The Electromagnetic spectrum (EM spectrum)

Consists of transverse waves that all travel at the speed of light (3×10^8 m/s) in a vacuum. The waves form a continuous spectrum i.e. the EM spectrum.

From highest frequency (shortest wavelength) to lowest frequency (longest wavelength), there are:

- Gamma rays: used in treatment of tumours, to sterilise medical equipment and to kill microbes in food.
- X-rays: diagnosing fractures and internal imaging of bones.
- UV: security labelling, tanning and fluorescent lamps.
- Visible light: photography, optical fibres, vision.
- Infra-red: Night-time/thermal imaging, TV remotes, remote controls, heaters and grills.
- Microwaves: Cooking, mobile and satellite communications.
- Radiowaves: radios, radar, broadcasting and communication.

The high frequency EM waves can cause damage whereas the low frequency ones are relatively safe. Gamma, X-rays and UV are all types of ionising radiation. UV waves can cause skin cancer and blindness whereas X-rays and gamma rays increase the risk of mutations and therefore cancer. Infra-red can cause skin burns and microwaves can cause internal heating of body tissue, leading to cell damage.

Within the visible light spectrum, different colours (the rainbow colours) can be seen. From highest to lowest wavelength, these are:

- Red (700nm)
- Orange
- Yellow
- Green
- Blue
- Indigo
- Violet (400nm)

Remember Richard Of York Gave Battle In Vain.

The wavelengths of the EM waves vary from 10^3m for radio waves to 10^{-12}m for gamma. The frequency varies from 10^4 Hz for radio waves to 10^{20} Hz for gamma.