$^{8}/_{10}$

## H3 Speed of Electron in an Electric Field

For electrons moving at a speed greater than 10% of the speed of light, you should only claim that your answer is approximate (unless you have used relativistic equations). If you reckon that the electron is travelling at a speed greater than 80% of the speed of light, you should decline to give your answer unless using relativity.

H3.1 Convert 7.2 eV into joules.

H3.2 Convert $3.0 \times 10^{-11}$ J into electronvolts.

H3.3 How fast is an electron going if it has been accelerated from rest by a potential difference of. . .

a) 50 V

b) 20 kV

c) 1.5 GV

H3.4 What accelerating potential is needed to produce electrons with a speed of. . .

a) 7000 m $s^{-1}$

b) $4.0 \times 10^{7}$ m $s^{-1}$

H3.5 How fast is an alpha particle going if it accelerated by a 1.5 MV potential? Assume that the alpha particle has twice the charge and four times the mass of a proton.

H3.6 To trigger a particular nuclear reaction, a deuterium nucleus (same charge as the proton, but twice the mass) needs to have a kinetic energy of $4.0 \times 10^{-13}$ J. What accelerating voltage is needed?

H3.7 In order to produce protons with a kinetic energy of 5.0 MeV, what accelerating voltage is needed?