Electromagnetic Spectrum – 2023 IGCSE Physics 0625

1. Nov/2023/Paper_ 0625/11/No.22

Where do all types of electromagnetic waves travel at the same speed?

A air

B a vacuum

C glass

D water

2. Nov/2023/Paper_ 0625/12/No.22

The table shows different types of wave in the electromagnetic spectrum.

radio waves	microwaves	infrared waves	visible light	ultraviolet waves	X-rays	gamma rays

Where do all the waves travel at the same speed?

A in a vacuum

B in diamond

C in glass

D in water

3. Nov/2023/Paper_ 0625/13/No.22

The diagram shows the electromagnetic spectrum.

γ-rays	E	ultraviolet	F	infrared	microwaves	G

Which types of wave are E, F and G?

	E	F	G
A	radio	visible light	X-rays
B	radio	X-rays	ultrasound
C	X-rays	radio	ultrasound
D	X-rays	visible light	radio

4. Nov/2023/Paper_ 0625/21,22/No.22

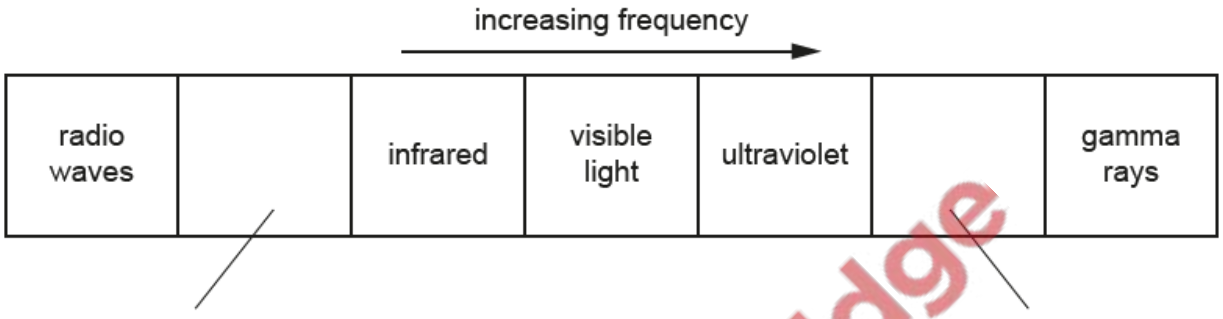
A radio transmitter broadcasts at a frequency of 200 kHz.

What is the wavelength of these radio waves?

A 6.7×10^{-4} m **B** 1.5 m **C** 1.5×10^{3} m **D** 1.5×10^{6} m

5. Nov/2023/Paper_ 0625/31/No.5

Fig. 5.1 shows the main regions of the electromagnetic spectrum in order of increasing frequency.



....

Fig. 5.1

(a) Two of the regions are unlabelled.

Add the correct label to each of the unlabelled regions in Fig. 5.1. [2]

(b) State **one** use of infrared radiation and **one** use of ultraviolet radiation.

infrared radiation

.....

ultraviolet radiation

.....

[2]

(c) Describe possible harmful effects of excessive exposure to:

infrared radiation

.....

ultraviolet radiation

.....

[2]

[Total: 6]

6. Nov/2023/Paper_ 0625/33/No.5

(a) Fig. 5.1 shows regions of the electromagnetic spectrum in order of increasing wavelength. **Two** of the regions are unlabelled.

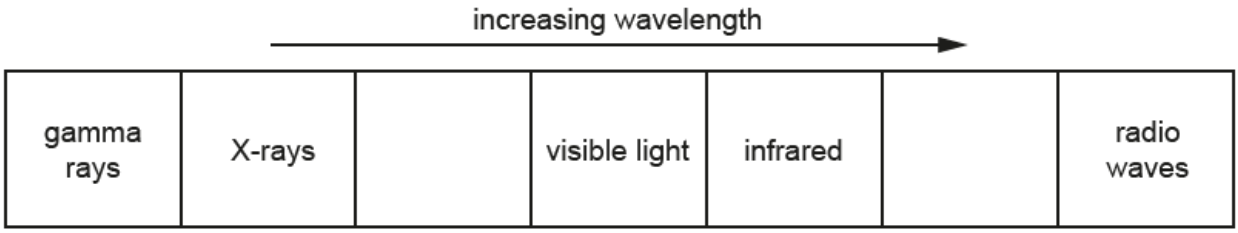


Fig. 5.1

(i) Complete Fig. 5.1 by writing the name of each unlabelled region in the correct box. [2]

(ii) State **two** properties that are the same for all regions of the electromagnetic spectrum.

1 .....

.....

2 .....

.....

[2]

(b) **(i)** State **one** use for infrared radiation.

..... [1]

(ii) State **one** harmful effect of excessive exposure to infrared radiation.

..... [1]

[Total: 6]

7. Nov/2023/Paper_ 0625/41/No.4(c)

A radio transmitter is a very tall, thin cylinder. It is prevented from falling over by wires which have one end fixed to the transmitter and the other end fixed in the ground. The ends of the wires in the ground are a long distance from the transmitter.

Fig. 4.1 shows the transmitter and two of the wires.

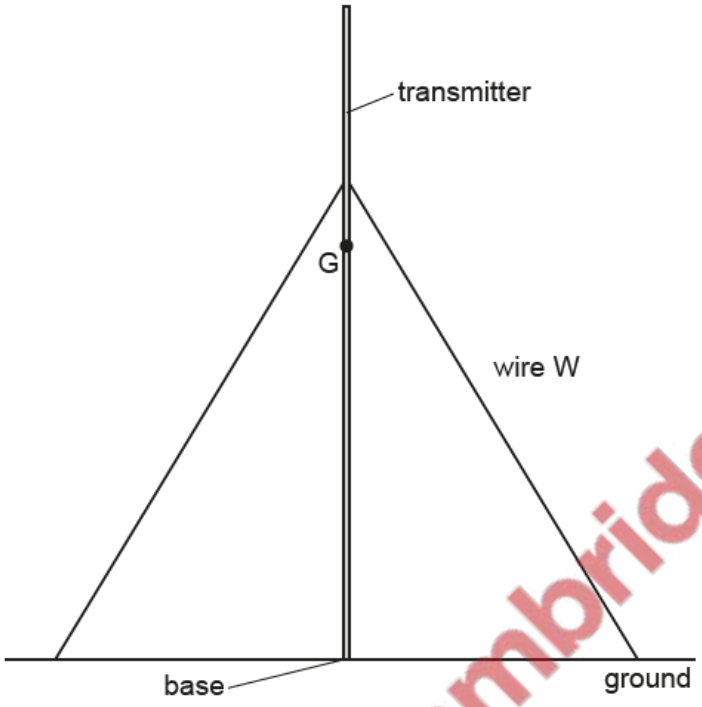


Fig. 4.1

(c) The radio transmitter uses radio waves to transmit radio and television programmes.

State **one** other use of radio waves.

.....

..... [1]

8. Nov/2023/Paper_ 0625/42/No.7

Fig. 7.1 shows some uses of electromagnetic radiation and different regions of the electromagnetic spectrum.

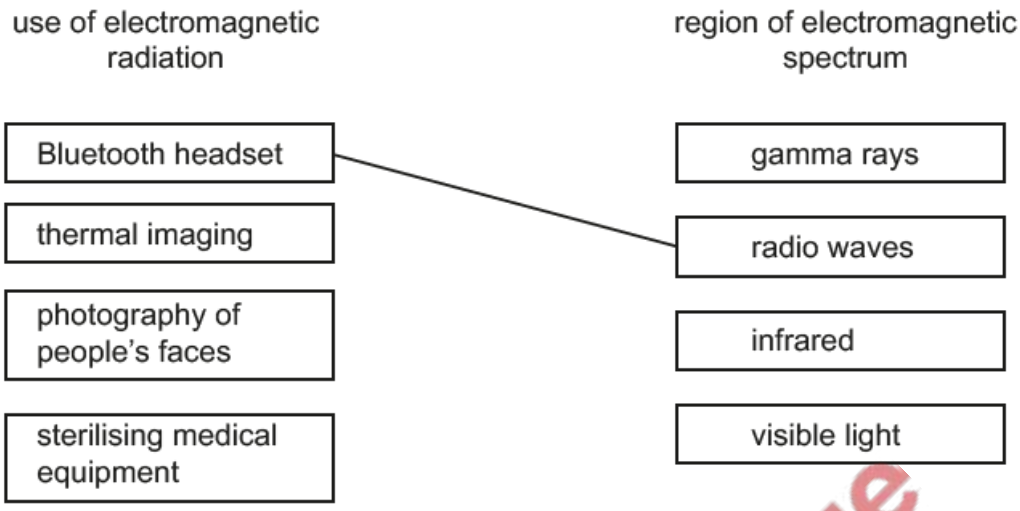


Fig. 7.1

(a) Draw a line from each use to the correct region of the spectrum. Each region of the spectrum is used once. One line has been completed for you. [2]

(b) State the speed of electromagnetic waves in a vacuum.

speed = ... [1]

(c) A Bluetooth headset can be used to listen to music on a mobile (cell) phone without the need for wires to connect the headset to the phone.

(i) The headset uses frequencies in the range 2.40–2.48 GHz.

Calculate the wavelength of the radio waves when the frequency is in the middle of the frequency range.

wavelength = ... [3]

(ii) Suggest why a Bluetooth headset only works well over short distances.

.....

..... [1]

[Total: 7]

9. June/2023/Paper_0625/11/No.21

Which statement is correct?

A A remote controller emits microwave radiation.

B A remote controller emits infrared radiation.

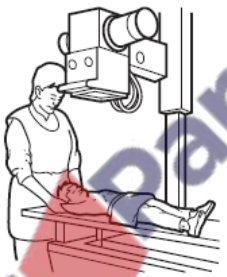
C A remote controller emits ultrasound.

D A remote controller emits ultraviolet radiation.

10. June/2023/Paper_0625/12/No.21

The two devices shown use different types of electromagnetic waves.

medical scanning



remote controller

Which types of waves are used in these devices?

	medical scanning	remote controller
A	ultraviolet	infrared
B	ultraviolet	microwaves
C	X-rays	infrared
D	X-rays	microwaves

11. June/2023/Paper_0625/13/No.21

Which row matches a region of the electromagnetic spectrum to one of its uses?

	region	use
A	gamma rays	intruder alarms
B	infrared	satellite television
C	microwaves	mobile (cell) phones
D	radio waves	sterilising food

12. June/2023/Paper_0625/21/No.21

Visible light has wavelengths in the range 4.0×10^{-7} m to 7.0×10^{-7} m.

What is the range of the frequencies of visible light?

A 0.12 Hz to 0.21 Hz

B 120 Hz to 210 Hz

C 4.3×10^{11} Hz to 7.5×10^{11} Hz

D 4.3×10^{14} Hz to 7.5×10^{14} Hz

13. June/2023/Paper_0625/22/No.21

A radio station broadcasts a signal with a frequency of 89 MHz.

What is the wavelength of this signal?

A 3.7 µm **B** 3.4 m **C** 3.7 km **D** 3.4 Mm

14. June/2023/Paper_0625/23/No.21

A student writes four statements matching a communication system to the region of the electromagnetic spectrum that it uses to transmit signals.

Which statement is correct?

A Wireless internet uses visible wavelengths.

B Mobile phones use X-rays.

C Cable television uses infrared wavelengths.

D Bluetooth uses ultraviolet wavelengths.

15. June/2023/Paper_0625/41/No.6

A mobile phone (cell phone) network uses microwaves of frequency 1.9×10^9 Hz to transmit and receive signals.

The speed of microwaves in air is 3.0×10^8 m/s.

(a) Calculate the wavelength of these microwaves in air.

wavelength = ... [2]

(b) State **two** reasons why microwaves are used for mobile phone (cell phone) signals.

1 .....

.....

2 .....

.....

[2]

(c) All mobile phone (cell phone) networks use digital signals to communicate with the phone.

(i) Describe, with the aid of a diagram, how a digital signal differs from an analogue signal.

.....

.....

.....

..... [3]

(ii) State **two** advantages of using digital signals rather than analogue signals.

1 .....

.....

2 .....

.....

[2]

[Total: 9]

16. June/2023/Paper_0625/33/No.6

Table 6.1 shows regions of the electromagnetic (e.m.) spectrum.

Two of the regions are not labelled.

Table 6.1

gamma rays	X-rays	.....	visible light	infrared	.....	radio waves

(a) (i) Complete Table 6.1 by writing the name of each region that is not labelled. [2]

(ii) State **two** properties that are the same for waves in all regions of the e.m. spectrum.

1 .....

.....

2 .....

.....

[2]

(b) X-rays are used in hospitals to check for broken bones.

(i) State **one** other use for X-rays.

..... [1]

(ii) State **one** precaution taken by people who work with X-rays.

..... [1]

[Total: 6]

17. June/2023/Paper_0625/43/No.5(a)

(a) Two types of electromagnetic radiation are used in glass optical fibres for high-speed broadband.

(i) State the type of electromagnetic radiation, other than visible light, which is used in glass optical fibres.

..... [1]

(ii) Give **two** reasons why these two types of electromagnetic radiation are used in glass optical fibres for high-speed broadband.

1 .....

.....

2 .....

.....

[2]