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 context. The following questions can also be discussed with the 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 reducing screen time mathematically? What factors are we ignoring?

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? For a more mathematical viewpoint, there are links for a discussion of function notation in the **Teaching and learning resources**.

4 Core: Coordinate Geometry  
5 Core: Geometry and trigonometry

Concept focus: Space, Relationships

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 the **Mixed Practice** in Chapter 4. The question relates to health and safety regulations surrounding the gradients 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 task related to the unit circle in the **Teaching and learning resources**. This highlights the relationship between the unit circle and the periodic functions of sine, cosine and tangent.

6 Core: Statistics

Concept focus: Validity, Approximation

The **Starter Activity** at the end of the introduction section is a great example of how statistics can be misleading and how students must always consider the validity of their mathematics.

Sampling is looked at in the **Teaching and learning** **resources** through an approximation lens. Students may have their own opinion of what concept is being highlighted.

7 Core: Probability  
8 Core: Probability Distributions

Concept focus: Modelling, Patterns

The **Starter Activities** 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?

9 Core: Differentiation  
20 Analysis and approaches: Differentiation

Concept focus: Change

The **Starter Activity** in Chapter 9 focuses on rate of change. This is a great link to the concept of change. The **Teaching and learning resources** include a PowerPoint on Kinematics with real-world examples to enforce the ideas of rate of change from the textbook.

**Worked Example 9.2** offers a scaffolded approach to limits of functions and this is complemented by the differentiation from first principles PowerPoint offered in the **Teaching and learning resources**.

10 Core: Integration

Concept focus: Approximation

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

These are complemented by the PowerPoint on volume of revolution in the **Teaching and learning resources**. It is mentioned that while volume of revolution is not a specific SL topic, the PowerPoint offers sufficient scaffolding to demonstrate how integration can be used to derive common formulas for well-known shapes.

13 Analysis and approaches: Sequences and Series

Concept focus: Generalisation, Patterns

Both the textbook and the **Teaching and learning** **resources** focus on generalising the patterns in Pascal’s triangle to expand brackets.

Before starting this chapter in the textbook, it is a good idea for students to attempt the Pascal’s triangle task in the **Teaching and learning** **resources**. The explanation in the textbook reinforces the ideas that the triangle teaches the student.

14 Analysis and approaches: Functions

Concept focus: Relationships

Functions are relationships in mathematics. The discussion of composite functions in the **Teaching and learning** **resources** includes a PowerPoint to share with students. The **Starter Activity** in the textbook offers support on the use of composite functions by asking students to analyse a sequence of instructions when baking a cake – this supports the idea that outputs of functions can become inputs of another.

16 Analysis and approaches: Graphs

Concept focus: Relationships, Change

Transformation of functions support is provided in the **Teaching and learning** **resources** in the form of an investigative piece surrounding the operations that can be performed on a function and the resulting graph. This would prove a great introductory activity to **Section 16A** in the textbook, reinforcing the concepts of change and relationships.

Asymptotes of graphs suggest a relationship that exists within certain limits and this is key to understanding the concept. **Section 16B** in the textbook is supported by the PowerPoint in the **Teaching and learning** **resources** that discusses how asymptotes are derived from a given function.

18 Analysis and approaches: Trigonometry

Concept focus: Quantity, Equivalence

Chapter 18 in the textbook refers to using Radians and Degrees to measure angles. While studying this chapter it would be useful to discuss the ideas from the Radians PowerPoint in the **Teaching and learning** **resources**.

Concepts such as quantity and equivalence are integral to the understanding that radians and degrees are both measures of angles; however, one is more practical than the other. For example, when measuring an angle by eye we use degrees, when using technology, it is more relevant to use radians.

19 Analysis and approaches: Probability and Statistics

Concept focus: Modelling, Validity

Validity is a major discussion point in statistics. Both the textbook Chapter 19 and the spreadsheet models offer students support for modelling the normal and binomial distributions. Discussion points are also offered in the **Teaching and learning** **resources.**

21 Analysis and approaches: Integration

Concept focus: Space, Approximation, Change

The concepts for this chapter can be tied in nicely with the concepts from the chapters on differentiation. Calculus offers a lot of discussion surrounding rate of change and the Kinematics material available in the **Teaching and learning** **resources** can be utilised when covering **Section 21C** in the textbook.

In order to reinforce the concept of space and before starting definite integrals, it would be beneficial to discuss the Volume of Revolution PowerPoint in the learning pack, as it demonstrates how integration is used to discover volume formulae that the students will be familiar with.