

Summary

HL - Vectors

Subject	Year	Start date	Duration
Mathematics: applications and interpretation	IB2	Week 2, January	2 weeks

Course Part

Description

In this unit you will learn how to use vectors in the 2D and 3D plane to solve kinematic problems.

Inquiry & Purpose

Inquiry / Higher Order Questions

Type	Inquiry Questions
Skills-based	How are vectors and matrices related? What are the similarities/ differences?
Concept-based	What are the flaws in using vectors to describe a real-life kinematic problem?

Curriculum

Aims

Develop logical and creative thinking, and patience and persistence in problem solving to instil confidence in using mathematics

Objectives

Problem solving: Recall, select and use their knowledge of mathematical skills, results and models in both abstract and real-world contexts to solve problems.

Syllabus Content

Topic 3: Geometry and trigonometry

AHL Content

AHL 3.10

Concept of a vector and a scalar.

Representation of vectors using directed line segments.

Unit vectors; base vectors i, j, k . Components of a vector; column representation; $\mathbf{v} = \begin{pmatrix} v_1 \\ v_2 \\ v_3 \end{pmatrix} = v_1 \mathbf{i} + v_2 \mathbf{j} + v_3 \mathbf{k}$

The zero vector $\mathbf{0}$, the vector $-\mathbf{v}$.

Position vectors $\overrightarrow{OA} = \mathbf{a}$

Rescaling and normalizing vectors.

AHL 3.11

Vector equation of a line in two and three dimensions: $\mathbf{r} = \mathbf{a} + \lambda \mathbf{b}$, where \mathbf{b} is a direction vector of the line.

AHL 3.12

Vector applications to kinematics.

Modelling linear motion with constant velocity in two and three dimensions.

Motion with variable velocity in two dimensions.

AHL 3.13

Definition and calculation of the scalar product of two vectors.

The angle between two vectors; the acute angle between two lines.

Definition and calculation of the vector product of two vectors.

Geometric interpretation of $|\mathbf{v} \times \mathbf{w}|$.

Components of vectors.


ATL Skills


 Approaches to Learning

 Thinking

Developing IB Learners

 Learner Profile

 Inquirers

 Knowledgeable

 Thinkers