

UNIT 3 PHYSICS

BOOK 1 – How Fast Can Things Go

Section 1: Unit 3 Physics Course Overview

Unit 3: How Do Fields Explain Motion and Electricity?
Areas of Study
Assessment

Section 2: Overview of Area of Study 3

How Fast Can Things Go?
Key Knowledge

Section 3: Area of Study 3 – How Fast Can Things Go?

Newton's Laws of Motion
Introduction

Vectors

Definitions
Working with Vectors
Addition of Vectors
Vector Subtraction
Vector Components

Constant Acceleration Formula

Motion Graphs

Newton's Laws

Newton's First Law
Newton's Second Law
Newton's Third Law

Inclined Planes

Projectile Motion

Range of a Projectile Motion
Air Resistance
Additional Questions on Projectile Motion

Circular Motion

Circular Motion at Constant Speed

Weight and Weightlessness

Banked Turns

Momentum and Impulse

Conservation of Momentum
Solving Questions Where Momentum is Conserved
Explosions
Force vs Time Graphs of Objects in Motion

Finding the Area Under a Force vs Time Graph
Force vs Time Graphs of Colliding Objects

Elastic and Inelastic Collisions

Additional Impulse and Momentum Questions
Elastic Potential Energy
Hooke's Law
Work
Realistic Force vs Compression Graphs

Gravitational Force-Distance Graphs

Finding the Energy Change from Force vs Distance Graphs

Weightlessness in Orbit

Special Relativity

Introduction to Special Relativity
Galilean and Newtonian Relativity
Theory of Special Relativity
Time Dilation
Length Contraction
Relativistic Mass
Mass – Energy

BOOK 2

Section 1: How Do Things Move Without Contact?

Introduction

Fields and Interaction
Static and Changing Fields
Electric Charge

Electric Fields

The Shape of an Electric Field
Electric Fields Between Point Charges
Field Lines

Magnetic Materials

Magnets are Always Dipoles
Magnetic Fields
Magnetic Field Strength
Magnetic Fields Around Currents
Increasing the Strength of a Magnetic Field

Electric Fields

Coulomb's Law (Electric Force)
Potential Energy in a Uniform Electric Field
Electric Force in a Uniform Electric Field
Linear Accelerator

Magnetic Fields

Force on a Current in a Magnetic Field
The Direction of Force
The Magnetic Field of a Solenoid
Forces on Charges Moving in a Magnetic Field
The Path Radius of Electrons in a Magnetic Field
DC Motors

Gravitation

Gravitational Fields
Gravitational Field Strength
Newton's Law of Universal Gravitation
A Quick Note Regarding Weight and Mass
Orbital Motion of Planets and Satellites
Types of Orbits
Orbital Motion
Orbital Speed
Kepler's Law of Periods
Total Energy and Work Done During Circular Motion
Gravitational Force – Distance Graphs

Comparison of Electric, Magnetic and Gravitational Fields

Section 2: How are Fluids Used to Move Electrical Energy?

Generation of Electricity – VCAA Study Design Key Knowledge

Conductors Pushed Through Magnetic Fields
Magnetic Flux
Electromagnetic Induction
Induced EMF in a Straight Conductor

Generators

How Generators Differ from Motors
Calculation of EMF

Transmission of Electricity – VCAA Study Design Key Knowledge

Alternating Voltage and Current
Transformers
Power Transmission