (cm ²)	M1 A1	Dep. on first M1. www3
(c)	CSA of hemisphere = $2 \times \pi \times 7^2$ 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.
	$\frac{411.58}{\text{their total}}$ s.o.i.	M1	Dep. on a total
	(\$) <u>0.649 to 0.652 or 64.9 to 65.2 cents</u>	A1	www5 NB M1M1A0M1A1 is not possible. 13
Q7(a)(i)	Venn Diagram with 12, 8, 7, 3 or with 20 – x, x, 15 – x, 3	B2	-1 each error/omission. Condone lack of labels.
(ii)	8	B1√	√ ft their 8 on diagram, but not x
(iii)	$\frac{12}{30}$ o.e.	B2√	√ ft (their 12)/30 from (i) or (ii) Sc1 for k/30 where k < 30
(iv)	$\frac{12}{20}$ o.e.	B2√	√ ft (their 12)/20 from (i) or (ii) if their 12 < 20 Sc1 for m/20 where m < 20
(b)(i)	$\frac{3}{9} \times \frac{4}{10}$	M1	In all of Q7, accept fractions, decimals or %.
	$\frac{12}{90}$ 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) $\frac{78}{90}$ o.e. c.a.o.	M1 A1√	or $\frac{6}{9} \times \frac{6}{10} + \frac{6}{9} \times \frac{4}{10} + \frac{3}{9} \times \frac{6}{10}$ √ ft 1 – their (b)(i)
(iii)	$\frac{5}{8}$ or $\frac{5}{9}$ seen	M1	
	$\frac{6}{9} \times \frac{5}{8} \times \frac{6}{10} \times \frac{5}{9}$ seen $\frac{900}{6480}$ o.e. c.a.o.	M1 A1	Allow a slip in 1 digit, but must use 4 fractions multiplied.
(iv)	p(4 blacks) $\frac{3}{9} \times \frac{2}{8} \times \frac{4}{10} \times \frac{3}{9}$ (=1/90)	M1	Simplest $\frac{5}{36}$
	1 – their(b)(iii) – their p(4 blacks) $\frac{5508}{6480}$ o.e. c.a.o.	M1 A1	Alt. method. Must see all 14 combinations. Dep. on first M1. Must add them
			Simplest $\frac{17}{20}$ 17

Page 4	Mark Scheme	Syllabus	Paper
	MATHEMATICS – JUNE 2004	0580/0581	4

Q8(a)	(i) Rotation (only) 90 (anticlockwise)(about O) or $\frac{1}{4}$ turn	B1 B1	“only” --- no other transformation mentioned. Ignore all matrices, except in (v). Do not allow “turn” for rotation Accept 270 <u>clockwise</u> or –270
	(ii) Translation (only) $\begin{pmatrix} -2 \\ -5 \end{pmatrix}$ o.e.	B1 B1	<u>Not</u> translocation, transformation, transportation. eg 2 to left and 5 down. Condone (–2 –5) and lack of brackets.
	(iii) Reflection (only) $y = -x$ o.e	B1 B1	
	(iv) 180 (or $\frac{1}{2}$ turn) Rotation (only) Centre (1, –1)	B1 B1	Enlargement sf= –1 earns B2 Sc1 for “Point Symmetry”
	(v) Enlargement (only) Scale Factor 2 (centre O)	B1 B1	Accept $\begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$ for scale factor 2
	(vi) Shear (only) y axis invariant <u>or</u> parallel to y axis	B1 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) $15x + 25y \leq 2000$ seen	B1	Allow $0.15x + 0.25y \leq 20$ but no others.
	(b) $y \leq x$ o.e. c.a.o.	B2	Sc1 for any other sign between x and y
	(c) $y \geq 35$ 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. $y = x$ correct $y = 35$ correct	B2 L1 L1	Sc1 for either point correct.
	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). (75, 35) s.o.i. c.a.o. (\$ 6.2(0) <u>or</u> 620 (cents)	M1 A1 B1 ✓	Implies M1 ✓ ft their (75, 35) evaluated for whole numbers only. Condone lack of units but not wrong units. www3
14			