

<b>07</b>	<b>6a</b>	Solve the following equation for $x$ : $2e^{2x} - e^x = 0$	<b>2</b>
<p>Let <math>m = e^x</math></p> $\therefore 2m^2 - m = 0$ $m(2m - 1) = 0$ $m = 0, \frac{1}{2}$ <p><math>\therefore e^x = 0</math> or <math>e^x = \frac{1}{2}</math></p> <p><math>\therefore</math> undefined <math>\log_e e^x = \log_e \frac{1}{2}</math></p> $\therefore x = \log_e \frac{1}{2}$			

\* These solutions have been provided by *projectmaths* and are not supplied or endorsed by the Board of Studies

### Board of Studies: Notes from the Marking Centre

Better responses solved by making a substitution for  $e^x$ , with some causing themselves problems by letting  $x = e^x$ , leading to solutions of  $x = 0$  or  $\frac{1}{2}$ . The majority of those who found that  $e^x = \frac{1}{2}$  got to the correct 'ln' expression for  $x$ . However, a few who gave decimal approximations only failed to take into account the difference between the 'ln' and 'log' buttons on their calculator. Some of those who used the factorisation method had difficulties with selecting the correct HCF to take out, eg  $e^x(e^2 - 1)$ . The best responses applied 'log laws' right from the start, with their solution written as:

$$\begin{aligned}
 2e^{2x} &= e^x \\
 \ln(2e^{2x}) &= \ln(e^x) \\
 \ln 2 + 2x &= x \\
 x &= -\ln 2
 \end{aligned}$$

Source: [http://www.boardofstudies.nsw.edu.au/hsc\\_exams/](http://www.boardofstudies.nsw.edu.au/hsc_exams/)