

# Concept commentaries – HL

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 Exponents and logarithms

### Concept focus: Representation, Equivalence, Patterns

The concepts of Representation and Equivalence can be brought together through the Logarithms in Chemistry PowerPoint and Large Numbers activity in the **Teaching and learning resources**.

The sections discussing Logs and Semi-logs in the textbook serve as an excellent introduction to the HL course as they encourage algebraic manipulation and pattern spotting.

## 2 Vectors

### Concept focus: Space

The concept space features heavily in these this chapter and is anchored by the topic of vectors.

There are lovely curriculum connections made in the chapter around the topic of diffusion in physics and biology. There is a lot of potential for an Exploration piece around these topics.

## 3 Matrices

### Concept focus: Relationships

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The concept of relationships is prominent in both the **Teaching and learning resources** and the textbook.

The PowerPoint ‘Eigenvectors’ offers good discussion points as you approach **Section 4.2** in the textbook.

## 4 Geometry and trigonometry

### 4A Radian measure

### Concept focus: Representation, Modelling

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Both the textbook and the **Teaching and learning resources** focus on the concept of representation with regards to geometry and trigonometry. Resources include activities on the unit circle, trigonometric graphs and a PowerPoint on radians.

The concept of modelling can be incorporated by having students work on the Fourier waves activity. It is important that the students have covered radians before attempting to model mathematics.

## 5 Functions

### Concept focus: Representation, Change

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The **Teaching and learning resources** contains a PowerPoint discussing composite functions. This will offer support to the concept of representation by utilising real-life examples of composite functions.

The concept of change can be discussed when attempting the function transformations activity. This can also be used as an assessment as it complements **Section 5C** in the textbook.

## 6 Complex Numbers

### Concept focus: Representation

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The concept of representation is tricky in this chapter because you are working with imaginary numbers. How do we ‘represent’ something that is imaginary? The **Starter Activity** offers excellent discussion points in relation to this concept.

## 7 Graph Theory

### Concept focus: Modelling

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The concept of modelling is supported by the activity available in the **Teaching and learning resources**. The toolkit activity in the textbook offers students the opportunity to create their weighted graphs. There is potential for an exploration piece around this topic.

There is a PowerPoint in the **Teaching and learning resources** that offers support to the topic of transition matrices.

## 8 Probability

## 9 Statistics

### Concept focus: Modelling, Validity

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The concepts of modelling and validity are heavily supported by the probability and statistics material. In the **Teaching and learning resources** there is a resource that can be used to introduce students to a statistical analysis project. This could also be a potential exploration piece, if the level of mathematics is commensurate with the course.

Utilising real life data is vital for students when approaching the concepts of modelling and validity. Asking themselves questions such as: how do I know that my results from my model are valid in the context of the question?

## 10 Differentiation

## 13 Series and Differential Equations

### Concept focus: Change, Modelling, Validity

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Differentiation is based on the concept of change. There is an introductory PowerPoint in the **Teaching and learning resources** that can be used to support the question: what is a rate of change?

There are resources that model Euler's method in Excel that can be used in conjunction with **Section 12B** in the textbook. The **TOK link** in **Section 13** of the textbook offers discussion surrounding the concept of validity.

The concepts of modelling and validity are also supported by the 'Economics' PowerPoint in the **Teaching and learning resources**.

# 11 Integration

# 12 Kinematics

## Concept focus: Systems, Change

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The concepts of systems and change are engrained in the topic of Kinematics. The **Teaching and learning resources** contains a PowerPoint to support this idea. It is an ideal introduction to these chapters.

The worked **Example 13.8** and the discussion and modelling activity afterwards around the concept of change are excellent opportunities for student presentations.