

IB Physics YEAR 2 - Unit 3 (Topic 3)

Teacher(s)	IB Physics PLC	Subject Group and Course	Group 4 - Physics		
Course Part and Topic	Topic 3 - Thermal Physics	SL or HL / Year 1 or 2	SL Year 2	Dates	November and December (4 weeks)
Unit Description and Texts		DP Assessment(s) for Unit			
Students will examine how thermal energy can be transferred and transformed. <ul style="list-style-type: none"> Bowen-Jones, Michael, and David Homer. IB Physics. Oxford: Oxford UP, 2014. Print. 		<ul style="list-style-type: none"> 3.1 paper 1 quiz Test (paper 1 + paper 2) 			

INQUIRY: establishing the purpose of the unit

<p>Transfer Goals</p> <p><i>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.</i></p>
<p><u>Phenomenon</u>: Energy may exist in potential, kinetic, thermal, electrical, chemical, nuclear, or other various forms.</p> <p><u>Statement of Inquiry</u>: Energy may exist in potential, kinetic, thermal, electrical, chemical, nuclear, or other various forms.</p> <ol style="list-style-type: none"> Students will use the equation for specific heat capacity to determine the thermal energy transferred. Students will use the gas law equations to determine states of gases.

ACTION: teaching and learning through inquiry

Content / Skills / Concepts - Essential Understandings	Learning Process
<p><u>Students will know the following content:</u></p> <ul style="list-style-type: none"> • <i>Molecular theory of solids, liquids and gases</i> • <i>Temperature and absolute temperature</i> • <i>Internal energy</i> • <i>Specific heat capacity</i> • <i>Phase change</i> • <i>Specific latent heat</i> • <i>Pressure</i> • <i>Equation of state for an ideal gas</i> • <i>Kinetic model of an ideal gas</i> • <i>Mole, molar mass and the Avogadro constant</i> • <i>Differences between real and ideal gases</i> <p><u>Students will develop the following skills:</u></p> <ul style="list-style-type: none"> • <i>Describing temperature change in terms of internal energy</i> • <i>Using Kelvin and Celsius temperature scales and converting between them</i> • <i>Applying the calorimetric techniques of specific heat capacity or specific latent heat experimentally</i> • <i>Describing phase change in terms of molecular behaviour</i> • <i>Sketching and interpreting phase change graphs</i> • <i>Calculating energy changes involving specific heat capacity and specific latent heat of fusion and vaporization</i> • <i>Solving problems using the equation of state for an ideal gas and gas laws</i> • <i>Sketching and interpreting changes of state of an ideal gas on pressure–volume, pressure–temperature and volume–temperature diagrams</i> 	<p><i>Check the boxes for any pedagogical approaches used during the unit. Aim for a variety of approaches to help facilitate learning.</i></p> <p>Learning experiences and strategies/planning for self-supporting learning:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Socratic seminar <input checked="" type="checkbox"/> Small group/pair work <input checked="" type="checkbox"/> PowerPoint lecture/notes <input checked="" type="checkbox"/> Individual presentations <input type="checkbox"/> Group presentations <input type="checkbox"/> Student lecture/leading <input type="checkbox"/> Interdisciplinary learning <p>Details:</p> <p><i>Students will learn through a combination of presentations, small group work, practice problems, and lab work.</i></p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Other(s): <i>practice problems, lab work</i>

<ul style="list-style-type: none"> Investigating at least one gas law experimentally 	<p>Formative assessment(s):</p> <p><i>Paper 1 quizzes at the end of 3.1.</i></p>
	<p>Summative assessments:</p> <p><i>Topic test consisting of questions from P1 and P2</i></p>
	<p>Differentiation:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Affirm identity - build self-esteem ✓ Value prior knowledge ✓ Scaffold learning ✓ Extend learning <p>Details:</p> <ul style="list-style-type: none"> • <i>SWD/504 – Accommodations Provided</i> • <i>ELL – Reading & Vocabulary Support</i> • <i>Intervention Support</i> • <i>Extensions – Enrichment Tasks and Project</i>
<p>Approaches to Learning (ATL)</p>	
<p><i>Check the boxes for any explicit approaches to learning connections made during the unit. For more information on ATL, please see the guide.</i></p>	
<ul style="list-style-type: none"> ✓ Thinking <input type="checkbox"/> Social ✓ Communication ✓ Self-management <input type="checkbox"/> Research <p>Details:</p> <p><i>Students will be continuously challenged to develop higher-order thinking skills as they take prior knowledge, combine it with new content, and</i></p>	

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 <i>Check the boxes for any explicit language and learning connections made during the unit. For more information on the IB's approach to language and learning, please see the guide.</i>	TOK Connections <i>Check the boxes for any explicit TOK connections made during the unit</i>	CAS Connections <i>Check the boxes for any explicit CAS connections. If you check any of the boxes, provide a brief note in the "details" section explaining how students engaged in CAS for this unit.</i>
<ul style="list-style-type: none"> <input type="checkbox"/> Activating background knowledge <input checked="" type="checkbox"/> Scaffolding for new learning <input checked="" type="checkbox"/> Acquisition of new learning through practice <input checked="" type="checkbox"/> Demonstrating proficiency <p>Details:</p> <p><i>Concepts throughout topic 3 build into understanding final concepts and labs.</i></p> <p><i>Students will complete practice problems</i></p> <p><i>Students will produce a full scatter plot with high and low gradients as demonstration of learning.</i></p>	<ul style="list-style-type: none"> <input type="checkbox"/> Personal and shared knowledge <input checked="" type="checkbox"/> Ways of knowing <input type="checkbox"/> Areas of knowledge <input type="checkbox"/> The knowledge framework <p>Details:</p> <p>When does modeling of "ideal" situations become "good enough" to count as knowledge?</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Creativity <input checked="" type="checkbox"/> Activity <input type="checkbox"/> Service <p>Details:</p> <p><i>Students will actively be carrying out experiments involving specific heat capacity.</i></p>
Resources		

<i>List and attach (if applicable) any resources used in this unit</i>
<ul style="list-style-type: none"> ● Textbooks (see page 1) ● 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>	<i>List the portions of the unit (content, assessment, planning) that were not as successful as hoped</i>	<i>List any notes, suggestions, or considerations for the future teaching of this unit</i>