# Electromagnetic Spectrum – 2022 November IGCSE 0625

**1.** Nov/2022/Paper_11/No.22

The diagram shows the electromagnetic spectrum. The numbers indicate the approximate wavelength at the boundaries between the various regions of the spectrum.

For a device to be able to make use of electromagnetic radiation, it needs an aerial of approximately the same size as the wavelength of the radiation it is designed to work with.

| P | Q | R | S | T | U | V |
|---|---|---|---|---|---|---|
| 1 m | $10^{-3}$ m | $7 \times 10^{-7}$ m | $4 \times 10^{-7}$ m | $10^{-8}$ m | $10^{-11}$ m | |

Which statement is correct?

**A** A mobile phone uses radiation from region P.

**B** A television satellite dish uses radiation from region Q.

**C** The receptor cells in an eye use radiation from region R.

**D** The remote controller for a television uses radiation from region U.

**2.** Nov/2022/Paper_11/No.23

Microwaves and X-rays are regions of the electromagnetic spectrum.

Which statement about microwaves and X-rays is correct?

**A** Microwaves and X-rays have the same frequency.

**B** Microwaves and X-rays travel at the same speed in a vacuum.

**C** Microwaves have a shorter wavelength than X-rays.

**D** Microwaves travel at a lower speed than X-rays in a vacuum.

**3.** Nov/2022/Paper_12,13/No.22

Visible light has a frequency of approximately $5.0 \times 10^{14}$ Hz.

M and N are two other types of electromagnetic radiation.

The frequency of M is $5.0 \times 10^{6}$ Hz.

The frequency of N is $5.0 \times 10^{15}$ Hz.

Which types of radiation are M and N?

| | M | N |
|---|---|---|
| **A** | radio waves | infrared |
| **B** | radio waves | ultraviolet |
| **C** | ultraviolet | X-rays |
| **D** | X-rays | infrared |

**4.** Nov/2022/Paper_12/No.23

Two students are describing different types of electromagnetic radiation.

student 1 This radiation is used in communications.

student 2 This radiation is used in remote controllers.

Which row shows the possible type of radiation that each student is describing?

| | student 1 | student 2 |
|---|---|---|
| **A** | microwave | infrared |
| **B** | radio | ultraviolet |
| **C** | sound waves | visible light |
| **D** | X-rays | gamma rays |

**5.** Nov/2022/Paper_13/No.23

Which wave is **not** an electromagnetic wave?

**A** microwaves

**B** radio

**C** sound

**D** ultraviolet

**6.** Nov/2022/Paper_21/No.23

What is the speed of microwaves in air?

**A** $3 \times 10^8$ μm/s

**B** $3 \times 10^8$ cm/s

**C** $3 \times 10^8$ m/s

**D** $3 \times 10^8$ km/s

**7.** Nov/2022/Paper_32/No.5(d_ e)

**(d)** The chart in Fig. 5.2 shows the regions of the electromagnetic spectrum.

Two of the regions are not labelled.

| | | | | | | |
|---|---|---|---|---|---|---|
| ..... | X-rays | ..... | visible light | infrared | microwaves | radio waves |

**Fig. 5.2**

**(i)** Complete the labelling in Fig. 5.2. [2]

**(ii)** Compare the speed of radio waves and visible light. Complete the sentence.

In a vacuum, radio waves travel ..... visible light. [1]

**(e)** The different regions of the electromagnetic spectrum have different uses.

State the region of the electromagnetic spectrum that is used for:

**(i)** the remote control for a television ..... [1]

**(ii)** the signal for satellite television broadcasting ..... [1]

**8.** Nov/2022/Paper_33/No.8

Fig. 8.1 shows the security and waiting areas at an airport.

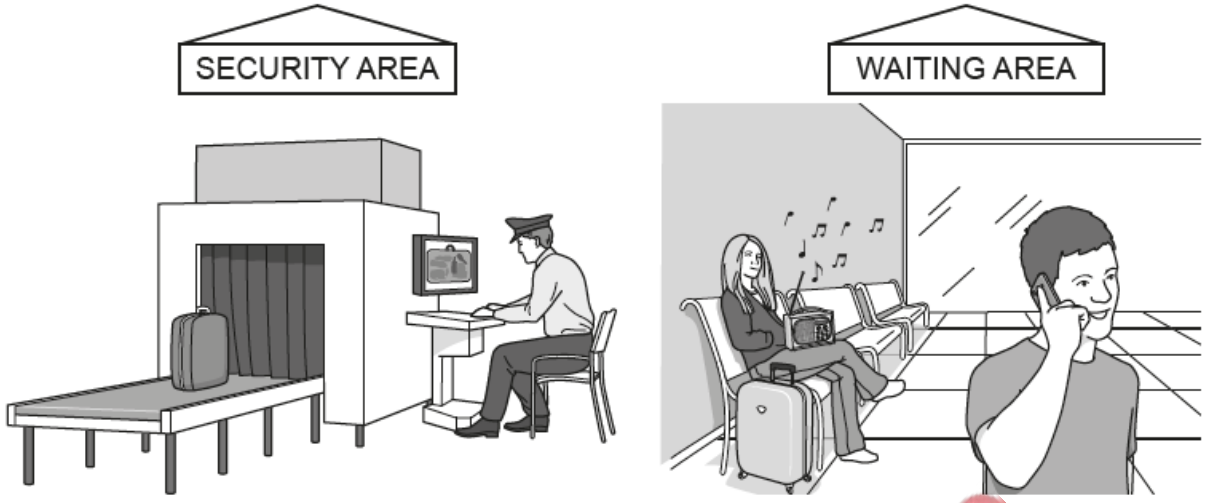


**Fig. 8.1**

**(a)** Fig. 8.1 shows several situations in which regions of the electromagnetic (EM) spectrum are being used.

Table 8.1 gives **three** of these situations.

State the name of the region of the EM spectrum which is being used in each situation.

**Table 8.1**

| | situation | region of EM spectrum |
|---|---|---|
| 1 | girl listening to radio | |
| 2 | boy using mobile phone | |
| 3 | security guard checking bags | |

[3]

**(b)** All waves can be reflected, refracted and diffracted.

State **two** other properties of waves in the electromagnetic spectrum.

property 1 .....

property 2 .....

[2]

**(c)** State **two** safety precautions for working with sources that emit γ (gamma)-radiation.

1. .....

2. .....

[2]

[Total: 7]