

Visible

Ultra violet

X-Ray

Gamma

Rays

Introduction to waves

- 1. Amplitude is the midpoint to the crest of a wave
- 2. Wavelength is the distance between the same point on successive waves
- 3. Frequency is the number of waves per second and is measured in Hertz, Hz,
- 4. Period is the time taken for one wave to pass a point.
- 5. Waves carry energy, the amplitude is a measure of the energy of a wave.
- 6. Use the formulae
 - a. wavelength = distance /no. of waves.
 - b. Frequency =no. of waves/time,
 - c. period =time /no. of waves.
- 7. Understand and correctly use the formulae v = d/t
- 8. Properties of waves, reflection, refraction, (diffraction- not covered),
- 9. Describe the two types of waves, longitudinal and transverse.
- 10. Sound and seismic p waves are examples of longitudinal waves and the EM waves are transverse waves.

Light

- 11. Light travels at 300 million (3 \times 10⁸) m/s in air and travels in straight lines. Light is a transverse wave.
- 12. Light can be refracted, reflected and diffracted.
- 13. Light is made up of a range of colours, red, orange, yellow, green, blue, indigo, and violet; where red light has a longer wavelength and lower frequency than blue light.
- 14. The primary light colours are red, green, and blue.
 - a. Red and green mix to give yellow,
 - b. blue and red make magenta and
 - c. green and blue make cyan.
 - d. If all of these three colours are mixed in the right ratio then white light is produced.
- 15. A prism can be used to split light into a spectrum.

Reflection

- 16. On a diagram I can label a mirror, the normal, the incident ray, the reflected ray, the angle of incidence, the angle of reflection
- 17. All angles are measured from the normal
- 18. The angle of incidence = the angle of reflection. This is the law of reflection
- 19. Light is reversible, if the direction of a light beam is reversed, it will follow the same path.

Refraction

- 20. Refraction occurs when light enters a material which is more optically dense the wave speed and wavelength reduce but frequency remains the same. Usually there is a change in direction of the wave.
- 21. If a ray of light enters a more dense material along the normal there will be no change in direction, although the wave speed and the wavelength will decrease.

Eye

- 22. Label a diagram of the eye and label the parts, cornea, iris, lens, retina and optic nerve.
- 23. Know that light enters our eye and lands on the retina where sense cells detect the signal and pass these through the optic nerve to the brain.
- 24. In short sight the lens is too strong or the eyeball is too long and light focuses in front of the retina, it can be corrected with a concave lens.
- 25. In long sight the lens is too weak or the eyeball is too short and light focuses behind the retina, it can be corrected with a convex lens
- 26. Explain that the size of the pupil changes due to the brightness of the surroundings.
- 27. State that the image formed on the retina of the eye is upside side-down and reversed.
- 28. Describe the position of the blind spot in the eye.

Lenses

- 29. There are two types of lenses- convex or converging and concave or diverging. Draw these two lenses and show how light passes through them. Lenses refract the light.
- 30. Describe how concave and convex lenses focus a parallel beam of light.
- 31. Describe an experiment to measure the focal length of a convex lens.
- 32. Convex lenses correct long sight, concave lenses correct short sight.

EM Spectrum

- 33. There is a collection of waves that all travel at the speed of light and these form the electromagnetic spectrum.
- 34. The order of the waves in the electromagnetic spectrum (from largest wavelength and lowest frequency) is Radio, Microwaves, IR, Visible, UV, X-ray, Gamma,
- 35. The higher the frequency the lower the wavelength and the lower the frequency the higher the wavelength for electromagnetic waves.
- 36. Some substances absorb EM waves, some reflect them and others transmit them
- 37. Give a use (application), detector, protector and source for each of the waves in the electromagnetic spectrum
- 38. See the table on page 3 of this revision sheet!

<u>Type of EM</u> <u>Waves</u>	<u>Use</u>	Detector	Danger	Protector	Source
Radio & TV	communication (under the sea, in space) Watching TV programmes, films, listening to the news	aerial	Large doses are believed to cause cancer, leukaemia and other disorders.	metal	transmitter, outer space
Microwaves	heating water molecules to warm food, communications	aerial	cataracts	metal screen	magnetron, transmitters, outer space
Infra Red	remote controls, security systems, automatic external lights searching for people in dark	photodiode, thermocouple, thermistor black bulb thermometer	clouding of the eye, thermal injury, high exposure damages the skin making hyperpigmentation worse.	aluminium foil, thermal insulators	warm objects, sun convector heaters
Visible	humans viewing the world, photography,	photodiode,photographic film, retina CCD	cataracts	polarising glasses, filter glasses	stars including the sun, LEDs, cinema screens
Ultra violet	detecting forged bank notes, causing white shirts to look cleaner kills bacteria and viruses	photodiode / melanocyte skin cells, , fluorescent materials	skin cancer, Arc eye damages the outmost protective layer of cells in the cornea.	glass / sunscreen cream	Fluorescent tubes, very hot objects, sun
X-Ray	detecting broken bones, checking suitcases at the airport,	photodiode / photographic film / electrical current detectors	cancer premature ageing	lead	X-ray tubes, stars
Gamma Rays	medical tracers to detect cancer, killing bacteria, sterlilising intruments, detecting broken pipes underground	Photodiode / photographic film / Geiger Muller Tube	cause damage to DNA, cancer	several cm of lead several m of concrete	Radioactive nuclei, outer space (stars)

"cataracts" in your eyes, which is a clouding of the lens preventing you from seeing clearly <u>http://v</u>