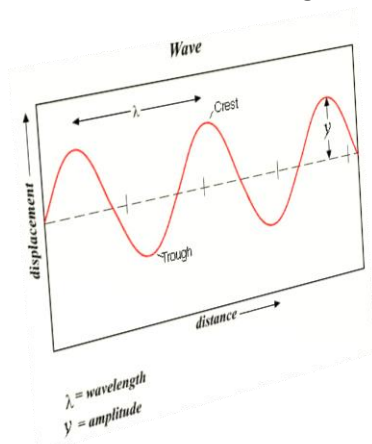


## National 5 Physics Learning Outcomes

### Unit 2 Waves and Radiation

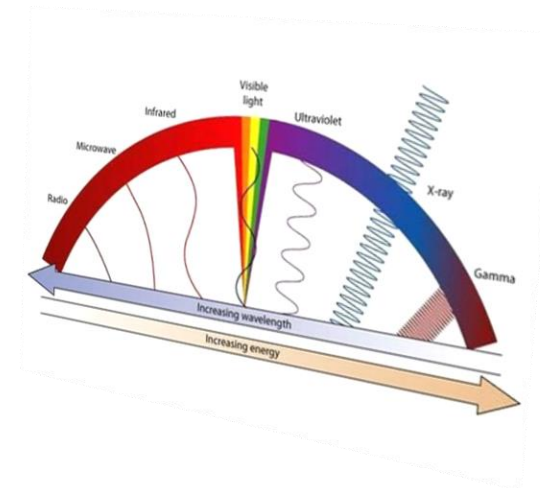
#### Key Area: Wave Parameters and Behaviour

- State that a wave is a transfer of energy
- State the difference between a transverse and longitudinal wave
- State that the Amplitude is a measure of a waves energy
- State that in a given medium wave speed is constant
- State that frequency of a wave is dependent on its source
- Use the following terms correctly and in context: wave, crest, trough, frequency, wavelength, speed, amplitude, period
- Carry out calculations involving the relationship between frequency and period
- Carry out calculations involving the relationship between frequency, wavelength and speed
- State what is meant by diffraction
- Know how wavelength and gap width affect diffraction



#### Key Area: E-M Spectrum

- State in order of wavelength the members of the Electro Magnetic spectrum: Radio, television, microwaves, infra-red, visible light, ultra violet, x- rays, gamma rays
- State that all members of the electromagnetic spectrum are transverse waves.
- State that all members of the electromagnetic spectrum travel through a vacuum or air at a speed of  $3 \times 10^8 \text{ m/s}$
- State that the energy of a photon in the electromagnetic spectrum is proportional to the photons frequency

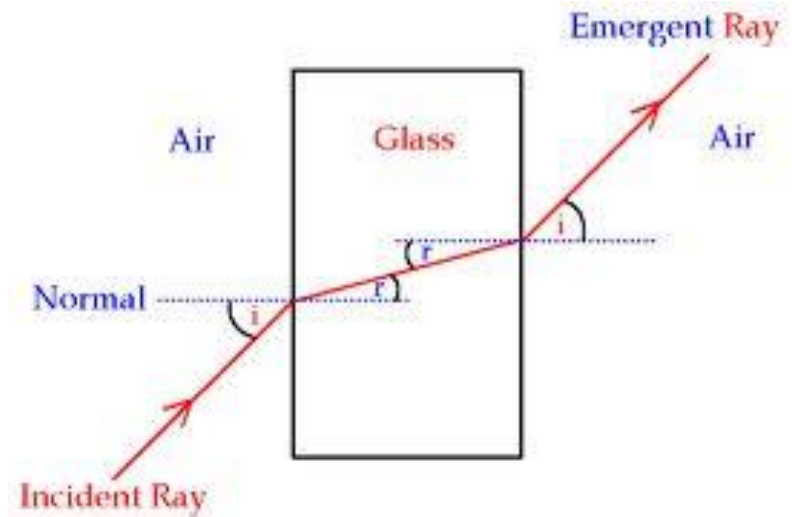
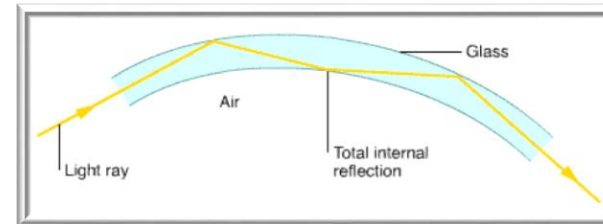
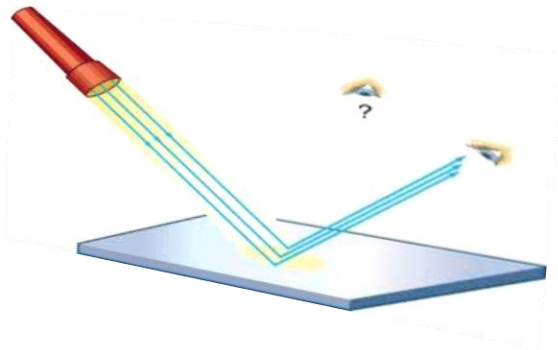


## National 5 Physics Learning Outcomes

### Unit 2 Waves and Radiation

#### Key Area: Light

- State what is meant by reflection of light
- Draw diagrams showing reflection taking place
- Use in the correct context the terms: incident ray, reflected ray, normal, angle of incidence, angle of reflection
- State what is meant by Total Internal Reflection
- Draw diagrams showing total internal reflection taking place
- State a practical application for total internal reflection
- State what is meant by refraction of light
- Draw diagrams showing refraction from one medium to another
- Use in the correct context the terms: incident ray, refracted ray, normal, angle of incidence, angle of refraction

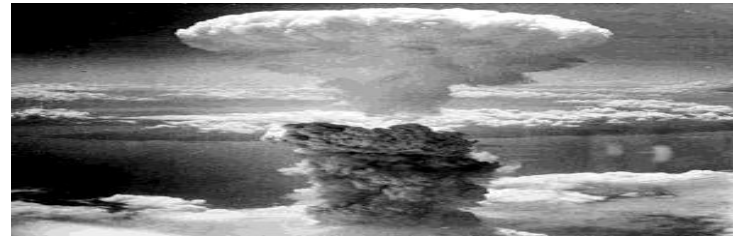


## National 5 Physics Learning Outcomes

### Unit 2 Waves and Radiation

#### Key Area: Nuclear Radiation

- Describe a simple model of an atom including protons, neutrons and electrons
- State what is meant by the terms alpha particle, beta particle and gamma ray
- State that radiation can be absorbed by materials
- State the approximate range through air and absorbers of alpha, beta and gamma radiation
- Explain the term ionisation
- State that alpha is the most ionising type of radiation
- Describe how detectors of radiations work
- State that radiation can kill living cells or change the nature of living cells
- State that absorbed dose is the energy absorbed per unit mass of the absorbing material
- Carry out calculations using the relationship between absorbed dose, energy absorbed and mass of absorber.
- State that a radiation weighting factor  $w_r$  is given to each radiation as a measure of its biological effect
- State equivalent dose is the product of absorbed dose and radiation weighting factors.



- Carry out calculations using the relationship between absorbed dose, weighting factor and equivalent dose.
- State that the equivalent dose rate is the equivalent dose per unit time
- Carry out calculations using the relationship between equivalent dose rate, equivalent dose and time
- State that the risk of biological harm from exposure to radiation depends on: the absorbed dose, the type of radiation, the type of tissue exposed
- Describe factors that affect background radiation
- Describe safety procedures for handling radioactive materials
- State that exposure to radiation is reduced by: shielding, limiting exposure time and increasing distance from the source.
- State one medical use of nuclear radiation
- State one non-medical use of nuclear radiation
- State that the activity of a source is how a measure of how many nuclei decay in 1 second
- Carry out calculation involving the relationship between, activity, number of nuclei decaying and time
- State that activity of a source decreases over time
- State the meaning of the term half-life

## National 5 Physics Learning Outcomes

### Unit 2 Waves and Radiation

#### Key Area: Nuclear Radiation continued

- Carry out calculations involving half- life
- Describe a method for measuring the half life of a source
- State advantages and disadvantages of using nuclear power in the generation of electricity.
- Describe the process of Fission: A heavy nucleus splitting into 2 lighter nuclei and releasing neutrons
- Explain in simple terms a chain reaction
- Describe the process of Fusion: 2 light nuclei combine to form 1 heavier nucleus
- Describe the principles of operation of a nuclear reactor in terms of: fuel rods, moderator, control rods, coolant, containment vessel
- Describe the problems associated with the disposal and storage of nuclear waste.

