11 **(a)** State what is meant by a *photon*.

.....

.....

.....[2]

(b) A stationary cobalt-60 ($^{60}_{27}$Co) nucleus emits a γ-ray photon of energy 1.18 MeV.

(i) Calculate the wavelength of the photon.

wavelength = ... m [2]

(ii) Show that the momentum of the photon is 6.3×10^{-22} N s.

[2]

(c) Use information in **(b)(ii)** to determine the recoil speed of the cobalt-60 nucleus when the γ-ray photon is emitted.

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

[Total: 8]