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

.....

.....

.....

..... [2]

(b) A solid metal sphere A of radius 27 cm is fixed in a vacuum and carries a charge of +0.060 μC. The charge on the metal sphere may be considered as a point charge at its centre.

(i) Determine the electric potential V_R at the surface of the sphere.

V_R = ... V [1]

(ii) On the axes of Fig. 4.1, draw a graph to show the variation with distance x from the centre of sphere A of the electric potential V for x = 0 to x = 120 cm.

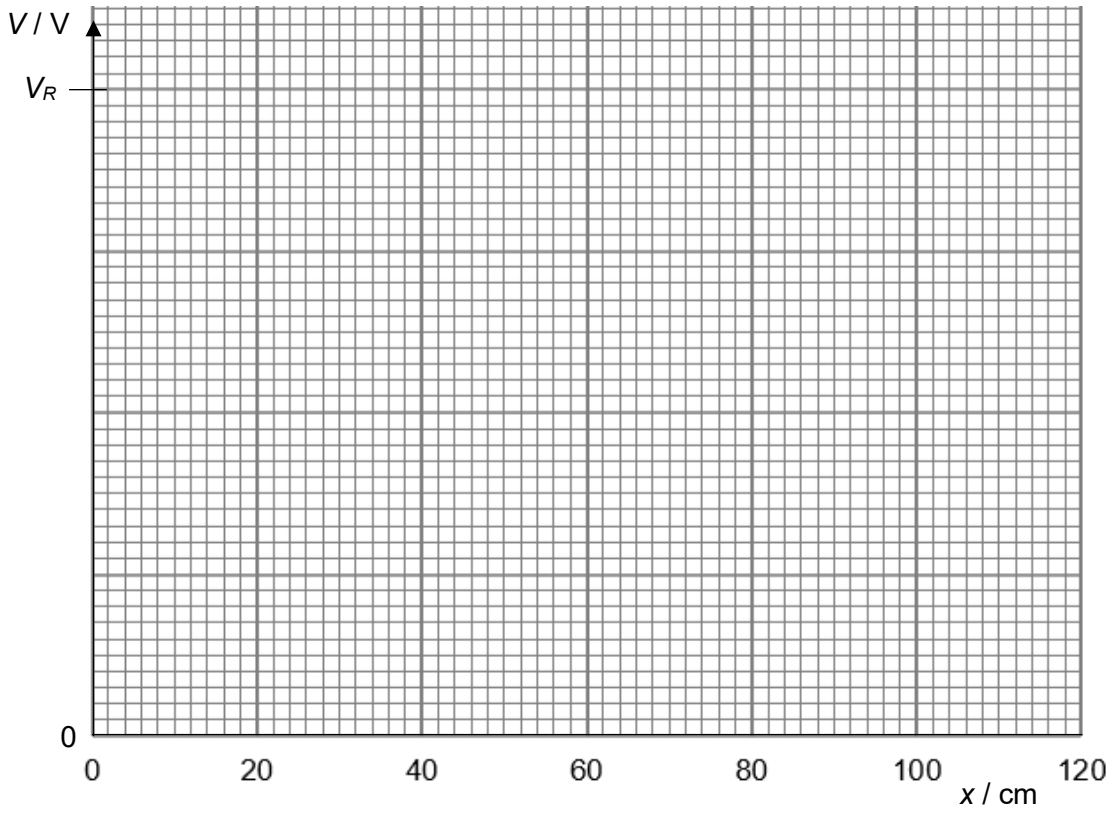

Fig. 4.1

[3]

(iii) A charged particle B is placed at a distance 1.4 m from the centre of sphere A as shown in Fig. 4.2.

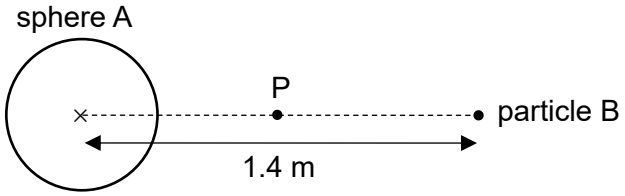

Fig. 4.2

Particle B carries a charge of −0.035 μC. Sphere A and particle B are fixed in position. Point P is the midpoint of the line joining the centre of the sphere and particle B.

Determine the magnitude of electric field strength at point P.

magnitude of electric field strength = ... N C^{-1} [2]

(iv) State and explain, in practice, whether the magnitude of the electric field strength at point P is greater than, smaller than or the same as your answer to **(b)(iii)**.

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..... [2]