

Home Gameboard Physics Fields Electric Fields Essential Pre-Uni Physics H3.2

## Essential Pre-Uni Physics H3.2

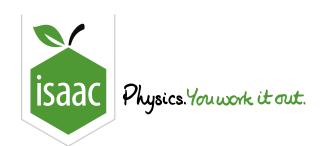


Physical constants which may be necessary to answer the problems on this page can be found within the hint tabs.

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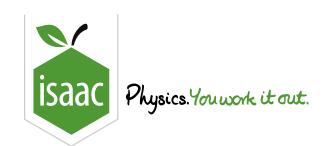
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How fast is an alpha particle going if it is accelerated by a  $1.5\,\mathrm{MV}$  potential? Assume that the alpha particle has twice the charge and four times the mass of a proton.

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Home Gameboard Physics Fields Electric Fields Energy and Fields - Accelerator 23.2

# Energy and Fields - Accelerator 23.2

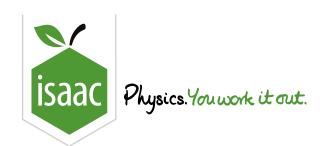


Calculate the voltage needed to accelerate a proton to  $3.5 \times 10^6 \, \mathrm{m \, s^{-1}}$  from rest.

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### Essential Pre-Uni Physics H3.6



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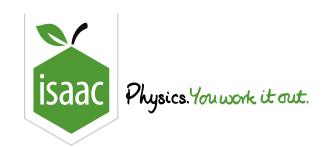
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To trigger a particular nuclear reaction, a deuterium nucleus (same charge as the proton, but twice the mass) needs to have a kinetic energy of  $4.0 \times 10^{-13}$  J. What accelerating voltage is needed?

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Home Gameboard Physics Fields Combined Fields Vectors and Fields - Mass Spectrometer 30.2

## Vectors and Fields - Mass Spectrometer 30.2

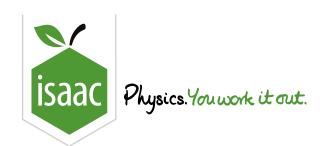


Calculate the speed electrons emerge from a  $95\,\mathrm{V}$  accelerator. Assume that the electrons start from rest.

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## Vectors and Fields - Mass Spectrometer 30.6

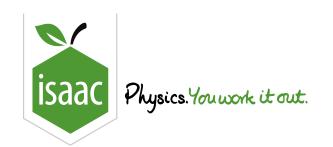


Calculate the specific charge q/m of a particle travelling at  $2.0 \times 10^6\,\mathrm{m\,s^{-1}}$  in a magnetic field if the path radius  $r=11.9\,\mathrm{mm}$  and the flux density  $B=0.175\,\mathrm{T}$ .

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## Vectors and Fields - Mass Spectrometer 30.7

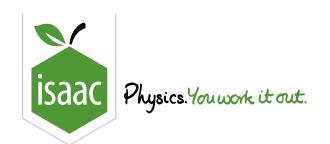


Calculate the voltage  $V_{\rm s}$  needed in a velocity selector to pass  $1.6 \times 10^6 \, {\rm m \, s^{-1}}$  electrons in a  $2.2 \, {\rm T}$  magnetic field if the velocity selector plate gap  $d=6.5 \, {\rm cm}$ .

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## 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.

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