

Core Topics SL

This table records some of the elements of the Core Topics 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
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Chapter 1: Straight lines

Exercise 1C q8	29	Voronoi diagrams (A&I)					
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Chapter 2: Sets and Venn diagrams

Opening Problem	40		Social studies	Global			Takes a familiar topic and encourages deeper analysis in the global context of the Human Development Index (HDI).
Theory of Knowledge	46-47	Proof by contradiction (A&A)				Proof	

Chapter 3: Surds and exponents

Opening Problem	64		Physics	England		Sir Joseph John Thomson	Nobel Prize winner in Physics 1906, subatomic particles.
Investigation	65	Proof by equivalence (A&A)					
Exercise 3E q12	79-80		Astronomy				Astronomical distances
Discussion	80			Asia	Mahjong		

Chapter 4: Equations

Text	89	Proof (A&A)					Identifying errors in worked solutions has been shown to be an important tool for conceptual understanding.
Historical note	92			Europe, Middle East, India			The development of the quadratic formula.
Discussion	98				Technology		In a world of technology, there is still purpose to analytic methods and conceptual understanding.

Chapter 5: Sequences and series

Opening Problem	102			Middle East, India	Legend, Chess	Ibn Khallikān	Famous problem
Theory of Knowledge	131-132					Proof	

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Activity 3	138	Affine transformations (A&I)		Sweden		Helge von Koch		A&I students explore the generation of this curve as iterations of a set of affine transformations.
Theory of Knowledge	139			Germany		Leopold Kronecker	Infinity	

Chapter 6: Measurement

Project	163	Approximation & Estimation (A&I), Modelling (A&I)						Compares numerical methods for the approximation of a real-world problem. Highlights the importance of clearly defining and articulating the problem that is to be solved. Could also be done as the “inverted” problem of lakes. Possible Mathematics Exploration.
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Chapter 7: Right angled triangle trigonometry

Theory of Knowledge	172-173		Astronomy	China		Li Chunfeng	Observation, belief, parallel subject development	
Exercise 7E q25	190	Scientific notation	Astronomy	Prussia		Friedrich Wilhelm Bessel		1838 measurement of the parallax of the star 61 Cygni.
Research	195		Physics	Global	Time			Possible Mathematics Exploration or Extended Essay.
Research	196		Astronomy	Global	Navigation	Hipparchus		Possible Mathematics Exploration or Extended Essay.

Chapter 8: Non-right angled triangle trigonometry

Cosine rule proof	208-209	Proof by exhaustion (A&A)						Most “proofs” of the cosine rule skip the comment about the acute angles in an obtuse angled triangle.
Investigation 1	212							Practical, hands-on investigation of the sine rule.
Exercise 8E q17	218							Combines real-world application and problem solving skills in a 3-dimensional problem.
Investigation 2	219							Practical, hands-on investigation of the ambiguous case of the sine rule.
Theory of Knowledge	221-222			Ancient Greece, India		Hipparchus	Subject development, protection of knowledge	Explores motivations for subject development, and the place of historical work in the modern subject. Compares spherical and planar triangles. Why did a “flat Earth” theory persist for so long?

Chapter 9: Points in space

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Theory of Knowledge	234-235		Physics	Ancient Greece		Euclid	Axioms, definitions, multi-dimensional space	Explores Euclid's postulates as a basis for planar geometry. Poses serious questions about what we may consider as intuitive, such as straightness and direction. This becomes necessary for exploring space-time as needed for advanced Physics.

Chapter 10: Probability

Opening Problem	240		Insurance					Real-world probability application
Investigation 1	242							Practical, hands-on investigations.
Investigation 2	242-243							Understanding the role of experimental probability.
Activity	272			USA		Steve Selvin		The Monty Hall Problem is one of the best known mathematical paradoxes. This Activity uses tree diagrams to explore the paradox, giving deep understanding of <i>why</i> the contestant should change their original guess.
Theory of Knowledge	276-277			Europe, USA	Ethics	Blaise Pascal, Pierre de Fermat, Agner Krarup Erlang, Edward Oakley Thorp	Mathematical intuition, decision making, ethics	

Chapter 11: Sampling and data

Discussion	289		Politics	United Kingdom, EU				Explores the mathematics of the "Brexit" referendum.
Theory of Knowledge	290		Medicine		Ethics		Ethics in research.	Applications in medical trials and social media.

Chapter 12: Statistics

Theory of Knowledge	312-313						Definitions	How do we decide which description or "definition" of centre to apply in a particular situation?
Investigation 3	342-343							Develops formulae for the mean and standard deviation of the linear transformation of a variable.
Investigation 4	343-344							Allows students to develop an understanding of the two statistics for standard deviation: the sample standard deviation s , and the population standard deviation σ .