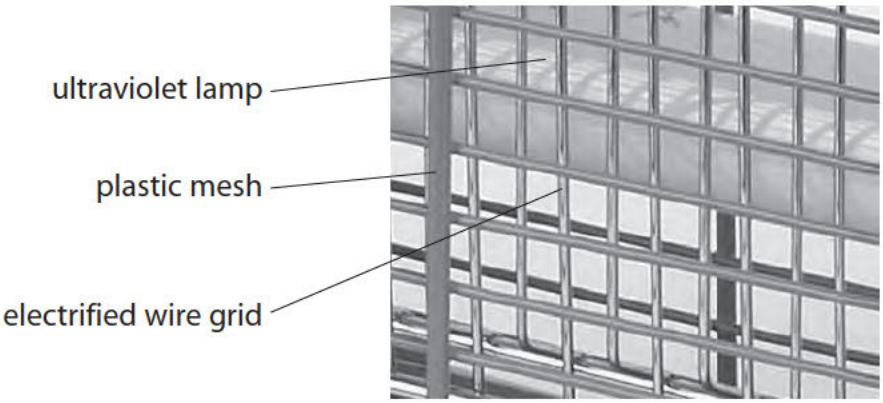
1 Many food shops have devices that attract and kill flying insects.

The devices consist of

- an ultraviolet lamp
- a plastic mesh on the outside
- an electrified wire grid below the plastic mesh
- a transformer that is connected to the wire grid



(a) The ultraviolet lamp attracts many flying insects towards the device.

Ultraviolet is an electromagnetic wave.

(i) State two properties of electromagnetic waves.

(2)

1 .....

.....

2 .....

.....

(ii) Which of these electromagnetic radiations has a frequency greater than ultraviolet?

(1)

☒ **A** infrared

☒ **B** gamma rays

☒ **C** radio waves

☒ **D** visible light

(b) The transformer supplies an output voltage of 2000 V a.c. to the wire grid.

The input voltage to the transformer is 230 V a.c.

(i) Give the name of this type of transformer.

(1)

.....

(ii) State the relationship between input (primary) voltage, output (secondary) voltage, primary turns and secondary turns.

(1)

(iii) There are 110 turns on the primary coil.

Calculate the number of turns on the secondary coil.

(3)

number of turns .....

(iv) Suggest a reason why there is a plastic mesh on the outside of the device.

(1)

.....

.....

.....

(Total for Question 1 = 9 marks)

2 The chart lists some electromagnetic radiations.

radio	owave	infrared	visible light	ultraviolet	-ray	gamma

(a) Complete the table by giving one radiation from the chart for each use.

You may give each type of radiation once, more than once or not at all.

(3)

Use for radiation	Type of radiation
cooking	
treating cancer	
identifying broken bones	

(b) All types of electromagnetic radiation from the Sun are emitted with

(1)

☒ **A** the same amplitude

☒ **B** the same frequency

☒ **C** the same speed

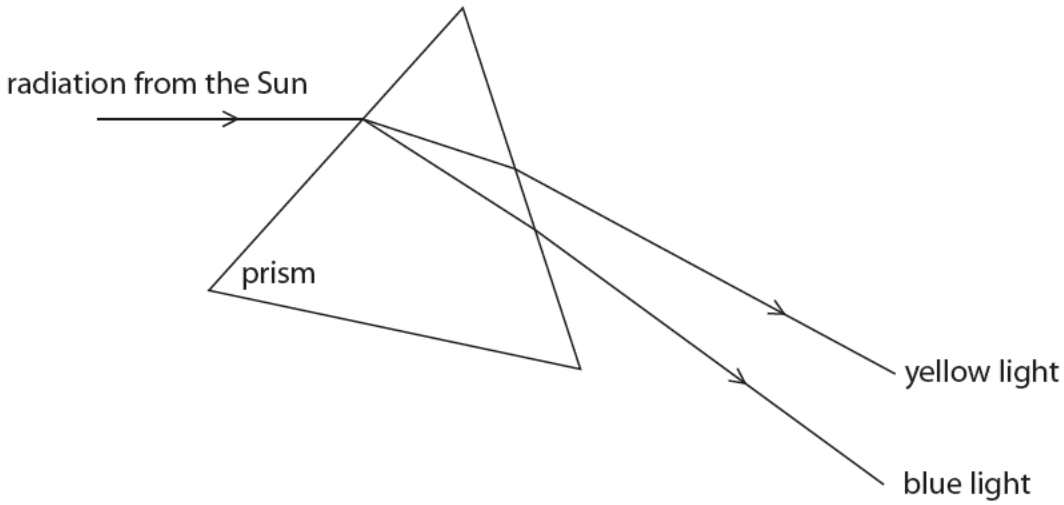
☒ **D** the same wavelength

(c) William Herschel was a scientist who investigated infrared radiation.

He passed electromagnetic radiation from the Sun through a triangular glass prism.

The prism refracted different radiations by different amounts.

The paths of yellow and blue visible light rays are shown in the diagram.



(i) Add to the diagram to show how the prism refracts an infrared ray.

(2)

(ii) William Herschel used a thermometer to detect infrared radiation.

He coloured the surface of his thermometer to make it more effective.

Which colour surface would work best?

(1)

☒ **A** black

☒ **B** red

☒ **C** silver

☒ **D** white

(Total for Question 2 = 7 marks)

3 A pulsar is a type of star.

We receive radiation from a pulsar in regular short bursts called pulses.

(a) Some pulsars emit radio waves. Other pulsars emit x-rays.

(i) State a property of waves that is the same for radio waves and x-rays.

(1)

.....

.....

(ii) State two properties of waves that are different for radio waves and x-rays.

(2)

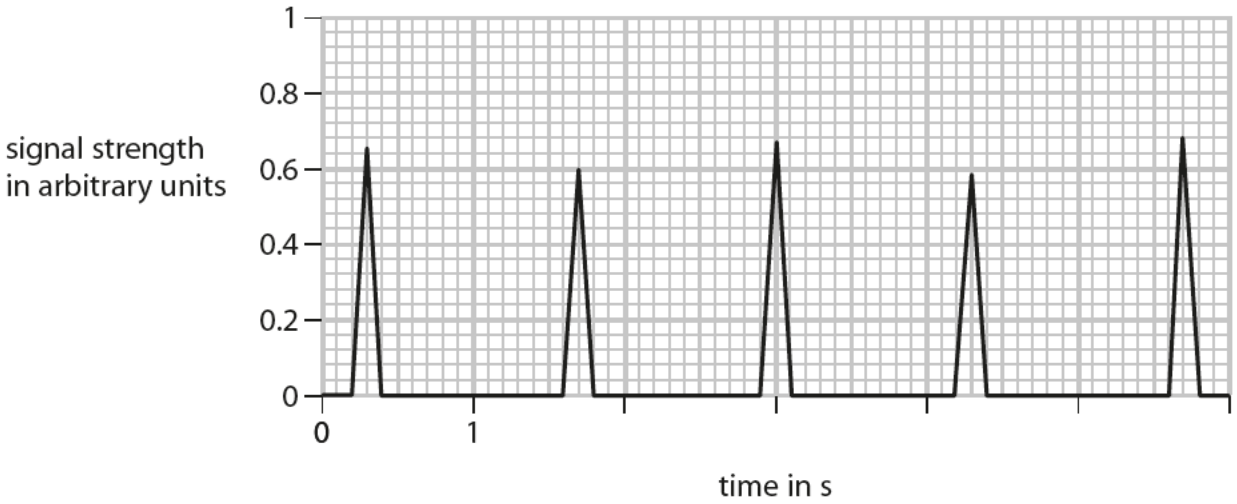
1 .....

.....

2 .....

.....

(b) The graph shows five pulses of the signal from a pulsar.



(i) Explain how the graph shows that the signal is not digital.

(2)

.....

.....

.....

.....

(ii) Use the graph to estimate the average time between each pulse.

(2)

time = ... s

(iii) Calculate the frequency of the pulses in the signal.

Give the unit.

(2)

frequency = ... unit .....

(Total for Question 3 = 9 marks)