UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the May/June 2008 question paper

4024 MATHEMATICS

4024/01   Paper 1, maximum raw mark 80

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began.

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.

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1 **(a)** $\dfrac{1}{14}$ 1   In both parts, if answers decimal,

accept fractions in working

(b) $4\dfrac{2k}{3k}$ 1   2   After 0 + 0, answers 0.0714(0) to 0.07145

and {4.665 to 4.67(0) or $\dfrac{14k}{3k}$ }   C1

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2 **(a)** 6.7   oe   1

(b) (0).051   oe   1   2

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3 **(a)** –8   1

(b) $\dfrac{x-2}{5}$ oe   1   2   Must use x

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4 100 or 120   2   2   Answer with more sig figs which rounds to this
or figs 1 or 12   C1
or at least 2 of 9, 2^2 and 0.3 seen   M1

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5 **(a)** 160.27   1   Accept 160 or 160.3

(b) 6820   1   2

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6 26 (cm)   2   2 $\dfrac{10}{\sin\theta}$ or $\dfrac{10\times13}{5}$ or $\sqrt{\{10^2+24^2\}}$ seen   M1

Accept $\dfrac{10(\sin 90)}{\sin \frac{5}{13}}$ for M1

                                          [12]   **[12]**

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7 **(a)** $32x + 120$ (cm^2) oe   M1   Accept any equivalent seen anywhere

(b) 8 (cm)   2   3   Their **(a)** = 376 oe seen   M1
[Their **(a)** must be linear in x]

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8 **(a)** 1   1

(b) $\dfrac{1}{81}$ 1   Accept (0).0123(0) to (0).01235

(c) 27   1   3   Accept ±27

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9 **(a)** ($BDC =$) 42 (°)   1   Accept all answers on the diagram if not seen in answer or working space

(b) ($ABC =$) 90 (°)   1

(c) ($ACB =$) 48 (°) **or** 138 – their (b) ♪√ft   1   3   ♪√ft only allowed if 0° < ACB ⩽ 96°

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10 **(a)** $y = 4x^2$ 2 $4x^2$ seen   M1
     or $y = kx^2$ with $k = 4$ seen anywhere   **or** $y = kx^2$ seen   M1

(b) $\dfrac{3}{2}$ and $-\dfrac{3}{2}$ oe www cao   1   3   Both required

     [12]   **[12]**

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11 **(a)** Equilateral triangle   1   Accept either word alone

(b) Rectangle   1

(c) Kite   1   3

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12 $x = 2$ **and** $y = -3$ 3   3   One correct **with supporting working**   C2
                                          or correct method to eliminate one variable
                                             condoning one arithmetic slip   M1
                                           [reaching such as $11x = k$, $kx = 22$, $11y = k$
                                                         or $ky = (-)33$]

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13 **(a)** 3.75 or $3\dfrac{3}{4}$ or $\dfrac{30}{8}$ (m/s²) oe   1   Accept –3.75 etc.

(b) 270 (m)   2   3   Correct method to find complete area under graph
                                                                               M1
     [9]   **[9]**

14 (a) 259 (g) 1

(b) 20 (%) 2 3 120, $16\frac{2}{3}$ or 16.6 to 16.7 oe C1

or fig ($\frac{5}{25}$ (× 100)) M1

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15 Final answer $\frac{8-t}{(2t-1)(t+2)}$ oe 3 3 $8-t$ and $(2t-1)(t+2)$ or $2t^2+3t-2$ M2

seen in single fraction, not necessarily together
or $3(t+2) - 2(2t-1)$ seen in single fraction M1
with quadratic denominator
[condoning missing brackets]

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16 (a) Ruled line from $(0, -2)$ to $(2, -1)$ drawn 1 Allow tolerance of ½ small square

(b) Correct region shaded **and** labelled **R** 2 3 Accept shaded in or out if R correct
Allow ♪√ft if line wrong if possible **or** Shaded in or out, without R C1
Allow C1 ♪√ft if line wrong if possible
If no line, shading with R marked to right of C1
$x = 0$, below $2y = 4 - 3x$, not bounded by $y = 0$

[9] [9]

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17 (a) $(3, -6)$ 1

(b) -4 1 Accept equivalents, such as $\frac{-16}{4}$ or $\frac{16}{-4}$

(c) $y = -4x + 6$ or 3 term equivalent 2 4 3 term line of gradient their **(b) or** which C1
Accept $y = -4x + c$ with $c = 6$ seen passes through $(1, 2)$ or $(5, -14)$
$-4x + 6$ alone C1

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18 (a) 9.19×10^7 (km) 2 Accept 9(or 9.2) $\times 10^7$
Correct answer not in standard form C1
or 150 000 000 – 58 100 000
or $15 \times 10^7 - 5.81 \times 10^7$ seen M1

(b) $(0).15$, $\frac{15}{100}$ or $\frac{3}{20}$ (terametres) 2 4 $1.5 \times 10^8 \times 10^3 / 10^{12}$ seen M1

1.5×10^{-4} oe seen S C1

19 (a) (i) $5x(3x + 2)$ 1   ⎧ In both parts, ignore extra brackets, condone missing outside brackets

    (ii) $(t + 3)(t – 5)$ 1   ⎩ If only solutions, accept factors in working ⎭

    (b) $(0).6$ oe   2   4 $4x – 1.2 = 3x – 0.6$ oe, or better seen   M1

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20 (a) $\begin{pmatrix} 1 & 3 \\ 2 & 1 \end{pmatrix}$ 2   At least 2 correct elements   C1

    (b) $\dfrac{1}{5}\begin{pmatrix} 4 & -1 \\ -3 & 2 \end{pmatrix}$ oe   2   4 $\dfrac{1}{5}$ soi **or** $\begin{pmatrix} 4 & -1 \\ -3 & 2 \end{pmatrix}$ soi   C1

                                      [16]   **[16]**

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21 (a) $(t) < -1.5, -1\dfrac{1}{2}$ or $-\dfrac{3}{2}$ oe (e.g. $-\dfrac{6}{4}$)   2 $t > -1.5$ **or** -1.5 alone   C1

                                                 or $-6 > 4t$ oe or better seen   M1

    (b) 58   2   4   At least two of $+4$, $+36$ and $+18$ seen   M1

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22 (a) -39 1

    (b) (i) $3n + 1$ or **any** equivalent   1

        (ii) (a) $\dfrac{19}{36}$ 1

            (b) $\dfrac{3n+1}{n^2}$ or $\dfrac{\text{their (b)(i)}}{n^2}$ 1   4

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23 (a) (i) (1 :) 300 000   1

    (ii) 30 (km)   1   Accept answers in range 29.5 to 30.5

  (b) Correct triangle drawn with sides   2   No arcs seen, sides in wrong order   C1
       7 (± 0.2) and 6 (±0.2) cm, arcs visible   and/or sides ± 0.4 cm
                                        and/or AC, BC not joined

                                        If C on wrong side of AB, otherwise correct   C1

  (c) Perpendicular bisector of AB drawn   1   Within 0.2 cm of centre of AB
                                         and within 2° of perp
                                         Minimum length 5 cm

  (d) F and G marked correctly √ft   1   6   Each to be 3 (±0.2) cm from C on attempt at
                                         perp bisector, even if C is below AB

                                    [14]   **[14]**

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24 (a) (i) 2   1

    (ii) 2.52, $2\frac{13}{25}$ or $2\frac{26}{50}$ www   3   2.52 oe or 2.5 seen www

                                          or such as $\frac{126}{50}$ seen   M2

                                          or $\dfrac{(0 \times 10) + 1 \times 11 + 2 \times 8 + 3 \times 3 + ...}{10 + 11 + 8 + 3 + ...}$ M1
                                          (condoning one error)

    (iii) $\dfrac{3k}{175k}$ oe   2 $\dfrac{7}{50} \times \dfrac{6}{49}$ or $\dfrac{7}{50} \times \dfrac{6}{50}$ or better seen   M1

  (b) Ignore any block diagrams and outside the range $5 \leqslant t \leqslant 11$
       Plots at heights 21, 11, 13 and 5   1   (Accept 10½, 5½, 6½ and 2½)
       joined with straight lines

       Time axis scaled and plots at 5, 7, 9 and 11   1   8   independent

                                          [8]   **[8]**

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