Yr 9 - Light & Waves Revision

1. a) Define a wave.

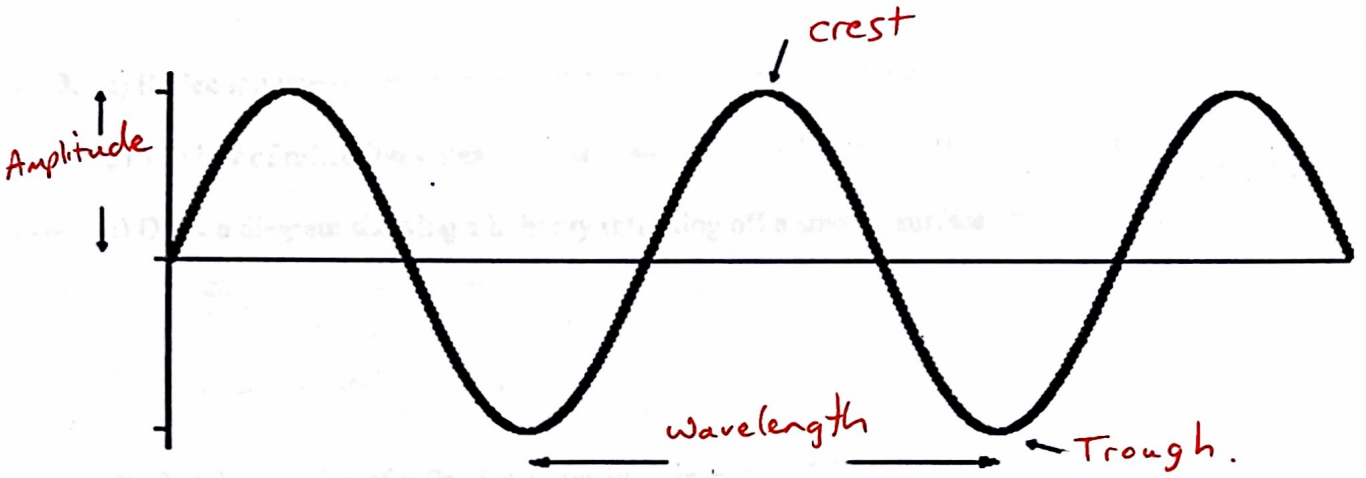
A wave is an oscillation carrying energy through space or a medium.

b) There are two types of waves. Name them and give an example of each.

Longitudinal – sound wave.

Transverse – Ocean wave

c) Label the diagram below:



d) What is the frequency of a wave? What units is it measured in?

How quickly it repeats – Hertz.

e) Fill in the table below:

	Amplitude	Frequency
Sound wave	Equilibrium to compression	50 - 20,000 H_z.
Light wave	centre line to peak.	370nm – 700nm.

f) What are 3 differences between light & sound waves?

- Longitudinal vs transverse.
- Physical vs Electromagnetic
- Needs air vs travels in vacuum.

2. a) Describe the electromagnetic spectrum.

[low frequency] Radio – microwave – IR – light – uv – x ray – gamma. [high frequency]

b) List the different types of radiation found in this spectrum from the lowest energy to highest energy.

As above

Description of EM: All electromagnetic waves based on their different frequencies. High frequency = more energy.

c) For 3 of the waves above, give at least 2 uses for each.

- Radio – communication, transmission.
- Microwave – Heating food, cell phone signal.
- uv – solar panels, killing microorganisms (sewerage)

d) What are some of the effects (positive and negative) of using electromagnetic spectrum? (Think about communications and health)

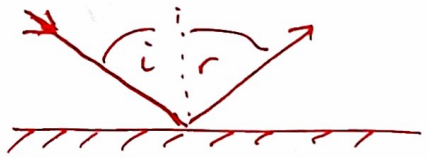
- (+) Phones, Radio, GPS, solar panels, medicine.

(−) Sunburn, cell damage

3. a) Reflection is:

b) The law of reflection states: The angle of incidence = angle of reflection

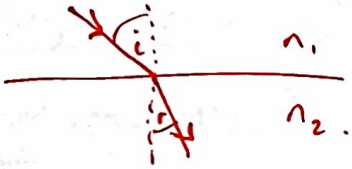
c) Draw a diagram showing a light ray reflecting off a smooth surface.



d) Give 2 examples of reflection occurring.
- Mirrors
- water
- radio waves off ionosphere.

4. a) Refraction is: Bending of light on entering a new medium

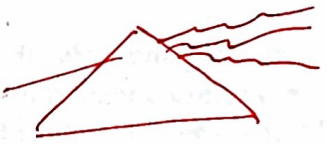
b) Draw a diagram showing a light ray refracting as it passes from air into glass:



c) Give 2 examples of refraction occurring.
- straw in water
- laser through glass - air.

5. a) Scattering of light is:
Dispersion

b) Draw a diagram of a ray of white light being scattered by a prism. (dispersion)



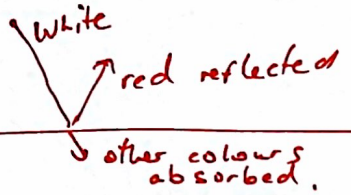
c) Give 2 examples of light scattering.
- Translucent glass - bathroom windows.
- Turbulent water.

d) What colours make up the visible portion of the electromagnetic spectrum (what colours make up white light)?

R, O, Y, G, B, I, V

6. a) Absorption of light is: An object absorbs the light energy.

b) Draw a diagram of a ray of white light hitting a transparent red sheet. Describe what happens.



c) Give an example of absorption. - leaves - green. reflected.

7. Draw a diagram of a:

convex lens

concave lens

8. a) Define transparent and give an example of a transparent object.
Light passes through undispersed - car window.

b) Define opaque and give an example of an opaque object.
No light passes through - wall

c) Why do black objects appear black?
They absorb all light

d) Sound is produced by vibrations and must have a medium to travel through.

9. What is the relationship between the speed, frequency and wavelength of a wave? (write formula and symbols that represent each part)

speed = v
frequency = f
wavelength = λ

$v = f\lambda$

$\lambda = \frac{v}{f}$

$f = \frac{v}{\lambda}$.

10. Remember the electromagnetic spectrum and be prepared to label any part of it. For example: the types of radiation in their correct order, which end has the longer wavelength and which the shorter wavelength, which end has the highest frequency and which end has the lowest frequency, which end has the highest amount of energy and which has the lowest amount of energy.

High Wavelength → Short wavelength

Radio - micro - IR - visible - UV - x ray - gamma

↑ low frequency

↑ High frequency