Knowledge Organiser Focus: Waves

I should already know:

Light and sound are waves.

Light travels in straight lines.

How light and sound behave.

I will learn:

Evaluate sound as a wave linking properties to uses.

Compare transverse and longitudinal waves linking their properties to their use.

Describe the electromagnetic spectrum and uses of each wave.

Explain how the eye works and can see different colours.

Define reflection and refraction using diagrams to support the understanding.

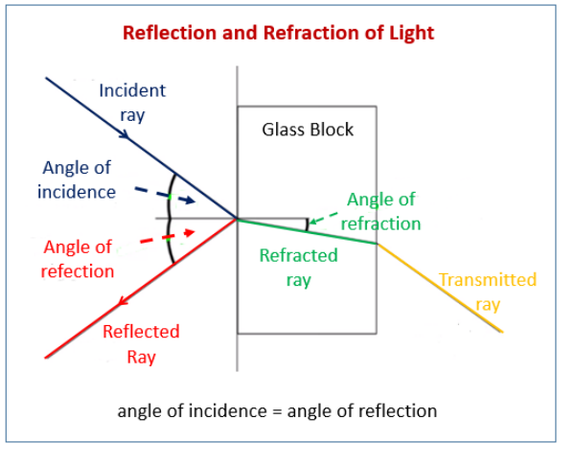
Compare the effects of pressure in solids, liquids and gases.

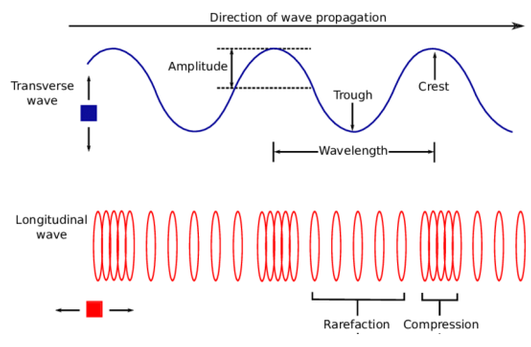
This will help in the future:

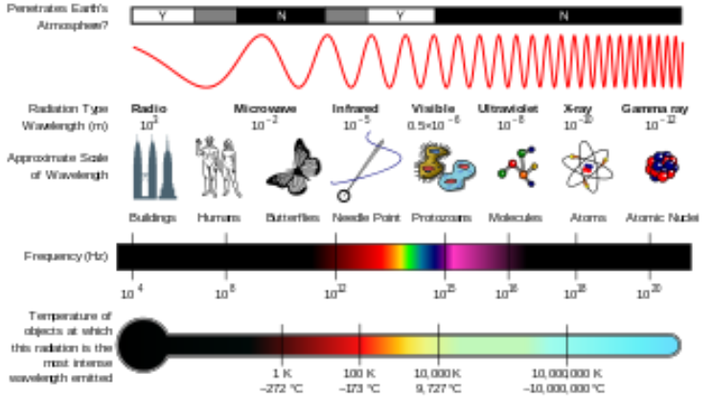
Careers in medicine, physics, engineering. Waves is a concept that covers all aspects of many careers in technology.

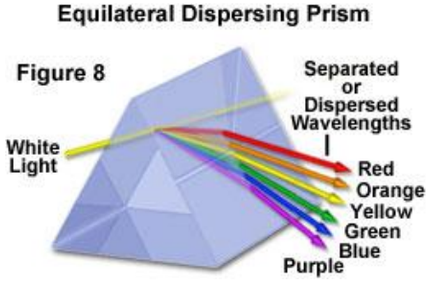
Key Words

Wave	A wave transfers energy without transferring matter
Pressure	The force exerted over an area
Transverse wave	The direction of vibration is at right angles to the direction of motion of the wave
Longitudinal wave	The direction of vibration is the same as the direction of motion of the wave
Amplitude	The maximum vibration, measured from the middle position of the wave
Frequency	Number of waves produced per second, in Hertz
Reflection	The bouncing back of light, heat, or sound from a surface without absorbing it.
Refraction	Change of direction of light going from one material into another
Vacuum	A space with no particles in it
Wavelength	Distance between two corresponding points on a wave. Measured in metres.
Ultrasound	Sound waves with frequency higher than the auditory range
Fluid	Liquid or gas
Upthrust	The upward force that a liquid or gas exerts on a body floating in it
Atmospheric pressure	The pressure caused by the weight of the air above a surface
Auditory range	The range of frequencies that an animal can hear (for humans 20Hz to 20000Hz)
Pitch	How high or low the sound is. A high pitch has a high frequency.









Greater Depth Challenge

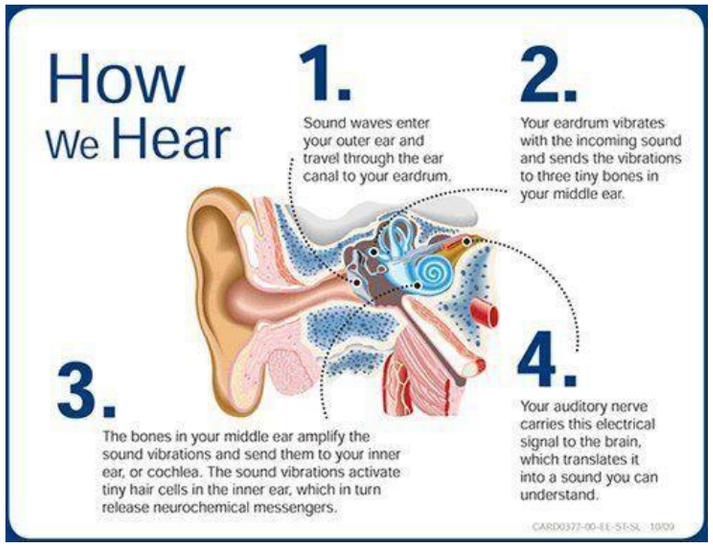
What is an echo?

How do whales communicate with each other?

Further Reading

BBC Bitesize, Educake.

I can evaluate sound as a wave linking properties to use.



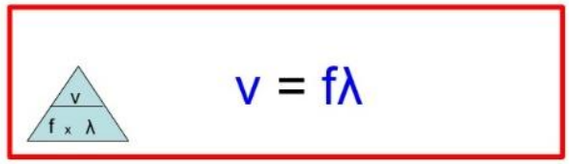
- The **amplitude** is the maximum height of the wave from its resting position – the greater the amplitude, the louder the sound
- The **wavelength** is the distance between the crests (tops) of two waves next to each other (or any other two identical point on waves next to each other)
- The **frequency** is the number of waves per second – the higher the frequency, the closer together the waves are and the higher the **pitch**

The Wave Equation

V = speed of wave (m/s)

f = frequency of wave (Hz)

λ = wavelength (m)



I can compare the effects of pressure in solids, liquids and gases.

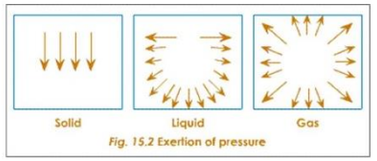


Fig. 15.2 Exertion of pressure

Pressure in fluids

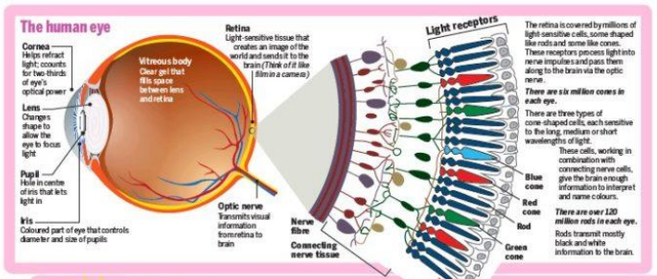
Liquids and gases are fluids. A **fluid** is able to change shape and flow from place to place. Fluids exert pressure on surfaces, and this pressure acts at 90° to these surfaces – we say that it acts **normal** to the surface.

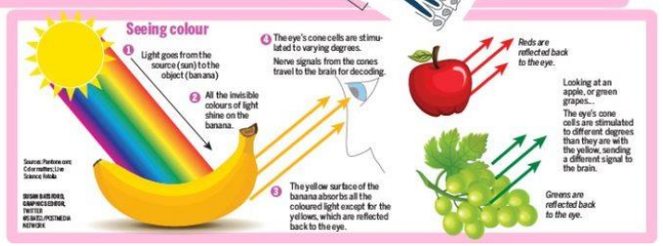
Atmospheric pressure

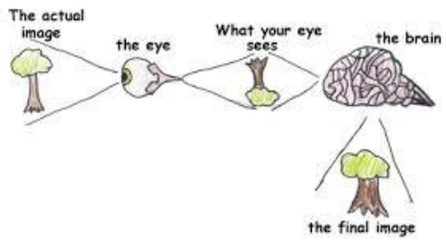
The **atmosphere** exerts a pressure on you, and everything around you. You may have seen a demonstration of the effects of this **atmospheric pressure**.

The Magdeburg hemispheres are two metal cups that fit together. If most of the air is removed from inside them using a vacuum pump, it is almost impossible to pull them apart again. The pressure of the atmosphere acting on their outside surface pushes them tightly together. Once the air is let back in, the pressure inside equals the pressure outside again, and the cups can easily be separated.

I can explain how the eye works and can see different colours.



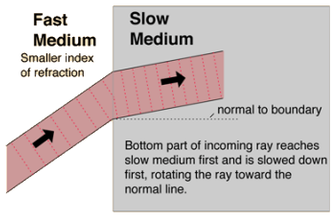




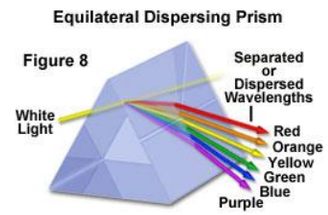
1. Light enters the eye through the cornea (the clear, dome-shaped surface that covers the front of the eye).
2. From the cornea, the light passes through the pupil. The amount of light passing through is regulated by the iris, or the colored part of your eye.
3. From there, the light then hits the lens, the transparent structure inside the eye, which focuses light rays onto the retina.
4. Finally, it reaches the retina, the light-sensitive nerve layer that lines the back of the eye, where the image appears inverted.
5. The optic nerve carries signals of light, dark, and colors to the area of the brain (the visual cortex), which assembles the signals into images (our vision).

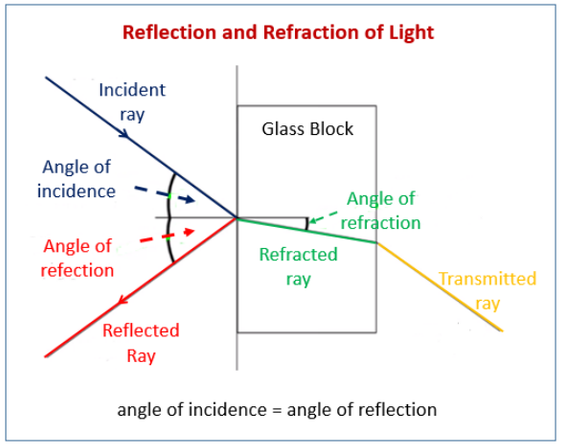
I can define reflection and refraction using diagrams to support the understanding.

Reflection occurs when a wave changes direction at a boundary between materials.



Refraction occurs when a wave changes direction as it changes speed when passing from one material to another.





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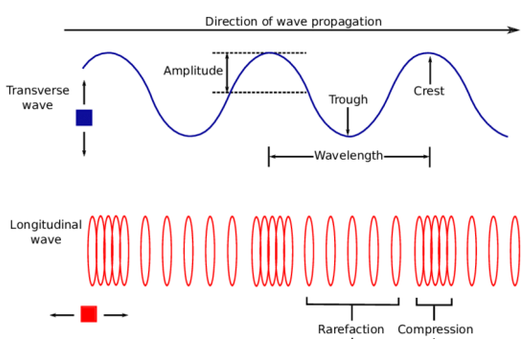
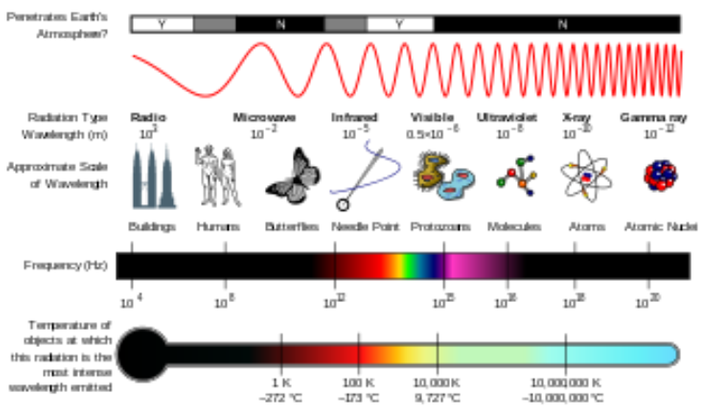


Transverse Waves	Longitudinal Waves
1. Transverse waves consist of crests and troughs.	1. Longitudinal waves consist of compressions and rarefactions.
2. There are no pressure variations.	2. There is a pressure variation throughout the medium.
3. They can be propagated through solids and surfaces of liquids but not in gases.	3. They can be propagated through solids, liquids as well as through gases.
4. In transverse waves, the particles of the medium vibrate at right angles to the direction of wave propagation.	4. In longitudinal waves, the particles of the medium vibrate parallel to the direction of the wave propagation.
5. There is no change in the density of medium.	5. There is a change in the density throughout the medium.
6. Light wave is an example of transverse wave.	6. Sound wave is an example of longitudinal wave.

I can describe the electromagnetic spectrum and uses of each wave.



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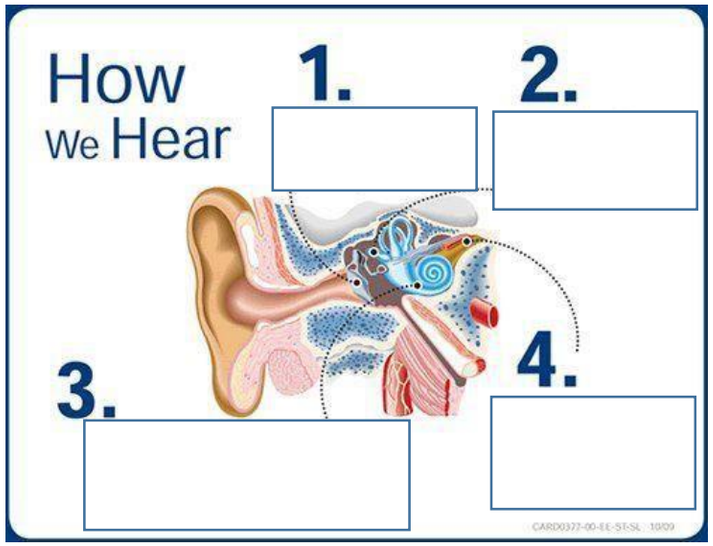

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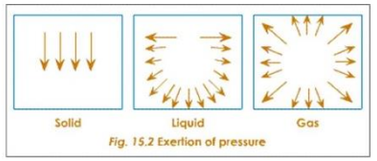

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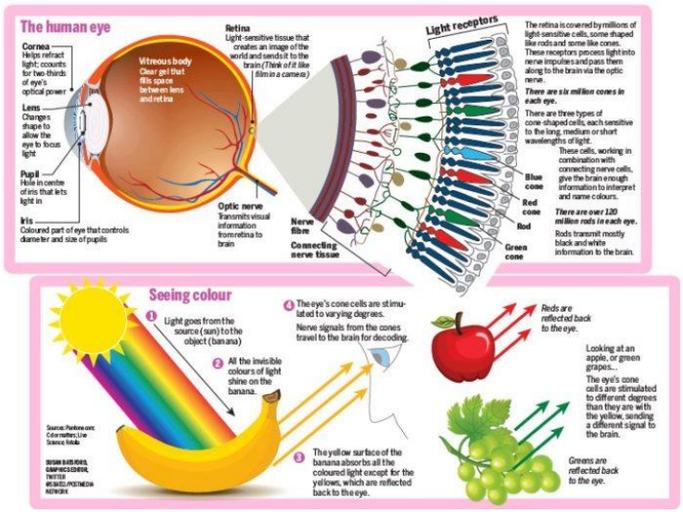

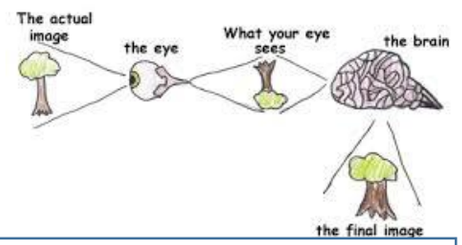

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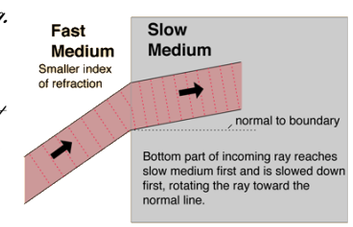

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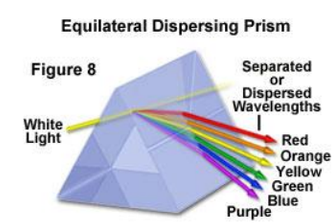

Reflection and Refraction of Light

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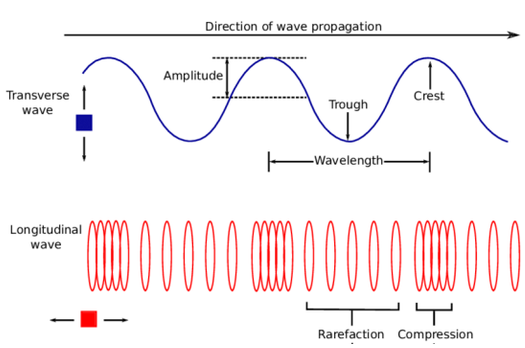


Transverse Waves	Longitudinal Waves

I can describe the electromagnetic spectrum and uses of each wave.

Penetrates Earth's Atmosphere?	
Radiation Type Wavelength (m)	
Approximate Scale of Wavelength	
Frequency (Hz)	
Temperature of objects at which this radiation is the most intense wavelength emitted	

Year 7 – The Knowledge – Science – Skills School

Scientific equipment

	Name	Use
	**Bunsen burner**	**Heating by burning a gas**
	Conical flask	To measure volume of liquids
	**Beaker**	**To hold, pour and heat liquids**
	Measuring cylinder	To measure precise volume of liquid
	**Evaporating basin**	**To heat and evaporate liquids**

	Name	Use
	**Stopwatch**	**To measure time**
	Tongs	To hold hot things (not test tubes)
	**Thermometer**	**To measure temperature**
	Safety Goggles	To protect your eyes
	**Tripod**	**To hold a beaker above a Bunsen burner**
	Gauze	Used to support a beaker

Risk assessment

Hazard / Chemical	Risks	Control measures	Emergency measures

Hazard – something that has the potential to cause harm to a person, property or environment.

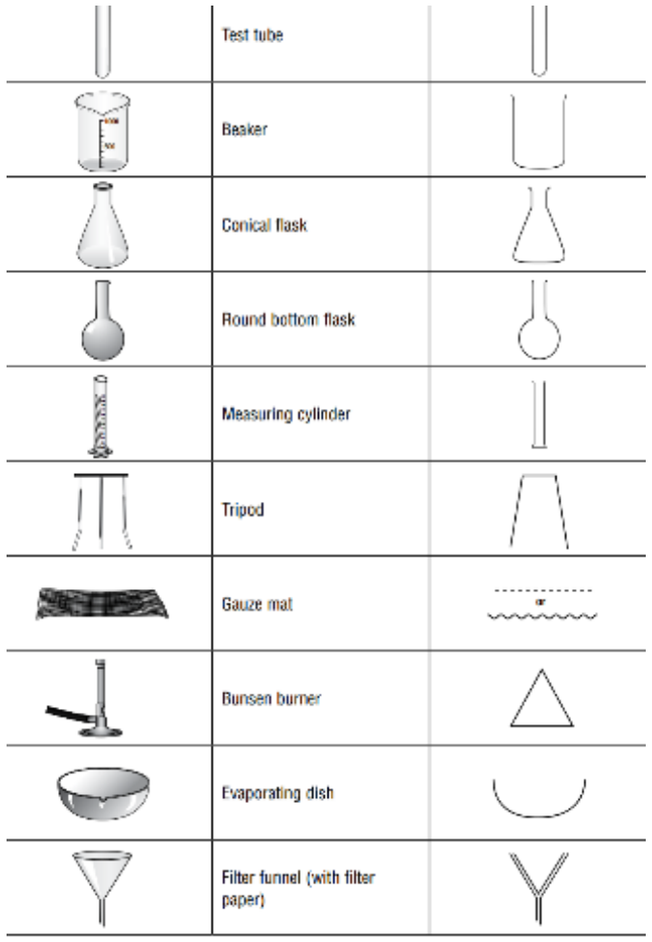
Risk – is the chance or probability of the hazard causing harm or damage to people, property or the environment.

Control measures – minimises the risk of the hazard causing harm.

Drawing equipment

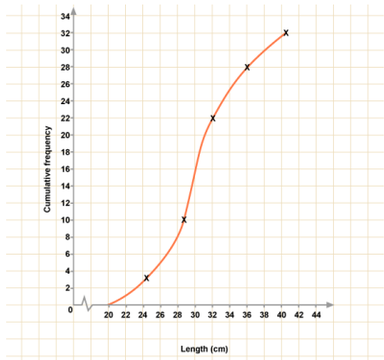
When drawing scientific equipment it must be drawn in 2D and not 3D.

Equipment diagrams should be drawn as part of the method for the experiment.



Hazard symbols

Graphs



Rules for a graph

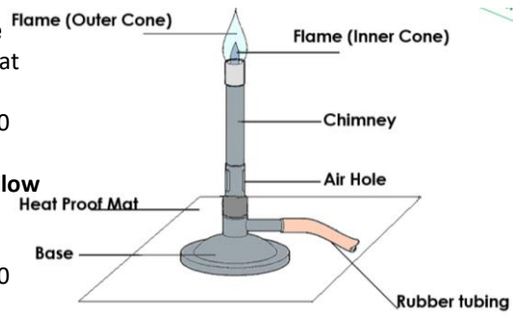
1. Title
2. Size
3. Appropriate scale
4. Labelled axis
5. Plot points accurately
6. Line of best fit

When describing graphs make sure you…

- Identifying if it's an increasing or decreasing trend.
- Support your chosen trend with evidence from the graph.
- Give a reason or opinion for the observed trend.

Bunsen burner

Different flames:
Collar open= Blue flame- used to heat substances
Temperature= 500 degrees
Collar closed= Yellow flame: used as a safety flame .
Temperature= 300 degrees



Calculation

Formula	Write the formula you are using.
Numbers	Substitute in the known numbers.
Answer	Calculate the answer.
Unit	Add units if appropriate.