

Q	Solution	Marks	Total	Comments
1	Row reduce (or column) $\begin{pmatrix} 12 & 6 & 0 & 3 \\ 0 & 9 & 4 & 15 \\ 9 & 3 & 18 & 0 \\ 0 & 2 & 3 & 5 \end{pmatrix}$ Three lines, therefore column reduce $\begin{pmatrix} 12 & 4 & 0^* & 3 \\ 0^* & 7 & 4 & 15 \\ 9 & 1 & 18 & 0^* \\ 0 & 0^* & 3 & 5 \end{pmatrix}$ Four lines, therefore complete $B - 1, D - 2, A - 3, C - 4$ Total = 45 minutes	M1  A1  M1  A1F  B1  B1	6      6	CAO
<b>Total</b>			<b>6</b>	

Q	Solution	Marks	Total	Comments
1	Row Reduce $\begin{array}{cccc c} 6 & 9 & 12 & 0 & 31 \\ 0 & 7 & 12 & 0 & 33 \\ 7 & 6 & 12 & 0 & 32 \\ 0 & 4 & 11 & 0 & 35 \end{array}$ Column Reduce $\begin{array}{ccc c} 6 & 5 & 1 & 0 \\ 0 & 3 & 1 & 0 \\ 7 & 2 & 1 & 0 \\ \hline 0 & 0 & 0 & 0 \\ \hline 0 & 4 & 11 & 0 \end{array}$ 3 lines $\therefore$ continue $\begin{array}{cccc} \underline{5} & \underline{4} & \underline{0} & \underline{0} \\ \underline{0} & \underline{2} & \underline{0} & \underline{0} \\ \underline{6} & \underline{1} & \underline{0} & \underline{0} \\ \underline{0} & \underline{0} & \underline{0} & \underline{1} \end{array}$ Match $Q1, S2, P3, R4$ Min = 147	M1 A1  M1  A1F  M1  A1F  A1F  B1  B1	9           9	or column reduce then row          OE       OE (Q1, S2, P4, R3)
<b>Total</b>			<b>9</b>	

<p><b>2 (a)</b> Add extra column of 76 Reduce rows</p> $\begin{array}{r rrrrr} 60 & 6 & 7 & 3 & 0 & 16 \\ \hline 61 & 6 & 10 & 12 & 0 & 15 \\ \hline 61 & 0 & 9 & 4 & 2 & 15 \\ \hline 62 & 7 & 10 & 12 & 0 & 14 \\ \hline 65 & 5 & 3 & 11 & 0 & 11 \end{array}$ <p>Reduce columns</p> $\begin{array}{r rrrrr} 0 & 3 & 3 & 0 & 11 \\ \hline 6 & 4 & 0 & 0 & 5 \\ \hline 6 & 7 & 9 & 0 & 4 \\ \hline 0 & 6 & 1 & 2 & 4 \\ \hline 7 & 7 & 9 & 0 & 3 \\ \hline 5 & 0 & 8 & 0 & 0 \end{array}$ <p>4 rows, so adjust</p> $\begin{array}{r} 6 & 4 & \textcircled{0} & 3 & 5 \\ 3 & 4 & 6 & \textcircled{0} & 1 \\ \textcircled{0} & 6 & 1 & 5 & 4 \\ 4 & 4 & 6 & 0 & \textcircled{0} \\ 5 & \textcircled{0} & 8 & 3 & 0 \end{array}$ <p>Match A - 3, B - 4, C - 1, <del>D - 5</del>, E - 2 Min = 253</p>	<p>M1</p> <p>M1 A1</p> <p>M1 A1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>B1</p>	<p>or reverse order</p> <p>9</p>	
<p><b>(b)</b> Add extra column of 60 Subtract all entries from 76 (+)</p> $\begin{array}{r rrrr} 10 & 9 & 13 & 16 & 16 \\ 9 & 5 & 3 & 15 & 16 \\ 15 & 6 & 11 & 13 & 16 \\ 7 & 4 & 2 & 14 & 16 \\ 6 & 8 & 0 & 11 & 16 \end{array}$	<p>M1</p> <p>M1</p> <p>A1</p>	<p>3</p>	<p>SC Extra column of 76 scores 1</p>
<b>Total</b>		<b>12</b>	