17 Ultraviolet light is incident on a zinc plate. If the photon energy is greater than the work function of the zinc, electrons are released.

(a) State what is meant by work function.

(1)

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(b) The ultraviolet (UV) section of the electromagnetic spectrum can be split into three parts, known as UVA, UVB and UVC. The range of wavelengths of these parts is given in the table.

	UVC	UVB	UVA
Range of wavelength / nm	200–280	280–320	320–400

The minimum de Broglie wavelength of the released electrons is 1.50×10^{-9} m.

Deduce whether the ultraviolet light incident upon the zinc plate is UVA, UVB or UVC.
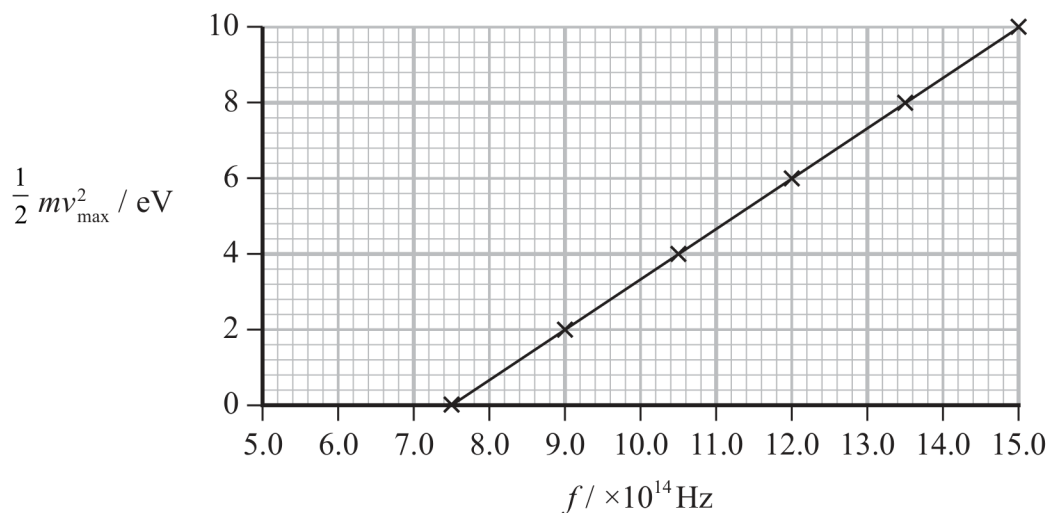
work function of zinc = 4.30 eV

(6)

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(c) A student used a zinc plate and UV light of different frequencies in an experiment. The student's graph of maximum kinetic energy of the released electrons against the frequency of the incident UV light is shown.

$\frac{1}{2} mv^2_{max}$ / eV

$f / \times10^{14}$ Hz

Einstein's photoelectric equation applies to this situation.

$$hf = \phi + \frac{1}{2} mv^2_{max}$$

Describe two ways that the graph is **not** consistent with the values known for a zinc plate. Your answer should include calculations.

work function of zinc = 4.30 eV

(4)

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(Total for Question 17 = 11 marks)