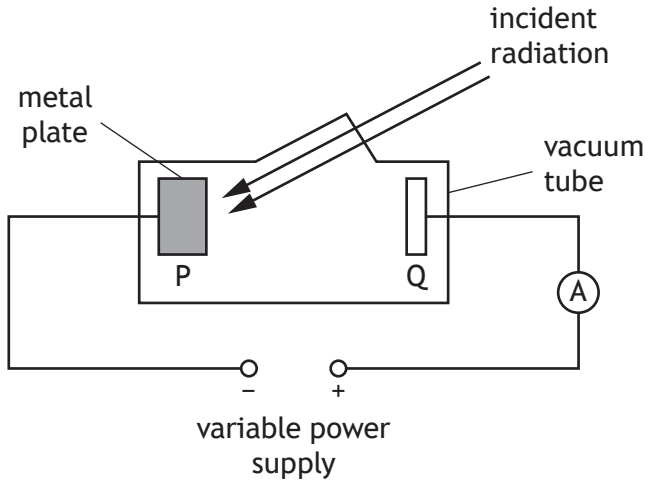
8. A student investigates the photoelectric effect using the apparatus shown.



The student notices that when white light is incident on metal plate P, the reading on the ammeter is 0 A. However, when ultraviolet radiation is incident on plate P, the reading on the ammeter is greater than 0 A.

(a) Explain why ultraviolet radiation produces a reading greater than 0 A on the ammeter, but white light does not. **1**

(b) The energy of a photon of ultraviolet radiation incident on plate P is $8{\cdot}0 \times 10^{-19}$ J.

The work function of the metal is $6{\cdot}9 \times 10^{-19}$ J.

The power supply is set to 12·0 V.

(i) Determine the maximum kinetic energy of an electron ejected from the surface of metal plate P. **1**

Space for working and answer

8. (b) (continued)

(ii) Show that the kinetic energy gained by the electron as it accelerates from plate P to plate Q is $1{\cdot}92 \times 10^{-18}$ J. **2**

Space for working and answer

(iii) Determine the maximum speed of this electron as it reaches plate Q. **4**

Space for working and answer