

# Chapter H

## Fields

8/10

### H1 Uniform Electric Fields

In these questions ignore the effects of non-electrical forces.

- H1.1 What is the magnitude of the force if a  $+6.0 \times 10^{-9}$  C charge is put in a  $50\,000 \text{ N C}^{-1}$  field?
- H1.2 What magnitude of field do you need to cause a  $-1.6 \times 10^{-19}$  C electron to experience a 2.00 N magnitude force?
- H1.3 How strong a field do you need to cause a  $+3.2 \times 10^{-19}$  C alpha particle to experience a 2.00 N force?
- H1.4 What is the strength of the electric field between two metal sheets held 5.0 cm apart, if one is connected to  $-500 \text{ V}$ , and the other connected to  $+2000 \text{ V}$ ?
- H1.5 What is the field strength needed to cause a spark in air, if 240 V can only jump a distance of  $8.0 \times 10^{-5} \text{ m}$ ?
- H1.6 An oil drop with a charge of  $+1.2 \times 10^{-15} \text{ C}$  is held between two horizontal metal plates which are 3.0 mm apart.
- If one plate is earthed (i.e. it is at 0 V) and the other is at  $+600 \text{ V}$ , what is the force on the oil drop?
  - If the drop experiences an upwards electrical force, which plate is connected to  $+600 \text{ V}$ ? The top one or the bottom one?
- H1.7 In an accelerator, you want to accelerate electrons (charge =  $-1.6 \times 10^{-19} \text{ C}$ ) with a force of  $8.0 \times 10^{-12} \text{ N}$  as they pass from one metal plate to another. The plates are 2.0 cm apart.
- If one plate is earthed (i.e. it is at 0 V) what will be the magnitude of the voltage on the other plate?
  - If the electrons start on the earthed plate, is the other plate connected to a positive or negative voltage?
- H1.8 What is the force on a  $+6.0 \times 10^{-13} \text{ C}$  charge between two metal surfaces if the surfaces are  $5.0 \times 10^{-5} \text{ m}$  apart, and the potential difference across the plates is 9.0 V?