Unit 2 – Particles & Waves
Section 2 – Forces on Charged Particles

2008 8. An electron is accelerated from rest through a potential difference of 2·0 kV.

The kinetic energy gained by the electron is

A $8{\cdot}0 \times 10^{-23}$ J

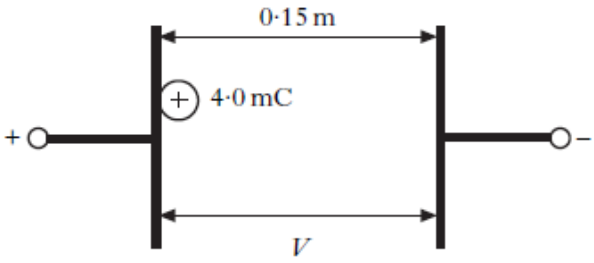
B $8{\cdot}0 \times 10^{-20}$ J

C $3{\cdot}2 \times 10^{-19}$ J

D $1{\cdot}6 \times 10^{-16}$ J

E $3{\cdot}2 \times 10^{-16}$ J.

2009 8. A potential difference, V, is applied between two metal plates. The plates are 0·15 m apart. A charge of +4·0 mC is released from rest at the positively charged plate as shown.



The kinetic energy of the charge just before it hits the negative plate is 8·0 J.

The potential difference between the plates is

A $3{\cdot}2 \times 10^{-2}$ V

B 1·2 V

C 2·0 V

D $2{\cdot}0 \times 10^{3}$ V

E $4{\cdot}0 \times 10^{3}$ V.

2010 7. The potential difference between two points is

A the work done in moving one electron between the two points

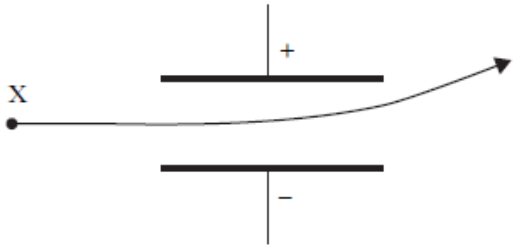
B the voltage between the two points when there is a current of one ampere

C the work done in moving one coulomb of charge between the two points

D the kinetic energy gained by an electron as it moves between the two points

E the work done in moving any charge between the two points.

2010 8. The product, X, of a nuclear reaction passes through an electric field as shown.



Product X is

A an alpha particle

B a beta particle

C gamma radiation

D a fast neutron

E a slow neutron.

2011 8. One volt is equivalent to one

A farad per coulomb

B ampere per ohm

C joule per ampere

D joule per ohm

E joule per coulomb.

2013 8. A student writes the following statements about electric fields.

I There is a force on a charge in an electric field.

II When an electric field is applied to a conductor, the free electric charges in the conductor move.

III Work is done when a charge is moved in an electric field.

Which of the statements is/are correct?

A I only

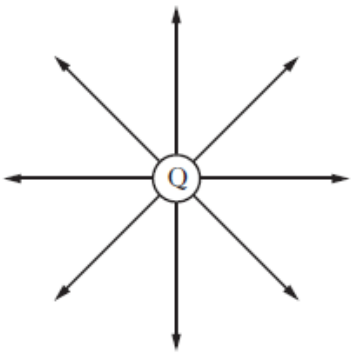
B II only

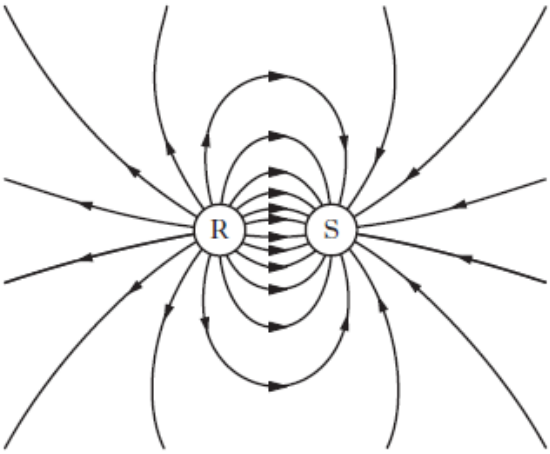
C I and II only

D I and III only

E I, II and III

2014 Revised 8. The electric field patterns around charged particles Q, R and S are shown.

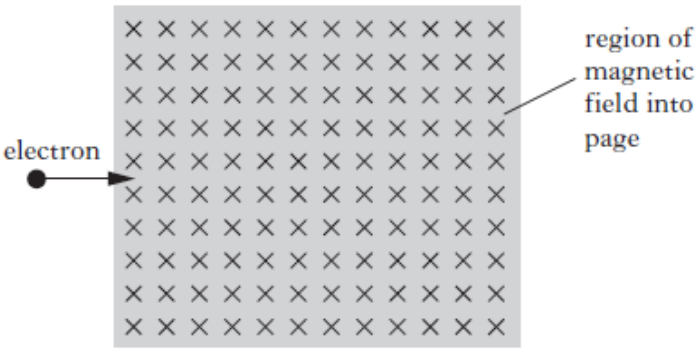




Which row in the table shows the charges on particles Q, R and S?

	Charge on Q	*Charge on R*	*Charge on S*
A	positive	positive	negative
B	negative	negative	positive
C	negative	positive	negative
D	negative	negative	negative
E	positive	positive	positive

2014 Revised 9. An electron enters a region of magnetic field as shown.



The direction of the force exerted by the magnetic field on the electron as it enters the field is

A to the left

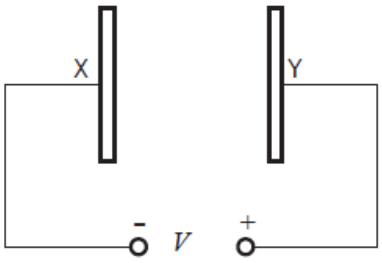
B into the page

C out of the page

D towards the top of the page

E towards the bottom of the page.

2015 10. Two parallel metal plates X and Y in a vacuum have a potential difference V across them.



An electron of charge e and mass m, initially at rest, is released from plate X.

The speed of the electron when it reaches plate Y is given by

A $\frac{2eV}{m}$

B $\sqrt{\frac{2eV}{m}}$

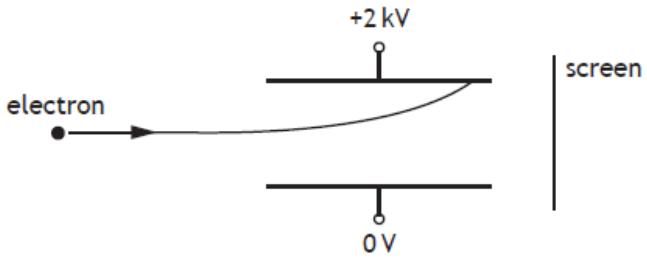
C $\sqrt{\frac{2V}{em}}$

D $\frac{2V}{em}$

E $\frac{2mV}{e}$

2015 11. A potential difference of 2 kV is applied across two metal plates.

An electron passes between the metal plates and follows the path shown.



A student makes the following statements about changes that could be made to allow the electron to pass between the plates and reach the screen.

I Increasing the initial speed of the electron could allow the electron to reach the screen.

II Increasing the potential difference across the plates could allow the electron to reach the screen.

III Reversing the polarity of the plates could allow the electron to reach the screen.

Which of these statements is/are correct?

A I only

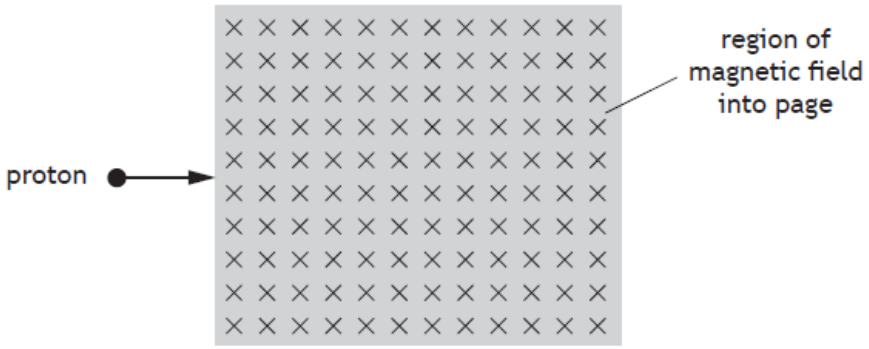
B II only

C III only

D I and II only

E I and III only

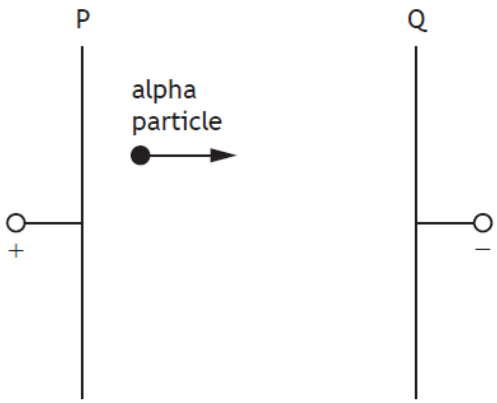
2018 10. A proton enters a region of magnetic field as shown.



On entering the magnetic field the proton

A deflects into the page
B deflects out of the page
C deflects towards the top of the page
D deflects towards the bottom of the page
E is not deflected.

2019 11. An alpha particle is accelerated in an electric field between metal plates P and Q.



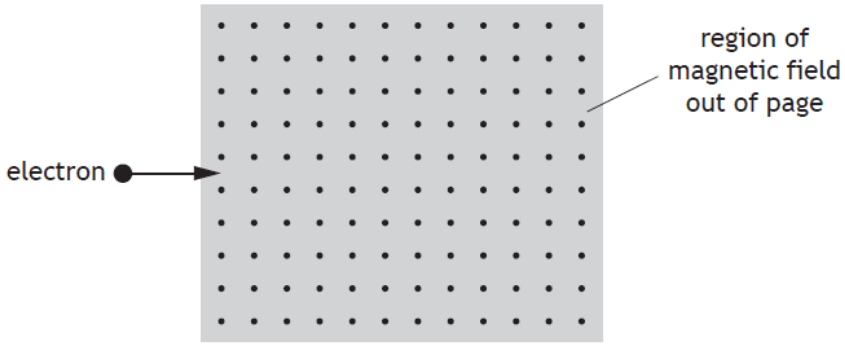
The charge on the alpha particle is $3{\cdot}2 \times 10^{-19}$ C.

The kinetic energy gained by the alpha particle while travelling from plate P to plate Q is $8{\cdot}0 \times 10^{-16}$ J.

The potential difference across plates P and Q is

A $2{\cdot}6 \times 10^{-34}$ V
B $2{\cdot}0 \times 10^{-4}$ V
C $4{\cdot}0 \times 10^{-4}$ V
D $2{\cdot}5 \times 10^{3}$ V
E $5{\cdot}0 \times 10^{3}$ V.

2019 **12.** An electron enters a region of uniform magnetic field as shown.



The direction of the magnetic force on the electron immediately after entering the field is

A towards the top of the page
B towards the bottom of the page
C towards the right of the page
D into the page
E out of the page.