7 **(a)** State what is meant by *electric potential* at a point.

.....

.....

.....[2]

(b) The centres of two charged metal spheres A and B are separated by a distance of 44.0 cm, as shown in Fig. 7.1.

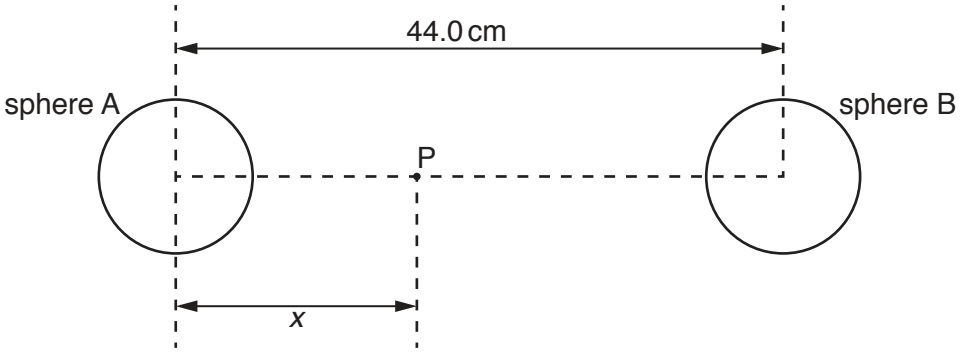

Fig. 7.1 (not to scale)

A moveable point P lies on the line joining the centres of the two spheres. Point P is a distance *x* from the centre of sphere A. The variation with distance *x* of the electric potential *V* at point P is shown in Fig. 7.2.

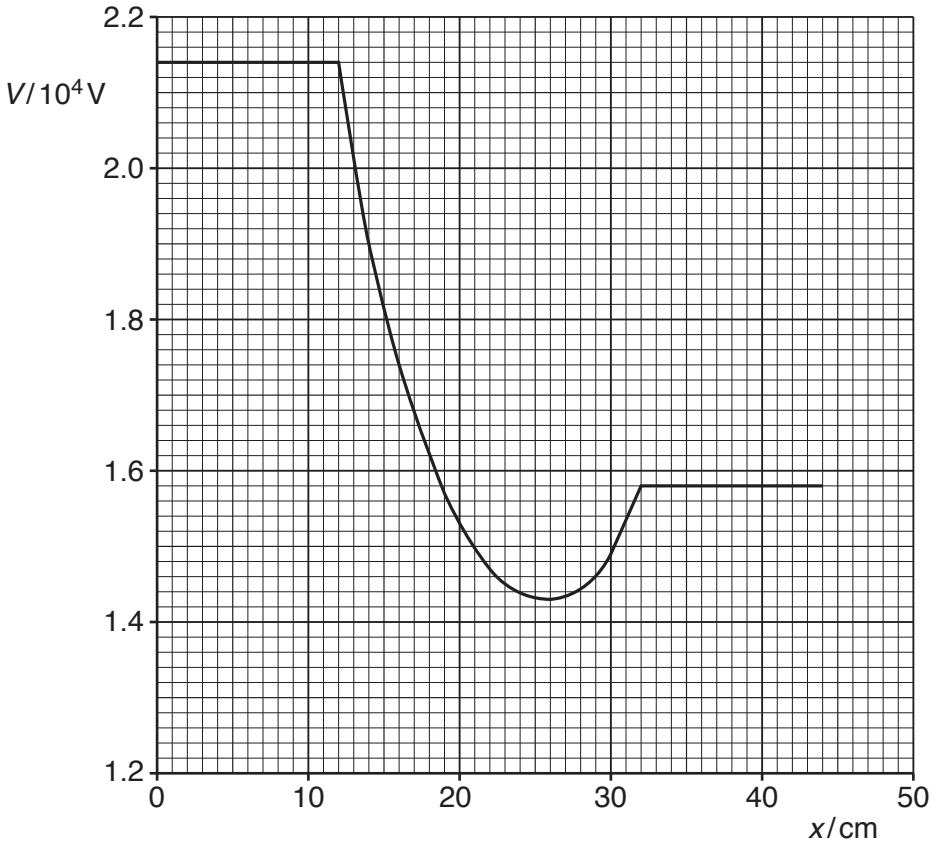

Fig. 7.2

(i) Use Fig. 7.2 to state and explain whether the two spheres have charges of the same, or opposite, sign.

.....

.....

.....[1]

(ii) A positively-charged particle is at rest on the surface of sphere A.

The particle moves freely from the surface of sphere A to the surface of sphere B.

1. Describe qualitatively the variation, if any, with distance x of the speed of the particle as it

moves from $x = 12\,\text{cm}$ to $x = 25\,\text{cm}$ .....

.....

passes through $x = 26\,\text{cm}$ .....

.....

moves from $x = 27\,\text{cm}$ to $x = 31\,\text{cm}$ .....

.....

reaches $x = 32\,\text{cm}$ .....

.....[4]

2. The particle has charge $3.2 \times 10^{-19}\,\text{C}$ and mass $6.6 \times 10^{-27}\,\text{kg}$.

Calculate the maximum speed of the particle.

speed = ... m s^{-1} [2]

[Total: 9]

[Turn over