

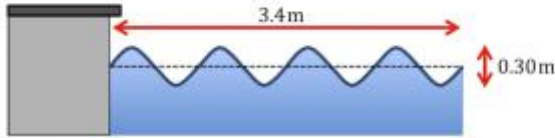
Lesson 4 – Waves & radiation part 1

(all answers are given in the online video)

1. Question 1 – wave terms and the wave equation

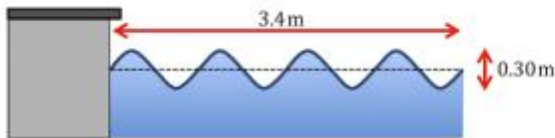
A wave machine in a swimming pool produces waves as shown below.

(a) Determine the wavelength and amplitude of the water waves.



A lifeguard finds that the waves travel the full length of the 25m pool in a time of 5.2s.

(b) Calculate the frequency of the water waves.



2. Now a refraction question – use your pen & ruler for this one

A man notices that, when he fills his coffee mug full of water, he can see a 20p coin which was dropped into it. When the mug was empty, he could not see the coin.

Draw a ray diagram to show how light from the coin reaches the man's eye.



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3. The difference between longitudinal and transverse waves

Wave characteristics

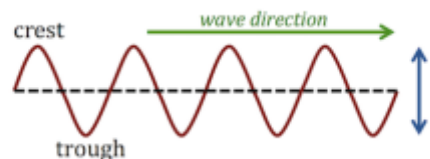
longitudinal waves - particles vibrate parallel to the direction of the wave.

examples – **sound waves**



transverse waves – particles vibrate at 90° to the direction of the wave.

examples – water waves, **all electromagnetic waves**

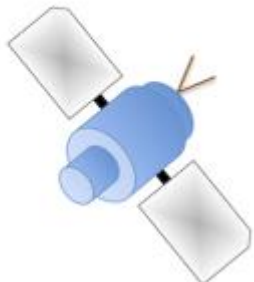




4. Satellite question – an intro to the electromagnetic spectrum

A weather satellite orbits the Earth at a height of 36000km above its surface.

Calculate the time taken for a radio signal sent from the satellite to reach Earth.






5. The electromagnetic spectrum in more detail – remember Roger Moore!

Electromagnetic spectrum

- All travel at $3 \times 10^8 \text{ ms}^{-1}$ (the speed of light) in air
- Unlike sound, they can all pass through a vacuum
- As frequency increases, wavelength decreases

longer wavelength,
lower frequency,
lower energy




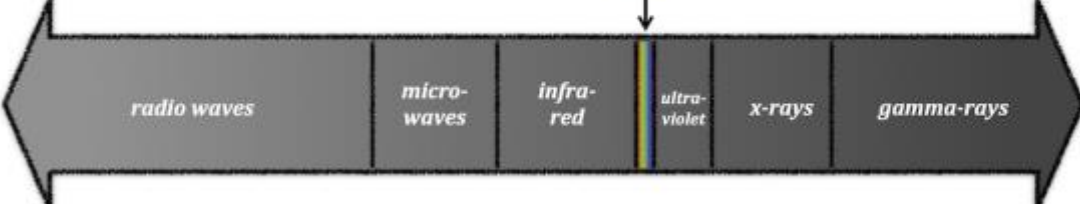
shorter wavelength,
greater frequency,
greater energy



Electromagnetic spectrum

visible light





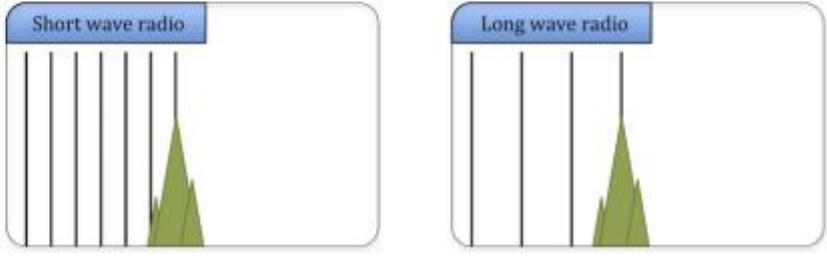


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6. Diffraction – see video for guidelines on how to complete the diagrams

Radio waves are diffracted as they pass over a hill. Complete the diagrams below to show the effect on long wave and short wave radio signals.



Short wave radio

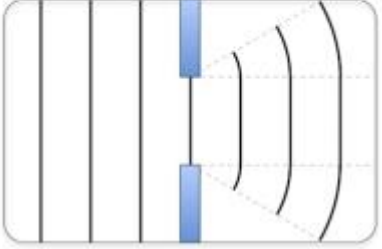
Long wave radio



7. Diffraction at a gap

Diffraction at a gap

The amount of diffraction depends on:
as gap size ↓ , amount of diffraction ↑
as wavelength ↑ , amount of diffraction ↑



All questions and slides were covered in the lesson.