Electromagnetic Spectrum – 2021 IGCSE 0625

1. June/2021/Paper_11/No.25

A student is asked to give two uses of four different types of electromagnetic radiation.

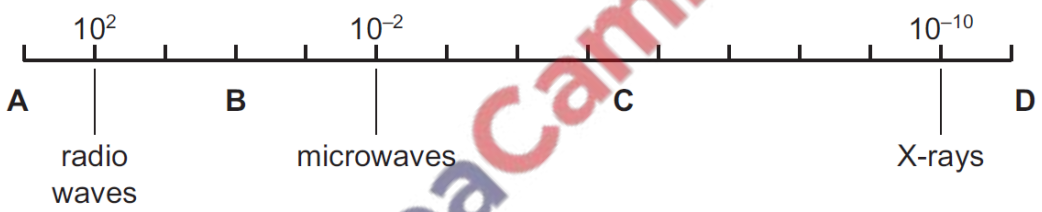
In which row are both the uses correct?

	radiation	use 1	use 2
A	radio	sterilising medical equipment	mobile phone masts
B	microwaves	mobile phones	sterilising medical equipment
C	infrared	remote controllers	intruder alarms
D	X-rays	security in airports	intruder alarms

2. June/2021/Paper_13/No.25

The diagram shows typical wavelengths (in metres) of radio waves, microwaves and X-rays in the electromagnetic spectrum.

In which region are the waves used in TV remote controllers found?



3. June/2021/Paper_21/No.25

A remote-controlled vehicle is travelling on the surface of a planet. The vehicle senses an obstacle ahead. It sends a radio message to the control room from where it is being controlled. The control room is 2.4×10^{6} km away from the vehicle. The control room sends a message back to the vehicle telling it to stop.

What is the minimum time that elapses between the vehicle sensing the obstacle and receiving the message back from the control room?

A 8.0 ms **B** 16 ms **C** 8.0 s **D** 16 s

4. June/2021/Paper_22/No.25

Here are three statements about the speed of electromagnetic waves.

1 The speed of an electromagnetic wave in a vacuum is 340 m/s.

2 The speed of an electromagnetic wave in a vacuum is 3.0×10^8 m/s.

3 The speed of an electromagnetic wave in a vacuum is approximately the same as in air.

Which statements are correct?

A 1 and 3 **B** 1 only **C** 2 and 3 **D** 2 only

5. June/2021/Paper_23/No.25

Which row correctly describes what happens to the frequency and to the speed of electromagnetic waves as we move through the spectrum from γ-rays to radio waves?

	frequency	speed in a vacuum
A	decreases	increases
B	decreases	remains the same
C	increases	decreases
D	increases	remains the same

6. March/2021/Paper_12/No.25

Thermal radiation is part of the electromagnetic spectrum.

What is the name of this region of the spectrum?

A gamma rays

B infrared rays

C ultraviolet rays

D visible light rays

7. March/2021/Paper_22/No.25

Which row gives the approximate speeds at which ultraviolet waves travel in air and in a vacuum?

	speed in air / m/s	speed in a vacuum / m/s
A	340	3.0×10^8
B	340	340
C	3.0×10^8	340
D	3.0×10^8	3.0×10^8

8. June/2021/Paper_31/No.7

A narrow beam of white light enters a glass prism and splits into the colours of the visible spectrum, as shown in Fig. 7.1.

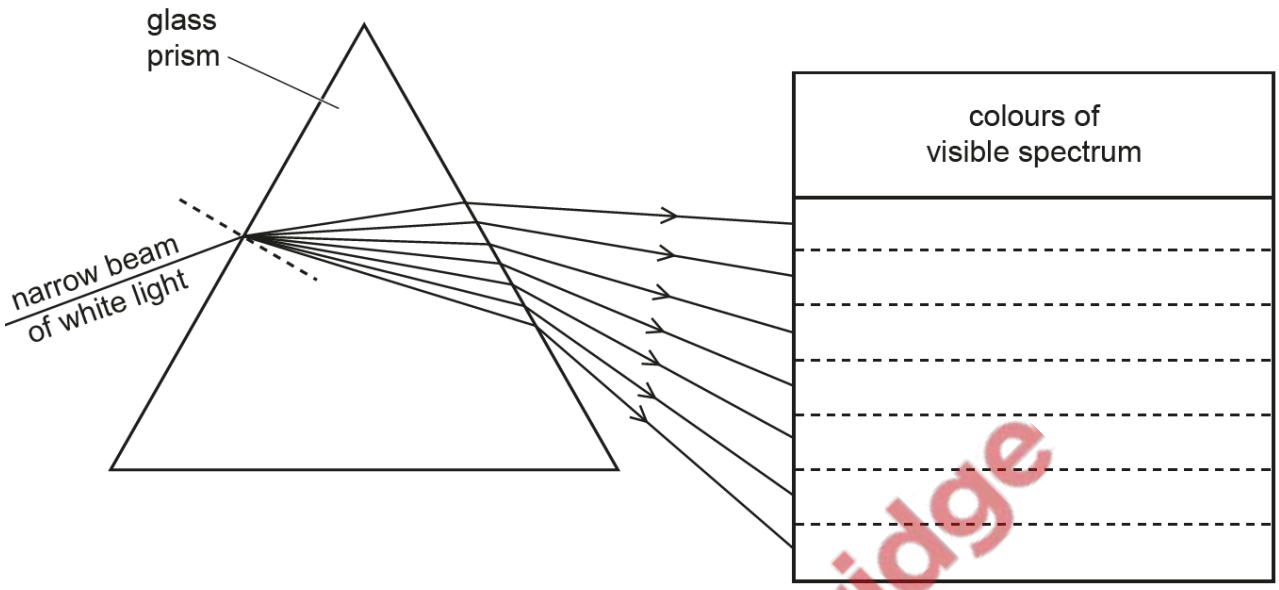


Fig. 7.1

(a) The rays leaving the prism represent the seven main colours of the visible spectrum.

Complete the labelling on Fig. 7.1 by writing the colours of the visible spectrum in the table. [2]

(b) State the term used to describe:

(i) the bending of the light as it enters the prism

..... [1]

(ii) the different amounts of bending that produce the spectrum.

..... [1]

(c) A student incorrectly writes some sentences about electromagnetic waves. His teacher circles a mistake in each sentence.

In the table, write a suitable correction for each mistake. The first one has been done for you.

student's sentences	correction
the speed of light is faster than radio waves in a vacuum	the same as
X-rays are used in television remote controllers	
radio waves have the highest frequencies in the electromagnetic spectrum	

[2]

[Total: 6]

9. June/2021/Paper_32/No.7

(a) Both radio waves and γ-rays (gamma) are radiations in the electromagnetic spectrum. Fig. 7.1 shows the main regions of the electromagnetic spectrum. Most regions are labelled.

radio waves	microwave radiation	infrared radiation	visible light	....	....	γ-rays

Fig. 7.1

(i) On Fig. 7.1, write the names of the radiations in the other **two** parts of the electromagnetic spectrum. [2]

(ii) State **one** use of γ-rays.

..... [1]

(iii) A star emits radio waves and γ-rays at the same time. They all travel across the vacuum of space to the Earth's atmosphere.

State whether the radio waves or the γ-rays, if either, arrive first at the Earth's atmosphere. Give a reason for your answer.

statement .....

reason ..... [2]

(b) Fig. 7.2 shows pulses of a signal from a star.

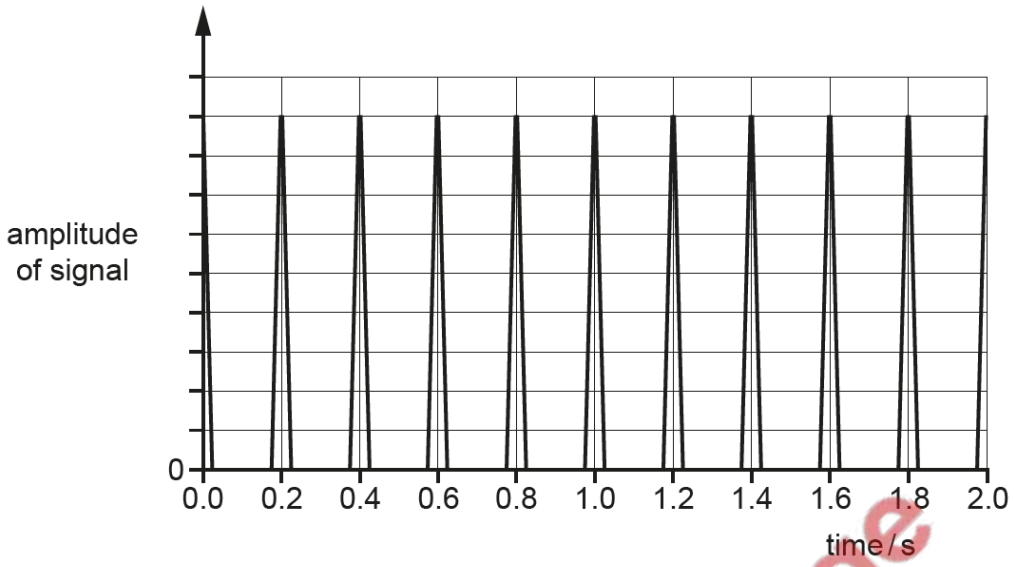


Fig. 7.2

(i) Use the graph in Fig. 7.2 to determine the time between pulses.

time between pulses = ... s [2]

(ii) Determine the frequency of the pulses in Fig. 7.2.

frequency = ... Hz [2]

[Total: 9]

10. June/2021/Paper_33/No.7

This question is about the electromagnetic spectrum.

(a) (i) State the name of a region of the electromagnetic spectrum which has **longer** wavelengths than visible light.

..... [1]

(ii) State the name of a region of the electromagnetic spectrum which has **shorter** wavelengths than visible light.

..... [1]

(iii) Electromagnetic waves are travelling through a vacuum. Indicate the property that is always the same for all the waves.

Tick (✓) **one** box.

frequency	
speed	
amplitude	

[1]

(iv) Indicate the correct statement about the nature of electromagnetic waves.

Tick (✓) **one** box.

All electromagnetic waves are transverse.	
All electromagnetic waves are longitudinal.	
Some electromagnetic waves are transverse and some are longitudinal.	

[1]

(v) Indicate the correct statement about the action of electromagnetic waves.

Tick (✓) **one** box.

They transfer energy from one place to another.	
They transfer atoms from one place to another.	
They transfer molecules from one place to another.	

[1]

(b) State the type of electromagnetic radiation used:

(i) for a remote controller to operate a television

..... [1]

(ii) in a hospital to produce an image of broken bones.

..... [1]

[Total: 7]