

Nurture, Believe, Achieve, Succeed

Science

Spring Term 1: Y8/9 FORMAL – PHYSICS: ‘Waves’

In Spring Term 1 all students will focus on developing their knowledge and understanding about Waves. Year 8/9 Formal Students will build on prior knowledge about light and sound that they may have covered in the previous year or in KS2. The initial half term of Baseline and Retrieval work should allow teaching staff to use this scheme of work and adapt it to meet the specific need, address any misconceptions and develop key concepts, skills and understanding for their group of students. Where possible, teachers can use various formative assessment tools to collect data on what knowledge and understanding is secure and what might need more work in order to ensure it is secure.

Pathway/ Year Group		Skills	Knowledge	Suggested learning activities (including trips, activities)	Assessment
Formal	Y8/9 A	Learning Outcomes: - Identify examples of waves in everyday life. - Observe and describe wave movement. - Use key vocabulary accurately (wave, energy, vibration). - Make simple predictions. - Work collaboratively during practical activities. - Follow instructions safely.	Learning Outcomes: - Understand that waves transfer energy. - Know that both sound and light travel as waves.	Lesson 1 – What Are Waves? Starter (10–15 min): - Show GIFs or simple animations of waves (water, slinky, sound vibration circles). - Students copy wave shapes with arms or rope. Main Practical Activities (60 min): Slinky Waves: Make transverse and longitudinal waves using a slinky. “Human Wave” Game: Students stand in a line and pass a “wave” movement along. Water Tray Waves: Create ripples by dropping objects into water; observe patterns. Wave Drawing: Draw big wave shapes on whiteboards or large paper. Investigation: “What makes bigger waves?” – Drop small vs large objects into water; compare height/spread. Plenary (10–15 min): - Quick-fire: “Is this a wave?” Show images (light bulb, splash, sound symbol, car). - Students choose their favourite wave type and say why.	Assessment Opps - Baseline questioning to assess prior knowledge. - Identify pictures that show waves and those that do not. - Teacher observation during practical demonstrations. - Verbal explanation of what a wave is. - Retrieval questions at end of lesson. - Exit ticket: name one example of a wave.
		Learning Outcomes: - Observe how vibrations produce sound. - Use investigation equipment appropriately.	Learning Outcomes: - Understand that sound is made by vibrations. - Know that sound travels through air as waves.	Lesson 2 – Sound Waves Starter: - Vibration demonstration: Place hand on throat while humming. Main Practical Activities: Rice-on-Drum Experiment: Bang a drum to make rice jump. Tuning Forks: Tap in water—watch ripples created by vibrations. Straw Panpipes: Make different pitches and compare waves. String Telephone: Make cup-and-string phones and test across room.	Assessment Opps - Predict which objects will make sounds. - Observe participation in vibration investigations. - Matching activity linking vibrations to sounds.

		- Record observations using words, symbols or drawings. - Compare loud and quiet sounds. - Use scientific vocabulary (sound, vibration, medium).		Investigation: “Does sound travel better through string or air?” Using the cup telephones. Plenary: - Students complete a simple sentence: “<i>Sound is made when _____.</i>” - Show thumbs up/down for true/false statements.	- Questioning about how sound travels. - Complete simple observation sheet. - Explain findings verbally or using sentence stems. - Teacher observation during investigations.
		Learning Outcomes: - Compare different sounds. - Investigate factors affecting pitch and volume. - Interpret simple results. - Use comparative language (higher, lower, louder, quieter). - Communicate observations effectively.	Learning Outcomes: - Understand pitch (high/low) and volume (loud/quiet). - Know that pitch is linked to wave frequency and volume to wave size.	Lesson 3 – Pitch and Volume Starter: - Play different sounds (bird, drum, whistle, car engine). Students sort into high/low pitch. Main Practical Activities: Rubber Band Guitars: Different thicknesses produce different pitches. Water Xylophone: Different water levels make different pitches. Balloon Speaker: Rubber vibrates differently when volume changes. Investigation: - Which makes a louder sound—tight or loose rubber bands? Students try both and record observations. Plenary: “Volume or Pitch?” game: Teacher makes a sound; students hold up cards for P or V.	Assessment Opps - Sort sounds into pitch and volume categories. - Retrieval quiz from previous lessons. - Complete a simple results table. - Explain which sound had the highest pitch. - Demonstrate understanding through practical tasks.
		Learning Outcomes: - Observe how light travels. - Use torches and equipment safely. - Make predictions before investigations. - Record observations. - Use scientific vocabulary (light source, transparent, opaque).	Learning Outcomes: - Know that light travels in straight lines as waves. - Recognise light sources and reflective objects.	Lesson 4 – Light as a Wave Starter: - Light vs dark sorting game using picture cards (sun, lamp, mirror, cat, book). Main Practical Activities: Torch Maze: Shine torches through a cardboard maze to show straight-line travel. Shadow Exploration: Use objects to create shadows on the wall or screen. Mirror Bouncing: Bounce light off mirrors to hit a target. Investigation: “What makes the biggest shadow?” Try objects of different sizes/shapes. Plenary: - Students draw where a shadow appears in a simple diagram. - Quick recap: “One thing light can do is...?”	Assessment Opps - Identify natural and artificial light sources. - Predict which materials light will pass through. - Completion of light investigation worksheet. - Teacher questioning during practical work. - Label simple diagrams. - Exit task identifying one fact about light.
		Learning Outcomes: Investigate reflection using mirrors.	Learning Outcomes: Know that light can reflect (bounce) and refract (bend).	Lesson 5 – Reflection & Refraction Starter: Show mirror illusions or funny reflections; ask: “Why do we see this?” Main Practical Activities:	Assessment Opps Predict what will happen during reflection activities.

		• Observe changes in light direction. • Compare reflection and refraction. • Use scientific language accurately. • Draw simple conclusions from observations.	• Observe how surfaces affect reflection.	• Mirror Writing: Write a word and read it using a mirror. • Reflective Search: Sort classroom items into reflective/non-reflective. • Refraction Jars: Place a pencil in water; observe how it looks bent. • Colour Mixing With Torches: Shine coloured torches on a white surface. Investigation: • Which material reflects light best? Try foil, paper, fabric, plastic, metal. Plenary: • Finish sentences: “Light bounces when it...” “Light bends when it...”	• Observe use of mirrors and equipment. • Label reflected light pathways. • Group discussion explaining observations. • Teacher assessment of practical skills. • Retrieval questions linking to previous lessons.
		Learning Outcomes: • Apply knowledge of sound and light waves. • Identify real-life uses of waves. • Communicate scientific understanding. • Work independently and collaboratively. • Review and evaluate learning.	Learning Outcomes: • Understand that waves are part of everyday life (sound, light, water). • Apply learning about waves through hands-on challenges.	Lesson 6 – Waves All Around Us Starter: • Waves around us slideshow: rainbows, Wi-Fi icon, ocean waves, music. Main Practical Activities: • Waves Scavenger Hunt: Find examples of waves around the school. • Make a Mini-Wave Machine: Jelly snakes on skewers or “wave bottles” with oil/water. • Sound & Light Stations: ○ Mirror maze ○ Cup telephones ○ Water ripple tray ○ Light and shadow puppets Investigation: • “Which wave can travel through darkness?” Students test sound vs light. Plenary: • Big Review Quiz (pictures, touch-and-feel, sound clips). Award “Wave Scientist” certificates.	Assessment Opps • End-of-unit quiz (verbal, pictorial or written). • Matching examples of wave uses to correct wave type. • Group presentation or poster activity. • Completion of a concept map. • Teacher assessment against learning objectives. • Student self-assessment using traffic lights. • Identify and explain one everyday use of waves.
		End of Unit Assessment Opportunity (for the final lesson or review week) • Picture-based knowledge quiz. • Vocabulary matching exercise. • Practical challenge demonstrating understanding of sound or light. • Labelling exercise using key terminology. • Retrieval questions covering all six lessons. • Teacher observation checklist against skills objectives. Student reflection on what they have learned and enjoyed.			