UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the June 2005 question paper

0580/0581 MATHEMATICS

0580/04, 0581/04 Paper 4 (Extended), maximum raw mark 130

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which Examiners were initialy instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the *Report on the Examination*.

- CIE will not enter into discussion or correspondence in connection with these mark schemes.

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UNIVERSITY of CAMBRIDGE
International Examinations

Grade thresholds for Syllabus 0580/0581 (Mathematics) in the June 2005 examination.

	maximum mark available	minimum mark required for grade:			
		A	C	E	F
Component 4	130	93	54	33	n/a

The threshold (minimum mark) for B is set halfway between those for Grades A and C.
The threshold (minimum mark) for D is set halfway between those for Grades C and E.
The threshold (minimum mark) for G is set as many marks below the F threshold as the E threshold is above it.
Grade A* does not exist at the level of an individual component.

TYPES OF MARK

Most of the marks (those without prefixes, and 'B' marks) are given for accurate results, drawings or statements.

- **M** marks are given for a correct method.
- **B** marks are given for a correct statement or step.
- **A** marks are given for an accurate answer following a correct method.

ABBREVIATIONS

a.r.t.	Anything rounding to
b.o.d.	Benefit of the doubt has been given to the candidate
c.a.o.	Correct answer **only** (i.e. no 'follow through')
e.e.o.	Each error or omission
f.t	Follow through
i.s.w.	Ignore subsequent working
o.e.	Or equivalent
SC	Special case
s.o.i.	Seen or implied
ww	Without working
www	Without wrong working
√	Work followed through after an error: no further error made

June 2005

IGCSE

MARK SCHEME

MAXIMUM MARK: 130

SYLLABUS/COMPONENT: 0580/04, 0581/04

MATHEMATICS

Paper 4 (Extended)

UNIVERSITY of CAMBRIDGE
International Examinations

1 (a)	$1.33 \times \frac{5}{7}$ o.e	**M1**	Implied by figures 95 in answer
	950 (kg) c.a.o.	**A2**	A1 for figs 95
(b)	$765 \times \frac{9}{(9+8)}$ o.e.	**M1**	
	($) 405 c.a.o.	**A1**	
(c)	$\frac{\text{their (b)}}{\text{their (a)}}$	**M1**	
	($) 0.43 or ($) 0.426	**A1√**	**f.t**. $\frac{\text{their (b)}}{\text{their (a)}}$ must be in dollars for A mark
(d)(i)	$0.35 \times \frac{60}{100}$ o.e	**M1**	
	($) 0.21 c.a.o.	**A1**	
(ii)	$0.35 \times \frac{100}{125}$ o.e	**M1**	
	($) 0.28 c.a.o	**A1**	0.26(25) is M0
		11	
2			All measurements ±2 mm or ±2 °
(a)	AB = 12cm	**B1**	
(b)	Perp. Bisector with arcs-2 sets for AB	**B2√**	SC1 if accurate without arcs
(c)	Accurate trapezium c.a.o.	**B2**	dep. on B1 in **(a)** and at least SC1 in **(b)**. SC1 for DC = 9cm and parallel to AB
(d)	Strict ft of their angle ABC (±2 º)	**B1√**	
(e)	(tan B =) $\frac{7}{1.5}$	**B1**	or (sinB=) $\frac{7}{\sqrt{(7^2+1.5^2)}}$ or (cosB=) $\frac{1.5}{\sqrt{(7^2+1.5^2)}}$
	77.9 final answer	**B1**	Indep
(f)(i)	Arc, centre D, radius 5 cm	**B1√**	No gaps in the trapezium, but condone extra
(ii)	Bisector of their angle D with arcs	**B2√**	SC1 if accurate without arcs
(iii)	Correct shading c.a.o.	**B1**	dep. on B1 in **(i)** and at least SC1 in **(ii)** and a correct trapezium
		12	

3			If choice of transformations in **(i)**, **(ii)**, **(iii)**, **(iv)** then lose the 1st two B marks in each part e.g. 6 left and 1 up. Condone -6 1
(a)(i)	Translation (only) (T)	**B1**	
	$\begin{pmatrix} -6 \\ 1 \end{pmatrix}$ o.e.	**B1**	
(ii)	Reflection (only) (M)	**B1**	
	in $y = -x$ o.e.	**B1**	must be equation
(iii)	Enlargement (only) (E)	**B1**	
	Centre (0,6)	**B1**	
	Scale factor 3 o.e. seen	**B1**	
(iv)	Shear (H)	**B1**	
	x-axis ($y = 0$) invariant	**B1**	
	(Shear) factor 0.5 o.e. seen	**B1**	
(b)(i)	$\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$ o.e.	**B2**	SC1 for a correct column
(ii)	$\begin{pmatrix} 1 & 0.5 \\ 0 & 1 \end{pmatrix}$ o.e.	**B2**	SC1 for a correct column Allow embedded matrices in both answers
		14	
4 (a)	$p = 0.25$	**B1**	Must be seen. No feedback from graph.
	$q = 1$	**B1**	If not labelled, must be in order
	$r = 8$	**B1**	
(b)	Scales correct	**S1**	x from –2 to 4. y to accommodate their values.
	Their 7 points plotted correctly (within 1mm and in the correct square)	**P3**√	ft P2 for 6 points correct. P1 for 5 points correct.
	Smooth curve through all 7 points (1mm)	**C1**√	ft provided correct shape maintained
(c)	2.75 to 2.85	**B1**	
(d)	0	**B1**	
(e)	Tangent drawn at $x = 1.5$	**T1**	Not a chord and no daylight
	Uses $\frac{\text{increase in } y}{\text{increase in } x}$ (using scale)	**M1**	Dep on T1 or a near miss (not chord or clearly drawn at $x = 1$ or $x = 2$)
	1.7 to 2.2	**A1**	If correct method seen, condone any answer in range, even with a slight slip
(f)	Correct ruled straight line (complete for range 0 to 4)	**B2**	SC1 for freehand complete line or any ruled line of gradient 2 or y-intercept of 1 (not y=1)
(g)	Correct for theirs(±0.05) dep. on at least SC1 in **(f)**	**B2**√	SC1 if y-coordinate also given or x=0 also given (or both)
		17	

5 (a)(i)	$c - d$ final answer o.e.	**B1**	
(ii)	OD + DE or OC + their CD + DE o.e. d – 0.5c final answer o.e.	**M1** **A1**	Must be seen if answer incorrect
(iii)	OA + AB or OC + CB or OC + EO o.e. 1.5c – d final answer o.e.	**M1** **A1**	Must be seen if answer incorrect
(b)(i)	120	**B1**	If 90 then only method marks in **(iv)** available If 60 only method marks in **(ii)** and **(iv)** available
(ii)	0.5 × 8 × 8 sin120 o.e. art 27.7 (cm²) www	**M1** **A1**	e.g. perp. onto AC, then 8sin60 × 8cos60 (16√3)
(iii)	$8^2 + 8^2 - 2 \times 8 \times 8 \cos 120$ Square root of correct combination (√192 or $13.8\left(\frac{5}{6}\right)$) art 13.9 (cm)(13.856406)	**M1** **M1** **A1**	** Dep on first M1. Errors must be due to slips, not incorrect combination (8√3) ** Alternative methods e.g. perp onto AC, then 8sin60 M1 ×2 M1 Sine Rule Implicit M1 Explicit M1
(iv)	ABC (×2) + OACD o.e. their **(ii)** × 2 + their **(iii)** × 8 166 to 167 (cm^2) c.a.o.	**M1** **M1** **A1**	Alt meth. 6 × ABX (X is centre) or 6 × ABC etc. 6 × [0.5 × 8 × 8 sin60] or their **(ii)** × 6 etc. (96√3)
		14	

			USE OF RADIUS = 0.7	
6 (a)	Vol of cyl.= π × 0.35^2 × 16.5 (6.3…)	**M1**	Use of radius = 0.7 loses all marks in **(a)**	
	Vol of cone = π x $\frac{0.35^2}{3}$ x 1.5 (0.19...)	**M1**	After that they can revert to 0.35 without penalty	
	a.r.t. 6.54 (cm^3)	**A1**	Any later use of 0.7 after 0.35 penalty 2 from the marks gained using 0.7	
(b)(i)	4.2	**B1**	8.4	**B1**
	1.4	**B1**	2.8	**B1**
(ii)	18 × their 4.2 × their 1.4	**M1**	18 × their 8.4 × their 2.8	**M1**
	106 (cm^3) (105.84)	**A1**	423 (cm^3) (423.36)	**A1**
(iii)	12 × their **(a)** ×100 / their **(b)(ii)**	**M1**	12 × their **(a)** ×100 / their **(b)(ii)**	**M1**
	74.(0) to 74.2 (%) c.a.o.	**A1**	74.1 to 74.3 (%)	**A1**
(c)(i)	(l =) $\sqrt{}$(1.5^2 + 0.35^2)	**M1**	(l =) $\sqrt{}$(1.5^2 + 0.7^2)	**M1**
	1.54 (cm)	**A1**	1.66 (cm)	**A1**
(ii)	Circle = π × 0.35^2	**M1**	Circle = π × 0.7^2	**M1**
	Cylinder = 2 × π × 0.35 × 16.5	**M1**	Cylinder = 2 × π × 0.7 × 16.5	**M1**
	Cone = π × 0.35 × their **(c)(i)**	**M1**	Cone = π × 0.7 × their **(c)(i)**	**M1**
	Any 2 correct areas (a.r.t. 0.385 a.r.t. 36.3 a.r.t. 1.69) 0.1225π 11.55π 0.539π	**B2**	Any 2 correct areas (a.r.t. 1.54 72.5 to 72.6 a.r.t. 3.65) 0.49π 23.1π 1.162π	**B2**
	38.3 to 38.4 (cm^2) c.a.o.	**A1**	77.7 to 77.8 (cm^2)	**A1**
		17		

7 (a)(i)	Median 46.5	**B1**		
(ii)	IQR 9.5 www	**B2**	SC1 for 42 or 51.5 seen	
(iii)	48	**B2**	SC1 for 102 seen	
(b)(i)	$n = 32$	**B1**		
(ii)	Midpts 32.5, 37.5, 42.5, 47.5, 52.5, 57.5 10x32.5 + 17x37.5 + 33x42.5 + 42x47.5 + their 32x52.5 + 16x57.5 [6960] $\sum fx$ / 150 46.4	**M1** **M1*** **M1** **A1**	At least 5 correct s.o.i. Dep on first M1 or midpoints ±0.5 Allow 1 more slip Dep on 2nd M1*	
(c)	Horizontal Scale correct 3 correct widths on their scale (f.t) For each block of correct width 2.7 cm 7.1(3) or 7.2 cm 3.2 cm	**S1** **W1**√ **H1** **H1** **H1** **15**	Implied by correct use. Ignore vertical scale no gaps For scale error double or half, award H1, H1, H1 for correct f.t heights After H0, SC1 for 3 correct frequency densities written or for heights 2.7cm, 7.1cm and 3.2cm drawn on doubled/ halved horizontal scale.	
8 (a)	$(x - 3)(x - 1)$ [= 0] 1 and 3	**M1** **A1**	$\frac{4 \pm \sqrt{[(-4)^2 - 4.1.3]}}{2}$ or $(x - 2^2) = 1$ or better	
(b)	Correct first step of rearrangement $\frac{x+1}{2}$ o.e.	**M1** **A1**	e.g. $y + 1 = 2x$ or $x + 1 = 2y$ or better not for $x = (\ \ )$	
(c)	$x^2 - 6x + 4 = 0$ $\frac{p \pm \sqrt{q}}{r}$ with $p = 6$ and $r = 2$ and $q = (-6)^2 - 4.1.4$ o.e. or 20 5.24 c.a.o. www 0.76 c.a.o. www	**MA1** **M1**√ **M1**√ **A1**	Can be implied by later work (method marks) f.t. if in the form $ax^2 + bx + c$ (= 0) with $a \neq 0$ [$(x-3)^2 - 5 = 0$ M1 then $x = (\pm)\sqrt{5} + 3$ M1 is the equivalent for completing the square.] Indep. SC1 for both answers 'correct' but not to 2 dp (5.236067977 , 0.763932022). Can be truncated or correctly rounded	
(d)	29	**B2**	SC1 for [$f(-2) =$] 15 seen or $2x^2 - 8x + 5$ o.e seen	
(e)	$(2x - 1)^2 - 4(2x - 1) + 3$ $4x^2 - 12x + 8$ or correctly factorised final answer	**M1** **A2** **14**	After A0, SC1 for $4x^2 - 12x + 8$ seen	

9 (a)	$x + y \leq 12$ o.e	**B1**	$x + y < 13$
(b)	$y \geq 4$ o.e.	**B1**	$y > 3$
(c)	Scales correct – full length	**S1**	
(d)	$x + y = 12$ ruled and long enough $y = 4$ ruled and long enough $5x + 3y = 45$ ruled and long enough (1 mm at (9, 0) and (0, 15) if extended) Unwanted regions shaded	**L1** **L1** **B2** **B2**√	or broken line $x + y = 13$ or broken line $y = 3$. F.t from $x \geq 4$ only in **(b)** SC1 for either point correct SC1 for wanted regions shaded f.t. from minor slips in the lines that do not compromise the shape and position of the triangle or from $x \geq 4$ in **(b)** and $x = 4$ drawn
(e)	6 super, 5 mini and 5 super, 7 mini (no extras) Can write as (6, 5) and (5, 7)	**B3**	SC2 for 1 correct and no more than 1 wrong SC1 for any point(s) in their region selected (enclosed by 3 lines or 2 lines + 1 axis)
(f)(i)	(7, 4) or (6, 5) s.o.i. ($) 274 ($) 260	**M1** **A1** **A1**	 If 0 scored, SC1 for evidence of $30x + 16y$ written or used
(f)(ii)	($) 94 c.a.o.	**B1**	
		16	