

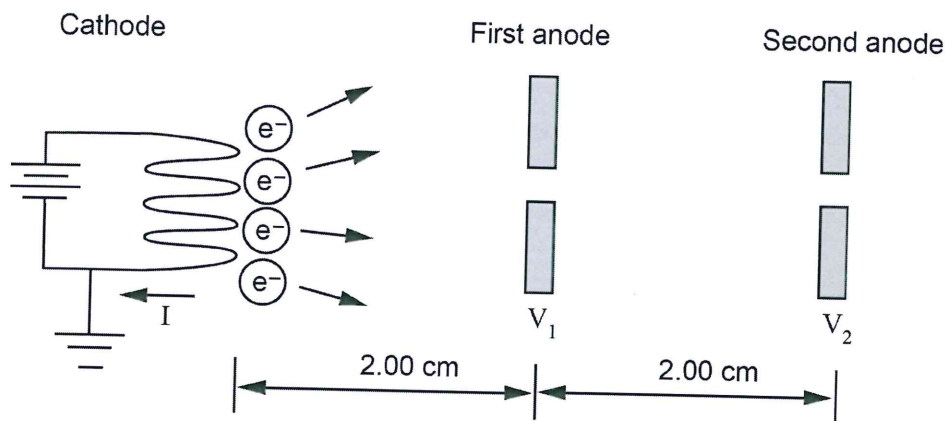
EXAM QUESTIONS

Chapter 3.3 - Energy

Question 1 2013:2:16

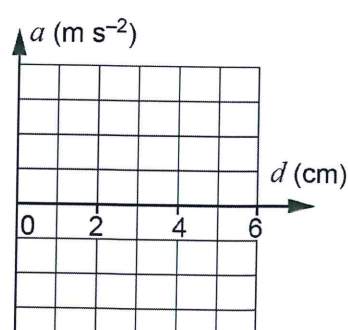
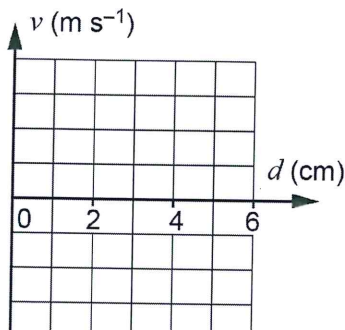
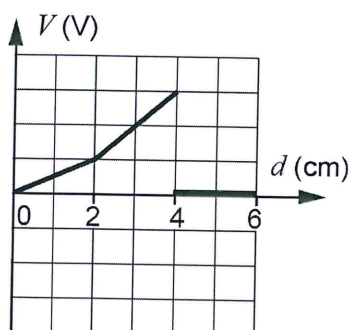
(16 marks)

An electron gun is a very important component of many devices, including particle accelerators, electron microscopes and cathode-ray tubes. A schematic diagram of an electron gun is shown below.



Assume the average initial velocity of a thermal electron is zero. The anode voltages are $V_1 = 1500 \text{ V}$ and $V_2 = 4500 \text{ V}$ and the distances between the cathode and anodes are as shown above.

- Calculate the velocity in m s^{-1} of the thermal electrons as they pass through the first anode. (4 marks)
- Calculate the average acceleration in m s^{-2} of an electron in the region between the cathode and the first anode. (3 marks)
- Complete the sketches that qualitatively represent the situation on the axes below. The first graph, of distance versus potential difference, has been completed for you. (6 marks)



- Calculate the electrical work done by the electric field in moving one electron from the first anode to the second anode. Include units with your answer. (3 marks)