

- 6 (a) State Coulomb's law.

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- (b) Two charged metal spheres A and B are situated in a vacuum, as illustrated in Fig. 6.1.

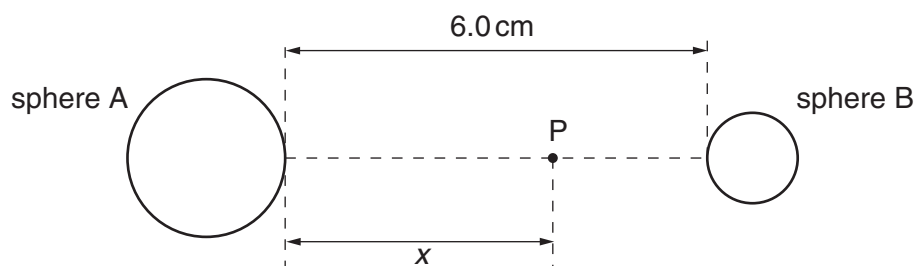


Fig. 6.1

The shortest distance between the surfaces of the spheres is 6.0 cm.

A movable point P lies along the line joining the centres of the two spheres, a distance  $x$  from the surface of sphere A.

The variation with distance  $x$  of the electric field strength  $E$  at point P is shown in Fig. 6.2.

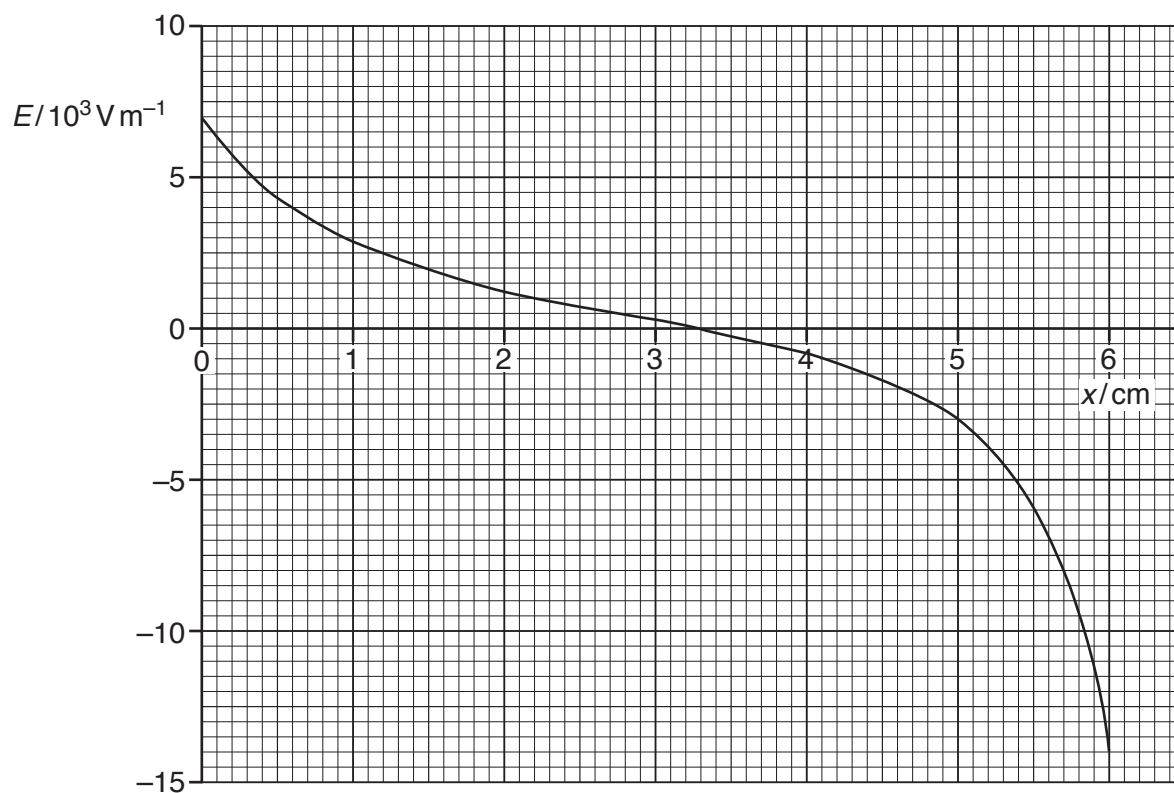


Fig. 6.2

- (i) Use Fig. 6.2 to explain whether the two spheres have charges of the same, or opposite, sign.

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- (ii) A proton is at point P where  $x = 5.0$  cm.  
Use data from Fig. 6.2 to determine the acceleration of the proton.

acceleration = .....  $\text{ms}^{-2}$  [3]

- (c) Use data from Fig. 6.2 to state the value of  $x$  at which the rate of change of electric potential is maximum. Give the reason for the value you have chosen.

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[Total: 9]