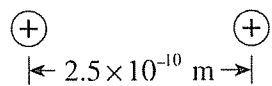
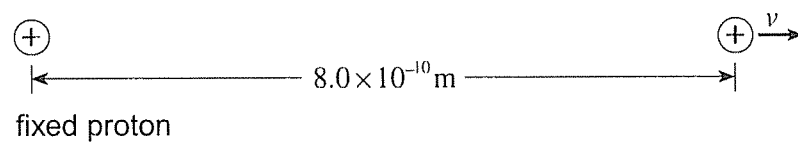


PHYSICS 12 - Electrostatics Review

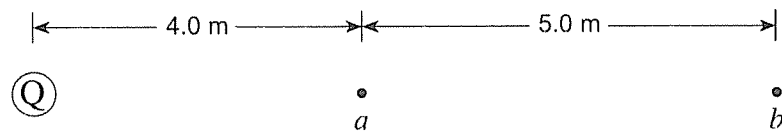
1. Two protons are initially held at rest 2.5×10^{-10} m apart.



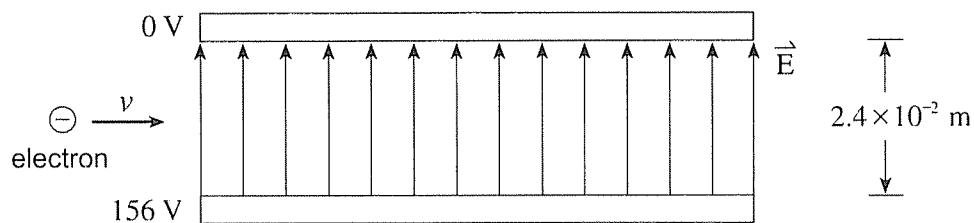
If one of the protons is released as shown below, what is its speed when it is 8.0×10^{-10} m from the fixed proton? **(7 marks)**



2. The potential difference in moving from position a to position b ($\Delta V_{a \rightarrow b}$) in the diagram below is equal to $+400$ V. Determine the size and polarity of the charge Q . **(7 marks)**

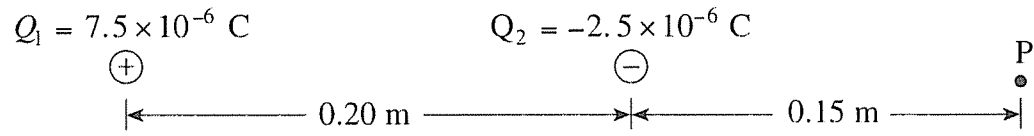


3. An electron with a speed of 3.3×10^7 m/s is directed between charged parallel plates as shown.



- a) What are the magnitude and direction of the electrostatic force on the electron while it is between the plates? **(5 marks)**
- b) What is the magnitude of the acceleration of the electron while it is between the plates? **(2 marks)**

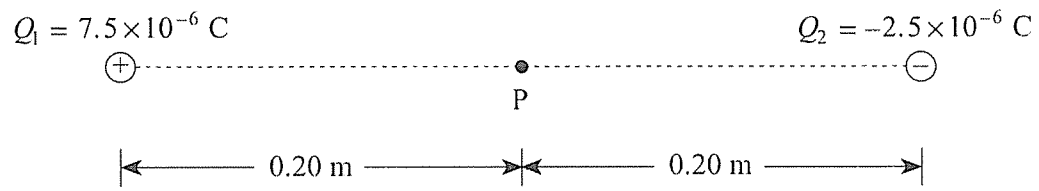
4. Electric charges Q_1 and Q_2 are arranged as shown in the diagram below.



What is the electric potential at point P?

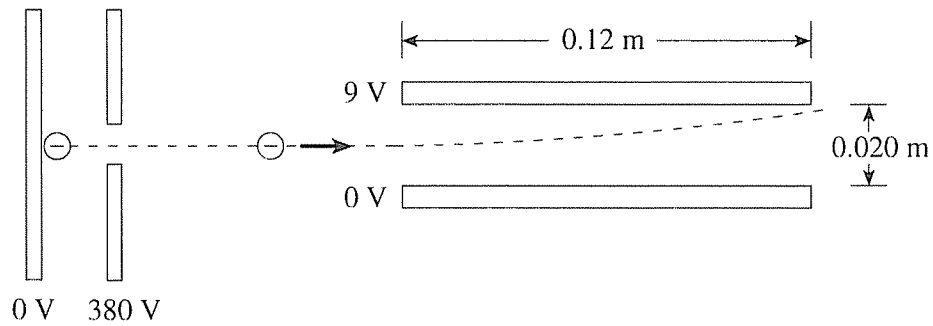
(7 marks)

5. Electric charges are arranged as shown in the diagram below.



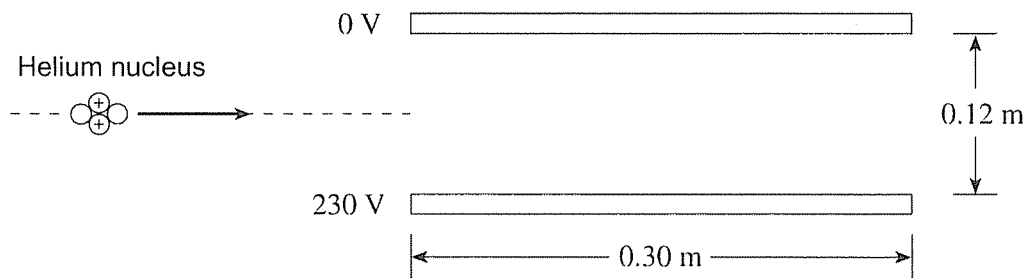
What is the electric field (magnitude and direction) at point P midway between the charges?
(7 marks)

6. A beam of electrons is directed to a region between oppositely charged parallel plates as shown in the diagram below.



- a) The electron beam is produced by accelerating electrons through an electric potential difference of 380 V. What is the speed of the electrons as they leave the 380 V plate?
(3 marks)
- b) What is the electrostatic force on electrons in the region between the horizontal plates when they are connected to a 9.0 V potential difference?
(4 marks)

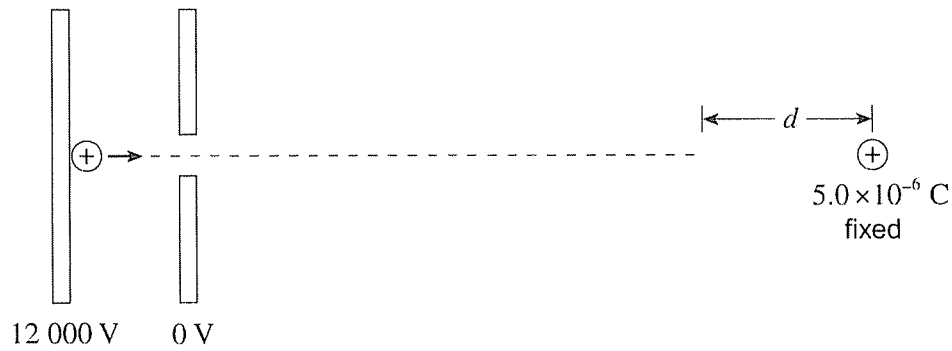
7. A helium nucleus having twice the charge and four times the mass of a proton is travelling with high velocity when it enters a set of charged plates as shown.



- a) Find the magnitude of the acceleration of the helium nucleus due to these plates. **(5 marks)**

- b) A proton travelling at the same velocity as the helium nucleus is then sent through these same plates. Explain, using principles of physics, why the acceleration of the proton is larger than that of the helium nucleus. **(4 marks)**

8. A proton, accelerated from rest through a potential difference of 1.2×10^4 V, is directed at a fixed 5.0×10^{-6} C charge.

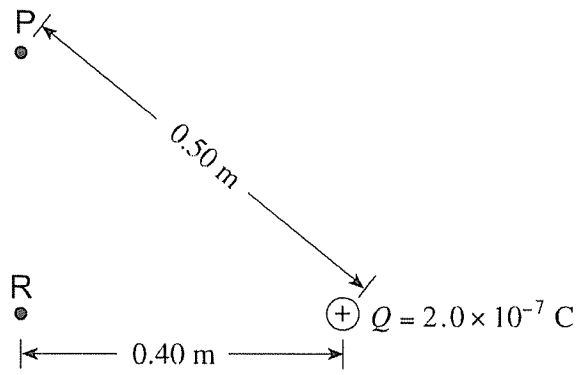


(Diagram not to scale.)

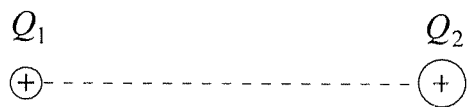
- a) What is the speed of the proton as it leaves the parallel plates? **(4 marks)**

- b) What is the distance d from the fixed charge when the proton is stopped? **(3 marks)**

9. What is the electric potential difference between points P and R due to the fixed point charge Q ? (7 marks)



10. A student decides to investigate how electric field varies along the line connecting two positive point charges. Charge Q_2 is greater than charge Q_1 .



Using principles of physics, describe the electric field along the line from Q_1 to Q_2 . (4 marks)
