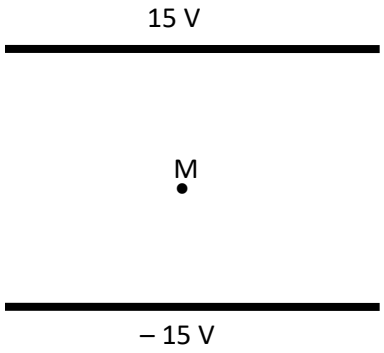
Quiz D18.1

Electric and magnetic fields

1. Two parallel plates are charged as shown. The separation of the plates is 15 mm.



What is the electric field strength at the midpoint M of the plates?

	Electric field strength /N C^{-1}	**Direction**
A	4.0×10^3	Down
B	4.0×10^3	Up
C	2.0×10^3	Down
D	2.0×10^3	Up

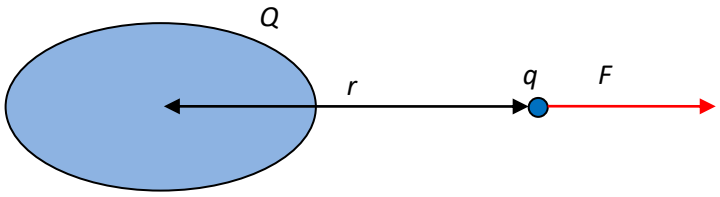
2. A charged conducting sphere has radius *R*. The electric field strength a distance *R* from the surface of the sphere is *E*. What is the electric field strength at a distance 2*R* from the surface of the sphere?

A $\frac{E}{9}$ **B** $\frac{E}{4}$ **C** $\frac{2E}{3}$ **D** $\frac{4E}{9}$

3. The electric force between two identical point charges X and Y is *F*. The magnitude of the charge on X is doubled and the separation is doubled as well. What is the force on each charge now?

	Force on X	Force on Y
A	$\frac{F}{4}$	$\frac{F}{2}$
B	$\frac{F}{4}$	$\frac{F}{4}$
C	$\frac{F}{2}$	$\frac{F}{2}$
D	$\frac{F}{2}$	$\frac{F}{4}$

4. An amount of charge *Q* is distributed on the surface of an ellipsoid.



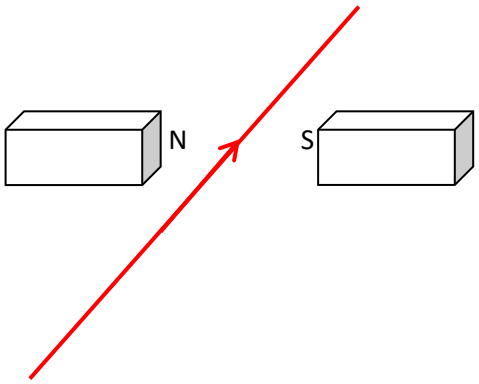
A point charge *q* placed at a distance *r* from the centre of the ellipsoid. The point charge experiences an electric force *F*. What is the electric field strength at the position of the point charge?

A $\frac{kQ}{r^2}$ **B** $\frac{kq}{r^2}$ **C** $\frac{F}{Q}$ **D** $\frac{F}{q}$

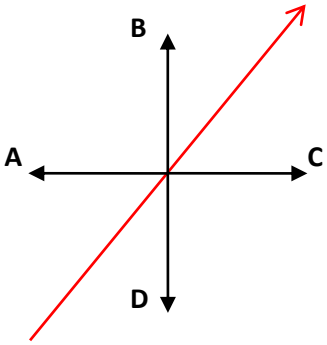
5. An electron orbits a proton in a circular orbit of radius *r*. What is the speed of the electron?

A $\sqrt{\frac{ke^2}{r}}$ **B** $\sqrt{\frac{ke^2}{m_e r}}$ **C** $\sqrt{\frac{2ke^2}{r}}$ **D** $\sqrt{\frac{2ke^2}{m_e r}}$

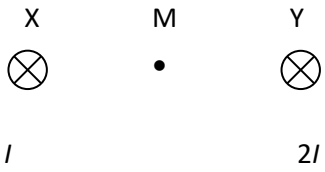
6. A current carrying wire is placed in between the poles of two magnets as shown.



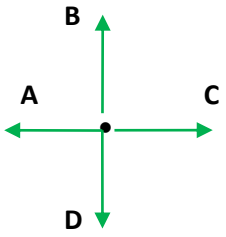
What is the direction of the magnetic force on the wire?



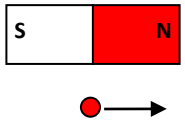
7. Two parallel wires, X and Y, carry currents into the plane paper. The current in X is *I* and that in Y is 2*I*.



Which is the direction of the net magnetic flux density at M, the midpoint of X and Y?



8. An electron moves past a bar magnet as shown.



What is the magnetic force on the electron at the position shown?

A Zero
B Into the page
C Out of the page
D Towards the magnet

9. Four parallel and equidistant wires, P, Q, R and S, carry equal currents. P, Q and S carry current into the page and R carries current out of the page.

The force per unit length P exerts on Q is f. What is the net force per unit length on S?

	Magnitude	**Direction**
A	$\frac{f}{6}$	Left
B	$\frac{f}{6}$	Right
C	$\frac{5f}{6}$	Left
D	$\frac{5f}{6}$	Right

10. Where can an approximately uniform magnetic field be found?

A Around a current carrying wire.
B Near a pole of a bar magnet.
C On the plane of a single current carrying loop.
D Along the axis of a current carrying solenoid (coil).

Quiz D18.1 Answers	
1	C
2	D
3	C
4	D
5	B
6	D
7	B
8	A
9	B
10	D