

## DP Topic 5 - Unit 5 Applications of Integration Planner

<b>Teacher(s)</b>	Jessica Vaughn	<b>Subject group and course</b>	Mathematics – Analysis & Approaches		
<b>Course part and topic</b>	Unit 5 – Applications of Integration (Topic 5 – Calculus)	<b>SL or HL/Year 1 or 2</b>	SL, Yr 2	<b>Dates</b>	Mid February – March
<b>Unit description and texts</b>		<b>DP assessment(s) for unit</b>			
Applications of Integration – Kinematics, Area between curves, Volume Oxford AA textbook: Chapter 10: From approximation to generalization: integration Chapter 13: Modeling change: more calculus Calculus, A Complete Course, by Mark Sparks		Assessment #10 (Kinematics, area between curves) Assessment #11 (Volume) All assessments will use previous IB exam questions from the Questionbank			

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

<b>Transfer goals</b>  <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>• Represent and interpret real world data in graphical and numerical form (histograms, cumulative frequency curves, box and whisker plots)</li> <li>• Conduct calculations and tests that determine relationships between variables.</li> <li>• Determine the likelihood of events occurring and evaluate risks.</li> </ul>

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

Content/skills/concepts—essential understandings	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><u>Students will know the following content:</u></p> <ul style="list-style-type: none"> <li>• Kinematics – particle motion</li> <li>• Area between two curves</li> <li>• Volumes of solids by revolution</li> </ul> <p><u>Students will develop the following skills:</u></p> <ul style="list-style-type: none"> <li>• How to calculate position, velocity, acceleration implementing differentiation and integration.</li> <li>• How to find area between two curves using integration.</li> <li>• How to find volume of figures formed by rotating functions around the x-axis.</li> </ul> <p><u>Students will grasp the following concepts:</u></p> <ul style="list-style-type: none"> <li>• Position, velocity, and acceleration are rates of change (calculated by derivatives) the reverse is integration.</li> <li>• Functions can be used to define regions, these regions can be defined by definite integrals.</li> <li>• Definite integrals can be used to represent volume of three dimensional shapes formed by rotating a function around an axis.</li> </ul>	<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. Students have a background in kinematics from first semester. Now they will be able to work in reverse, using integration.</p> <p>Students will build on their knowledge of area under a function to calculate area between two functions and volumes by revolutions.</p> <p>Teacher will provide multiple resources electronically and in person to support student learning.</p>

	<p><b>Formative assessment:</b></p> <p>IB Questionbank Practice problems</p> <p>TOTD – quick checks</p> <p>HW quizzes: kinematics, area between curves, volume by revolutions</p> <p><b>Summative assessment:</b></p> <p>Assessment #10 (Kinematics, area between curves)</p> <p>Assessment #11 (Volume)</p> <p>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>Details:</p> <p>Students have seen differentiation in the first semester. This unit will build on their background from differentiation. They will be given multiple opportunities to practice math skills within class problems and optional, extension resources from Khan Academy and Delta Math. Practice assignments will include solution guides so students can check their understanding.</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>	

☒ 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 statistics to display and summarize data easily

<b>Language and learning</b> <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> <i>Check the boxes for any explicit TOK connections made during the unit</i>	<b>CAS connections</b> <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>
<div> <input checked="" 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 </div> <p>Details: The applications of integration will be new to the students, but it builds on their previous course work in differentiation and integration. The vocabulary and notation will be demonstrated and learned through practice. The summative assessment will show students proficiency and can replace other grades based on mastery level shown. Students will have ample opportunities to utilize the vocabulary and notation in class to get feedback from both the instructor and other students.</p>	<div> <input type="checkbox"/> Personal and shared knowledge  <input type="checkbox"/> Ways of knowing  <input checked="" type="checkbox"/> Areas of knowledge  <input type="checkbox"/> The knowledge framework </div> <p>Details: Integration as an inverse operation of differentiation is an "undoing" process. Students solidify their knowledge of integration by applying in contextual situations.</p>	<div> <input type="checkbox"/> Creativity  <input type="checkbox"/> Activity  <input type="checkbox"/> Service </div> <p>Details: N/A</p>
<b>Resources</b> <i>List and attach (if applicable) any resources used in this unit</i>		
<p>Textbook - Mathematics: Analysis &amp; Approaches. Chapter 10  Calculus, A Complete Course by Mark Sparks  IB QuestionBank  Master Math Mentor  Khan Academy  Delta Math  Master Math mentor, pdf notes and videos</p>		



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

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