

Question Number	Answer	Mark
11(a)	Top line correct (1)	2
	Bottom line correct (1)	
	<u>Example of calculation</u> ${}^{187}_{75}\text{Re} \rightarrow {}^{187}_{76}\text{Os} + {}^0_{-1}\beta^{-} + {}^0_0\bar{\nu}$	
11(b)	Use of $1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$ (1)	3
	Use of $E_k = \frac{1}{2}mv^2$ (1)	
	$v = 3.0 \times 10^7 \text{ m s}^{-1}$ (1) <u>Example of calculation</u> $2.6 \times 10^3 \times 1.6 \times 10^{-19} \text{ J} = \frac{1}{2} \times 9.11 \times 10^{-31} \text{ kg} \times v^2$ $\therefore v = \sqrt{\frac{2 \times 4.16 \times 10^{-16} \text{ J}}{9.11 \times 10^{-31} \text{ kg}}} = 3.02 \times 10^7 \text{ m s}^{-1}$	
	Total for question 11	5