5 A particle P of mass $4\,\text{kg}$ is moving in a horizontal straight line. At time $t\,\text{s}$ the velocity of P is $v\,\text{m\,s}^{-1}$ and the displacement of P from a fixed point O on the line is $x\,\text{m}$. The only force acting on P is a resistive force of magnitude $(4e^{-x}+12)e^{-x}\,\text{N}$. When $t=0$, $x=0$ and $v=4$.

(a) Show by integration that $v=\dfrac{1+3e^{x}}{e^{x}}$. [4]

(b) Find an expression for x in terms of t. [4]

[Turn over