Applications & Interpretation SL

This table records some of the elements of the Applications & Interpretation SL book which are particularly "IB", or which are interesting "features". They are definitely things to look out for, but please do not consider this an exhaustive list.

	Page	Topic link	Subject link	International link	Cultural link	Historic link	TOK link	Comments

Chapter 1: Approximations and error

Chapter 2: Loans and annuities

	Page	Topic link	Subject link	International link	Cultural link	Historic link	TOK link	Comments
Historical note	32			Italy		Banking		
Activity 1 Discussion	36-37 38		Personal finance					Understanding the effect of interest rates and loan duration is essential for future life planning.
Activity 2	37-38	Series	Personal finance					Provides an algebraic development of the loan repayments formula.
Activity 3 Activity 4	41 42-43		Personal finance					Perpetuities and growing annuities are special types of annuities.

Chapter 3: Functions

Chapter 4: Modelling

	Page	Topic link	Subject link	International link	Cultural link	Historic link	TOK link	Comments
Theory	80-81						Scientific Method	Is the modelling cycle the mathematical equivalent of the scientific method?
Activity 1	84							Enables students to practice the construction of a mathematical model, including assumptions and simplification.
Investigation	84-85		Astronomy	Ancient Rome, England, Italy		Julius Caesar, Roger Bacon, Pope Gregory XIII		Calendars
Theory of Knowledge	85-86		Astronomy, Physics	Europe		Nicolaus Copernicus, Johannes Kepler, Sir Isaac Newton, George Box	Modelling	Historic models such as a clockwork orrery for the solar system provide insight into physical processes, but have never been exact. Can an imperfect model be useful?

Chapter 5: Bivariate Statistics

	Page	Topic link	Subject link	International link	Cultural link	Historic link	TOK link	Comments
Historical note	107					Karl Pearson, Sir Francis Galton		

	Page	Topic link	Subject link	International link	Cultural link	Historic link	TOK link	Comments
Discussion	120							Strangely, the A&I SL course requests understanding of the difference between the regression line of y against x, and the regression line of x against y, but the regression line of x against y is not calculated in this course. It is instead calculated in the A&A SL course.
Theory of Knowledge	121-122		Biology, Environmental Science	Japan, Global			Modelling	
Activity 3	127-128			England		Francis Anscombe		

Chapter 6: Quadratic functions

	Page	Topic link	Subject link	International link	Cultural link	Historic link	TOK link	Comments
Activity 1	134							Conic sections
Historical note	158-159	Vectors	Physics	England, Italy		Galileo Galilei	Ethics	The study of projectile motion was driven by its applications in war. Does this negate the virtue of its study?

Chapter 7: Direct and Inverse variation

	Page	Topic link	Subject link	International link	Cultural link	Historic link	TOK link	Comments
Theory of Knowledge	168		Physics	England		William Thomson (Lord Kelvin)	Measurement	Are some scales of measurement more natural or intuitive than others?

Chapter 8: Exponentials and Logarithms

	Page	Topic link	Subject link	International link	Cultural link	Historic link	TOK link	Comments
Investigation 2	200-201	Compound interest						This investigation gives a pre-limits derivation of the natural exponential e by considering compound interest compounding at a faster and faster rate.
Historical note	203	Continued fractions				Jacob Bernoulli, Leonhard Euler		Exact representations of the irrational number e.
Exercise 8G q14	207		Music, Physics					Logarithmic scales are widely used to understand the real world. In this question we explore their application in musical notes.
Research	208		Physics					Explores the decibel scale for sound intensity. Possible basis for a Mathematical Exploration.
Theory of Knowledge	210-211		Physics	Scotland		John Napier	Nature of mathematics	Do we invent or discover mathematics? Is mathematics a collaborative effort? Why is pure mathematics important?

Chapter 9: Trigonometric functions

	Page	Topic link	Subject link	International link	Cultural link	Historic link	TOK link	Comments
Opening Problem	218	Radian measure						For 40 years, Haese Mathematics has been using the classic real-world example of a light on a Ferris wheel to motivate the study of trigonometric functions.
Historical note	222		Physics			Michael Faraday		Electromagnetic application of the sine wave.
Investigation 1	227	Transformation of functions						Builds on from the earlier chapter to give conceptual understanding of the general sine function.
Investigation 2	234-235	Modelling (A&I)	Physics					The spring and pendulum.
Research	235	Modelling (A&I)	Astronomy, Geography			Sir Isaac Newton		Possible Mathematical Exploration such as modelling sunrise and sunset at a particular latitude over time assuming level ground. (This is non-trivial!)
Historical note	236			France		Léon Foucault		Foucault's pendulum

Chapter 10: Differentiation

	Page	Topic link	Subject link	International link	Cultural link	Historic link	TOK link	Comments
Historical note	259			Ancient Egypt, Ancient Greece, Europe		Democritus, Eudoxus, Archimedes, Johann Bernoulli, Isaac Barrow		
Theory of Knowledge	264		Physics	Ancient Greece		Zeno of Elea	Paradoxes	

Chapter 11: Properties of curves

Chapter 12: Applications of differentiation

	Page	Topic link	Subject link	International link	Cultural link	Historic link	TOK link	Comments
Theory of Knowledge	300-301						Optimisation	How does the given problem relate to the law of reflection in Physics?
Exercise 12C q5	303	Inverse proportion	Physics					This question has the potential to really enlighten students who struggle to connect the mathematics of a model with its physical meaning. If a student is struggling, they could start from the other end: Since the surface area of a sphere is proportional to r^2, we might expect that illuminance might fall off as 1 / r^2.

Chapter 13: Integration

	Page	Topic link	Subject link	International link	Cultural link	Historic link	TOK link	Comments
Opening Problem	308		Physics			Archimedes		We begin the study of integration by following its historical development.

	Page	Topic link	Subject link	International link	Cultural link	Historic link	TOK link	Comments
Historical note	312-313					Bonaventura Cavalieri, Sir John Wallis		
Historical note	314					Sir Isaac Newton, Gottfried Wilhelm Leibniz, Bernhard Riemann	Parallel development	The progression from Archimedes to modern calculus was only possible with the introduction of limits.
Exercise 13B q3	315							Links to the standard normal deviation and the proportion of data within 3 standard deviations of the mean.

Chapter 14: Discrete random variables

	Page	Topic link	Subject link	International link	Cultural link	Historic link	TOK link	Comments
Activity	347				Game strategy			
Investigation 1 Investigation 2	352 355							Use of technology to investigate the binomial distribution.

Chapter 15: The normal distribution

	Page	Topic link	Subject link	International link	Cultural link	Historic link	TOK link	Comments
Investigation 1	365	Calculus						Investigates the normal curve using differential calculus.
Historical note	366					Carl Friedrich Gauss		
Investigation 3	376							The normal approximation to the binomial distribution.

Chapter 16: Hypothesis testing

	Page	Topic link	Subject link	International link	Cultural link	Historic link	TOK link	Comments
Historical note	384		Agriculture	England, Ireland		William Sealy Gosset, Karl Pearson, Sir Ronald Aylmer Fisher		
Investigation 2	390-391							Students should understand the importance of multiple testing, because there is probability of a type 1 error α with each test.
Theory of Knowledge	391		Medicine	England		Sir Ronald Aylmer Fisher	Ethics	
Activity 2	404		Genetics			Gregor Johann Mendel		

	Page	Topic link	Subject link	International link	Cultural link	Historic link	TOK link	Comments
Theory of Knowledge	405		Genetics, Medicine		Vaccines	Sir Ronald Aylmer Fisher, Gregor Johann Mendel	Ethics	Fisher concluded that the data presented by Mendel, "the father of modern genetics" was too perfect to have been true. The MMR vaccine hoax has been cited as "perhaps the most damaging medical hoax in the last 100 years", having given rise to the anti-vaccine movement.

Chapter 17: Voronoi diagrams

	Page	Topic link	Subject link	International link	Cultural link	Historic link	TOK link	Comments
Historical note	418			Ukraine		Georgy Feodosevich Voronoy		
Research	421-422		Biology					Voronoi diagrams in nature
Historical note	435-436	Maps, Statistics	Medicine	England		Louis Pasteur, John Snow	Mathematics underpinning other subjects	If Voronoi had been born before Snow, his diagrams could have made Snow's deduction much easier.