

# Concept commentaries – SL

Opportunities to consider and discuss the key concepts underpinning the syllabus are signposted throughout the Hodder Education Student Books for Mathematics for the IB Diploma. This document contains some further ideas about how teachers can draw out and elaborate on these concepts, thereby fostering deeper understanding. It also contains suggestions about how the Teaching and Learning Resources can be used to complement the content outlined in the Student Books.

## 1 Core: Exponents and logarithms

### Concept focus: Representation

The starter activity and the opening problem offer great examples of the concept of representation. It is important that students can use large and small numbers in contexts. The following questions can also be discussed with students and offer opportunities for small-group work or teacher-led discussion:

- **Exercise 1B, question 24** – population
- **Exercise 1C, question 44** – pH values.

In the **Teaching and learning resources** there is also an activity on using large numbers that supports the concept of representation.

## 2 Core: Sequences

### Concept focus: Modelling, Generalization

Modelling mathematics is a tricky topic for discussion. **Exercise 2A, question 42** offers a good discussion on the concept of modelling. The focus of the question is reducing screen time. Are we able to model the process of quitting smoking mathematically? What factors are we ignoring?

The opening problem on the topic of the lottery is discussed in another context – allowance payments – in the **Teaching and learning resources**. It is discussed along with the concept of representation but does have a strong focus on modelling. The students are asked ‘How does using technology help us answer a question like this?’ It is important to ask students to quickly choose one of the offered options before attempting the problem.

## 3 Core: Functions

### Concept focus: Representation, Relationships

The **starter activity** in the textbook offers an opportunity for students to work in small groups and discuss the concept of representation. What do functions look like?

## 4 Core: Coordinate geometry

## 5 Core: Geometry and trigonometry

### Concept focus: Space

The **starter activity** in Chapter 4 links well to the concept of space. It may be a good idea to have students analyse gradients and slopes around the campus. This would support the ideas suggested in **question 16** of Chapter 4 **Mixed practice**. The question relates to health and safety regulations surrounding gradient of ramps and it would be a powerful activity for students to measure their own campus in terms of health and safety.

Relationships can be discussed when attempting the Voronoi diagrams task in the **Teaching and learning resources**. This offers the students the opportunity to study relationships and explore patterns in the world around them.

## 6 Core: Statistics

## 15 Applications and interpretation: Hypothesis testing

### Concept focus: Validity, Approximation

The **starter activity** is a great example of how statistics can be misleading and how students must always consider the validity of their mathematics. The **Teaching and learning resources** also discuss the validity of data with various links for discussion.

In the **Teaching and learning resources**, sampling is discussed through a validity lens. Students may have their own opinion of what concept is being highlighted.

The **Teaching and learning resources** also offer a structure for a statistics project. There can be no better discovery of validity for students than through collecting and analysing their own data.

## 7 Core: Probability

## 8 Core: Probability distributions

### Concept focus: Modelling, Patterns

The **starter activity** in Chapter 7 and the **opening problems** in both Chapters 7 and 8 offer good discussion points for predicting outcomes from models. The concept focus is modelling

but could also be patterns. How do we use the pattern generated by a model to make predictions?

The **Teaching and learning resources** discuss the idea of students analysing a simple card game and how mathematics can be used to inform our decision making. Analysing casino games involve more mathematics but it is certainly a challenge to analyse a complex system.

This is a culturally sensitive topic and casinos and gambling should really be seen as ways that probability can trick people.

## 9 Core: Differentiation

### Concept focus: Change

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The **Starter activity** focuses on rate of change. This is a great link to the concept of change. This is a great link to the concept of change. The **Teaching and learning resources** include a PowerPoint focusing on the meaning of ‘rate of change’, with real-world examples, to enforce the ideas of rate of change from the textbook.

## 10 Core: Integration

### Concept focus: Approximation

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**Worked example 10.7** and **Exercise 10B, question 14** provide excellent opportunities for teacher-led discussions on how integration can be applied in real-life and used for approximate measures in abstract situations.

## 11 Applications and interpretation: Number and finance

### Concept focus: Approximation, Relationships

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Using the PowerPoints in the **Teaching and learning resources** on credit card debt and the Fibonacci sequence, a focus can be brought to the concepts of approximation and relationships.

**Section 11B** in the Student Book offers further discussion about financial mathematics and the relationships that exist between variables. This can be used in conjunction with the credit card writing task in the **Teaching and learning resources**.

## 12 Applications and interpretation: Solving equations with technology

## 13 Applications and interpretation: Mathematical models

### Concept focus: Modelling

Modelling plays a large part in both Chapter 12 and Chapter 13. Activities in the **Teaching and learning resources** such as Bacteria growth and Interpreting graphs offer support to **Section 12A** of the Student Book. Solving equations does not always have to be an algebraic process, it can also be done graphically.

The Big wheel activity in the **Teaching and learning resources** offers support to **Section 13E** of the textbook and emphasises the importance of mathematical models.

## 14 Applications and interpretation: Geometry

### Concept focus: Space

The PowerPoint on Voronoi diagrams in the **Teaching and learning resources** offers support to **Section 14B** of the textbook. There is a focus on the concept of space and it is important for students to reflect on the suitability of Voronoi diagrams when representing a space in real life.

## 16 Applications and interpretation: Differentiation

### Concept focus: Change, Representation, Generalization

The concepts for this chapter can be tied in nicely with the concepts from **Chapter 9**. Calculus offers a lot of discussion surrounding change and generalization and the optimization activity available in the **Teaching and learning resources** can be utilized when discussing the starter activity and in **Section 16A**.

Optimization can also support the concept of representation – is it possible to represent the volume of an object using a graph?