4 Two small spherical charged conductors **A** and **B** are isolated in space. The variation with distance x of the electric potential V between the conductors along the line joining their centres is shown in Fig. 3.1.

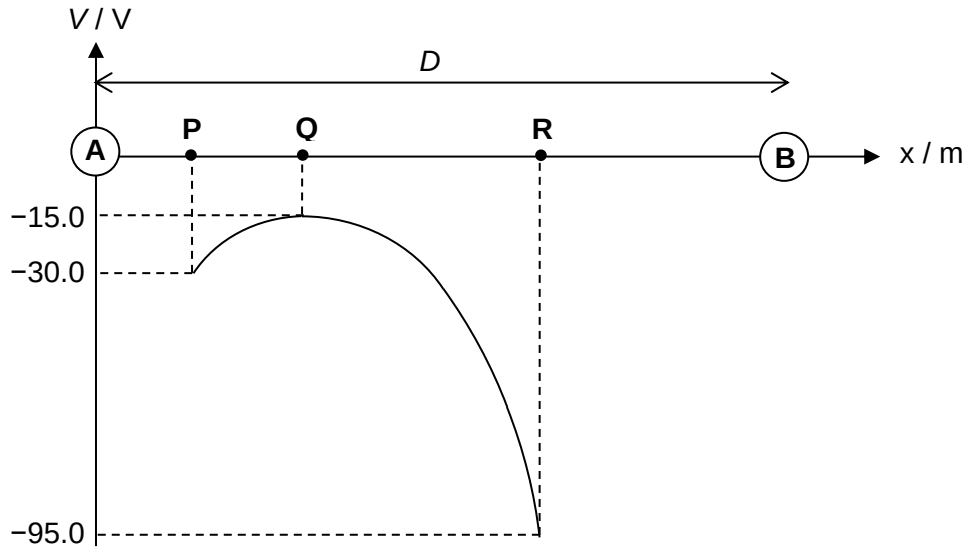

Fig. 3.1

The distance D between the two conductors is very much larger than the radii of the conductors. At point **Q**, the electric potential is a maximum.

(a) State and explain the signs of the charge of conductors **A** and **B**.

……

……

……

……

…….. [2]

(b) By considering the relation between electric field strength *E* and electric potential *V*, use Fig. 3.1 to explain which conductor has a larger magnitude of charge.

……

……

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……

……

…….. [3]

(c) Determine the work done by an external force in moving a negative charge of −2.0 C from point **P** to point **R** at constant velocity.

work done = …… J [2]

(d) On Fig. 3.2, sketch the variation with distance *x* of the electric field strength *E* between point **P** and point **R**. Numerical values are not expected.

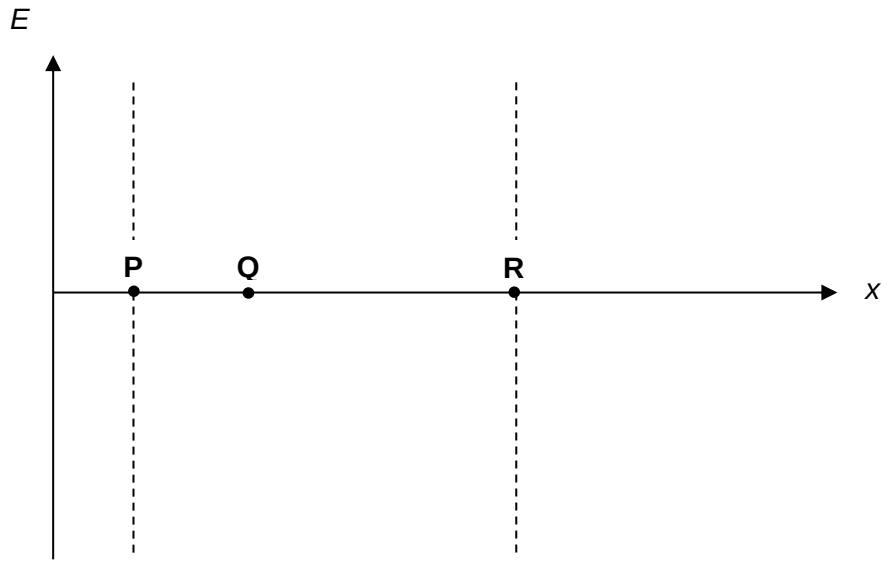

Fig. 3.2

[2]