Solutions

Each answer shows the steps, then the **result**.

2.1

- $E = V/d$

2.2

- $E = V/d$

$$E = \frac{V}{d} = \frac{200\ \text{V}}{5.0 \times 10^{-3}\ \text{m}} = \mathbf{4.0 \times 10^{4}}\ \text{V m}^{-1}$$

2.3

- from the **higher-potential** plate to the **lower-potential** plate

2.4

- N C^{-1}

3.1 B

- parallel plates a small distance apart give a **uniform** field

3.2

(a) $E = V/d$

$$E = \frac{V}{d} = \frac{200\ \text{V}}{5.0 \times 10^{-3}\ \text{m}} = \mathbf{4.0 \times 10^{4}}\ \text{V m}^{-1}$$

(b) $F = qE$

$$F = qE = (1.6 \times 10^{-19}\ \text{C})(4.0 \times 10^{4}\ \text{V m}^{-1}) = \mathbf{6.4 \times 10^{-15}}\ \text{N}$$

3.3

- it follows a **parabolic** path
- constant velocity along the plates, constant acceleration across the field (like a projectile)

3.4

- the force **doubles** ($E = V/d$, so halving d doubles E and hence $F = qE$)

3.5

(a) $E = V/d$

$$E = \frac{V}{d} = \frac{250\ \text{V}}{8.0 \times 10^{-3}\ \text{m}} = \mathbf{3.1 \times 10^{4}}\ \text{V m}^{-1}$$

(b) $F = qE$

$$F = qE = (1.6 \times 10^{-19}\ \text{C})(3.1 \times 10^{4}\ \text{V m}^{-1}) = 5.0 \times 10^{-15}\ \text{N}$$

- $a = F/m$

$$a = \frac{F}{m} = \frac{5.0 \times 10^{-15}\ \text{N}}{9.1 \times 10^{-31}\ \text{kg}} = \mathbf{5.5 \times 10^{15}}\ \text{m s}^{-2}$$