

IB AA HL Y1 Unit 5 - Topic 5 Calculus

Teacher(s)	Mikayla Smith Baillio	Subject group and course	Mathematics – Analysis and Approaches		
Course part and topic	Unit 5 - Topic 5: Calculus Topic 5: SL 5.1-5.4, 5.6-5.8	SL or HL/Year 1 or 2	HL, Yr 1	Dates	5 Weeks
Unit description and texts		DP assessment(s) for unit			
<p>Measuring and describing change in two variables. Identifying limits, continuity, average rate of change and instantaneous rate of change. Using derivatives to analyze functions and situations.</p> <p>Oxford AA textbook: Chapter 5: Measuring Change: Differentiation.</p>		<p>Topic 5 Formative Quiz Topic 5 Test</p> <p>Questions for the cumulative assessments come from released questions in the IB Question bank. Each summative assessment is cumulative by semester with the majority (60-75%) of the test coming from the content covered between summative assessments.</p>			

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.

Students should be able to:

1. Identify limits of functions from tables and graphs.
2. Explain an average and instantaneous rate of change.
3. Connect the average rate of change to the concept of a derivative.
4. Understand all basic derivative rules.
5. Describe functions using first and second derivative tests.

ACTION: teaching and learning through inquiry

<p>Content/skills/concepts—essential understandings</p>	<p>Learning process - <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><u>Students will know the following content:</u></p> <ul style="list-style-type: none"> ● Concept of a limit of a function ● Concept of a derivative. ● Derivative rules: <ul style="list-style-type: none"> ○ Power rule ○ Derivative of sin and cos ○ Product rule and quotient rule ○ Chain rule ● First derivative to identify intervals of increase/decrease, maximums and minimums ● Second derivative test to determine points on inflections and concavity. <p><u>Students will develop the following skills:</u></p> <ul style="list-style-type: none"> ● Identify limits of functions from graphs and tables. ● Calculate the average rate of change with the slope of a secant line. Recognize instantaneous rate of change as the slope of a tangent line. ● Characterize graphs as increasing/decreasing based on gradient and derivatives. ● Take derivatives of many types of functions. ● Implement derivative rules to accurately find derivative functions. <p><u>Students will grasp the following concepts:</u></p> <ol style="list-style-type: none"> 1. Describe functions and how they change using limits, rate of change, increasing/decreasing. 2. Find and use derivatives for most types of functions 	<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>Most lessons will start with direct instruction and introduction from the instructor. Students will work in small groups to solve problems and complete explorations – some will be consistent across groups, some will be unique allowing for each group/individual to have time to present their work. Discussions regarding method, alternate approaches, and efficiency will be regularly included in the class.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Other/s:

	<p>Formative assessment: Unit 5 Quizz Skills Checks</p>
	<p>Summative assessment: Topic 5 Test</p> <p>Questions for the cumulative assessments come from released questions in the IB Question bank. Each summative assessment is cumulative by semester with the majority (60-75%) of the test coming from the content covered between summative assessments.</p>
	<p>Differentiation:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Affirm identity <input type="checkbox"/> Value prior knowledge <input checked="" type="checkbox"/> Scaffold learning <input checked="" type="checkbox"/> Extend learning <p>Details: Limits and derivatives will be a brand new concept for most students. Derivatives will be mostly the focus, so it is important the concept is well understood.</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

Social – partner work

Communication – utilizing the language and notation of mathematics

Self- Management - students will have problems sets to complete that will need to be balanced with their other time commitments and responsibilities.

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: The topic of calculus will be new to the students. The vocabulary and notation will be demonstrated and learned through practice. Multiple notations are commonly accepted in calculus, all will be taught and used throughout the unit. Students will have ample opportunities to utilize the vocabulary and notation in class to get feedback from both the instructor and other students.	<input checked="" 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 Details: 1. Can a mathematical statement be true before it has been proven? 2. Does personal experience play a role in the formation of knowledge claims in mathematics? Does it play a different role in mathematics compared to other areas of knowledge? 3. Is there always a trade-off between accuracy and simplicity?	<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: Analysis and Approaches HL (Oxford – 2019) (Ch.5) IB QuestionBank Revision Village Website videos and Question banks		

