6 **(a)** An isolated metal sphere of radius r is charged so that the electric field strength at its surface is E_0.

On Fig. 6.1, sketch the variation of the electric field strength E with distance x from the centre of the sphere. Your sketch should extend from $x = 0$ to $x = 3r$.

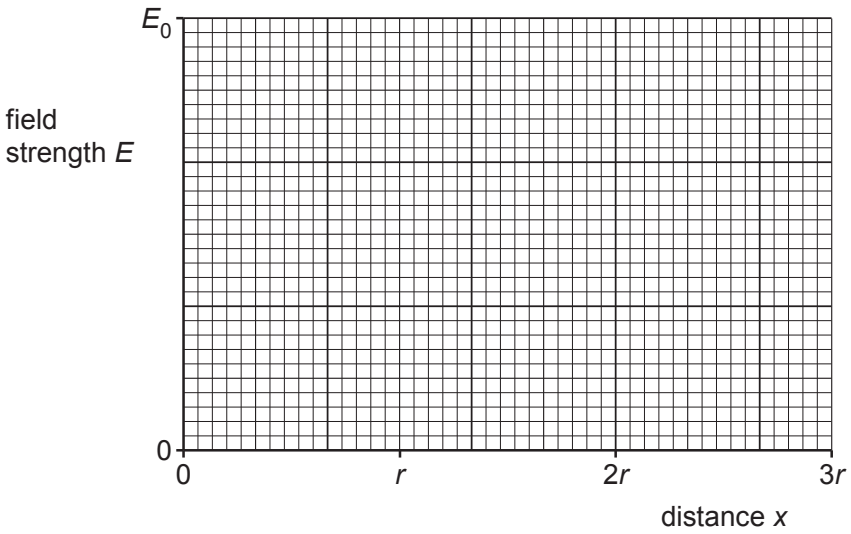

Fig. 6.1

[3]

(b) The de Broglie wavelength of a particle is λ_0 when its momentum is p_0.

On Fig. 6.2, sketch the variation with momentum p of the de Broglie wavelength λ of the particle for values of momentum from $\frac{p_0}{2}$ to p_0.

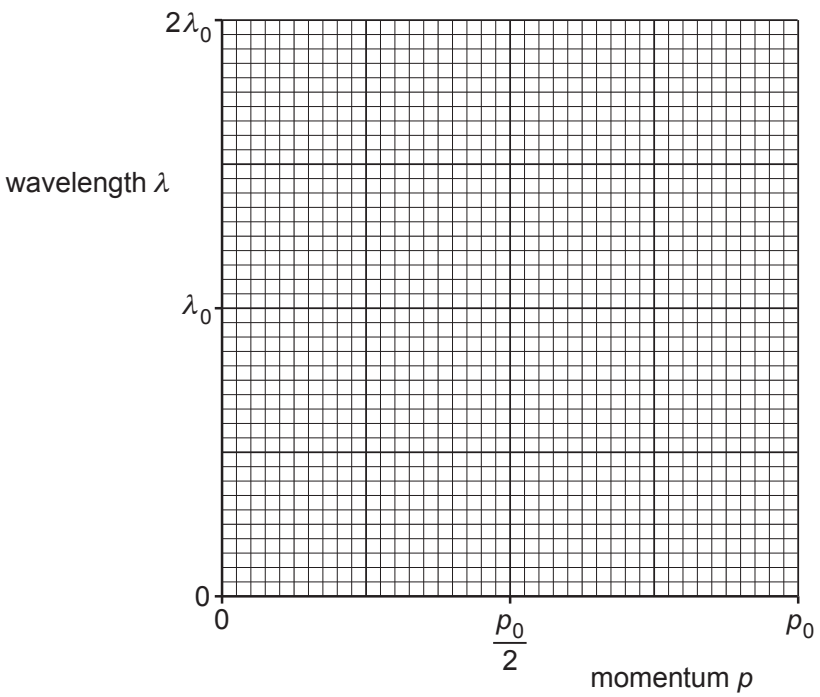

Fig. 6.2

[2]

(c) A radioactive isotope decays with a half-life of 15 s to form a stable product.

A fresh sample of the radioactive isotope at time $t = 0$ contains N_0 nuclei and no nuclei of the stable product.

On Fig. 6.3, sketch the variation with t of the number n of nuclei of the stable product for time $t = 0$ to time $t = 45$ s.

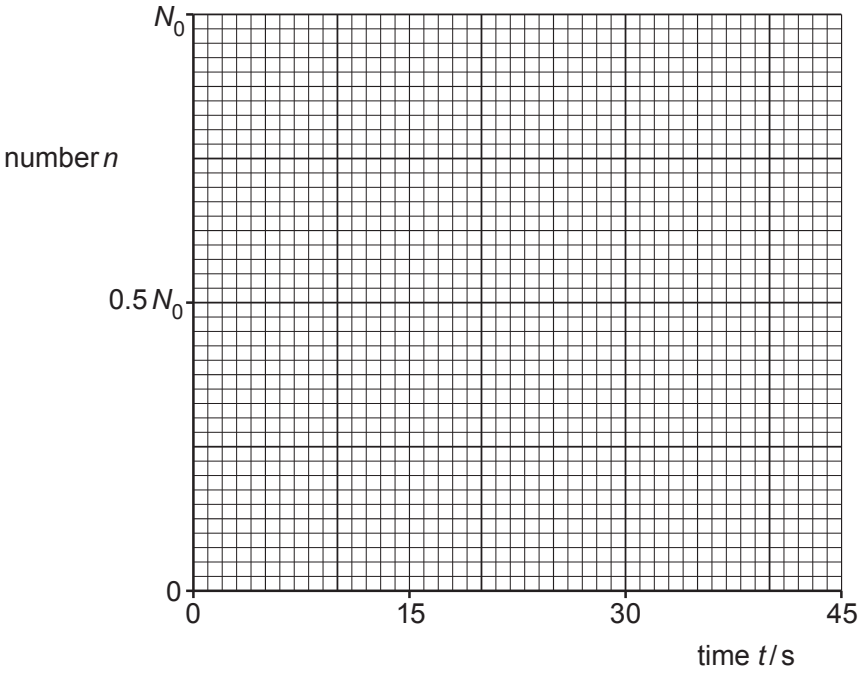

Fig. 6.3

[3]

[Total: 8]