

# **IB Physics YEAR 2 - Unit 2 Waves Planner**

Teacher(s)	Thomas Shyamala	Subject Group and Course	Group 4 - Physics		
Course Part and Topic	3 - Waves	SL or HL / Year 1 or 2	SL Year 2	Dates	August-September (4 weeks)
Unit Description and Texts		DP Assessment(s) for Unit			
<ul> <li>Students will examine how energy can be transferred and transformed.</li> <li>Bowen-Jones, Michael, and David Homer. IB Physics. Oxford: Oxford UP, 2014. Print.</li> </ul>		<ul> <li>3.1 paper 1 quiz, 3.2</li> <li>3.2 paper 2 quiz and</li> <li>3.1 and 3.2 Test (paper 2)</li> </ul>	3.2 paper 2 quiz		

### INQUIRY: establishing the purpose of the unit

#### **Transfer Goals**

List here one to three big, overarching, long-term goals for this unit. Transfer goals are the major goals that ask students to "transfer" or apply their knowledge, skills, and concepts at the end of the unit under new/different circumstances, and on their own without scaffolding from the teacher.

Phenomenon: Waves might seem like they are moving matter but in reality, they are only moving energy.

<u>Statement of Inquiry</u>: Energy may exist in potential, kinetic, thermal, electrical, chemical, nuclear, or other various forms. Wave motion transfers energy from one point to another, with no permanent displacement of the particles of the medium.

- 1. Students will use the wave equation and concepts of standing waves to determine the speed of sound in air.
- 2. Students will use a path difference to determine the interference pattern that results from superposition of waves.

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# ACTION: teaching and learning through inquiry

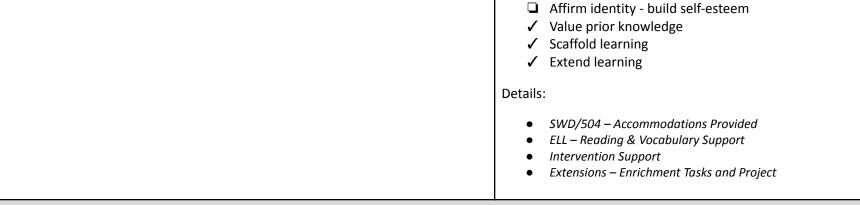
Content / Skills / Concepts - Essential Understandings	Learning Process
	Check the boxes for any pedagogical approaches used during the unit. Aim for a variety of approaches to help facilitate learning.
Students will know the following content:         • Simple harmonic oscillations         • Time period, frequency, amplitude, displacement and phase difference         • Conditions for simple harmonic motion         • Traveling waves         • Wavelength, frequency, period and wave speed         • Transverse and longitudinal waves         • The nature of electromagnetic waves         • Mavefronts and rays         • Amplitude and intensity         • Superposition         • Polarization         • Snell's law, critical angle and total internal reflection         • Diffraction through a single-slit and around objects         • Interference patterns         • Double-slit interference         • Path difference         • The nature of standing waves         • Modes and antinodes	Learning experiences and strategies/planning for self-supporting learning: Lecture Socratic seminar Small group/pair work PowerPoint lecture/notes Individual presentations Group presentations Student lecture/leading Interdisciplinary learning
Crosscutting Concepts <ul> <li>Patterns</li> <li>Energy and Matter</li> </ul> <li>Students will develop the following skills:</li>	Details: Students will learn through a combination of presentations, small group work, practice problems, and lab work. Other(s): practice problems, lab work
Qualitatively describing the energy changes taking place during one cycle of an oscillation	

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•	Sketching and interpreting graphs of simple harmonic motion examples Explaining the motion of particles of a medium when a wave passes through it for both transverse and longitudinal cases Sketching and interpreting displacement–distance graphs and displacement–time graphs for transverse and longitudinal waves Solving problems involving wave speed, frequency and wavelength Investigating the speed of sound experimentally Sketching and interpreting diagrams involving wavefronts and rays Solving problems involving amplitude, intensity and the inverse square law Sketching and interpreting the superposition of pulses and waves Describing methods of polarization Sketching and interpreting diagrams illustrating polarized, reflected and transmitted beams Solving problems involving Malus's law Sketching and interpreting incident, reflected and transmitted waves at boundaries between media	Formative assessment(s): Paper 1 quizzes at the end of each subtopic
•	Sketching and interpreting the superposition of pulses and waves Describing methods of polarization Sketching and interpreting diagrams illustrating polarized, reflected and transmitted beams Solving problems involving Malus's law Sketching and interpreting incident, reflected and transmitted waves at boundaries	
		Summative assessments: Topic test consisting of questions from P1 and P2 Full lab report Differentiation:





## Approaches to Learning (ATL)

Check the boxes for any explicit approaches to learning connections made during the unit. For more information on ATL, please see the auide.

- ✓ Thinking
- Social
- ✓ Communication
- ✓ Self-management
- Research

Details:

Students will be continuously challenged to develop higher-order thinking skills as they take prior knowledge, combine it with new content, and analyze the data they collected to reach a conclusion.

Students will begin to prepare for the IA and group 4 project.

Students will communicate their findings to their peers in the form of small-group presentations.

Language and Learning	TOK Connections	CAS Connections
Check the boxes for any explicit language and learning connections made during the unit. For	Check the boxes for any explicit TOK connections made during the unit	Check the boxes for any explicit CAS connections. If you check any of the boxes,

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more information on the IB's approach to language and learning, please see <u>the guide.</u>		provide a brief note in the "details" section explaining how students engaged in CAS for this unit.		
<ul> <li>Activating background knowledge</li> <li>Scaffolding for new learning</li> <li>Acquisition of new learning through practice</li> <li>Demonstrating proficiency</li> <li>Details:</li> <li>Concepts throughout topic 3 build into understanding final concepts and labs.</li> <li>Students will complete practice problems</li> <li>Students will produce a full scatter plot with high and low gradients as demonstration of learning.</li> </ul>	<ul> <li>Personal and shared knowledge</li> <li>Ways of knowing</li> <li>Areas of knowledge</li> <li>The knowledge framework</li> <li>Details:</li> <li>When does modeling of "ideal" situations become "good enough" to count as knowledge?</li> </ul>	<ul> <li>Creativity</li> <li>Activity</li> <li>Service</li> <li>Details:</li> <li>Students will actively be carrying out experiments involving specific heat capacity.</li> </ul>		
Resources         List and attach (if applicable) any resources used in this unit         • Schoology Course Page         • Hodder IB Physics textbook (problems and labs)         • Online notes and videos (Schoology)         • Simulations and animations online (TBD)				

# **REFLECTION:** considering the planning, process, and impact of the inquiry



What worked well	What didn't work well	Notes / Changes / Suggestions
<i>List the portions of the unit (content, assessment, planning) that were successful</i>	List the portions of the unit (content, assessment, planning) that were not as successful as hoped	<i>List any notes, suggestions, or considerations for the future teaching of this unit</i>