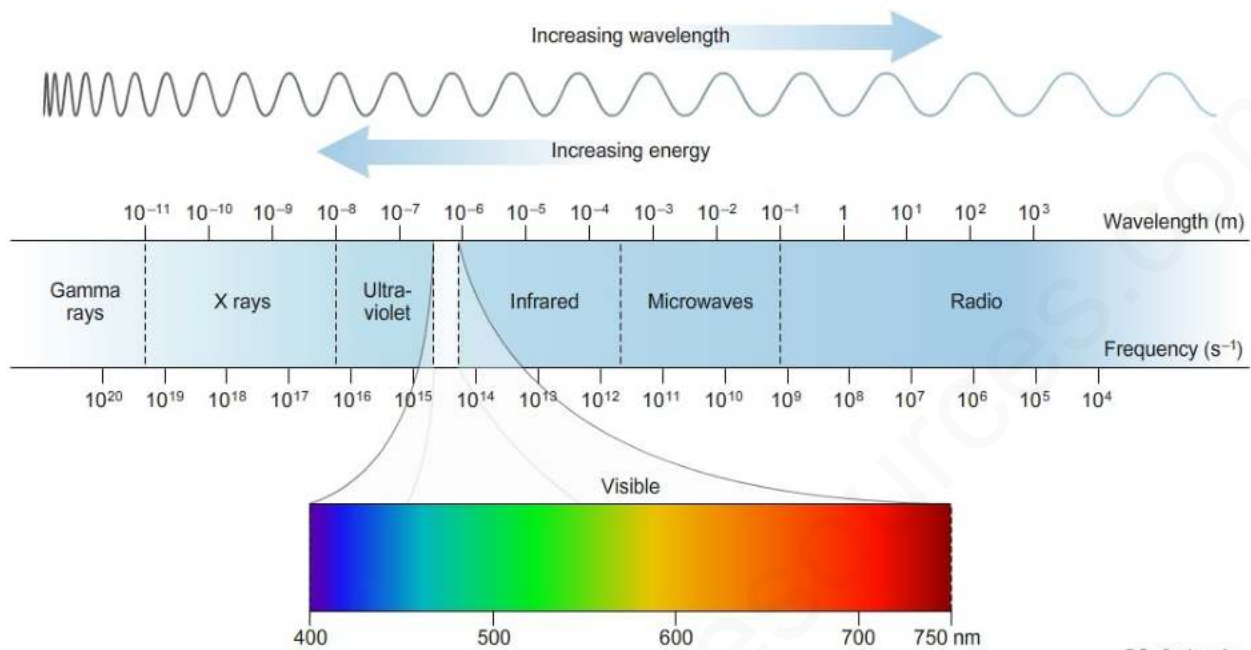


ELECTROMAGNETIC SPECTRUM

- Electromagnetic spectrum are electric and magnetic disturbances that transfer energy from one place to another.
- All electromagnetic waves travel with a speed of 3×10^8 m/s.
- Electromagnetic waves do not transfer matter.
- The energy they transfer depends upon the wavelength of the waves. That is why waves of different wavelengths have different effects.

• Light is one of the family of radiations called the electromagnetic spectrum. Some types of electromagnetic radiation are used to transmit information such as computer data, telephone calls and TV signals.

ELECTROMAGNETIC SPECTRUM WAVELENGTH ,FREQUENCY AND USES



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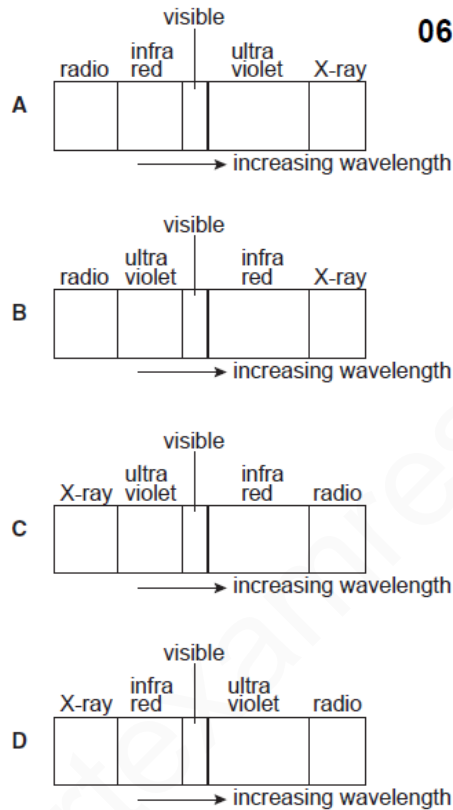
TYPES OF ELECTROMAGNETIC SPECTRUM	USE
RADIO WAVES	<ul style="list-style-type: none"> • Measuring speed and distance in a radar • Used to broadcast radio and television
MICRO WAVES	<ul style="list-style-type: none"> • Heating food
INFRARED RAYS	<ul style="list-style-type: none"> • In heat sensitive thermal imaging cameras
VISIBLE LIGHT	<ul style="list-style-type: none"> • To make lasers to use in surgery
ULTRAVIOLET RAYS	<ul style="list-style-type: none"> • Used in fluorescent tubes
X RAYS	<ul style="list-style-type: none"> • Used to view inside of objects and bodies
GAMMA	<ul style="list-style-type: none"> • Used in medicine to kill cancer cells

APPLICATION BASED QUESTIONS:

MCQ:

23 Which diagram shows the correct order of the waves in the electromagnetic spectrum?

0625/1/O/N/02



20 Which type of radiation lies between visible light and microwaves in the electromagnetic spectrum?

0625/01/O/N/04

- A infra-red
- B radio waves
- C ultra-violet
- D X-rays

22 The table gives common uses for three types of electromagnetic wave.

Which row correctly identifies the waves?

0625/12/O/N/13

	satellite television	terrestrial television (not satellite)	television remote controllers
A	infra-red waves	microwaves	radio waves
B	microwaves	radio waves	infra-red waves
C	radio waves	infra-red waves	microwaves
D	radio waves	microwaves	infra-red waves

27 Which type of electromagnetic wave is used in airport security scanners?

- A infra-red
- B microwaves
- C radio waves
- D X-rays

0625/12/O/N/14

22 Which statement is correct about the speed of electromagnetic waves in a vacuum?

- A Ultra-violet waves have the greatest speed.
- B Visible light waves have the greatest speed.
- C Infra-red waves have the greatest speed.
- D All electromagnetic waves have the same speed.

0625/01/M/J/03

0625/12/M/J/13

22 An electronic engineer makes devices which can receive television pictures from satellites.

Which type of electromagnetic radiation must these devices be able to receive?

- A infra-red waves
- B microwaves
- C radio waves
- D ultra-violet waves

21 Which group of electromagnetic radiations is arranged in order of increasing frequency?

- A infra-red, visible light, ultraviolet
- B γ -rays, X-rays, infra-red
- C ultra-violet, visible light, radio waves
- D X-rays, radio waves, γ -rays

EXTENDED THEORY

(b) Fig. 7.1 shows part of the electromagnetic spectrum. O/N/07-P3-Q7



Fig. 7.1

- (i) On Fig. 7.1, label the positions of γ -rays, visible light waves and radio waves. [1]
 - (ii) State which of the three types of wave in (i) has the lowest frequency.
..... [1]
 - (iii) State the approximate value of the speed in air of radio waves.
..... [1]
-

5 (a) State the type of electromagnetic radiation

F/M/15-P32-Q5

(i) used in luggage security checks at airports,

.....

(ii) used by remote controls for TV sets.

.....

[2]

(b) (i) The electromagnetic waves used in a microwave oven have a frequency of 2.45×10^9 Hz. The speed of the waves is 3.00×10^8 m/s.

Calculate the wavelength of the waves.

wavelength = [2]

7 (a) A police car siren emits sound waves that vary in pitch.

O/N/14-P32-Q7

Tick **two** boxes that apply to the sound waves emitted by the siren.

- electromagnetic
- longitudinal
- transverse
- visible
- frequency 0.1–10 Hz
- frequency 100–10000 Hz
- frequency 100000–1000000 Hz

[2]

7 Fig. 7.1 shows the parts of the electromagnetic spectrum.

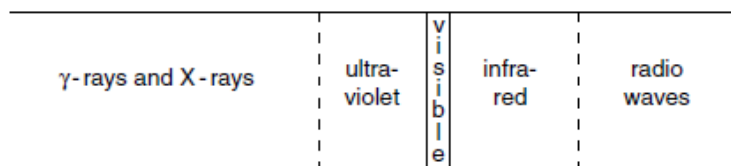


Fig. 7.1

(a) Name one type of radiation that has

(i) a higher frequency than ultra-violet,

..... [1]

(ii) a longer wavelength than visible light.

..... [1]

7 (a) The following list contains the names of types of energy transfer by means of waves.

γ -rays, infra-red, radio/TV/microwaves, sound, visible light, X-rays

(i) Which one of these is **not** a type of electromagnetic wave?

O/N/10-P31

..... [1]

(ii) State the nature of the wave you have named in (a)(i).

..... [1]

(iii) The remaining names in the list are all regions of the electromagnetic spectrum, but one region is missing.

Name the missing region.

..... [1]

8 A student draws a diagram to represent the electromagnetic spectrum.

Fig. 8.1 is the student's diagram.

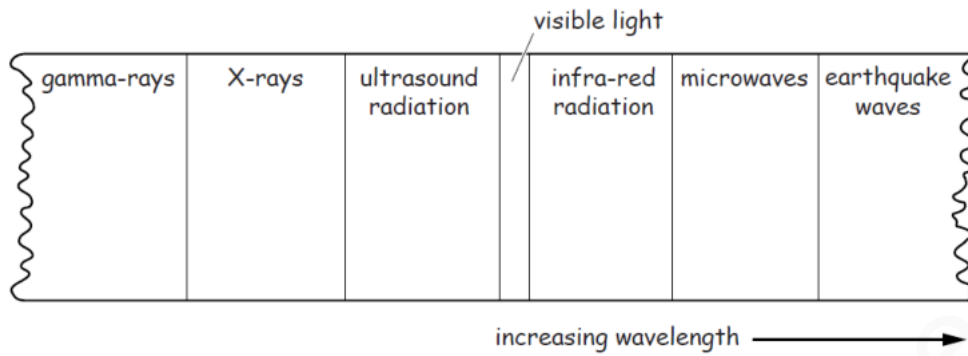


Fig. 8.1

The student has made two mistakes.

(a) On Fig. 8.1, cross out what is wrong and correct the diagram.

[2]
