

## Topic 2

### The electromagnetic spectrum

- 2.1 Demonstrate an understanding of how Herschel and Ritter contributed to the discovery of waves outside the limits of the visible spectrum
- 2.2 Demonstrate an understanding that all electromagnetic waves are transverse and that they travel at the same speed in a vacuum
- 2.3 Describe the continuous electromagnetic spectrum including (in order) radio waves, microwaves, infrared, visible (including the colours of the visible spectrum), ultraviolet, X-rays and gamma rays
- 2.4 Demonstrate an understanding that the electromagnetic spectrum is continuous from radio waves to gamma rays, but the radiations within it can be grouped in order of decreasing wavelength and increasing frequency
- 2.5 Demonstrate an understanding that the potential danger associated with an electromagnetic wave increases with increasing frequency
- 2.6 Relate the harmful effects, to life, of excessive exposure to the frequency of the electromagnetic radiation, including:
  - a microwaves: internal heating of body cells
  - b infrared: skin burns
  - c ultraviolet: damage to surface cells and eyes, leading to skin cancer and eye conditions
  - d X-rays and gamma rays: mutation or damage to cells in the body
- 2.7 Describe some uses of electromagnetic radiation:
  - a radio waves: including broadcasting, communications and satellite transmissions
  - b microwaves: including cooking, communications and satellite transmissions

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- c infrared: including cooking, thermal imaging, short range communications, optical fibres, television remote controls and security systems
  - d visible light: including vision, photography and illumination
  - e ultraviolet: including security marking, fluorescent lamps, detecting forged bank notes and disinfecting water
  - f X-rays: including observing the internal structure of objects, airport security scanners and medical X-rays
  - g gamma rays: including sterilising food and medical equipment, and the detection of cancer and its treatment
- 2.8 Recall that ionising radiations are emitted all the time by radioactive sources
- 2.9 Describe that ionising radiation includes alpha and beta particles and gamma rays and that they transfer energy