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Essential Pre-Uni Physics H3.2



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



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Essential Pre-Uni Physics H3.5



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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.

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Energy and Fields - Accelerator 23.2



Calculate the voltage needed to accelerate a proton to $3.5\times10^6\,m\,s^{-1}$ from rest.

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Essential Pre-Uni Physics H3.6



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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?

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Vectors and Fields - Mass Spectrometer 30.2



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

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Vectors and Fields - Mass Spectrometer 30.6



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 $B = 0.175 \, \mathrm{T}$.

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Gameboard Physics Fields Combined Fields Vectors and Fields - Mass Spectrometer 30.7

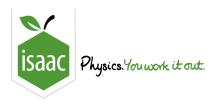
Vectors and Fields - Mass Spectrometer 30.7



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

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Gameboard Physics Fields Combined Fields Vectors and Fields - Mass Spectrometer 30.11

Vectors and Fields - Mass Spectrometer 30.11



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.