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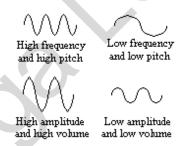
GCSE Revision Notes

Physics Revision Notes – Waves

- 1. All waves carry energy from one place to another. There are two types of waves:
 - Transverse waves have vibrations perpendicular to the direction of travel (e.g. all electromagnetic waves).
 - Longitudinal waves have vibrations in the same direction as that in which they are travelling (e.g. sound waves).
- 2. The following words are used to describe waves:
 - **Amplitude** the distance from the horizontal axis to the peak (in m).
 - Wavelength (1) the distance from peak to peak, or trough to trough (in m).
 - **Frequency** the number of complete waves per second (in Hz).
 - **Period** the time taken for one complete wavelength (in s).
- 3. All waves can be reflected, refracted and diffracted:
 - **Reflection** a wave bouncing off a surface.
 - **Refraction** a wave bending when it passes through a different medium.
 - Diffraction a wave spreading out when it passes through a narrow gap.
- 4. The wave formula:

Velocity (m/s) = Frequency (Hz)×Wavelength (m) $-v = f \times I$

- 5. **Sound** is a longitudinal wave:
 - The amplitude is related to its **volume** (a higher amplitude means a higher volume).
 - The wavelength is related to its **pitch** (a shorter wavelength means a higher pitch).
- 6. Sound is produced by objects **vibrating**:
 - The **strings** on a violin.
 - The surface of a drum.
 - The **air** in a trumpet.
 - The reeds in an oboe.
- 7. A **cathode ray oscilloscope** shows sounds as transverse waves:



- 8. **Ultrasound** is a high frequency sound wave, and is used in industry, medicine, quality control and sonar by transmitting the waves, and observing the way in which they are reflected back.
- 9. The Earth consists of a crust, a mantle, a liquid outer core, and a solid inner core.
- 10. There are two types of **seismic waves**:
 - P-waves are longitudinal. They travel through solids and liquids and are fast.
 - **S-waves** are transverse. They will only travel through solids and are slower than p-waves.
- 11. Properties of **reflection**:
 - The angle of incidence is always equal to the angle of reflection.
 - An **image** is virtual, laterally inverted, and the same distance from the mirror as the **object**.
- 12. Properties of refraction:
 - If a wave enters a denser medium (e.g. a perspex block), it will be bent towards the normal.
 The emerging ray will come out at the same angle, but displaced.
 - A **prism** can be used to split white light into the **visible spectrum**.
 - When a wave passes into a different medium, it will either slow down or speed up.
- 13. Properties of **total internal reflection**:
 - Total internal reflection is when a wave reflects off the inside of a block, rather that refracting out of it.
 - The **critical angle** for perspex is about 43°.
 - This principle is used in **fibre optics** (e.g. with endoscopes in medicine).