

3.3 Electromagnetic spectrum

Name: _____ Class: _____ Date: _____

Total: 8 marks

Objective

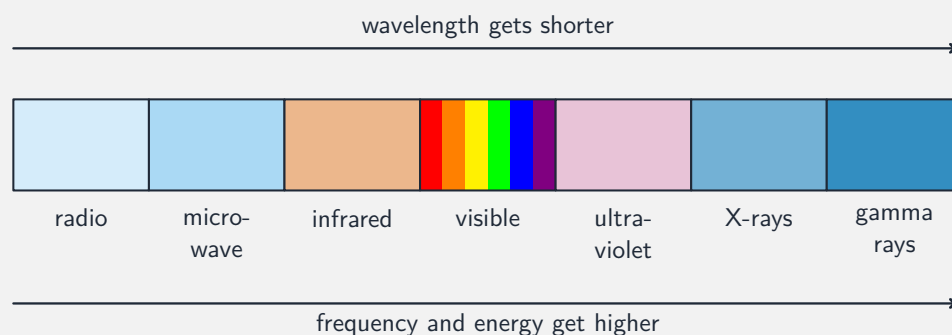
Build the skills to answer exam questions on the **electromagnetic spectrum** 电磁波谱—the order of the regions, their uses, and their dangers.

You must be able to:

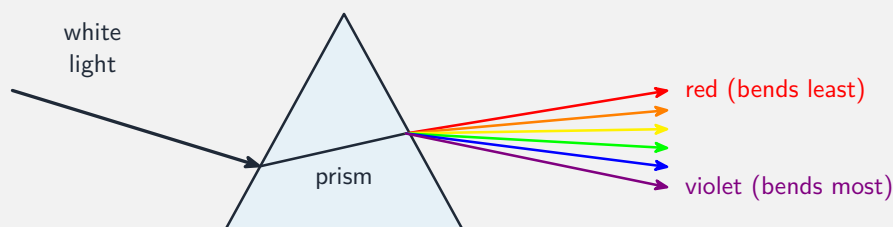
- list the regions in order of wavelength/frequency
- give a use for each region
- state the dangers of the higher-frequency regions

1 Worked examples

■ The EM spectrum



From radio to gamma rays: wavelength falls, frequency and energy rise



A prism disperses white light into the visible spectrum

- **order:** radio, microwave, infrared, visible, ultraviolet, X-ray, gamma.

- all travel at 3.0×10^8 m/s in a vacuum.
- **uses:** microwave (phones/cooking), infrared (remote controls/thermal imaging), UV (sterilising), X-ray (scans), gamma (sterilising/cancer treatment).

2 Practice

2.1 Name the region of the EM spectrum used for mobile phone signals. [1]

2.2 State which has the higher frequency: ultraviolet or infrared. [1]

3 Exam-style questions

3.1 Which travels fastest in a vacuum? [1]

- **A** radio waves
- **B** visible light
- **C** gamma rays
- **D** they all travel at the same speed

3.2 Going from radio waves towards gamma rays:

(a) State what happens to the frequency and to the wavelength. [2]

(b) State one danger of too much ultraviolet radiation. [1]

3.3 Give a use for (a) infrared and (b) X-rays. [2]

4 Go further

You are now ready for the real exam questions on this subtopic. Open the **3.3 Electromagnetic spectrum** past-paper sheet in the Library, or try these in **Practice mode**:

- 0625/21 N25 —Q22 (EM spectrum)
- 0625/23 N25 —Q22 (EM spectrum)
- 0625/43 N25 —Q5 (uses of EM waves)

Solutions

2.1 microwaves.

2.2 ultraviolet.

3.1 D. All electromagnetic waves travel at the same speed in a vacuum.

3.2 (a) the frequency increases and the wavelength decreases.

(b) it can cause skin cancer (or eye damage).

3.3 (a) infrared —remote controls / thermal imaging / grills.

(b) X-rays —medical or security scans.