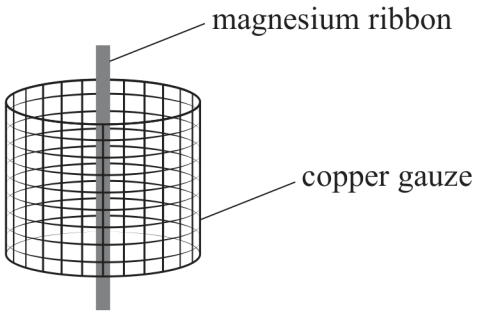
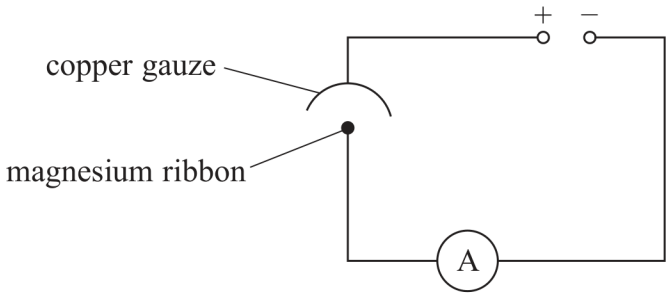
17 Some students investigated the photoelectric effect.

They used a piece of magnesium ribbon placed inside a cylinder of copper gauze as shown. There was an air gap between the copper gauze and the magnesium ribbon.



The copper gauze was connected to the positive terminal of a power supply. The magnesium ribbon and a sensitive ammeter were connected to the negative terminal of the power supply, as shown.



The students made the following observations:

- when light from an ultraviolet lamp was incident on the gauze and ribbon, a current was detected by the ammeter.
- when the polarity of the power supply was reversed, the current decreased to zero.

*(a) Explain these observations.

(6)

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(b) The students reconnected the circuit so that a current was detected when ultraviolet light was incident on the gauze and ribbon.

(i) The students replaced their original lamp with an ultraviolet lamp with a much greater intensity.

Explain the effect this had on their experiment.

(3)

(ii) The ultraviolet lamp was replaced by a laser which emitted red light of wavelength 633 nm.

Deduce whether the photoelectric effect will occur.

work function of magnesium = 3.7 eV

(4)

(Total for Question 17 = 13 marks)