## UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE O Level

## MARK SCHEME for the November 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.

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

| 1 | (a) <br> (b) | $\begin{array}{\|l\|} \hline 2.44 \\ (0) .021 \\ \hline \end{array}$ |  | $\begin{aligned} & 1 \\ & 1 \\ & \hline \end{aligned}$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 2 | (a) <br> (b) | $\begin{aligned} & \frac{9}{20} \\ & \frac{2}{15} \text { с.а.о. } \end{aligned}$ |  | $1$ $1$ |  |
| 3 | (a) <br> (b) | $\begin{aligned} & \frac{3}{8} \text { or } \frac{6}{16} \text { only } \\ & 30 \end{aligned}$ |  | $\begin{aligned} & 1 \\ & 1 \end{aligned}$ |  |
| 4 | (a) <br> (b) | $\begin{aligned} & \mathrm{M}, \mathrm{~S}, \mathrm{~L} \\ & 20 \end{aligned}$ |  | $\begin{aligned} & 1 \\ & 1 \\ & \hline \end{aligned}$ |  |
| 5 | (a) <br> (b) | $\begin{array}{\|l\|} \hline \frac{1}{4} \text { с.a.o. } \\ 2.4 \times 10^{6} \text { c.a.o. } \\ \hline \end{array}$ |  | $\begin{aligned} & 1 \\ & 1 \\ & \hline \end{aligned}$ |  |
| 6 | (a) <br> (b) | $\frac{1}{2}(n+1)(n+2) \text { o.e. (seen) }$ |  | $\begin{gathered} 1 \\ 1^{*} \end{gathered}$ [12] | Accept ( $n+1+1$ ) |
| 7 |  | $\begin{aligned} & \frac{90000}{50 \times 60} \\ & 30 \\ & \hline \end{aligned}$ | M1 <br> A1 | 2* |  |
| 8 | (a) <br> (b) <br> (c) | $\begin{aligned} & \hline 73 \\ & 31 \text { f.t. their } 73-42 \\ & 318 \end{aligned}$ |  | $\begin{array}{r} \hline 1 \\ \text { f.t. } 1 \\ 1 \\ \hline \end{array}$ |  |
| 9 | (a) <br> (b) <br> (c) | Fig. 6 <br> Fig. 4 <br> Fig. 2 |  | 1 1 1 |  |
| 10 | (a) <br> (b) | $\begin{aligned} & 75 \\ & \frac{360}{180-165} \text { or }(2 n-4) 90=165 n \\ & 24 \end{aligned}$ | $\begin{aligned} & \text { M1 } \\ & \text { A1 } \end{aligned}$ | $\begin{array}{r} 1 \\ 1 \\ \\ 2^{*} \\ {[11]} \end{array}$ | o.e. |
| 11 | (a) <br> (b) <br> (c) | $\begin{aligned} & \hline 5 x(x-2) \\ & 4 \\ & 0 \text { or }-2 \\ & \hline \end{aligned}$ |  | $\begin{aligned} & 1 \\ & 1 \\ & 1 \end{aligned}$ |  |
| 12 | (a) <br> (b) | $\begin{aligned} & A \hat{C} B=C \hat{D} A \text { and } B \hat{A} C=A \hat{C} D \\ & \Rightarrow \Delta \mathrm{~s} \text { similar } \\ & \frac{7}{A D}=\frac{4}{6} \text { or } \frac{6}{9} \\ & 10 \frac{1}{2} \end{aligned}$ | M1 <br> A1 | 1 <br> 1 $2^{*}$ | Any irrelevant or wrong information $=0$ |


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\begin{tabular}{|c|c|c|c|c|c|}
\hline 13 \& \begin{tabular}{l}
(a) \\
(b)
\end{tabular} \& \begin{tabular}{l}
(i) Squares \\
(ii)
\end{tabular} \& \& \[
\begin{aligned}
\& 1 \\
\& 1 \\
\& 1
\end{aligned}
\] \& Any clear indication of a set in \(R\) \(\cap Q^{\prime}\) \\
\hline 14 \& \begin{tabular}{l}
(a) \\
(b)
\end{tabular} \& \[
\begin{aligned}
\& y \geq \frac{1}{2} x \text { o.e. } \\
\& -41 / 2 \leq x<-2 \\
\& -4 \text { and }-3
\end{aligned}
\] \& M1
A1 \& \[
1
\]
\[
\begin{array}{r}
2^{*} \\
{[12]}
\end{array}
\] \& Accept as separate statements \\
\hline 15 \& \begin{tabular}{l}
(a) \\
(b)
\end{tabular} \& \[
\begin{aligned}
\& \left(\begin{array}{rr}
0 \& 1 \\
-1 \& 2 \\
0 \& -3
\end{array}\right) \\
\& (1-1)
\end{aligned}
\] \& \& 2 \& \begin{tabular}{l}
SC1 for 4 or 5 elements correct \\
SC1 for a (1 x 2) matrix
\end{tabular} \\
\hline 16 \& \begin{tabular}{l}
(a) \\
(b) \\
(c) \\
(d)
\end{tabular} \& \[
\begin{array}{|l|}
\hline-17 \\
5 \\
\frac{1}{3}(x+5) \\
3 \text { f.t. }
\end{array}
\] \& \& 1
1
1
f.t. 1 \& Allow y etc. \\
\hline 17 \& \begin{tabular}{l}
(a) \\
(b)
\end{tabular} \& \[
\begin{aligned}
\& \text { Idea of } 100 \pm 2.5 \text { or } 75 \pm 2.5 \\
\& 340 \\
\& \frac{22.5 \text { or } 21.5}{2.5 \text { or } 3.5} \\
\& 9
\end{aligned}
\] \& \begin{tabular}{l}
M1 \\
A1 \\
M1 \\
A1
\end{tabular} \& \[
\begin{aligned}
\& 2^{*} \\
\& 2^{*}
\end{aligned}
\] \& i.e. any one of \(97.5,102.5,72.5\) or 77.5 seen \\
\hline 18 \& \begin{tabular}{l}
(a) \\
(b)
\end{tabular} \& \begin{tabular}{l}
\[
\begin{aligned}
\& x=0 \\
\& y=-2
\end{aligned}
\] \\
(i) 13200 \\
(ii) 500
\end{tabular} \& \& \[
\begin{array}{r}
1 \\
1 \\
1 \\
1 \\
{[16]}
\end{array}
\] \& \\
\hline 19 \& \begin{tabular}{l}
(a) \\
(b) \\
(c) \\
(d)
\end{tabular} \& \begin{tabular}{l}
\[
219 \rightarrow 221 \text { incl. }
\] \\
13 \\
All 8 points plotted correctly \\
Smooth curve \\
A - any comparison using curves
\end{tabular} \& \[
\begin{aligned}
\& \mathrm{P} 1 \\
\& \mathrm{C} 1
\end{aligned}
\] \& 1
1
2
1 \& \\
\hline 20 \& \begin{tabular}{l}
(a) \\
(b) \\
(c) \\
(d)
\end{tabular} \& \begin{tabular}{l}
\[
\begin{aligned}
\& 13-14 \\
\& \frac{2}{3} \text { or } 0.66-0.67 \\
\& \text { (i) } 500
\end{aligned}
\] \\
(ii) 700 f.t. their \(500+200\)
\(\qquad\) straight line curve
\end{tabular} \& \[
\begin{aligned}
\& \mathrm{L} 1 \\
\& \mathrm{C} 1
\end{aligned}
\] \& 1
1
1
f.t. 1

2

$[11]$ \& | A B |
| :--- |
| from $(30,300)$ to ( 40 , their 500 f.t. $)$ |
| from (40, their 500 f.t.) to $(60$, |
| their 700$)$ | <br>

\hline
\end{tabular}

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\begin{tabular}{|c|c|c|c|c|}
\hline 21 \& \begin{tabular}{l}
(a) \\
(b) \\
(c) \\
(d) \\
(e)
\end{tabular} \& \[
\begin{array}{ll}
(4,4) \\
(21 / 2,2) \& \\
y=4 \& \\
y=1 / 2 x-1 / 2 \& \text { B1 + B1 } \\
20 \& \\
\hline
\end{array}
\] \& \[
\begin{array}{r}
1 \\
1 \\
1 \\
2^{*} \\
1 \\
\hline
\end{array}
\] \& Mark at earliest \(a x+b y+c=0\) stage \\
\hline 22 \& \begin{tabular}{l}
(a) \\
(b) \\
(c) \\
(d)
\end{tabular} \& \[
\begin{aligned}
\& (6,2) \\
\& \text { (i) } \\
\& \text { (ii) } \quad(-2,0) \\
\& \left(00^{\circ} \mathrm{AC}\right. \\
\& (0,-2),(-4,-2)(-6,-6) \\
\& \left(\begin{array}{cc}
-\frac{1}{2} \& 0 \\
0 \& -\frac{1}{2}
\end{array}\right)
\end{aligned}
\] \& \begin{tabular}{l}
1
1
1
2 \\
1 \\
[12]
\end{tabular} \& SC1 for 2 points plotted correctly or 3 points stated \\
\hline 23 \& \begin{tabular}{l}
(a) \\
(b)
\end{tabular} \& \begin{tabular}{l}
(i) 1:2000000 \\
(ii) 235-237 \\
The possible positions clearly indicated P1
\end{tabular} \& 1
1

4

$[6]$ \& | I within $2^{\circ}$ |
| :--- |
| II within $2^{\circ} 2 \mathrm{~mm}$ III within 2 mm | <br>

\hline
\end{tabular}

