



DEPARTMENT OF EDUCATION

National Pacing Guide: Physics

Grades: 10-12

2023-2024

Ministry of Education
NATIONAL PHYSICS PACING GUIDE
Standard Version – 3 years

GRADE 10 PHYSICS

Christmas Term September - December

WEEK	TOPIC
2 weeks	Introduction to physics... Scientists, Personalities and Careers Measurements. Basic Quantities and units. The Metric System. SI Units and Converting Units Scientific Notation Vectors Density
1 week	Other Measuring instruments. Measuring Cylinders. Graphing Exercise Timing Devices : Analog and Digital, balances
2 weeks	Forces: Introduction to Forces. Types of Forces. Weight and Mass Measure force using spring balance. Forces as vectors
4 weeks	Hooke's Law: Adding Forces, Pressure: Hydrostatics' Relationship between pressure force and area Solve problems Atmospheric Pressure: Pressure in fluids, Make a simple barometer, Investigate factors that affect pressure in fluids – depth and density Perform calculations to determine force and pressure in hydraulic systems
1 week	Archimedes principles, Practice Pressure calculations
1 week	Pascal's principle Pressure Gas Law
1 week	Floating and Sinking

Ministry of Education
NATIONAL PHYSICS PACING GUIDE
Standard Version – 3 years

GRADE 10 PHYSICS

EASTER AND SUMMER TERMS

WEEK	TOPIC
3 weeks	Speed Velocity and Acceleration: Recall the difference between scalar and vector quantities Explain and show how the term speed, velocity and acceleration and displacement compare to each other
3 weeks	Newton’s Law of Motion: State and Explain Newtons First Second and Third Laws Use the Laws to solve problems
4 weeks	Momentum Define momentum. Solve problems using the principle of conservation of momentum. Define Acceleration. Use the four equations of motion to solve problems Interpret motion graphs qualitatively Calculate acceleration and total displacement
5 weeks	Work, Energy and Power Define work. Measure and Calculate work done Name and describe the various forms of energy Calculate kinetic energy. Distinguish between kinetic and potential energy. Classify the different types of potential energy. Calculate potential energy Solve problems. Relate the concepts of energy time and power Calculate power in two different ways
4 weeks	Machines. Define machine Mechanical Advantage. Velocity ratio. Efficiency. Relationship among MA VR and Eff Explain the effect of machines on work and power Friction and Drag

Ministry of Education
NATIONAL PHYSICS PACING GUIDE
Standard Version – 3 years

GRADE 11 PHYSICS

CHRISTMAS TERM

WEEK	TOPIC
1 week	MATTER Kinetic Theory of Matter
2 weeks	Brownian Motion and Diffusion Properties of solid, Liquid and gas Change of State Phase Change
2 weeks	Gas laws : Boyle's law Charles Law
1 week	Combined Gas law Practice calculations on gas laws
1 week	Energy; Definition and units, Types of energy, Energy Changes
5 weeks	Energy Measurements, Energy Sources Heat Energy <ul style="list-style-type: none"> a. Temperature b. Expansion of solids and liquids c. Heat transfer: Conduction, convection and radiation d. Specific heat capacity e. Changes in state f. Latent heat of fusion and vaporization

Ministry of Education
NATIONAL PHYSICS PACING GUIDE
Standard Version – 3 years

GRADE 11 PHYSICS

EASTER AND SUMMER TERMS

WEEK	TOPIC
2 weeks	<p>Waves Mechanical Waves, Electromagnetic waves, Longitudinal waves, transverse</p>
3 weeks	<p>Sound Waves Describe how sound waves are produced. Identify sound waves as longitudinal waves. State properties of sound waves. Draw and label the Human ear and describe how it works. Explain echoes as reverberation. Solve problems using speed of sound equation</p>
3 weeks	<p>Water Waves Describe and illustrate reflection of parallel wave fronts off a plane concave and convex surface. Describe and illustrate refraction as waves from deep to shallow water. Examine and describe the effect of refraction on velocity, wavelength and frequency. Describe the term diffraction. Draw and explain the diffraction of straight wave fronts at wide and narrow apertures (gaps). Describe the inference of water using two points sources (constructive and destructive) Describe how waves arrive in phase and out of phase.</p>
2 weeks	<p>Light Waves Identify different light sources. State the properties of light. Explain the operations of a pinhole camera Draw and describe how shadows are forms using point and extended sources</p>
2 weeks	<p>Reflection State the laws of Reflection. Explain the effects of concave and convex mirrors using ray diagrams Explain the formation of virtual images by convex and concave mirrors using ray diagrams.</p>
4 weeks	<p>Refraction Define Refraction. Explain why refraction of light takes place Calculate and explain the term refractive index given values i and r Draw diagrams of the passage of light rays through rectangular blocks Explain why material with a high refractive index bends the light to a greater degree Calculate the critical angle given the refraction index</p>

	<p>Calculate real and apparent length Solve problems using Snell's law Colour – use prism to produce light spectrum</p>
4 weeks	<p>Lense Describe and draw the paths of light as they enter and leave the prism Draw and describe the effects of convex lenses on parallel light rays. Do the same for concave lenses. Use ray diagrams to find the position of an image produced by a convex or concave lens and identify the image as real or virtual Solve problems using lens equation. Calculate the magnification of lenses. Compare the human eye to a camera. View parts of a camera. Draw a ray diagram showing how a telescope produces an image of a distant object on the human retina.</p>

Ministry of Education
NATIONAL PHYSICS PACING GUIDE
Standard Version – 3 years

GRADE 12 PHYSICS

CHRISTMAS TERM

WEEK	TOPIC
3 weeks	ELECTRICITY Electrostatics – atomic model Charges electroscope Capacitors
6 weeks	CURRENT ELECTRICITY Conductors and insulators Conventional current Simple circuits Ohm’s Law Current and charge Ohmic and non-ohmic conductors
1 week	ELECTRICAL ENERGY, POWER AND DOMESTIC APPLICATION Local power supply House wiring Cost of electricity Safety
1 week	Magnetism and Electromagnetism
1 week	Magnetic fields, electric motor Electromagnetic Induction: Faraday’s law, Lenz law, a.c. generator & transformers d.c. motor, galvanometer, induced e.m.f.

Ministry of Education
NATIONAL PHYSICS PACING GUIDE
Standard Version – 3 years

GRADE 12 PHYSICS

EASTER AND SUMMER TERMS

WEEK	TOPIC
2 weeks	Nuclear Physics State the size of atoms. Structure. Draw and label parts of an atom.
2 weeks	Nuclear Reactions Define the term chain reaction. State the difference between fusion and fission. Explain the principle of operation of a Geiger- Miller tube and a diffusion cloud chamber
2 weeks	Radioactive emissions Describe experiments to compare the range and penetrating power of Alpha, Beta and Gamma rays in different materials. Recall the ionizing abilities of Alpha, Beta and Gamma rays
3 weeks	Half life Define the term half-life and state its importance in long term storage of nuclear waste. Describe an experiment from which a radioactive curve can be obtained. Show from a graph that radioactive decay processes have a constant half-life. Solve simple problems on half life
2 weeks	Applications of Nuclear Physics State and describe the main design features of a nuclear power plant and problems involved Describe how radioactive isotopes can be used in medicine, archaeology and food processing Discuss the danger of radioactivity and safety precautions necessary
4 weeks	Electronics Electronic Devices Cathode Ray tube Diode in circuits. Describe the action of an LDR, a thermistor and LED and a photodiode Explain the action of an electric bell, a relay, a reed switch and the microphone and receiver of a telephone
3 weeks	Simple Electronic Circuits Describe how simple circuits such as motor control and burglar alarms work.