Essential Pre-Uni Physics H3.2

A Level

Physical constants which may be necessary to answer the problems on this page can be found within the hint tabs.

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

Convert $3.0 \times 10^{-11}\,\mathrm{J}$ into electron volts.

Essential Pre-Uni Physics H3.5

A Level

Physical constants which may be necessary to answer the problems on this page can be found within the hint tabs.

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

How fast is an alpha particle going if it is accelerated by a $1.5\,\mathrm{MV}$ potential? Assume that the alpha particle has twice the charge and four times the mass of a proton.

Gameboard:
STEM SMART Physics 40 - School of Fields - Accelerators

Energy and Fields - Accelerator 23.2

A Level

Calculate the voltage needed to accelerate a proton to $3.5 \times 10^{6}\,\mathrm{m\,s^{-1}}$ from rest.

Gameboard:
STEM SMART Physics 40 - School of Fields - Accelerators

Essential Pre-Uni Physics H3.6

A Level

Physical constants which may be necessary to answer the problems on this page can be found within the hint tabs.

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

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 $4.0 \times 10^{-13}\,\mathrm{J}$. What accelerating voltage is needed?

Gameboard:
STEM SMART Physics 40 - School of Fields - Accelerators

Vectors and Fields - Mass Spectrometer 30.2

A Level

Calculate the speed electrons emerge from a $95\ \mathrm{V}$ accelerator. Assume that the electrons start from rest.

Gameboard:
STEM SMART Physics 40 - School of Fields - Accelerators

Vectors and Fields - Mass Spectrometer 30.6

A Level

Calculate the specific charge q/m of a particle travelling at $2.0 \times 10^6\,\mathrm{m\,s^{-1}}$ in a magnetic field if the path radius $r = 11.9\,\mathrm{mm}$ and the flux density $B = 0.175\,\mathrm{T}$.

Gameboard:
STEM SMART Physics 40 - School of Fields - Accelerators

Vectors and Fields - Mass Spectrometer 30.7

A Level

Calculate the voltage V_s needed in a velocity selector to pass $1.6 \times 10^6\,\mathrm{m\,s^{-1}}$ electrons in a $2.2\,\mathrm{T}$ magnetic field if the velocity selector plate gap $d = 6.5\,\mathrm{cm}$.

Gameboard:
STEM SMART Physics 40 - School of Fields - Accelerators

Vectors and Fields - Mass Spectrometer 30.11

A Level

A singly charged ion is accelerated by a $650\,\mathrm{kV}$ potential before passing into a region with a $1.25\,\mathrm{T}$ magnetic field. It curves with a radius of $0.322\,\mathrm{m}$. Calculate its mass.