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 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 √ 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:

A.G. Answer given
b.o.d. Benefit of doubt
c.a.o Correct answer only
(in)dep (In) dependent
Ex.Q. Extra question
  Follow through
  Further error made
I.S.W. Ignore subsequent working
M.R. Misread
o.e. Or equivalent
O.W. Omission of essential working
P.A. Premature approximation
S.C. Special case
s.o.i Seen or implied
S.O.S. See other solution
t.&e. Trial and error
W.W. Without working (i.e. answer only seen)
W.W.W. Without wrong working
(£) or (°) Condone the omission of the £ or degree sign etc.
<table>
<thead>
<tr>
<th>Question</th>
<th>(a)</th>
<th>(i)</th>
<th>(9 - 5p)</th>
<th>B1</th>
<th>1</th>
<th>(3q^2 - 2r^2)</th>
<th>B1</th>
<th>+5qr</th>
<th>B1</th>
<th>2</th>
<th>(2(3t + 1)(3t - 1))</th>
<th>B2</th>
<th>2</th>
<th>SC1 for any incomplete (correct) factorisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(b)</td>
<td>(i)</td>
<td>30</td>
<td>(3x^2 = 75)</td>
<td>B1</td>
<td>1</td>
<td>(x = \pm 5)</td>
<td>A1</td>
<td>2</td>
<td>(y - 18 = 3x^2)</td>
<td>M1</td>
<td>2</td>
<td>(x = \frac{1}{3}(y - 18)) A1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(ii)</td>
<td></td>
<td></td>
<td>M1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>M1</td>
<td>2</td>
<td>(x = 5) (or -5) implies M1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(iii)</td>
<td></td>
<td></td>
<td>M1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>M1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 (a)</td>
<td>(i)</td>
<td>150</td>
<td>((g))</td>
<td>B1</td>
<td>1</td>
<td>450 : 550 or better</td>
<td>M1</td>
<td>9 : 11</td>
<td>A1</td>
<td>2</td>
<td>'their' (150 + 450) (\frac{1250}{1250}) (figs)</td>
<td>M1</td>
<td>48%</td>
<td>A1</td>
</tr>
<tr>
<td></td>
<td>(ii)</td>
<td>($) 3.60</td>
<td>Idea that $6.20 = 80%$</td>
<td>B1</td>
<td>1</td>
<td>$7.75$</td>
<td>A1</td>
<td>2</td>
<td></td>
<td>M1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 (a)</td>
<td>(i)</td>
<td>(t = 69)</td>
<td>B1</td>
<td>1</td>
<td>(u = 57)</td>
<td>B1</td>
<td>1</td>
<td>(x = 72)</td>
<td>B1</td>
<td>1</td>
<td>(y = 15)</td>
<td>B1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(b)</td>
<td>(3z + 3 \times 105)</td>
<td>M1</td>
<td>2</td>
<td>(z = 135)</td>
<td>A1</td>
<td>2</td>
<td>N.B. Alt. method using pentagon.</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(c)</td>
<td>(i)</td>
<td>(12) (cm)</td>
<td>B1</td>
<td>1</td>
<td>(\frac{18}{18}) (or his (\frac{12}{18}))</td>
<td>M1</td>
<td>15 (cm)</td>
<td>A1</td>
<td>2</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(ii)</td>
<td>(\frac{18}{18}) (or his (\frac{12}{18}))</td>
<td>M1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4 (a)</td>
<td>(i)</td>
<td>(\frac{20}{\cos 55})</td>
<td>M1</td>
<td>2</td>
<td>(34.8 - 35) (cm) A1</td>
<td>1</td>
<td>(34.9 + 20 = 54.8 - 35) (cm)</td>
<td>B1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(ii)</td>
<td>'their'</td>
<td>B1</td>
<td>2</td>
<td></td>
<td>M1</td>
<td>16.3 - 16.4</td>
<td>A1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(iii)</td>
<td>(20 \sin 55)</td>
<td>M1</td>
<td>2</td>
<td></td>
<td>M1</td>
<td>43.6 - 43.66</td>
<td>A1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>Arc of circle</td>
<td>B1</td>
<td>2</td>
<td>Centre C or (125)°</td>
<td>B1</td>
<td>2</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>(c)</td>
<td>(\frac{125}{360})</td>
<td>M1</td>
<td>2</td>
<td></td>
<td>M1</td>
<td>43.6 - 43.66</td>
<td>A1</td>
<td>2</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 5 (a) (i) Mode = 0

(ii) Median = 1

(iii) Mean = \( \frac{(0 \times 8) + (1 \times 5) + \ldots}{8 + 5 + \ldots} = 1.6 \)  

(b) (i) \( p = \frac{1}{5}, q = 1, r = 0 \) o.e

(ii)(a) \( \frac{2}{7} \)

(b) \( \frac{4}{21} \)

(c) \( \frac{4}{7} \) or ‘their’ \( \frac{4}{21} \times 3 \)

### 6 (a)  
73 – 37 = 36

(b) Any other 3 pairs

(c) Multiples of 9, digits add up to 9

(d) (i) \( 10x + y \)

(ii) \( 10x + y - (10y - x) = 9x - 9y \)

### 7 (a) \( 2x^2 = 500 \)

(b) \( \frac{1}{3} \times 150 \times h = 500 \)

(c) \( \frac{4}{3} \pi^3 = 500 \)

(d) Use of \( R \) and \( R + 1.5 \) o.e  

Area of x section = \( \frac{500}{6} \)

(e) \( R = 8 \) – 8.1 (cm)  

\( \left( \frac{2}{5} \right)^3 \)

\( 32 \) (cm\(^3\))
### 8 (a) Scales
- All 10 points correctly plotted (within 1 mm)  \( S_1 \)
- Smooth curve through points (allow marginally incorrect points)  \( P_1 \)
- 3 Lost for straight lines, incomplete, grossly thick

(b) (i) Negative value  \( T_1 \)
- 0.32 to 0.45  \( T_1 \)
- 3

(ii) Rate at which water level is changing or fall of water level per hour o.e  \( R_1 \)

(c) (i) 4 (m)  \( B_1 \)
- 3

(ii) Straight line through (0,4) and (6,2)  \( L_2 \)
- Allow (L1) for any st. line through (0,4) with –ve gradient

(iii) Their 2 – their 1.2  \( M_1 \)
- 75 – 85  \( A_1 \)
- 6

(iv) 5.7 – 5.9  \( B_1 \)

### 9 (a) (i) \[
\sin D = \frac{\sin 118}{950} \quad M_1 \\
\Rightarrow \sin D = \frac{600 \sin 118}{950} \quad M_1 \\
\hat{D} = 33.89 - 33.9 \Rightarrow A_1 \\
B = 28.1 - 28.11 \checkmark A_1 \\
(62 - their 33.9) \]

(ii) \[
(CD^2) = 1040^2 + 950^2 - \text{(or+)}(2) 1040.950. \cos 42 \quad M_1 \\
CD^2 = 1040^2 + 950^2 - 2.1040.950 \cos 42 \quad M_1 \\
= 515000 - 516000 \quad A_1 \\
CD = 716 - 719 (m) \quad A_1 \\
(iii) \quad (CN = 1040 \sin 42 \quad \text{o.e}) \\
\quad = 695 - 696 (m) \quad A_1 \\
\quad 2

(b) Angle of Dep. = \[ \tan^{-1} \left( \frac{500}{\text{their 696}} \right) \]
- 35.6 – 35.75  \( A_1 \)
- 2
### Question 10

- **(a)** \( \frac{20}{x} \)  
  **B1**

- **(b)** \( \frac{25}{x+2} \)  
  **B1**

- **(c)** \( \frac{20}{x} - \frac{25}{x+2} = \frac{1}{2} \)  
  **M1**  
  \( 40(x+2) - 50x = 3x(x+2) \)  
  **M1**  
  \( \Rightarrow 3x^2 + 16x - 80 = 0 \)  
  **A1**  
  N.B. A.G

- **(d)** For numerical \( p \pm (or \pm r) \sqrt{q} \)  
  \( p = -16 \) and \( r = 6 \)  
  **B1**  
  \( q = 1216 \) or \( q = 34.8 - 34.9 \)  
  **B1**  
  \( x = 3.145 \)  
  **B1**  
  \(-8.479 \)  
  **B1**  
  **SC1** for 3.1 – 3.2 and -8.4 to -8.5

- **(e)** Time up \( \frac{20}{3.145} \)  
  **M1**  
  \( \frac{25}{5.145} \)  
  **M1**  
  11 h 13 min or 673 min  
  **A1**

### Question 11

- **(a)**  
  - **(i)** Reflection  
    **B1**  
  - **(ii)** \( \begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix} \)  
    **B1**  
  - **B1**  
  - **B1**  
  - **B1**  

- **(b)**  
  - **(i)** (-1,3)  
    **B1**  
  - **(ii)** \( \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 1 \\ 2 \end{pmatrix} \)  
    **M1**  
  - **K is (2, -1)**  
    **A1**  
  - **(iii)** Rotation \( 90^\circ \text{ Anticlockwise} \) \( \text{or} \ 270^\circ \text{ Clockwise} \)  
    **B1**  
  - **(iv)** \( \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \)  
    **B2**  
  - **SC1** for Reflection in \( x \) axis

- **(c)**  
  - **(i)** 1 : 9  
    **B1**  
  - **(ii)** 27  
    **B1**  

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