

- 3 (a) Fig. 3.1 shows the path of a moving object as it enters and travels through a uniform field of force.

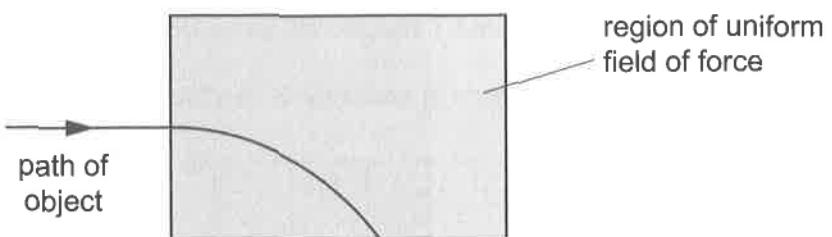


Fig. 3.1

Before the object enters this field, its direction of motion is perpendicular to the direction of the field.

The object could be a mass in a gravitational field or a charged particle in an electric field. In both cases, the shape of the path is the same.

Explain why the shape of the path is the same in both cases.

.....
.....
.....
.....

[2]

- (b) The variations with separation of the gravitational force F_G and of the electric force F_E between two protons are shown in Fig. 3.2.

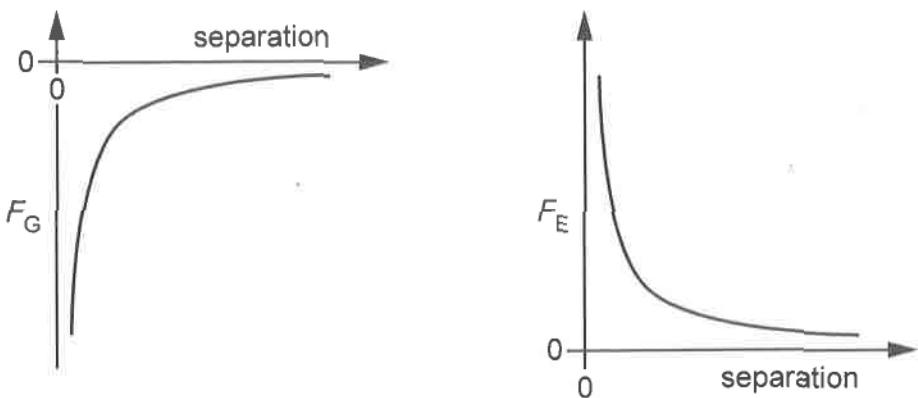


Fig. 3.2

- (i) Explain why the gravitational force and the electric force have opposite signs.
-
.....

[1]





- (ii) State and explain whether the axes on both graphs are drawn to the same scale.

.....
.....
.....

[2]

- (c) Two charged particles, P and R, are isolated in space and separated by a distance of 6.0 cm, as shown in Fig. 3.3.

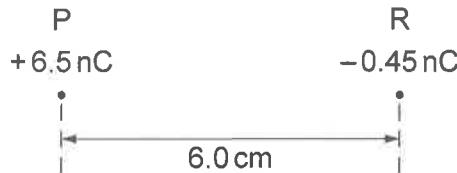


Fig. 3.3

Particle P has a charge of + 6.5 nC and particle R has a charge of - 0.45 nC.

- (i) Explain whether the electric field strength is zero at any point along a straight line between the two charges.

.....
.....
.....

[1]

- (ii) Explain whether the electric potential is zero at any point along a straight line between the two charges.

.....
.....
.....

[1]

- (iii) An electron is situated on a straight line that passes through P and R.

Determine the distance in cm from P along the line where there is no resultant force on the electron.

distance = cm [2]

[Total: 9]

