7 **(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. 7.1.

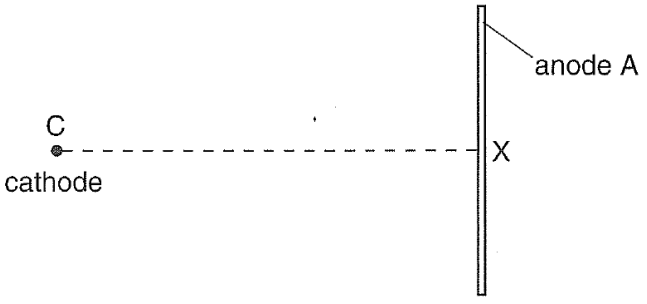
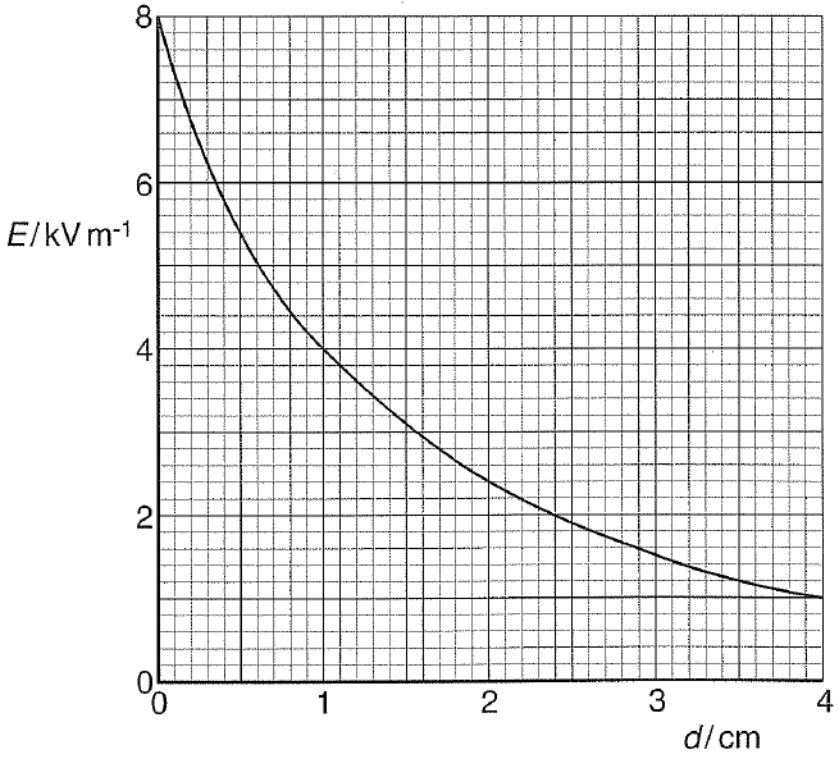


Fig. 7.1

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. 7.2.



(i) On Fig. 7.1, mark with an arrow the direction of the electric field along CX. [1]

(ii) Use Fig. 7.2 to determine the force *F* on an electron at a point mid-way between C and X.

F = ... 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.

potential difference = ... 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.

.....

.....[1]

[Total: 7]