

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

General Certificate of Education Ordinary Level

MARK SCHEME for the June 2005 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.

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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.
- C Consolation mark, sometimes awarded for an incorrect answer. In some places it may be earned in the working.
- When a part of a question has two or more "method" steps, the M marks are generally independent unless the scheme specifically says otherwise.
 - FT implies that the candidate has continued correctly after an error.

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
- FT Follow through
- ISW Ignore Subsequent Working
- MR Misread
- PA Premature Approximation (resulting in basically correct work that is insufficiently accurate)
- SOI Seen or implied
- SOS See Other Solution (the candidate makes a better attempt at the same question)

June 2005

GCE O LEVEL

MARK SCHEME

MAXIMUM MARK: 80

SYLLABUS/COMPONENT: 4024/01

**MATHEMATICS
PAPER 1**

| | | |
|--------|-------------------------|----------|
| Page 1 | Mark Scheme | Syllabus |
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| | | | | | | |
|----|------------|---|--------|--|----------|---|
| 1 | (a) (b) | 0.65 c.a.o. 80(%) | 1 1 | | | |
| 2 | (a) (b) | $\frac{8}{21}$ c.a.o. $\frac{24}{35}$ c.a.o. | 1 1 | If answer decimal, accept in working. If answer decimal, accept in working. After 0+0, answers 0.3805 to 0.381 and 0.6855 to 0.686. | C1 | 2 |
| 3 | (a) (b) | $\begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$ $\frac{1}{2} \begin{pmatrix} 4 & 2 \\ 1 & 1 \end{pmatrix}$ o.e. | 1 1 | | | 2 |
| 4 | (a) (b) | $348^{(o)}$ $218^{(o)}$ | 1 1 | | | 2 |
| 5 | (a) (b) | (\$) 10 (h) | 1 1 | Not $12\frac{8}{25}$ After 12.3, accept 12.32 in working. | | 2 |
| 6 | (a) (b) | (±) 5000 20 (cm) | 1 1 | | | 2 |
| 7 | (a) (b) | 39 (h) (\$) 145(.00) | 1 1 | | | 2 |
| 8 | | $\frac{3x+1}{2}$ o.e. | 2 | After clear MR, M1 available. $ax + b$ with $a = \frac{3}{2}$ $b \neq 0$ or $a \neq 0$ $b = \frac{1}{2}$ Use of letter other than x, -1 if possible. | C1 | 2 |
| 9 | | (x) = 33 (y =) -4 | 2 | One correct with supporting working . Or correct method for one variable reaching such as $2x = 95 - 29$ or $2y = 3 \times 29 - 95$ | C1 M1 | 2 |
| 10 | | 140 (minutes) Accept 2 h 20 (min) or 11.20 (a.m.) | 2 | 140 seen, or prime factors 2×5 , $2^2 \times 5$, 5×7 Answer 280, 4h 40, 13.40 or 1.40 p.m. | M1 C1 | 2 |
| 11 | (a) (b) | Rectangle from 200 to 400, height 0.1 $72^{(o)}$ | 1 1 | Accept freehand | | 2 |
| 12 | (a) (b) | 23 35 4 (min) 1.5 (s) | 1 2 | Ignore embellishments $\frac{4.5}{3}$ seen, or accept at $\frac{\sum \text{times}}{3}$ when $\sum \text{times}$ is in seconds, or minutes/seconds and with seconds < 60. | M1 | 3 |

| | | | | | | |
|----|-----|--|--------|---|--|---|
| 13 | (a) | (5, ½) or (5, 0.5) | 1 | Ruled or good freehand, > 4 cm long. Cutting x axis between (11, 0) and (13, 0), produced if necessary. | | 3 |
| | (b) | (i) Parallel line through (0, -4) | 1 | | | |
| | | (ii) 12 c.a.o. | 1 | | | |
| 14 | (a) | 128 ^(o) | 1 | Accept on diagram if necessary | | 3 |
| | (b) | 26 ^(o) or ½(180 - a) ° f.t. | 1 | Accept on diagram if necessary | | |
| | (c) | 64 ^(o) or ½ their (a) f.t. or 90-their (b) f.t. | 1 | Accept on diagram if necessary | | |
| 15 | (a) | 132 | 1 | Condone -87 | | 3 |
| | (b) | 87 f.t. 219 or {their132 + their87 } | 1 | | | |
| 16 | (a) | Units digit ranged | 1 | | | 3 |
| | (b) | 1 20 c.a.o. | 1 | | | |
| | (c) | 4 | 1 | | | |
| 17 | (a) | 74.4 to 74.7 (kg) | 1 | | | 3 |
| | (b) | 79.1 to 79.4 (kg) | 1 | | | |
| | (c) | 23 to 25 | 1 | | | |
| 18 | (a) | $\frac{x}{360} \pi 8^2$ or better seen (cm ²) | 1 | Accept $\frac{22}{7}$ for π . | | 3 |
| | (b) | 15 ^(o) (accept 14.9 to 15.1) | 2 | Their (a) = $\frac{1}{3} \times \frac{\pi 4^2}{2}$ o.e. seen | | |
| 19 | (a) | 60 (cm ²) | 2 | $\sqrt{13^2 - 5^2}$ s.o.i. | | 4 |
| | (b) | (i) 480 or 8 x their (a) f.t. (cm ²) (ii) Plane BCDE | 1 1 | Accept clear indication of correct plane | | |
| 20 | (a) | (i) -1 < x ≤ 4 (ii) O ——— -3 | 1 1 | Accept in other form if equivalent Line must go to x = 3 or further or show an indication it continues | | 4 |
| | (b) | (1, 3) (1, 5) (3, 5) (5, 3) Accept without brackets if pairs clear | 2 | At least two pairs correct. Any extra pairs or terms, -1. | | |
| 21 | (a) | Enlargement | 1 | No other transformation stated or implied | | 4 |
| | (b) | Scale factor -2 dep $\begin{pmatrix} 12 \\ -1 \end{pmatrix}$ | 1 2 | Ignore references to centre $\begin{pmatrix} 3 \\ -4 \end{pmatrix} + k \begin{pmatrix} 3 \\ 1 \end{pmatrix}, \begin{pmatrix} 6 \\ -3 \end{pmatrix} + k \begin{pmatrix} 3 \\ 1 \end{pmatrix},$ $\begin{pmatrix} -6 \\ 8 \end{pmatrix} + k \begin{pmatrix} 6 \\ -3 \end{pmatrix}$ or $k \begin{pmatrix} 6 \\ -8 \end{pmatrix} + \begin{pmatrix} 3 \\ 1 \end{pmatrix} + k' \begin{pmatrix} 6 \\ -3 \end{pmatrix} + \begin{pmatrix} -6 \\ 1 \end{pmatrix}$ | | |

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|----|-------|---|---|---|----------|---|
| 22 | (a) | Correct sketch for $x = 0$ | 1 | No incorrect lines for (a) or (b) through (0,0) with gradient 1, by eye. Long enough to cut both branches | M1 | 4 |
| | (b) | Line $y = x$ sketched | 1 | | | |
| | (c) | $\sqrt{3}$ $-\sqrt{3}$ | 1 | Accept clear attempts, e.g. 1.7. After $0+0$, $x^2 = 3$ or $k^2 = 3$ seen | | |
| 23 | (a) | Ruled straight lines (0,0) to (30,18) and (30,18) to (40,18) | 1 | | M1 | 4 |
| | (b) | (i) $\frac{3k}{5k}$ or 0.6 (m/s ²) f.t. | 1 | Follow through from their graph ($\neq 0$) | | |
| | (ii) | 11.25, $11\frac{1}{4}$ or $\frac{45k}{4k}$ (m/s) | 2 | Accept 11.2 or 11.3 $\frac{1}{2} 30 \times$ their 18 s.o.i. and division by 40 | | |
| 24 | (a) | Triangle drawn, with arcs visible | 1 | Sides $10 \pm 0.4\text{cm}$, $7 \pm 0.4\text{cm}$ | | 5 |
| | (b) | $108^{(\circ)}$ to $111^{(\circ)}$ | 1 | | | |
| | (c) | 3.2 to 3.5 (cm) | 1 | Dep on semicircle | | |
| | (d) | (i) Angle in semicircle | 1 | No incorrect reason. Diameter alone not enough. | | |
| | (ii) | $-\frac{\text{their(c)}}{10}$ f.t. | 1 | Accept for example $-\frac{3.5}{10}$ Accept $-\frac{47}{140}$ | | |
| 25 | (a) | Interior angle (parallel lines) or angle sum of quad | 1 | Accept clear equivalents provided symmetry correctly quoted. | C1 M1 | 6 |
| | (b) | $D = F = K (= 60)$ Or $DC + CF = FE + EK = KA + AD$ | 1 | Be generous if intention clear but $DF = FK = KD$ alone not enough. | | |
| | (c) | (i) 3 (m) | 1 | | | |
| | (ii) | $4k:1k$ | 2 | Accept $\frac{4}{1}$ or 4. $25k:9k$ or $k:4k$ Or attempt at $(DF:GB)^2$ | | |
| | (iii) | $\frac{3k}{4k}$ f.t. (k integer) | 1 | Follow through from (ii) But not for $\frac{1}{2}$ after 2:1 | | |

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|----|-----|--------------------------|---|--|----|---|
| 26 | (a) | $(3t - 2s)(x + 5y)$ o.e. | 2 | <p>(a), (c) Condone missing outside brackets, “= 0” and use of wrong letter if clear. If only solutions (even incorrect) in answer space, give marks if factors seen.</p> <p>Complete correct extraction of one factor such as $3tx - 2sx + 5t(3y - 2s)$</p> <p>$3(x - 2) + 4(x + 1) = 12$ or better s.o.i. (condone missing brackets for M1)</p> <p>$(2y - 1)(y + 2)$ o.e.</p> <p>or $\frac{3 \pm \sqrt{25}}{4}$ or better seen</p> | M1 | 6 |
| | (b) | 2 | 2 | | M1 | |
| | (c) | $(2y + 1)(y - 2)$ o.e. | 2 | | C1 | |