Subject: **Science** **Year: 8** **Term: 2 Topic: Waves**

Pupil flightpath		Mastery Steps		
GCSE target	**KS2 start point**	**Knowledge and Understanding**	**Skills and application**	**Analysis and evaluation**
8/9	**117-120**	• When a wave travels through a substance, particles move to and fro. Energy is transferred in the direction of movement of the wave. Waves of higher amplitude or higher frequency transfer more energy • A physical model of a transverse wave demonstrates it moves from place to place, while the material it travels through does not, and describes the properties of speed, wavelength and reflection	• Explain observations where sound is reflected, transmitted or absorbed by different media • Explain observations of how sound travels using the idea of a longitudinal wave • Explain observations where coloured lights are mixed or objects are viewed in different lights • Explain differences in the damage done to living cells by light and other waves, in terms of their frequency • Explain how audio equipment converts sound into a changing pattern of electric current	• Suggest the effects of particular ear problems on a person's hearing • Predict whether light will reflect, refract or scatter when it hits the surface of a given material • Suggest what happens when two waves combine • Suggest reasons why sound waves can agitate a liquid for cleaning objects, or massage muscles for physiotherapy
6/7	**102-116**	• Sound consists of vibrations which travel as a longitudinal wave through substances. The denser the medium, the faster sound travels • The greater the amplitude of the waveform, the louder the sound. The greater the frequency (and therefore the shorter the wavelength), the higher the pitch • Construct ray diagrams to show how light reflects off mirrors, forms images and refracts	• Describe the amplitude and frequency of a wave from a diagram or oscilloscope picture • Describe how lenses may be used to correct vision • Describe the properties of different longitudinal and transverse waves	• Evaluate the data behind a claim for a sound creation or blocking device, using the properties of sound waves • Compare and contrast the properties of sound and light waves • Evaluate electricity production by wave energy using data for different locations and weather conditions
4/5	**85-101**	• Sound does not travel through a vacuum • The speed of sound in air is 330 m/s, a million times slower than light • Light travels at 300 million metres per second in a vacuum • Different colours of light have different frequencies • When a light ray meets a different medium, some of it is absorbed and some reflected. For a mirror, the angle of incidence equals the angle of reflection. The ray model can describe the formation of an image in a mirror and how objects appear different colours • When light enters a denser medium it bends towards the normal; when it enters a less dense medium it bends away from the normal. Refraction through lenses and prisms can be described using a ray diagram as a model	• Use drawings of waves to describe how sound waves change with volume or pitch • Use ray diagrams of eclipses to describe what is seen by observers in different places • Use ray diagrams to describe how light passes through lenses and transparent materials • Use the wave model to explain observations of the reflection, absorption and transmission of a wave.	• Use diagrams to compare the waveforms a musical instrument makes when playing different pitches or volumes • Use a ray diagram to predict how an image will change in different situations • Use ray diagrams to explain how a device with multiple mirrors works

2/3	80-84	Vibration, Longitudinal wave, Volume, Pitch, Amplitude, Wavelength, Frequency, Oscilloscope, Absorption, Auditory range, Echo, Reflected ray, Normal line, Angle of reflection, Angle of incidence, Refraction, Absorption, Scattering, Transparent, Translucent, Opaque, Convex lens, Concave lens. Retina. Ultrasound. Ultraviolet (UV), Microphone, Loudspeaker, Pressure wave, Waves, Transverse wave, Transmission		