

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 initially 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.

CIE is publishing the mark schemes for the June 2005 question papers for most IGCSE and GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.



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)



Page 1	Mark Scheme	Syllabus	Paper
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1	(a)	$1.33 \times \frac{5}{7}$ 950 (kg)	o.e. c.a.o.	M1 A2	Implied by figures 95 in answer A1 for figs 95
	(b)	$765 \times \frac{9}{(9+8)}$ (\$) 405	o.e. c.a.o.	M1 A1	
	(c)	<u>their (b)</u> <u>their (a)</u> (\$) 0.43 or (\$) 0.426		M1 A1√	f.t. <u>their (b)</u> must be in dollars for A mark their (a)
	(d)(i)	$0.35 \times \frac{60}{100}$ (\$) 0.21	o.e. c.a.o.	M1 A1	
	(ii)	$0.35 \times \frac{100}{125}$ (\$) 0.28	o.e. c.a.o.	M1 A1	0.26(25) is M0
				11	
2	(a)	AB = 12cm		B1	All measurements ± 2 mm or $\pm 2^\circ$
	(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) <u>and</u> at least SC1 in (b). SC1 for DC = 9cm and parallel to AB
	(d)	Strict ft of their angle ABC ($\pm 2^\circ$)		B1√	
	(e)	(tan B =) $\frac{7}{1.5}$ 77.9 final answer		B1 B1	or (sinB=) $\frac{7}{\sqrt{(7^2+1.5^2)}}$ or (cosB=) $\frac{1.5}{\sqrt{(7^2+1.5^2)}}$ 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) <u>and</u> at least SC1 in (ii) and a correct trapezium
			12		

Page 2	Mark Scheme	Syllabus	Paper
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3	(a)(i)	Translation (only) (T) $\begin{bmatrix} -6 \\ 1 \end{bmatrix}$	o.e.	B1 B1	If choice of transformations in (i) , (ii) , (iii) , (iv) then lose the 1 st two B marks in each part e.g. 6 left and 1 up. Condone -6 1 must be equation SC1 for a correct column SC1 for a correct column Allow embedded matrices in both answers
	(ii)	Reflection (only) (M) in $y = -x$	o.e.	B1 B1	
	(iii)	Enlargement (only) (E) Centre (0,6) Scale factor 3 o.e. seen		B1 B1 B1	
	(iv)	Shear (H) x-axis ($y = 0$) invariant (Shear) factor 0.5 o.e. seen		B1 B1 B1	
	(b)(i)	$\begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}$	o.e.	B2	
	(ii)	$\begin{bmatrix} 1 & 0.5 \\ 0 & 1 \end{bmatrix}$	o.e.	B2	
4	(a)	$p = 0.25$ $q = 1$ $r = 8$		B1 B1 B1	Must be seen. No feedback from graph. If not labelled, must be in order x from -2 to 4. y to accommodate their values. ft P2 for 6 points correct. P1 for 5 points correct. ft provided correct shape maintained Not a chord and no daylight Dep on T1 or a near miss (not chord or clearly drawn at $x = 1$ or $x = 2$) If correct method seen, condone any answer in range, even with a slight slip SC1 for freehand complete line or any ruled line of gradient 2 or y-intercept of 1 (<u>not</u> $y=1$) SC1 if y-coordinate also given or $x=0$ also given (or both)
	(b)	Scales correct Their 7 points plotted correctly (within 1mm and in the correct square) Smooth curve through all 7 points (1mm)		S1 P3 √ C1 √	
	(c)	2.75 to 2.85		B1	
	(d)	0		B1	
	(e)	Tangent drawn at $x = 1.5$ Uses <u>increase in y</u> (using scale) increase in x 1.7 to 2.2		T1 M1 A1	
	(f)	Correct ruled straight line (complete for range 0 to 4)		B2	
	(g)	Correct for theirs(± 0.05) dep. on at least SC1 in (f)		B2 √	
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Page 3	Mark Scheme	Syllabus	Paper
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5 (a)(i)	$c - d$ final answer	o.e.	B1	
(ii)	OD + DE <u>or</u> OC + their CD + DE $d - 0.5c$ final answer	o.e. o.e.	M1 A1	Must be seen if answer incorrect
(iii)	OA + AB <u>or</u> OC + CB <u>or</u> OC + EO $1.5c - d$ final answer	o.e. 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)	$0.5 \times 8 \times 8 \sin 120$ art 27.7 (cm ²)	o.e. www	M1 A1	e.g. perp. onto AC, then $8 \sin 60 \times 8 \cos 60$ ($16\sqrt{3}$)
(iii)	$8^2 + 8^2 - 2 \times 8 \times 8 \cos 120$ Square root of correct combination ($\sqrt{192}$ or $13.8\left(\frac{5}{6}\right)$) art 13.9 (cm)(13.856406)		M1 M1	** Dep on first M1. Errors must be due to slips, not incorrect combination
(iv)	ABC ($\times 2$) + OACD their (ii) $\times 2$ + their (iii) $\times 8$ 166 to 167 (cm ²)	o.e. c.a.o.	M1 M1 A1	($8\sqrt{3}$) ** Alternative methods e.g. perp onto AC, then $8 \sin 60$ M1 $\times 2$ M1 Sine Rule Implicit M1 Explicit M1
			A1	Alt meth. $6 \times ABX$ (X is centre) <u>or</u> $6 \times ABC$ <u>etc.</u> $6 \times [0.5 \times 8 \times 8 \sin 60]$ <u>or</u> their (ii) $\times 6$ <u>etc.</u> ($96\sqrt{3}$)
			14	

Page 4	Mark Scheme	Syllabus	Paper
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6	(a)	Vol of cyl. = $\pi \times 0.35^2 \times 16.5$ (6.3...)	M1	USE OF RADIUS = 0.7	
		Vol of cone = $\pi \times \frac{0.35^2}{3} \times 1.5$ (0.19...) a.r.t. 6.54 (cm ³)	M1	Use of radius = 0.7 loses all marks in (a) After that they can revert to 0.35 without penalty	
	(b)(i)	4.2	B1	8.4	B1
		1.4	B1	2.8	B1
	(ii)	18 × their 4.2 × their 1.4 106 (cm ³) (105.84)	M1 A1	18 × their 8.4 × their 2.8 423 (cm ³) (423.36)	M1 A1
		12 × their (a) × 100 their (b)(ii) 74.(0) to 74.2 (%) c.a.o.	M1 A1	12 × their (a) × 100 their (b)(ii) 74.1 to 74.3 (%)	M1 A1
	(c)(i)	(l =) $\sqrt{(1.5^2 + 0.35^2)}$ 1.54 (cm)	M1 A1	(l =) $\sqrt{(1.5^2 + 0.7^2)}$ 1.66 (cm)	M1 A1
		(ii)	Circle = $\pi \times 0.35^2$ Cylinder = $2 \times \pi \times 0.35 \times 16.5$ Cone = $\pi \times 0.35 \times$ their (c)(i)	M1 M1 M1	Circle = $\pi \times 0.7^2$ Cylinder = $2 \times \pi \times 0.7 \times 16.5$ Cone = $\pi \times 0.7 \times$ their (c)(i)
	Any 2 correct areas (a.r.t. 0.385 a.r.t. 36.3 a.r.t. 1.69) 0.1225 π 11.55 π 0.539 π 38.3 to 38.4 (cm ²) c.a.o.		B2 A1	Any 2 correct areas (a.r.t. 1.54 72.5 to 72.6 a.r.t. 3.65) 0.49 π 23.1 π 1.162 π 77.7 to 77.8 (cm ²)	B2 A1
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7 (a)(i)	Median 46.5	B1	
(ii)	IQR 9.5 www	B2	SC1 for 42 <u>or</u> 51.5 <u>seen</u>
(iii)	48	B2	SC1 for 102 <u>seen</u>
(b)(i)	$n = 32$	B1	
(ii)	Midpts 32.5, 37.5, 42.5, 47.5, 52.5, 57.5 $10 \times 32.5 + 17 \times 37.5 + 33 \times 42.5 + 42 \times 47.5$ $+ \text{their } 32 \times 52.5 + 16 \times 57.5$ [6960] $\frac{\sum fx}{150}$ 46.4	M1 M1* M1 A1	At least 5 correct s.o.i. Dep on first M1 <u>or</u> midpoints ± 0.5 Allow 1 more slip Dep on 2 nd 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	Implied by correct use. <u>Ignore vertical scale</u> no gaps For scale error double or half, award H1, H1, H1 for correct f.t heights After H0, SC1 for 3 <u>correct</u> frequency densities written or for heights 2.7cm, 7.1cm and 3.2cm drawn on doubled/ halved horizontal scale.
		15	
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 $x = (\quad)$
(c)	$x^2 - 6x + 4 = 0$ $\frac{p \pm \sqrt{q}}{r}$ with $p = 6$ <u>and</u> $r = 2$ and $q = (-6)^2 - 4.1.4$ o.e. or 20	MA1 M1 √ M1 √	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.
	5.24 c.a.o. www	A1	SC1 for both answers 'correct' but not to 2 dp
	0.76 c.a.o. www		(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	After A0, SC1 for $4x^2 - 12x + 8$ seen
		14	

Page 6	Mark Scheme	Syllabus	Paper
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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) <u>Unwanted</u> 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 <u>minor</u> 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 <u>and</u> 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) (\$) 274 (\$) 260	s.o.i.	M1 A1 A1	If 0 scored, SC1 for evidence of $30x + 16y$ written or used
(f)(ii)	(\$) 94	c.a.o.	B1 16	