

DP pilot unit planner 3

Teacher(s)	Spohn, Ian	Subject group and course	Math Applications and Interpretation		
Course part and topic	Topic 2: Functions Course Unit 10: Modelling Rates of Change: Exponential and Logarithmic Functions	SL or HL/Year 1 or 2	SL Year 2	Dates	3/10/23 – 26/10/23
Unit description and texts		DP assessment(s) for unit			
Mathematics: Applications and Interpretation SL Course Companion		Unit Exam			

INQUIRY: establishing 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>
<ol style="list-style-type: none"> 1) Learn how to use Logarithms to solve equations for variables which exist in the exponential form. 2) Model data using exponential and logarithmic graphs. 3) Understand how interest rates and varying compounding periods affect over all monetary growth or decay

Essential understandings

List here the key content/skills/concepts that students will know/develop by the end of the unit.

Students will know the following content:

- Students will know exponential and logarithmic functions and how they differ from rational or polynomial functions.
- Students will know the laws of exponents and the laws of logarithms.
- Students will know Sigma notation and Percentage notation.

Students will develop the following skills:

- Students will develop the ability to model and represent information and data using logarithmic and exponential functions
- Students will develop the ability to assess and compare annuities, interest gains, mortgages, and other monetary principals
- Students will be able to recognize patterns and use the Sequence and Series formulas to find information about those patterns
- Students will be able to use the GDC's Finance App to calculate monetary values involving compound interest

Students will grasp the following concepts:

- Students will grasp variable manipulation, amortization, annuities, and interest gain
- Students will grasp asymptotes and holes, as well as what they represent

Missed concepts/misunderstandings

List here likely misunderstandings students may have during the unit with relation to skills, content and concepts.

Content-based: Sigma notation is intimidating for some students as it is unlike anything they have seen before.

Skills-based: Applying the correct formula to situations – e.g. a student may use the Geometric Sum Series to calculate the FV of an amortization instead of using the Financial APP in the GDC.

Concept-based: Students have frequently had trouble using logarithms to manipulate variables. Students struggle to understand why values in the GDC come out negative when using the Finance App in the calculator.

Inquiry questions

List here the understandings above written in question form, preferably as ones that inspire students to answer them. Feel free to create additional questions that help inspire further inquiry in the unit but may not directly connect to an above essential understanding.

Content-based: How does Sigma differ from Theta or other variables used in geometry and algebra? Why was the letter Σ chosen for the notation?

Skills-based: What exactly is amortization? How does Amortization different from a Geometric Sequence?

Concept-based: Negative money does not exist physically. You will never receive a \$ -5 bill. So how can money become negative?

ACTION: teaching and learning through inquiry

<p>Essential understanding goals</p> <p><i>Copy and paste the essential understanding goals from above “Inquiry” section.</i></p>	<p>Assessment of essential understanding goals</p> <p><i>Write a 1:1 matching assessment for all goals. Assessments should be labelled formative (F) or summative (S).</i></p>	<p>Learning process</p> <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><u>Students will know the following content:</u></p> <p>1) Learn how to use Logarithms to solve equations for variables which exist in the exponential form.</p> <p><u>Students will develop the following skills:</u></p> <p>2) Model data using exponential and logarithmic graphs.</p> <p><u>Students will grasp the following concepts:</u></p> <p>3) Understand how interest rates and varying compounding periods affect over all monetary growth or decay</p>	<p><u>Content-based:</u></p> <p>(S) A quiz will be given to ascertain development of skill in using logarithms. (S) The Unit Test will contain questions using Logarithmic principals</p> <p>(F) Class competition in which teams are timed in changing equations between Logarithmic and Exponential form.</p> <p><u>Skills-based:</u></p> <p>(S) The Unit Test will contain questions in which a situation will require students to model data using an graph. Students will determine whether the data is exponential, logarithmic, or something else. (F) Class will complete an exercise comparing the shapes of graph. This will be connected to end behavior of polynomials.</p> <p><u>Concept-based:</u></p> <p>(F) Students will complete a project in which they will compare the prices and interest rates of houses on the local market in order to make an informed decision as to which is the most reasonable to buy for their budget.</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 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><input type="checkbox"/>Other/s:</p>

Resources

Approaches to learning (ATL) <i>Check the boxes for any explicit approaches to learning connections made during the unit. For more information on ATL, please see the guide.</i>	Metacognition <i>Check the boxes for any metacognitive approaches used that ask students to reflect on unit content, their own skills, or unit concepts. For more information on the IB’s approach to metacognition, please see the guide.</i>	Differentiation: <i>For more information on the IB’s approach to differentiation, please see the guide.</i>
<input checked="" type="checkbox"/> Thinking <input type="checkbox"/> Social <input type="checkbox"/> Communication <input checked="" type="checkbox"/> Self-management <input checked="" type="checkbox"/> Research Details: Thinking and Self Management: Students will plan ahead with a pre-set monthly income in order to “purchase” a house while making sure to maintain enough income for food, common bills, and other necessities. Research: During the same project, students will need to research common housing prices and interest rates to find a suitable price.	<input checked="" type="checkbox"/> Reflection on content <input type="checkbox"/> Reflection on skills <input type="checkbox"/> Reflection on concepts Details: Students will use new skills and content to balance their budget at the end of the unit. After the project has concluded, we will discuss the challenges of maintaining a household income.	<input checked="" type="checkbox"/> Affirm identity—build self-esteem <input type="checkbox"/> Value prior knowledge <input type="checkbox"/> Scaffold learning <input checked="" type="checkbox"/> Extend learning Details: By planning a budget for a home, students can become more comfortable for realistically planning for the future. Additionally, this extends their learning into a very real facet of life beyond academic superfluosity.

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 checked="" type="checkbox"/> Activating background knowledge <input type="checkbox"/> Scaffolding for new learning <input type="checkbox"/> Acquisition of new learning through practice <input checked="" type="checkbox"/> Demonstrating proficiency Details: Interest, especially simple interest, calls back to the monetary concept of sales tax. The use of the Finance APP in the GDC grants them access to a simplified way of calculating complex changes in financial readings.	<input type="checkbox"/> Core theme <input type="checkbox"/> Optional themes <input checked="" type="checkbox"/> Areas of knowledge Details: AoK History: The concept of “credit” and “interest” date back as far as 3000BC in ancient Sumeria. Ethics: Loan Sharks are often accused of practicing poor ethics with interest rates that are impossible for impoverished individuals to pay back. So how much interest is considered Ethical?	<input type="checkbox"/> Creativity <input type="checkbox"/> Activity <input type="checkbox"/> Service Details:

REFLECTION: Considering the planning, process and impact of the inquiry

What worked well	What didn't work well	Notes/changes/suggestions:
<p>Students responded well to examples of logarithms moving variables. Examples were shown with no values, only variables.</p>	<p>Students struggled to see the value of geometric sequences and series. Perhaps next time I will include an example with the half-life of a radioactive isotope or the spread of covid during 2020.</p>	<p>Need to show more examples related to real-world incidents. Students tend to disengage when they can not make the connection to anything they view as actually valuable.</p>
<p>Transfer goals <i>List the transfer goals from the beginning of this unit planner.</i></p>		
<ol style="list-style-type: none"> 1) Learn how to use Logarithms to solve equations for variables which exist in the exponential form. 2) Model data using exponential and logarithmic graphs. 3) Understand how interest rates and varying compounding periods affect over all monetary growth or decay 		
<p>Transfer reflection <i>How successful were the students in achieving the transfer goals by the end of the unit?</i></p>		
<p>Unit is ongoing, however:</p> <ol style="list-style-type: none"> 1) Students have shown proficiency in the use of logarithms in order to find the which term a specific value of a sequence would be. 2) Students have not yet had the opportunity to use exponential or logarithmic graphs during this unit. 3) Financial models and assignments have been a large point of discussion during class as students have expressed anxieties over finding affordable housing. They have grown more confident in dealing with the issue as we have covered how to calculate mortgage payments among other household bills and budgeting. 		