4 **(a)** State Coulomb's law between 2 point charges.

....

....

.... [1]

(b) A positive point charge +*Q* is positioned at a fixed point X and an identical positive point charge is positioned at a fixed point Y, as shown in Fig. 4.1.
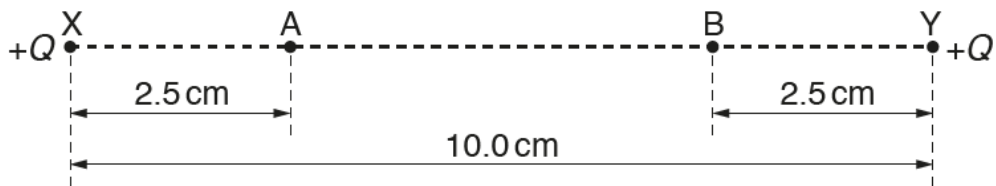

Fig. 4.1

The charges are separated in a vacuum by a distance of 10.0 cm.

Point A and B are on the line XY. Point A is a distance of 2.5 cm from X and point B is at a distance of 2.5 cm from Y. The electric field strength at point A is 4.1×10^{-5} V m^{-1}.

(i) Calculate charge +*Q*.

+*Q* = ... C   [3]

(ii) On Fig. 4.2, sketch the variation of the electric field strength E with distance d from A, along the line AB, up to B. [2]
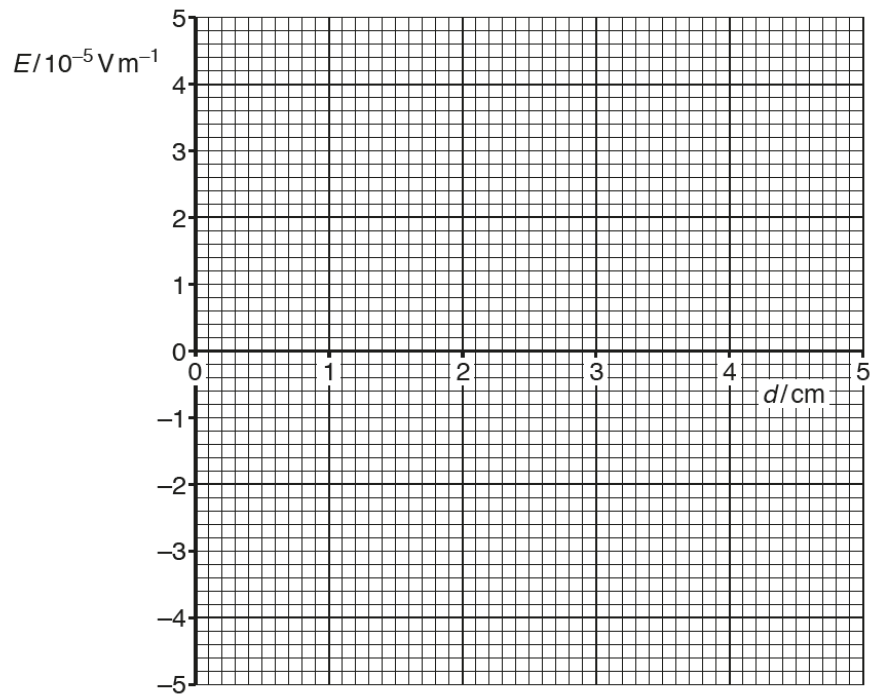

Fig. 4.2

(iii) What quantity is represented by the area between the line drawn **(b)(ii)** and the d-axis?

.... [1]

(iv) 1. A small positive charge is placed at A. The electric field causes this charge to move from rest along the line AB.
Describe the acceleration of the charge as it moves from A to B.

....

....

....

.... [2]

2. Hence, state the type of motion it has along the line AB.

.... [1]