5 **(a)** Define *electric potential* at a point.

……

……

……

……

[2]

(b) An isolated solid metal sphere is positively charged.

The variation of the electric potential V with distance x from the centre of the sphere is shown in Fig. 5.1.

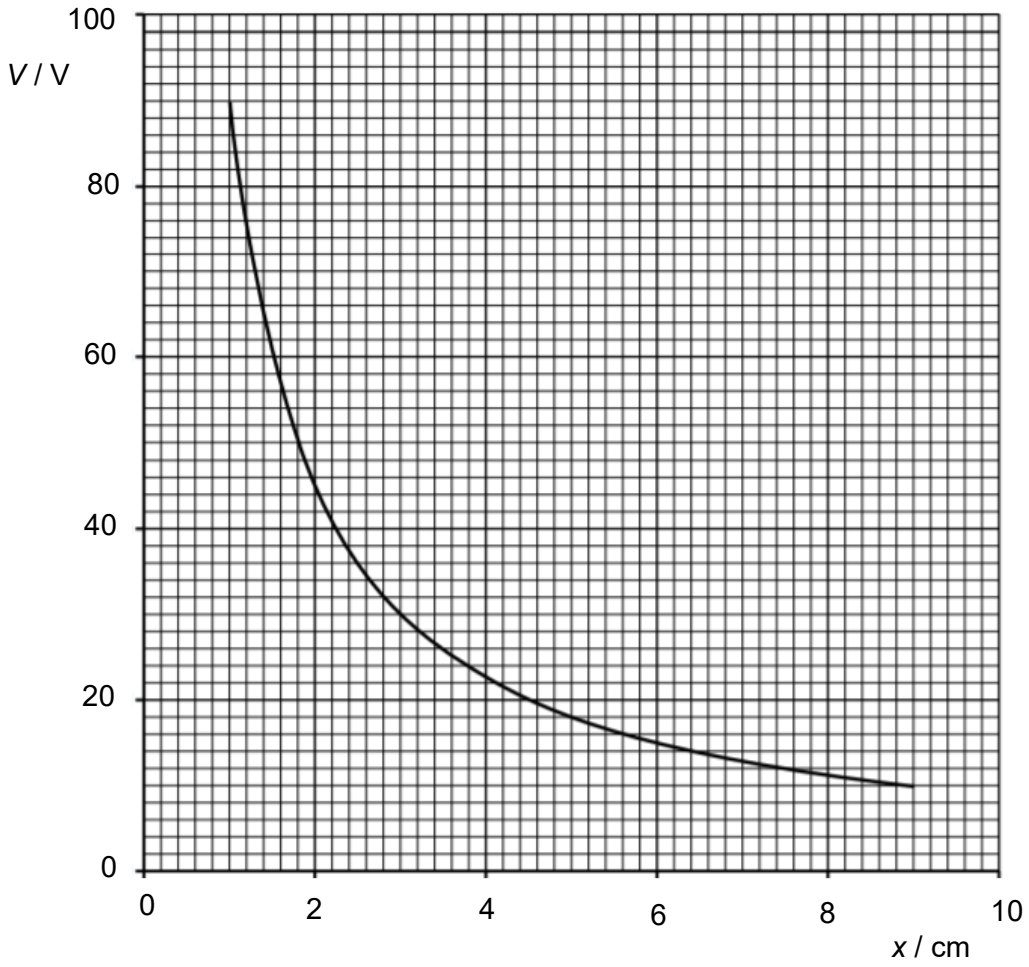

Fig. 5.1

Use Fig. 5.1 to suggest

(i) why the radius of sphere cannot be greater than 1.0 cm,

……..……..

[1]

……..……..……

(ii) quantitatively that the charge on sphere behaves as if it were a point charge.

[3]

(c) An alpha particle of charge +2*e* is directed to the sphere from infinity with a kinetic energy E_K.

Use Fig. 5.1 to determine the minimum value of E_K of the alpha particle to reach a point just 5 cm from the centre of the sphere.

[2]

E_K = ……...…… J