

Prior Learning		<p>Students have learned about energy and energy transfers at KS3 and KS4.</p> <p>At KS3, students have been introduced to longitudinal and transverse waves and their characteristics. They were also taught about the reflection, transmission and absorption of waves.</p>		
Lesson Number	AQA Spec	Title	Content	Assessment
1	4.6.1.2	Math skills: Using and rearranging equations	<ul style="list-style-type: none"> Select and apply the equations $T = 1/f$ and $v = f \lambda$ Substitute numerical values into equations using appropriate units. Change the subject of an equation. 	
2	4.6.1.2	Describing waves	<ul style="list-style-type: none"> Describe wave motion. Define wavelength and frequency. Apply the relationship between wavelength, frequency and wave velocity. 	
3	4.6.1.1	Transverse and longitudinal waves	<ul style="list-style-type: none"> Trilogy students do not need to know the content in the last section: Change in speed of sound waves. Compare the motion of transverse and longitudinal waves. 	
	4.6.1.2		<ul style="list-style-type: none"> Explain why water waves are transverse waves. Explain why sound waves are longitudinal waves. 	
4	4.6.1.2 4.6.1.5 (echo sounding)	Measuring wave speeds	<ul style="list-style-type: none"> Trilogy students do not need to know the content in the last section: Echo sounding Explain how the speed of sound in air can be measured. Explain how the speed of water ripples can be measured. Describe the use of echo sounding. 	

5	4.6.1.2 Prac 8	Required practical: Measuring the wavelength, frequency and speed of waves in a ripple tank and waves in a solid	<ul style="list-style-type: none"> Develop techniques for making observations of waves. Select suitable apparatus to measure frequency and wavelength. Use data to answer questions. 	Assessment 1: Written assessment. 15 Marks Feedback: Teacher
6 TRIPLE ONLY	4.8.2	Redshift	<ul style="list-style-type: none"> Describe redshift Describe evidence for the expanding universe 	
6	4.6.1.3 4.6.2.2	Reflection and refraction of waves	<ul style="list-style-type: none"> Trilogy students do not need to know about reflection, absorption and transmission of sound wave, how to construct ray diagrams for reflection and the law of reflection and, but they do need to know about refraction of electromagnetic waves and how to construct ray diagrams to illustrate refraction Describe reflection, transmission and absorption of waves. Construct ray diagrams to illustrate reflection. Construct ray diagrams to illustrate refraction. 	
7	4.6.1.3 4.6.2.2	Reflection, refraction and wave fronts	<ul style="list-style-type: none"> Explain reflection and refraction and how these may vary with wavelength. Construct ray diagrams to illustrate refraction. Use wave front diagrams to explain refraction in terms of the difference in velocity of the waves in different substances. 	

8 TRIPLE ONLY	4.6.1.3 Required Practical 9	Required practical: Investigate the reflection of light by different types of surface and the refraction of light by different substances	<ul style="list-style-type: none"> • Make and record observations of how light is reflected and transmitted at different surfaces. • Measure angles and discuss the method, apparatus and uncertainty in measurements. • Draw conclusions from experimental results. 	
9 TRIPLE ONLY	4.6.2.5	Lenses	<ul style="list-style-type: none"> • Understand what a lens does. • Draw ray diagrams to show the formation of images by lenses. • Describe the difference between a real and a virtual image. 	
10 TRIPLE ONLY	4.6.2.5	Images and magnification	<ul style="list-style-type: none"> • Draw ray diagrams to show the formation of real and virtual images by lenses. • Calculate the magnification of an image. 	
11	4.6.2.1 4.6.2.2 4.6.2.3 4.6.2.4	The electromagnetic spectrum	<ul style="list-style-type: none"> • Recall the similarities and differences between transverse and longitudinal waves. • Recognise that electromagnetic waves are transverse waves. • Describe the main groupings and wavelength ranges of the electromagnetic spectrum. 	
12 TRIPLE ONLY	4.6.2.1 4.6.2.6	Colour	<ul style="list-style-type: none"> • Describe what happens when light of different wavelengths lands on an object. • Explain what determines the colour of an opaque object. • Explain the effect of coloured filters. 	
13	4.6.2.1 4.6.2.2 4.6.2.3 4.6.2.4	Gamma rays and X-rays	<ul style="list-style-type: none"> • List the properties of gamma rays and X-rays. • Compare gamma rays and X-rays. 	

14	4.6.2.1 4.6.2.2 4.6.2.3 4.6.2.4	Ultraviolet and infrared radiation	<ul style="list-style-type: none"> Describe the properties of ultraviolet and infrared radiation. Describe some uses and hazards of ultraviolet radiation. Describe some uses of infrared radiation. 	Assessment 2: Multiple choice Quiz 25 Marks Feedback: Auto/Self-assessed
15	4.6.2.2 Prac 10	Required practical: Investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface	<ul style="list-style-type: none"> Explain reasons for the equipment used to carry out an investigation. Explain the rationale for carrying out an investigation. Apply ideas from an investigation to a range of practical contexts. 	
16 TRIPLE ONLY	4.6.3.1 4.6.3.2	Emission and absorption of infrared radiation	<ul style="list-style-type: none"> Realise that all bodies emit and absorb infrared radiation. Compare emission and absorption of radiation from different surfaces. Define a perfect black body. Explain that the intensity and distribution of wavelengths of any emission depend on the temperature of the body. 	
17 TRIPLE ONLY	4.6.3.2 4.6.2.2	Temperature of the Earth	<ul style="list-style-type: none"> Describe how the atmosphere absorbs radiation in a way that varies with wavelength. List the factors affecting the temperature of the Earth. Explain how the temperature of an object is related to the radiation absorbed and radiation emitted. 	
18	4.6.2.1 4.6.2.2 4.6.2.3 4.6.2.4	Microwaves	<ul style="list-style-type: none"> List some properties of microwaves. Describe how microwaves are used for communications. 	

19		Radio and microwave communication	<ul style="list-style-type: none"> Describe how radio waves are used for television and radio communications. Describe how microwaves are used in satellite communications. Describe the reflection and refraction of radio waves. 	
20	4.6	Key concept: Transferring energy or information by waves	<ul style="list-style-type: none"> To understand that all waves have common properties. To understand how waves can be used to carry information. To understand various applications of energy transfer by different types of electromagnetic waves. 	
21 TRIPLE ONLY	4.6.1.4	Sound waves	<ul style="list-style-type: none"> Describe how we hear sound and state the range of frequencies we can hear. Explain that sound travels faster in a denser medium. Explain about reflection, absorption and transmission of sound. 	
22 TRIPLE ONLY	4.6.1.5	Exploring ultrasound	<ul style="list-style-type: none"> Explain what ultrasound is. Describe how ultrasound is used in industry to investigate or detect hidden or buried objects. Explain how ultrasound is used in medicine. 	
23 TRIPLE ONLY	4.6.1.5	Seismic waves	<ul style="list-style-type: none"> Describe how earthquakes are detected. Describe the properties of P waves and S waves. Explain how the properties of seismic waves allow us to investigate the inside of the Earth. 	
End of Unit test Assessment: Teacher				
Where we will use these ideas again		P8 – Redshift, evidence for the expanding universe.		