DP AI SL Planner – Unit 5 Topic 5: Calculus

Teacher(s)	Jessica Vaughn	**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**			
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. Pearson Mathematics: Applications & Interpretations SL textbook: Chapter 9: Introduction to Differential Calculus Chapter 10: Further Differential Calculus Chapter 11: Integral Calculus		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.			

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:

- 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** *Check the boxes for any pedagogical approaches used during the unit. Aim for a variety of approaches to help facilitate learning.*
<u>Students will know the following content:</u> ● 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. <u>Students will develop the following skills:</u> ● Differentiation ● Integration <u>Students will grasp the following concepts:</u> ● Functions can be represented in multiple ways (equations, graphs, tables, etc). ● Functions can be used to describe rate of change and accumulation.	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 Details: 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 and extensions. Students will participate in a TOK-based project in groups debating "who invented Calculus" ☐ Other/s:

	Formative assessment: IB Questionbank Practice problem sets TOTD – quick checks IB Exam-Style Practice Questions
	Summative assessment: 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.
	Differentiation: ☒Affirm identity—build self-esteem ☐Value prior knowledge ☒Scaffold learning ☒ Extend learning Details: 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.

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 *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.*	**TOK connections** *Check the boxes for any explicit TOK connections made during the unit*	**CAS connections** *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.*
☐Activating background knowledge ☐ Scaffolding for new learning ☒ Acquisition of new learning through practice ☒ 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.	☒ Personal and shared knowledge ☐ Ways of knowing ☐ Areas of knowledge ☒ 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.	☐ Creativity ☐ Activity ☐ Service Details: N/A
Resources *List and attach (if applicable) any resources used in this unit*		
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

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