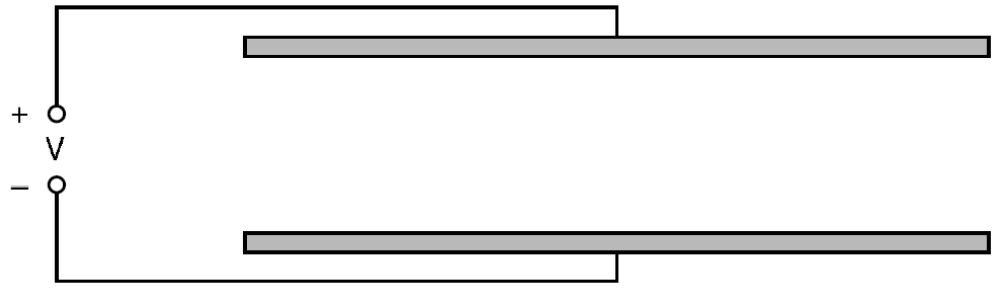
5 (a) (i) State what is meant by an *electric field*.

……..

……. [1]

(ii) Complete the diagram in Fig. 5.1 to show the electric field pattern between the parallel plates.



[2]

Fig. 5.1

(iii) The plates in Fig. 5.1 are separated by a distance *d* and there is a potential difference *V* between them. A small charge of +*Q* is moved from the negative plate up to the positive of the plate.

State an expression for the work *W* done on the charge

1. in terms of *V* and *Q*

W = …… [1]

2. in terms of the force *F* on the charge and *d*.

W = …… [1]

(iv) Use your answers to **(a) (iii)** to show that the electric field strength between the plates in **(a) (ii)** is equal to the potential gradient.

[2]

(b) The electric field pattern around two charges of +1.0 μC and +4.0 μC is shown in Fig. 5.2.

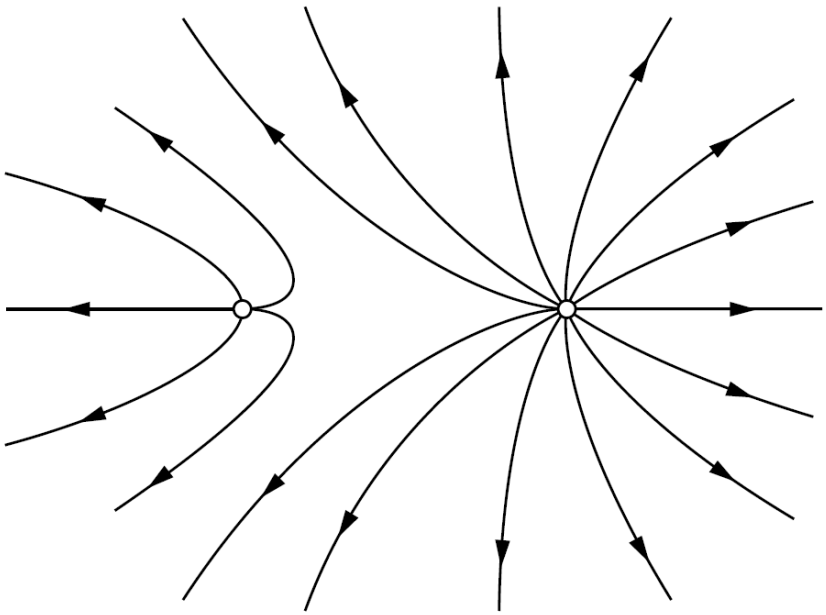


Fig. 5.2 (not to scale)

The distance between the two charges is 6.0 cm.

There is a neutral point between the charges. A point charge placed at the neutral point does not experience a force.

Determine the distance of the neutral point from the 1.0μC charge.

distance = …… cm [3]

[Total: 10]