

5 (a) State Coulomb's law.

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.....
..... [2]

- (b) Two identical oil droplets are in a vacuum. The centres of the droplets are a distance of $3.8 \times 10^{-6} \text{ m}$ apart. The droplets have equal charge and exert an electric force on each other of magnitude $6.3 \times 10^{-17} \text{ N}$.

Determine the magnitude of the charge on each droplet.

charge = C [2]

- (c) One of the oil droplets in (b) is now placed between two horizontal metal plates, as shown in Fig. 5.1.

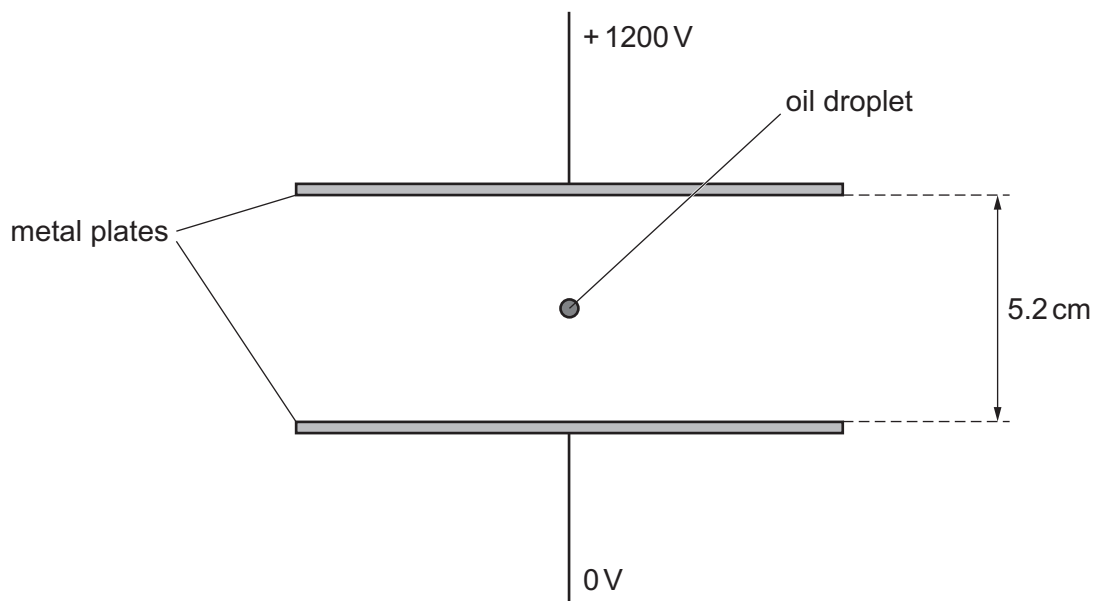


Fig. 5.1 (not to scale)

A potential difference (p.d.) of 1200 V is applied between the plates, with the top plate at the higher potential. The oil droplet is stationary and in equilibrium.

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- (i) State the sign of the charge on the oil droplet.

..... [1]

- (ii) On Fig. 5.1, draw four lines to represent the electric field between the plates. [3]

- (iii) The distance between the plates is 5.2 cm.

Determine the mass of the oil droplet.

mass = kg [3]