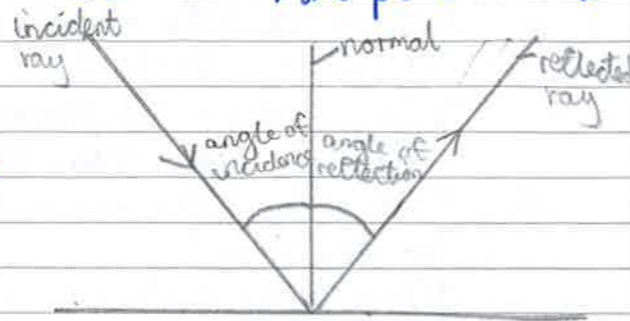
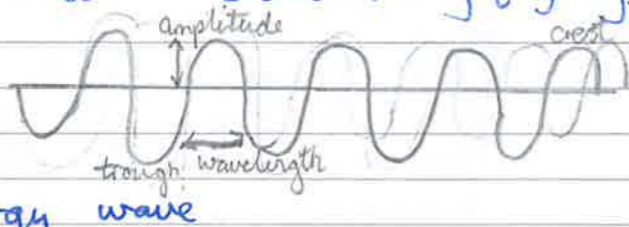


- Unit of space = Light Years
- Light travels 1,000,000 times faster than sound so it travels very much faster
- The sun's light takes just over 8 minutes to reach the earth (149 km)
- The nearest star to the earth, Proxima Centauri, is 4.3 light years away
- The earth is tilted so in the summer, the light is more concentrated so it is hotter and the days are longer, and less concentrated in winter
- At the poles there is a time when the sun never rises and never sets
- The moon orbits the earth every 27.5 days. It takes 27.5 days to rotate too, so we only ever see one side of the moon.
- A solar eclipse happens when the earth passes through the moon's shadow and a lunar eclipse happens when the moon passes through the earth's shadow
- The largest orbiting satellite of the earth is the moon. The orbit is held in place by the earth's gravity
- Without gravity, satellites would fly off into space
- Satellites are used for GPS and for TV broadcasting (eg. Sky)

Light

- A form of energy
- Visible light is part of the electro-magnetic spectrum
- Light travels very fast (300 km/s)
- Light travels in a transverse energy wave
- Luminous: Objects that give off light
- Illuminated: Objects which are lit up by luminous objects, but don't give off their own light
- Transparent: An object which allows light through it
- Translucent: An object which allows some light through it
- Opaque: An object that allows no light through it
- Light only travels in straight lines (rectilinear propagation)
- When light cannot fully travel through an object a shadow is formed; the umbra is the dark centre of the shadow, the penumbra is the fuzzy edge
- Normal: An imaginary line drawn at  $90^\circ$  to the mirror
- Incident ray: the ray coming towards the mirror
- Angle of incidence: the angle between the incident ray and normal
- Reflected ray: the ray going away from the mirror
- Angle of reflection: the angle between the normal and the reflected ray



- Regular reflection is when the mirror is smooth and shiny and a regular image is reflected
- Diffuse reflection is when the mirror is rough and scatters the light, so not much is reflected into your eyes
- An image in a mirror is laterally inverted and is a virtual image
- A periscope uses mirrors to enable the user to see around corners
- When light goes from one substance to another it changes direction/refracts
- The light bends towards the normal if it is going from a less dense substance to a more dense substance as it slows down to enter. It bends away if it is going from a more dense substance to a less dense substance
- When light is being refracted and the angle of incidence is gradually increased, eventually it will reach the critical angle and total internal reflection will happen as the light has nowhere to refract to
- Gems are cut so that they reflect light like prisms
- White light is made out of 7 colours: red, orange, yellow, green, blue, indigo, violet
- These colours can only be seen when a prism splits up white light. Since some colours travel faster than others, they all refract slightly different amounts so all the colours can be seen
- Red light travels fastest so refracts the least
- Sound energy travels in a longitudinal wave (pulses go in the same direction that the wave is moving)
- The waves are made up of compressions and rarefactions
- For sound to travel, particles need to vibrate/make sound so therefore sound can't travel through a vacuum (eg. space)
- Sound travels faster the closer together particles are, so it travels fastest in solids
- A sound wave: troughs represent rarefactions and crests represent compressions
- Wavelength: the distance from one trough to the next or one crest to the next
- Trough = lowest point, crest = highest point
- Amplitude (volume): the height from a crest or trough to the mid-line. Measured in decibels (dB)
- Frequency (Pitch): how many wavelengths a second. Measured in hertz (Hz)
- If you increase the amplitude the sound gets louder, and if you increase the frequency the sound gets higher
- To raise the pitch of a note on a violin string:
  - a) use a lighter string
  - b) make the string shorter
  - c) put more tension on the string
- The reflection of sound is an echo. Hard objects and soft objects make different echoes

Sound