

UNIT I - WAVES & LIGHT

Content

- Wave properties
- Wave effects
- Reflection of light
- Refraction of light
- Total internal reflection
- Optical fibres
- Dispersion
- Converging lenses
- Electromagnetic spectrum
- Sound waves
- Pitch and loudness
- Echoes

Resources & ICT

- Textbooks
- Worksheets
- PowerPoint presentations
- Past exam papers
- Practical equipment
- YouTube clips
- Online resources from the BM website

Students to Know

- Meaning of wave motion and the vocabulary used to describe a wave
- Relevant formulae; wave equation, speed-distance-time
- Law of reflection and rules for refraction
- Names and order of the regions of the electromagnetic spectrum

Students to Understand

- The difference between a transverse and a longitudinal wave
- The nature of reflection, refraction and diffraction
- The relationship between speed, frequency and wavelength
- The principle of total internal reflection and its use in optical fibres

Students to be able to Do

- Recognise different wave effects; reflection, refraction and diffraction
- Draw ray diagrams to represent reflection, refraction and the action of a converging lens
- Perform calculations involving the wave equation, speed of sound and echo time

Cross curricular links

- Mathematics; speed, distance and time, basic algebra and geometry
- Geography; erosion

Types of assessment

- Quality and accuracy of practical work
- Past exam questions
- Exercises from textbooks
- End of unit topic test

Differentiation incl. EAL

- Extension work for gifted students
- Mixed ability practical groups
- Group work, individual and with teacher support

Learning styles activities

- Lectures
- Individual and group practicals
- YouTube clips
- Quizzes and tests
- Individual exercises
- Group discussions



Sunset, British Columbia, Canada

© Susan Wilkinson

Global citizenship, internationalism, local environment

- Images in the presentations depict local or international environment (wave diffraction at the port of Alexandria, Egypt; wave refraction in Alaska)
- Optical fibre communications, in Lausanne and globally
- Connection with frequently encountered optical and sound effects (rainbow, thunderstorm over Lake Geneva)



BRILLANTMONT
International School

UNIT 2 - MECHANICS

Content

- Speed, distance & time
- Uniform acceleration
- Distance-time graphs
- Speed-time graphs
- Freefall
- Nature of forces
- Resultant forces
- Newton's laws of motion
- Mass and inertia
- Weight and gravity
- Density
- Hooke's law
- Turning effect
- Principle of moments
- Conditions for equilibrium
- Centre of mass
- Stability
- States of equilibrium
- Work done
- Power
- Air and liquid pressure

Resources & ICT

- Textbooks
- Worksheets
- PowerPoint presentations
- Past exam papers
- Practical equipment
- YouTube clips
- Online resources from the BM website
- Autograph

Types of assessment

- Interpretation and plotting of data
- Quality and accuracy of practical work
- Past exam questions
- Exercises from textbooks
- End of unit topic test

Students to Know

- Relevant laws and formulae
- Conditions needed for an object to be in equilibrium

Students to Understand

- How a falling object accelerates due to the force of gravity and why it moves at its terminal velocity
- The difference between balanced and unbalanced forces
- The difference between mass and weight
- How the position of the center of mass affects stability

Students to be able to Do

- Interpret distance-time graphs and use them to calculate speed
- Interpret speed-time graphs and use them to calculate acceleration and distance travelled
- Explain how a force can change the size, shape or motion of an object
- Perform a variety of calculations

Cross curricular links

- Mathematics; speed, distance and time, speed-time graphs, gradients, basic algebra, ratio and proportion

Differentiation incl. EAL

- Extension work for gifted students
- Mixed ability practical groups
- Group work, individual and with teacher support

Learning styles activities

- Lectures
- Individual and group practicals
- YouTube clips
- Quizzes and tests
- Individual exercises
- Group discussions
- Data interpretation



Old cars, Siem Reap, Cambodia

© Susan Wilkinson

Global citizenship, internationalism, local environment

- Isaac Newton's contribution to the understanding of the physical universe
- Images in the presentations depict local or international environment (international motor race circuit, Orlando roller coaster)
- Connection with daily encountered mechanical physics
- Internationally used units of distance (kilometers, miles etc.)

UNIT 3 - ELECTRICITY

Content

- Current
- Potential difference
- Electromotive force
- Resistance
- Resistivity
- Electrical power and energy
- Circuits in series
- Circuits in parallel
- Dangers of electricity
- Static electricity
- Conductors and insulators
- Induced charges
- Charging by induction
- Electric fields

Resources & ICT

- Textbooks
- Worksheets
- PowerPoint presentations
- Past exam papers
- Practical equipment
- YouTube clips
- Online resources from the BM website

Students to Know

- The meaning of the terms current, voltage, resistance and e.m.f.
- Formulae for resistance, resistivity, electrical energy and power

Students to Understand

- The difference between an insulator and a conductor
- How some insulators become electrically charged
- How different factors affect resistance
- The dangers of mains electricity and various safety devices used

Students to be able to Do

- Explain how to measure current and voltage
- Calculate resistance from a V-I graph or using Ohm's law
- Draw and interpret circuit diagrams and name individual components
- Calculate resistance, current and voltage for series and parallel circuits

Cross curricular links

- Chemistry; atomic structure and metallic bonding
- Mathematics; basic algebra, graph plotting, gradients

Types of assessment

- Interpretation and plotting of data
- Quality and accuracy of practical work
- Past exam questions
- Exercises from textbooks
- End of unit topic test

Differentiation incl. EAL

- Extension work for gifted students
- Mixed ability practical groups
- Group work, individual and with teacher support

Learning styles activities

- Lectures
- Individual and group practicals
- YouTube clips
- Quizzes and tests
- Individual exercises
- Group discussions
- Data interpretation



Electrical lighting, Athens

© Susan Wilkinson

Global citizenship, internationalism, local environment

- Differences between countries in electrical safety methods employed
- Connection with daily encountered circuits
- Impact of conventional theory on international standards for circuit diagrams

UNIT 4 - ENERGY

Content

- Types of energy
- Forms of potential energy
- Energy transfer
- Conservation of energy
- Kinetic energy calculations
- Gravitational potential energy calculations
- Efficiency
- Renewable energy resources
- Non-renewable energy resources
- Production of electricity
- Conductors and insulators
- Conduction, convection and radiation
- Absorbers and emitters
- Practical applications

Resources & ICT

- Textbooks
- Worksheets
- PowerPoint presentations
- Past exam papers
- Lego energy models
- YouTube clips
- Internet research
- Online resources from the BM website

Types of assessment

- Past exam questions
- Exercises from textbooks
- End of unit topic test
- Presentations
- Posters

Students to Know

- The law of conservation of energy
- The formulae for kinetic energy and gravitational potential energy
- The meaning of renewable and non-renewable energy resources
- The meaning of conduction, convection and radiation

Students to Understand

- How objects gain gravitational potential energy
- How energy is conserved in energy transformations
- How electricity is generated in power stations in terms of energy transfers
- How the sun's energy and energy stored in water can be harnessed

Students to be able to Do

- Identify different forms of energy
- Calculate the kinetic energy and/or gravitational potential energy of an object
- Calculate the efficiency of an energy transfer
- Describe the advantages and disadvantages of different energy sources and their impact on the environment
- Identify and explain everyday applications of conduction, convection and radiation

Cross curricular links

- Mathematics; basic algebra, percentages
- Geography; energy resources, onshore and offshore breezes, trade winds
- Chemistry; organic chemistry, greenhouse gases, carbon cycle
- Biology; carbon cycle

Differentiation incl. EAL

- Extension work for gifted students
- Mixed ability practical groups
- Group work, individual and with teacher support

Learning styles activities

- Lectures
- YouTube clips
- Quizzes and tests
- Individual exercises
- Group discussions
- Posters
- Presentations



Energy transformations, Calgary, Canada

© Susan Wilkinson

Global citizenship, internationalism, local environment

- Global impact of a nuclear power disaster
- Different countries' uses of energy resources and their environmental impact
- Images in the presentations depict local or international environments
- Connection with energy transformations encountered daily



BRILLANTMONT
International School

December-January - 4 weeks
April-May - 2 weeks

UNIT 5 - MAGNETISM

Content

- Hard and soft magnetic materials
- Magnetic fields
- Induced magnetism
- Methods of magnetising
- Methods of demagnetising

Resources & ICT

- Textbooks
- Worksheets
- PowerPoint presentations
- Past exam papers
- Practical equipment
- YouTube clips
- Online resources from the BM website

Types of assessment

- Quality and accuracy of practical work
- Past exam questions
- Exercises from textbooks
- End of unit topic test

Students to Know

- The differences between hard and soft magnetic materials

Students to Understand

- The nature of a magnetic field
- The difference between like and unlike poles

Students to be able to Do

- Explain how materials can be magnetized and demagnetized
- Draw magnetic field lines

Cross curricular links

- Geography; Earth's magnetic field

Differentiation incl. EAL

- Extension work for gifted students
- Mixed ability practical groups
- Group work, individual and with teacher support

Learning styles activities

- Lectures
- Individual and group practicals
- YouTube clips
- Quizzes and tests
- Individual exercises
- Group discussions



Magnetic desert sand, Swakopmund, Namibia

© Susan Wilkinson

Global citizenship, internationalism, local environment

- Earth's magnetic field