

- Describe what is meant by *gravitational field*.
- Two positive charges, each of charge Q , have an electrostatic force F when their separation is r . What is the electrostatic force between two positive charges each of charge $2Q$ when their separation is r ?
 A $\frac{F}{2}$ B F C $4F$
- Which of these can be used to define the tesla?
 A ma B $\frac{F}{Il}$ C It
- Which quantity is given by the area under a graph of Q against V for a capacitor?
 A energy stored B capacitance C current
- One of the moons of Mars is called Phobos.
 - mass of Phobos = 1.06×10^{16} kg
 - mass of Mars = 6.39×10^{23} kg
 - mean distance from the centre of Mars to the centre of Phobos = 9.4×10^6 m
 Calculate the mean force holding Phobos in orbit.
- The value of g at the surface of the Moon is 1.63 N kg^{-1} .
 - Sketch a graph showing how g varies with increasing distance, r from the surface of the Moon.
 - Describe how to calculate the work done in raising a mass through a distance h from the surface of the Moon.
- The relationship between the time period, T , and the radius, r , of an orbit is $T^2 \propto r^3$.
 - State the factor by which the time period changes when the radius is doubled.
 - State the factor by which the radius must change in order to halve the time period.
- The equation for escape velocity, v is $\sqrt{\frac{2GM}{R}}$
 Calculate the escape velocity from the surface of the Sun.
- Two point charges, each of $2.75 \times 10^{-6} \text{ C}$, are isolated in space. Calculate the distance between them if the repulsive force is to be 0.50 N .
- A Van de Graaff generator consists of a charged metal sphere on an insulating stand. The charge on the sphere is 35 nC . Calculate the electric field strength at a point 30 cm from the centre of the sphere. Assume the electric field is radial and the permittivity of air is the same as in free space.

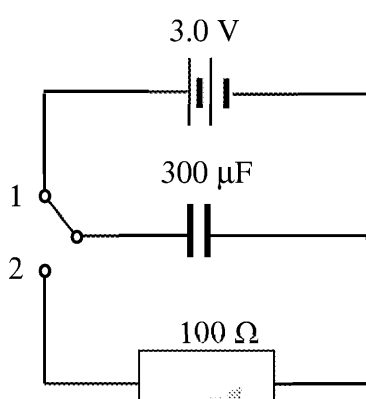
COPYRIGHT
PROTECTED



11. (a) State Faraday's law.
(b) Explain why a moving coil generator contains many coils of wire.
12. Two square parallel metal plates have a separation of 1.20 m and have a side length of 0.85 m .
(a) Calculate the electric field strength between the plates.
(b) One proton is held midway between the plates. Calculate the work done to move the proton 10 cm closer to the positive plate.
(c) Each plate has a side length of 0.85 m . Assuming that the two plates behave as a capacitor, calculate the capacitance of this arrangement of plates for air as the dielectric.



13. A $300 \mu\text{F}$ capacitor is charged to 3.0 V with the switch at position 1.



- (a) Calculate the charge on the capacitor when it is charged to 3.0 V .
(b) The switch is then moved to position 2.
(i) Calculate the time taken for the charge to drop to half.
(ii) Calculate the charge on the capacitor 0.10 s after moving the switch to position 2.



14. An electron moves into a uniform magnetic field of 100 pT with a speed of $1.0 \times 10^6 \text{ m s}^{-1}$. The direction of the magnetic field is perpendicular to the movement of the electron. Assume that the only force acting on the electron comes from the magnetic field.
(a) Calculate the force on the electron.
(b) Explain the shape of the path taken by the electron in the magnetic field.
(c) State the speed of the electron 1.0 ns after entering the magnetic field.

15. In North America the mains voltage is 110 V . 110 V is the r.m.s. voltage.
(a) Calculate the peak voltage.
(b) In the UK, the r.m.s. mains voltage is 240 V . Calculate the ratio of the power dissipated in a resistor when connected to a North American adaptor for people coming from North America to the UK.



**COPYRIGHT
PROTECTED**



Preview of Questions Ends Here

This is a limited inspection copy. Sample of questions ends here to avoid students previewing questions before they are set. See contents page for details of the rest of the resource.