Summary

HL - Exponentials

Subject	Year	Start date	Duration
Mathematics: applications and interpretation	IB2	Week 1, October	3 weeks

Course Part

Description

In this unit you will learn how exponential models are used to describe growth and decay situations.

Inquiry & Purpose

Inquiry / Higher Order Questions

Type	Inquiry Questions
Skills-based	What are the flaws of using an exponential growth model - particularly for large values of x/time?
Skills-based	Are there any limitations to exponential models in real life populations situations? How do logistics models over come this?

Curriculum

Aims

Take action to apply and transfer skills to alternative situations, to other areas of knowledge and to future developments in their local and global communities

Objectives

Problem solving: Recall, select and use their knowledge of mathematical skills, results and models in both abstract and real-world contexts to solve problems.

Syllabus Content

Topic 2: Functions

SL Content

SL 2.5

Exponential growth and decay models. $f(x) = ka^x + c$ $f(x) = ka^{-x} + c \quad (\text{for } a > 0)$ $f(x) = ke^{rx} + c$

AHL Content

AHL 2.9

Exponential models to calculate half-life.

Natural logarithmic models: $f(x) = a + b\ln x$

Logistic models: $f(x) = \frac{L}{1 + Ce^{-kx}}; L, \quad C, \quad k > 0$

AHL 2.10

Scaling very large or small numbers using logarithms.

Linearizing data using logarithms to determine if the data has an exponential or a power relationship using best-fit straight lines to determine parameters.

Interpretation of log-log and semi-log graphs.

Topic 4: Statistics and probability

AHL Content

AHL 4.13

Non-linear regression.

ATL Skills

Approaches to Learning

Thinking

Developing IB Learners

Learner Profile

Inquirers

Knowledgeable

Thinkers