18 Uniform fields and force – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	**Write it 3 times** (English)		
uniform			
potential difference			

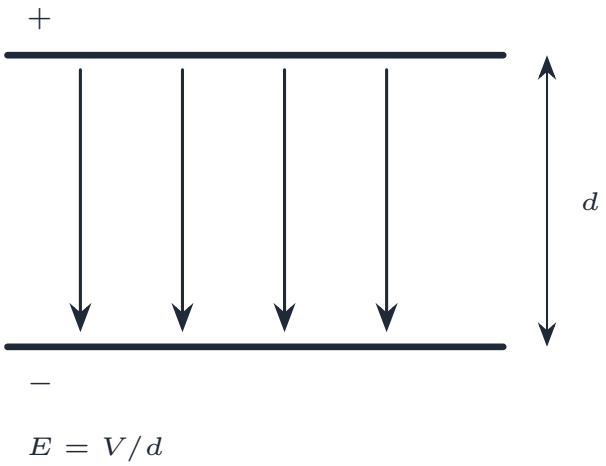
Recall

Between two parallel plates the field is **uniform** – the same strength everywhere.

New ideas

Read these first. Each idea has a short worked example. Then do the Practice.

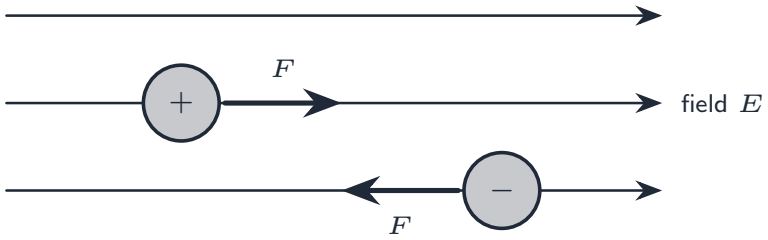
1 The uniform field



Two parallel plates a distance d apart with **potential difference** V between them make a uniform field of strength $E = V/d$.

Worked example. Plates 0.040 m apart with 200 V across them give $E = V/d = 200/0.040 = 5.0 \times 10^3$ V m^{-1}.

2 Force on a charge



A charge q in a field feels a force $F = qE$ – along the field if positive, opposite if negative.

Worked example. A charge $q = 2.0 \times 10^{-6}$ C in the field above feels $F = qE = (2.0 \times 10^{-6})(5.0 \times 10^3) = 1.0 \times 10^{-2}$ N.

Watch out: $E = V/d$ works only for a *uniform* field (parallel plates). The units V m^{-1} and N C^{-1} are the same thing.

Practice

Try these in order.

18.1 What kind of field is between two parallel plates? [1]

18.2 Write the formula for the field between parallel plates. [1]

18.3 Plates 0.020 m apart have 10 V across them. Find the field strength. [1]

18.4 Write the force on a charge q in a field E. [1]

18.5 A charge of 4.0×10^{-6} C sits in a field of 2000 N C^{-1}. Find the force on it. [2]

18.6 Two plates have a fixed voltage across them. Explain what happens to the field strength if the plates are moved further apart. [2]

18.7 Challenge. An electron (negative charge) is released from rest between two charged plates. Explain which plate it moves towards and why it speeds up. [2]