

Electromagnetic Spectra Past Paper Questions IGCSE Edexcel

1.

This question is about parts of the electromagnetic spectrum.

gamma	x-ray	ultraviolet	visible	infrared	microwave	radio
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(a) Which of these parts has the longest wavelength?

(1)

- A gamma
- B infrared
- C radio
- D visible

(b) State two properties that are the same for all parts of the electromagnetic spectrum.

(2)

1.....

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2.....

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(c) Discuss a use and a harmful effect for three parts of the electromagnetic spectrum.

(6)

1

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2

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3

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2.

Electromagnetic radiation can affect the human body.

Discuss how excessive exposure to electromagnetic radiation may cause damage to the human body.

Refer to the different parts of the electromagnetic spectrum in your answer.

(6)

3.

This question is about parts of the electromagnetic spectrum.

gamma rays	x-rays		visible light	infrared waves	microwaves	radio waves
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(a) Name the missing part of this spectrum.

(1)

(b) Which part of this spectrum has the shortest wavelength?

(1)

(c) Explain how the frequency of electromagnetic waves in free space differs with increasing wavelength.

(2)

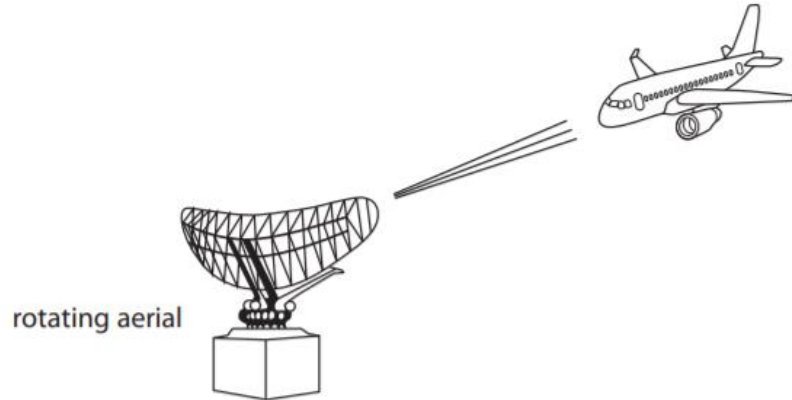
(d) Microwaves are used to heat food.

State another part of the spectrum that is used to heat food.

(1)

(e) Microwaves are used at airports to detect aeroplanes.

A microwave beam is emitted from a large rotating aerial and reflected back off the metal surface of the aeroplane.



(i) Explain how microwaves are used to find the distance to an aeroplane.

(3)

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(ii) Suggest why it is important for the aerial to rotate through a full circle every two seconds.

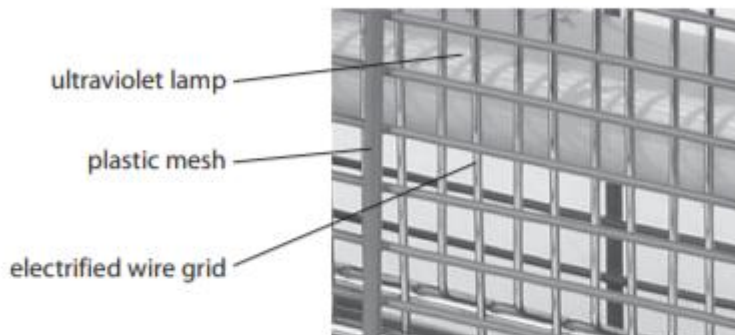
(1)

4.

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)

(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)

5.

This question is about electromagnetic waves.

(a) (i) Which of these has the shortest wavelength?

(1)

- A infrared
- B microwaves
- C ultraviolet
- D visible light

(ii) Which of these statements is **not** correct?

(1)

- A electromagnetic waves are longitudinal
- B electromagnetic waves can transfer energy
- C electromagnetic waves can travel between stars
- D electromagnetic waves travel at the same speed in free space

(iii) Which of these is a use for x-rays?

(1)

- A broadcasting television
- B cooking a potato
- C looking at the internal structure of objects
- D looking through night vision goggles

(b) Gamma radiation is used in hospitals even though it can be dangerous.

(i) Describe one use of gamma radiation in hospitals.

(2)

(ii) Explain the risks to patients and doctors of using gamma radiation.

(2)


(iii) State one way of reducing the risks to a doctor who uses gamma radiation.

(1)

6.

The table shows the main sections of the electromagnetic spectrum.

Gamma rays	X-rays	Ultraviolet	Visible	Infrared	Microwaves	Radio
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(a) (i) State two sections of the spectrum that are used for communications. (2)

(ii) State two sections of the spectrum that are used for cooking. (2)

(b) The arrow below the table shows the direction of (1)

- A increasing wave amplitude
- B increasing wave frequency
- C increasing wave speed
- D increasing wavelength

(c) A radio station broadcasts at a frequency of 200 kHz.
The wavelength of the radio waves is 1500 m.

(i) State the equation linking wave speed, frequency and wavelength. (1)

(ii) Calculate the speed of these radio waves and give the unit. (3)

speed = unit

7.

1 The Astra satellite is in an orbit around the Earth.

(a) The satellite uses microwave signals for communication.

Microwaves are part of the electromagnetic spectrum.

(i) Which part of the electromagnetic spectrum has longer wavelengths than microwaves?

(1)

- A gamma rays
- B radio waves
- C ultraviolet light
- D visible light

(ii) Which of these statements is correct?

(1)

- A Microwaves always travel faster than radio waves.
- B Microwaves always travel slower than radio waves.
- C Microwaves and radio waves travel at the same speed in a vacuum.
- D Microwaves and radio waves travel at the same speed in all materials.

(iii) State one property of electromagnetic waves that makes microwaves suitable for communications with a satellite in space.

(1)

(b) The Astra satellite takes 24 hours to orbit the Earth once.

It travels at a speed of 3.1 km/s.

Calculate the orbital radius of the satellite and give the unit.

(4)

orbital radius = unit

(c) The Astra satellite orbits above the equator and travels in the same direction as the rotation of the Earth.

Suggest why this type of 24-hour orbit is an advantage for communications.

(1)

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8.

The Earth receives different types of electromagnetic wave from the Sun.

These include

- infrared
- ultraviolet
- visible light

(a) Complete the table by arranging these three types of electromagnetic wave in order of decreasing wavelength.

(1)

longest wavelength → shortest wavelength		

(b) Name two other types of electromagnetic wave.

(2)

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(c) Ultraviolet waves are useful, but they can be dangerous.

(i) State two uses of ultraviolet waves.

(2)

1

2

(ii) State two dangers of ultraviolet waves.

(2)

1

2

9.

This question is about parts of the electromagnetic spectrum.

radio waves	A	infrared	visible light	ultraviolet	B	gamma rays
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(a) The names of two parts of the electromagnetic spectrum are missing.

Complete the table with the names of the missing parts.

(2)

	Name
A	
B	

(b) The Sun emits different types of electromagnetic waves.

(i) Which of these is the same for all the waves?

(1)

- A** amplitude
- B** frequency
- C** speed
- D** wavelength

(ii) Which type of electromagnetic wave causes sunburn and snow blindness?

(1)

- A** gamma rays
- B** infrared
- C** radio waves
- D** ultraviolet