

- 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.

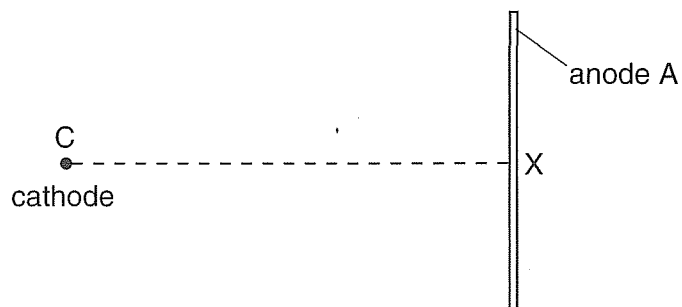


Fig. 2.1

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.

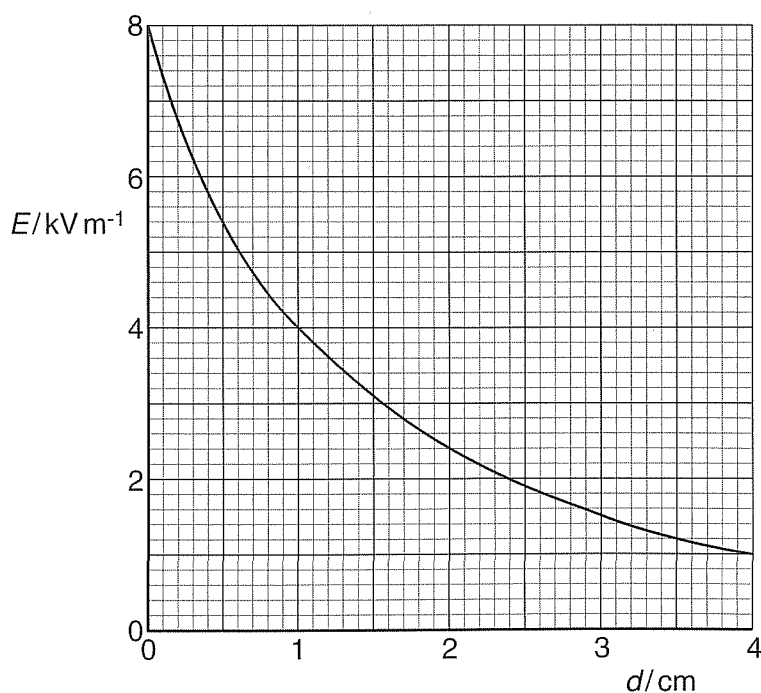


Fig. 2.2

- (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.

$F = \dots\dots\dots$  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 =  $\dots\dots\dots$  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.

$\dots\dots\dots$   
 $\dots\dots\dots$  [1]