

DP AI SL Planner – Unit 5 Topic 5: Calculus

Teacher(s)	Michelle Desmarais	Subject group and course	Mathematics – Applications and Interpretations		
Course part and topic	Topic 5 – Calculus 5.1-5.8	SL or HL/Year 1 or 2	SL, Yr 2	Dates	5 weeks March - April
Unit description and texts		DP assessment(s) for unit			
<p>The calculus unit will teach students the foundations of calculus: basic derivatives and integrals. Students will learn derivatives as rates of change and integrals as accumulations and areas.</p> <p>Pearson Mathematics: Applications & Interpretations SL textbook: Chapter 9: Introduction to Differential Calculus Chapter 10: Further Differential Calculus Chapter 11: Integral Calculus</p>		<p>Assessment #10 (5.1- 5.4, 5.6, 5.7) Assessment #11 (5.5, 5.8) All assessments will use previous IB exam questions from the Questionbank Additional questions will be adapted from Oxford text to cover new content not previously included in IB exams.</p>			

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>Students should be able to:</p> <ul style="list-style-type: none"> ● Use derivatives to describe, calculate, and problem solve with rates of change. ● Analyze functions using derivatives and integrals. ● Describe/solve real world situations involving kinematics. ● Connect differentiation and integration as inverse operations

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"> ● Basic understanding of limits ● Derivative as a rate of change/gradient function. ● The power rule for differentiation. ● Write equations of tangents and normals. ● Connections between derivatives and graphs of functions. ● Optimization in real-world context. ● Integration as anti-differentiation – reverse power rule. ● Use integration to find area between a function’s graph and the x-axis. ● Trapezoidal rule as a means to approximate area. <p><u>Students will develop the following skills:</u></p> <ul style="list-style-type: none"> ● Differentiation ● Integration <p><u>Students will grasp the following concepts:</u></p> <ul style="list-style-type: none"> ● Functions can be represented in multiple ways (equations, graphs, tables, etc). ● Functions can be used to describe rate of change and accumulation. 	<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 type="checkbox"/> Individual presentations <input checked="" type="checkbox"/> Group presentations <input type="checkbox"/> Student lecture/leading <input type="checkbox"/> Interdisciplinary learning <p>Details:</p> <p>Each section will start with direct instruction and introduction from the instructor. Students will work in small groups to solve problems and complete explorations. Discussions regarding method, alternate approaches, and efficiency will be regularly included in the class.</p> <p>Teacher will provide multiple resources electronically and in person to support student learning and extensions.</p> <p>Students will participate in a TOK-based project in groups debating “who invented Calculus”</p> <ul style="list-style-type: none"> <input type="checkbox"/> Other/s:

	<p>Formative assessment:</p> <p>IB Questionbank Practice problem sets</p> <p>TOTD – quick checks</p> <p>IB Exam-Style Practice Questions</p>
	<p>Summative assessment:</p> <p>Assessment #10 (5.1- 5.4, 5.6-5.7)</p> <p>Assessment #11 (5.5, 5.8)</p> <p>All assessments will use previous IB exam questions from the Questionbank Additional questions will be adapted from Oxford text to cover new content not previously included in IB exams.</p>
	<p>Differentiation:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Affirm identity—build self-esteem <input type="checkbox"/> Value prior knowledge <input checked="" type="checkbox"/> Scaffold learning <input checked="" type="checkbox"/> Extend learning <p>Details:</p> <p>Students have never seen calculus content before, though we will connect to the concepts of slope equations of lines. Students will be presented with new concepts and given multiple optional resources to use to gain an understanding of calculus. They will also be given multiple opportunities to practice math skills with IB questionbank problems and optional resources from Khan Academy and Delta Math.</p>

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 guide](#).

Thinking

Social

Communication

Self-management

Research

Details:

Thinking - making connections within the content and applications, choosing appropriate formulas

Social – partner/group work

Communication – utilizing the language and notation of calculus

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>
<input type="checkbox"/> Activating background knowledge <input type="checkbox"/> Scaffolding for new learning <input checked="" type="checkbox"/> Acquisition of new learning through practice <input checked="" type="checkbox"/> Demonstrating proficiency Details: Students have a background in functions from previous courses. This unit will build on their knowledge of functions to determine rates of change and accumulation functions.	<input checked="" type="checkbox"/> Personal and shared knowledge <input type="checkbox"/> Ways of knowing <input type="checkbox"/> Areas of knowledge <input checked="" type="checkbox"/> The knowledge framework Details: There will be some background discussion on who invented calculus and what it means to be the "inventor" of a mathematical idea or process. There will also be discussion on the ethics related to the Newton vs. Leibniz debacle.	<input type="checkbox"/> Creativity <input type="checkbox"/> Activity <input type="checkbox"/> Service Details: N/A
Resources <i>List and attach (if applicable) any resources used in this unit</i>		
Textbook - Mathematics: Applications & Interpretations. Chapters 9, 10, 11 Khan Academy IB QuestionBank Delta Math		

Stage 3: Reflection—considering the planning, process and impact of the inquiry

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