

## DP AA SL Planner – Unit 1: Limits, Average rate of change

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| <b>Teacher(s)</b>                                                                                                                                                                                                      | Jessica Vaughn                                                                     | <b>Subject group and course</b>                                                                               | Mathematics – Analysis & Approaches |              |             |
| <b>Course part and topic</b>                                                                                                                                                                                           | Topic 5 – Limits, average rate of change, intro to derivatives<br>5.1-5.2, 1.1-1.3 | <b>SL or HL/Year 1 or 2</b>                                                                                   | SL, Yr 2                            | <b>Dates</b> | August 1-22 |
| <b>Unit description and texts</b>                                                                                                                                                                                      |                                                                                    | <b>DP assessment(s) for unit</b>                                                                              |                                     |              |             |
| Measuring and describing change in two variables. Identifying limits, continuity, average rate of change, and instantaneous rate of change.<br><br>Oxford AA textbook:<br>Chapter 5: Measuring change: Differentiation |                                                                                    | Assessment #1 (5.1-5.2, 1.1-1.3)<br>All assessments will use previous IB exam questions from the Questionbank |                                     |              |             |

### ***INQUIRY: establishing the purpose of the unit***

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| <b>Transfer goals</b><br><br><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> |
| Students should be able to: <ul style="list-style-type: none"> <li>• Identify limits of functions from tables and graphs.</li> <li>• Explain average and instantaneous rates of change.</li> <li>• Connect average rate of change to the concept of a derivative.</li> </ul>                                                                    |

## ***ACTION: teaching and learning through inquiry***

| Content/skills/concepts—essential understandings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Learning process                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| <p><u>Students will know the following content:</u></p> <ul style="list-style-type: none"> <li>• Concept of a limit of a function</li> <li>• Concept of a derivative</li> </ul> <p><u>Students will develop the following skills:</u></p> <ul style="list-style-type: none"> <li>• Identify limits of functions from graphs and tables.</li> <li>• Calculate average rate of change with the slope of a secant line.</li> <li>• Recognize instantaneous rate of change as the slope of a tangent line.</li> <li>• Characterize graphs as increasing/decreasing based on gradient and derivatives.</li> </ul> <p><u>Students will grasp the following concepts:</u></p> <ul style="list-style-type: none"> <li>• Describe functions and how they change using limits, rate of change, increasing/decreasing.</li> </ul> | <p><i>Check the boxes for any pedagogical approaches used during the unit.<br/>Aim for a variety of approaches to help facilitate learning.</i></p> <p>Learning experiences and strategies/planning for self-supporting learning:</p> <p><input checked="" type="checkbox"/> Lecture</p> <p><input type="checkbox"/> Socratic seminar</p> <p><input checked="" type="checkbox"/> Small group/pair work</p> <p><input checked="" type="checkbox"/> PowerPoint lecture/notes</p> <p><input checked="" type="checkbox"/> Individual presentations</p> <p><input type="checkbox"/> Group presentations</p> <p><input type="checkbox"/> Student lecture/leading</p> <p><input type="checkbox"/> Interdisciplinary learning</p> <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. Teacher will provide multiple resources electronically and in person to support student learning.</p> <p><input type="checkbox"/> Other/s:</p> <p><b>Formative assessment:</b></p> <p>IB Questionbank Practice problems</p> <p>TOTD – quick checks</p> <p>HW quizzes: limits, intervals of increase/decrease</p> |

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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <p><b>Summative assessment:</b><br/>Assessment #1 (5.1-5.2, 1.1-1.3)<br/>All assessments will use previous IB exam questions from the Questionbank</p> <p><b>Differentiation:</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Affirm identity—build self-esteem</li> <li><input type="checkbox"/> Value prior knowledge</li> <li><input checked="" type="checkbox"/> Scaffold learning</li> <li><input checked="" type="checkbox"/> Extend learning</li> </ul> <p><b>Details:</b></p> <p>Limits and derivatives will be brand new content for students. Derivatives will be the focus of most of first semester, so it is important that the concept is understood. Many representations of derivatives and many resources will be used in class with access to additional resources for students who want or need more practice.</p> |
| <p><b>Approaches to learning (ATL)</b></p> <p><i>Check the boxes for any explicit approaches to learning connections made during the unit. For more information on ATL, please see <a href="#">the guide</a>.</i></p>                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Thinking</li> <li><input checked="" type="checkbox"/> Social</li> <li><input checked="" type="checkbox"/> Communication</li> <li><input type="checkbox"/> Self-management</li> <li><input type="checkbox"/> Research</li> </ul> <p><b>Details:</b></p> <p>Thinking - making connections within the content and applications</p> <p>Social – partner work</p> <p>Communication – utilizing the language and notation of calculus</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| <b>Language and learning</b><br><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 <a href="#">the guide</a>.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>TOK connections</b><br><i>Check the boxes for any explicit TOK connections made during the unit</i>                                                                                                                                                                                                                                                                                                                                               | <b>CAS connections</b><br><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> |
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| <input type="checkbox"/> Activating background knowledge<br><input type="checkbox"/> Scaffolding for new learning<br><input checked="" type="checkbox"/> Acquisition of new learning through practice<br><input checked="" type="checkbox"/> Demonstrating proficiency<br><br>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 type="checkbox"/> Personal and shared knowledge<br><input type="checkbox"/> Ways of knowing<br><input checked="" type="checkbox"/> Areas of knowledge<br><input type="checkbox"/> The knowledge framework<br><br>Details: Students will be introduced to a new mathematical concept: calculus. History on the “fathers” of calculus will be included and the debate over who is actually credited with developing the notation and processes. | <input type="checkbox"/> Creativity<br><input type="checkbox"/> Activity<br><input type="checkbox"/> Service<br><br>Details: N/A                                                                                      |
| <b>Resources</b><br><i>List and attach (if applicable) any resources used in this unit</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                       |
| Textbook - Mathematics: Analysis & Approaches. Chapter 5<br>IB QuestionBank<br>Calculus, A Complete Course by Mark Sparks<br>Master Math Mentor<br>Khan Academy<br>Delta Math<br><a href="http://www.flippedmath.com">www.flippedmath.com</a>                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                       |