

- 2 (a) Define *electric field strength* at a point.

..... [1]

- (b) Electrons are emitted from a cathode C and are accelerated towards an anode A, as illustrated in Fig. 2.1.

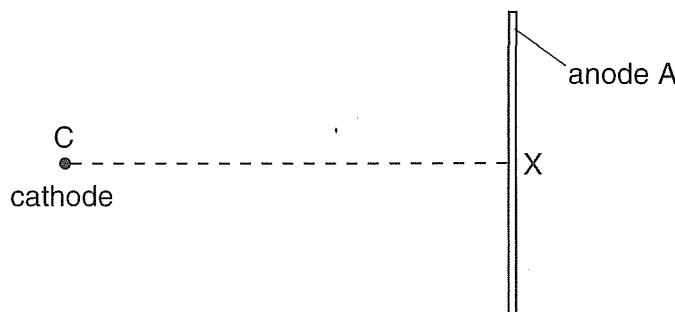


Fig. 2.1

The anode is earthed. CX is a line drawn from C normal to the anode A. The distance CX is 4.0 cm.

The variation with distance d from C along CX of the magnitude of the electric field strength E is shown in Fig. 2.2.

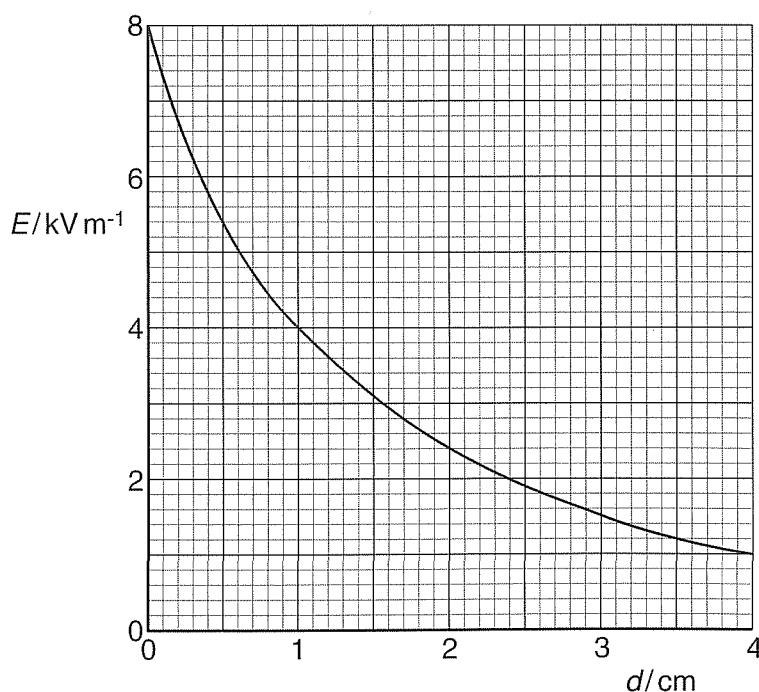


Fig. 2.2

- (i) On Fig. 2.1, mark with an arrow the direction of the electric field along CX. [1]

- (ii) Use Fig. 2.2 to determine the force F on an electron at a point mid-way between C and X.

$$F = \dots \text{ N} [2]$$

- (c) (i) A student assumes that the force F on the electron remains constant as the electron moves from C to X.

Use the value of F calculated in (b)(ii) to estimate, on the basis of this assumption, the potential difference between C and X.

$$\text{potential difference} = \dots \text{ V} [2]$$

- (ii) Suggest, with a reason, whether the magnitude of the potential difference calculated in (i) will be an over-estimate or an under-estimate of the actual potential difference.

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..... [1]