

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

General Certificate of Education Ordinary Level

MARK SCHEME for the November 2004 question paper

4024 MATHEMATICS

4024/01

Paper 1, maximum raw mark 80

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 November 2004 question papers for most IGCSE and GCE Advanced Level syllabuses.

Mark Scheme Notes

Marks are of the following three types:

- M Method mark, awarded for a valid method applied to the problem. Method marks are not lost for numerical errors, algebraic slips or errors in units. However, it is not usually sufficient for a candidate just to indicate an intention of using some method or just to quote a formula; the formula or idea must be applied to the specific problem in hand, e.g. by substituting the relevant quantities into the formula. Correct application of a formula without the formula being quoted obviously earns the M mark and in some cases an M mark can be implied from a correct answer.
 - A Accuracy mark, awarded for a correct answer or intermediate step correctly obtained. Accuracy marks cannot be given unless the associated method mark is earned (or implied).
 - B Mark for a correct result or statement independent of method marks.
- When a part of a question has two or more "method" steps, the M marks are generally independent unless the scheme specifically says otherwise; and similarly when there are several B marks allocated. The notation DM or DB (or dep*) is used to indicate that a particular M or B mark is dependent on an earlier M or B (asterisked) mark in the scheme. When two or more steps are run together by the candidate, the earlier marks are implied and full credit is given.
 - The symbol \surd implies that the A or B mark indicated is allowed for work correctly following on from previously incorrect results. Otherwise, A or B marks are given for correct work only. A and B marks are not given for fortuitously "correct" answers or results obtained from incorrect working.
 - Note: B2 or A2 means that the candidate can earn 2 or 0.
B2/1/0 means that the candidate can earn anything from 0 to 2.

The following abbreviations may be used in a mark scheme or used on the scripts.

- AG Answer Given on the question paper (so extra checking is needed to ensure that the detailed working leading to the result is valid)
- BOD Benefit of Doubt (allowed when the validity of a solution may not be absolutely clear)
- CAO Correct Answer Only (emphasising that no "follow through" from a previous error is allowed)
- CWO Correct Working Only – often written by a 'fortuitous' answer
- ISW Ignore Subsequent Working
- MR Misread
- PA Premature Approximation (resulting in basically correct work that is insufficiently accurate)
- SOS See Other Solution (the candidate makes a better attempt at the same question)

Penalties

- MR -1 A penalty of MR -1 is deducted from A or B marks when the data of a question or part question are genuinely misread and the object and difficulty of the question remain unaltered. In this case all A and B marks then become "follow through $\sqrt{}$ " marks. MR is not applied when the candidate misreads his own figures – this is regarded as an error in accuracy.
- OW -1,2 This is deducted from A or B marks when essential working is omitted.
- PA -1 This is deducted from A or B marks in the case of premature approximation.
- S -1 Occasionally used for persistent slackness – usually discussed at a meeting.
- EX -1 Applied to A or B marks when extra solutions are offered to a particular equation. Again, this is usually discussed at the meeting.

November 2004

GCE O LEVEL

MARK SCHEME
MAXIMUM MARK: 80
SYLLABUS/COMPONENT: 4024/01 MATHEMATICS PAPER 1

Page 1	Mark Scheme	Syllabus
	GCE O LEVEL – NOVEMBER 2004	4024

1	(a) 0.024	1	Accept $3\sqrt{0.2}, \pm 0.2, 0.2^3, -0.2$
	(b) 0.2	1	
2	(a) A E	1	
	(b) B D F	1	
3	(a) $\frac{1}{3}$ or 0.33 (333)	1	Not $\frac{5}{15}$
	(b) 2.82 cao	1	NB: Don't accept fractions
4	(a) $2\frac{1}{2}, -1$	1	Accept reversed answers. Ignore extras.
	(b) $3n - 2$ o.e.	1	i.e. Accept unsimplified e.g. $3(n - 1) + 1$ [Accept $n = 3n - 2$]
5	(a) 16.66 or 16.7	1	Not 16.70
	(b) 0.04 o.e.	1	
6	(a) 42.5	1	Accept $\frac{85}{2}$
	(b) 9	1	Accept $\frac{9}{1}$
7	(a) 120 (cm ³)	1	} After cao allow SC1 for cm ³ <u>and</u> cm ²
	(b) 184 (cm ²)	1	
8	(a) $\frac{5}{12}$	1	Ignore embellishments in front e.g. $\cos^{-1} - \frac{5}{13}$; But not $-\cos \frac{5}{13}$
	(b) $-\frac{5}{13}$	1	NB: If decimal answers look back for fractional answers.
9	(a) 300° (ignoring embellishments) or N60°W cao	1	+ for (a) < 180°; – for (a) > 180°
	(b) 120° (ignoring embellishments) or S60°E or $\sqrt{a \pm 180}$ o.e.	1√	
10	(a) (±) 11 (°C)	1	Accept –11
	(b) –3 and –4	1	Do <u>not</u> accept a range answer or extra integer values.

11 (a) -12	1	Accept coordinates in all parts. Accept answers reversed seen either in answer spaces or, if blank, in working or on diagram. SC1 for 4 and -3 with the same rules as above.
(b) (i) -4	1	
(ii) 3	1	
12 (a) 6.8×10^{-24} cao	1	Accept correct standard form or normal decimal form only.
(b) Figs 61(2) or their 6.8×9 Correct power of 10, -1, or 'their -24' + 23	1√ 1√	
13 (a) $\begin{pmatrix} 14 \\ 0 \end{pmatrix}$	1	Ignore fraction line.
(b) $5\frac{1}{2}$ 2	1 1	
14 (a) 65 75 875 925	1 1	If 0 + 0 allow SC1 for any 2 correct.
(b) 1135 or √ their 875 + 4 × their 65	1√	
15 (a) $4\frac{1}{2}$	1	SC1 for either $\frac{1}{2}$ or $\begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix}$ soi
(b) $\frac{1}{2} \begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix}$ o.e seen	*2	
16 $y \geq -3$ $x + y \leq 5$	1 2	Condone $-3 \leq y \leq 4$: condone strict inequalities -1 once for symbol reversed or equality used.
17 (a) 14	1	√ - their 5
(b) (i) 5	1	
(ii) $1\frac{1}{2}, -5\sqrt{\quad}$ B1B1	2√	
18 (a) $A \cap (B \cup C)'$ or $A \cap B' \cap C'$	1	Accept without label
(b) 	1	
(c) 8, 10	1	
(d) 3	1	

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19 (a)	3 rectangles of correct widths (4, 4, 8)	B1	2	Must start from 0 Ignore scales on axis: Mark intention of correct ratio
	3 rectangles of correct heights $(3\frac{1}{2}, 4\frac{1}{2}, 1)$	B1 indep		
(b)	$\frac{(14 \times 2) + (18 \times 6) + (8 \times 12)}{14 + 18 + 8}$	M1	*2	Mid interval values must be correct. Condone 1 slip in the frequencies. Not $\frac{232}{40}$ NB: Look back after answer of 6.
	5.8	A1		
20 (a)	$\frac{360}{180 - 160}$ or $\frac{(n-2)180}{n} = 160$ o.e.	M1 A1	*2	
(b)	(i) 70(°)		1	
	(ii) 105 or $\sqrt{\frac{1}{2}}$ their (i) + 70		1√	
21 (a)	1.9 o.e.		1	
(b)	420		1	
(c)	0, at rest, o.e.		1	
(d)	500		1	
22 (a)	$(a - 2b)(1 - 3c)$		1	Condone $5t^2 \pm 0(t) + 6$. SC1 for pair of values satisfying one equation (to 3 s.f. accuracy) Not $\frac{10}{-5}$
(b)	$5t^2 + 6 (= 0)$		1	
(c)	First value correct with supporting working	M2		
	$x = 4\frac{1}{2}, y = -2$	A1	*3	
23 (a)	8 hours 20 minutes o.e.		1	e.g. 500 <u>mins</u> $\sqrt{8\frac{1}{3}}$ <u>h</u> $\sqrt{\quad}$
(b)	(i) $\frac{660}{\text{time}}$	M1		Intention of figs 660/time
	120 o.e.	A1	*2	2 <u>km/min</u> $\sqrt{\quad}$
	(ii) $\frac{660}{150}$	M1		
	4 hours 24 minutes	A1	*2	4.4 implies M1/

Page 4	Mark Scheme	Syllabus
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24	(a) Δ completed (with arcs)	T1	Within 2 mm of correct point.
	(b) $101(^{\circ}) - 105(^{\circ})$	1	
	(c) (i) Arc, radius 5 cm and centre C M	A1	Condone extra bisectors.
	(ii) Bisector of angle B M	B1	
	(d) 11.7 – 12.1 (m)	1	
25	(a) (0, -1)	1	SC1 for either 2 correct points plotted OR all 3 points seen in working SC1 for either 2 correct points plotted or anti-cl. rotation (3, 0), (3, 1), (1, 0)
	(b) Reflection (or mirror image) in line $y = -x$ B1 B1	2	
	(c) Triangle drawn (2, 1), (2, 0), (3, -3)	2	
	(d) Triangle drawn (5, 3), (5, 4), (7, 4)	2	