Physics 11

Foundational Outcomes

NOVA SCOTIA
NOUVELLE-ÉCOSSE

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Prepared by the Department of Education and Early Childhood Development

This is the most recent version of the current curriculum materials as used by teachers in Nova Scotia.

Physics 11

EECD has made suggestions for prioritizing outcomes to assist teachers as they support student learning. Teachers will need to make their professional decisions based on the needs of their students.

The Foundational Outcomes identified in this document represent outcomes determined to be relevant for future learning in the discipline. Decisions about foundational outcomes were made in consultation with teachers, science specialists and post-secondary institution expectations. The foundational outcomes are meant to guide teachers in making decisions about creating learning experiences that will prepare and engage their learners in a responsive way. However, a teacher's professional judgment remains the most crucial factor for responding effectively to the needs of learners.

It might be relevant for teachers to review or to seek out learning outcomes from an earlier curriculum or grade level in order to support learners moving forward with current curriculum. Sometimes, however, current curricular learnings do not directly rely on learning from the previous year and current curriculum can be engaged in without additional review.

The learning environment (face-to-face, blended, online) will continue to be an important factor that will impact the types of learning experiences with which learners are able to engage. While learning science in a hands-on, experimental way is preferred, should laboratory experiments not be possible due to public health concerns, teachers are encouraged to offer online experiment simulations, to record scientific phenomena to discuss, notice, observe and unpack with learners, to support simple, safe experiments that could be done at home, to provide authentic data that can be analysed etc…

Integrated, project-based learning and inquiry-based learning (especially in areas that connect STSE) allow for learner choice and flexible pacing which is particularly effective for students to not only learn new concepts but also for demonstrating their learning.

It is suggested that the focus for science in grades 9-12 be on using the foundational outcomes to focus on foundational understandings for future learning, encouraging cross-cutting scientific themes and application of learning. Weighting for course modules should be reflective of the amount of time spent exploring the outcomes in the module.

Unit: Kinematics

Subtopic: PRESENTING VECTORS

- identify the frame of reference for a given motion and to distinguish fixed and moving frames (325-7)
- identify and investigate questions that arise from practical problems/issues involving motion (212-1)

Subtopic: VECTOR ANALYSIS

- use vectors to represent position, displacement, velocity, and acceleration (325-5)

Subtopic: ALGEBRAIC PROBLEM SOLVING

- analyze word problems, solve algebraically for unknowns, and interpret patterns in data (325-2)

Unit: Dynamics

Subtopic: DYNAMICS INTRODUCTION

- use vectors to represent forces (325-5)

Subtopic: NEWTON'S LAWS

- apply Newton's laws of motion to explain inertia and the relationships among force, mass, and acceleration (325-8)
- interpret patterns and trends in data and infer or calculate linear and non-linear relationships among variables (214-5)

Unit: Momentum and Energy

Subtopic: CONSERVATION OF MOMENTUM

- apply quantitatively the law of conservation of momentum to one-dimensional collisions and explosions (326-3)

Subtopic: WORK, POWER, AND EFFICIENCY

- analyze quantitatively the relationships among force, distance, and work (325-9)
- analyze quantitatively the relationships among work, time, and power (325-10)

Subtopic: TRANSFORMATION, TOTAL ENERGY, AND CONSERVATION

- analyze quantitatively the relationships among mass, speed, and thermal energy, using the law of conservation of energy (326-1)
- describe quantitatively mechanical energy as the sum of kinetic and potential energies (326-5)
- analyze quantitatively problems related to kinematics and dynamics using the mechanical energy concept (326-6)
- analyze common energy transformation situations using the closed system work-energy theorem (326-7)
- determine the percentage efficiency of energy transformation (326-8)

- design an experiment, select and use appropriate tools, carry out procedures, compile and organize data, and interpret patterns in the data to answer a question posed regarding the conservation of energy (212-3, 212-8, 213-2, 214-3, 214-5, 214-11, 326-4)
- determine which laws of conservation, momentum, and energy are best used to analyze and solve particular real-life problems in elastic and inelastic interactions (326-4)

Unit: Waves

Subtopic: FUNDAMENTAL PROPERTIES

- describe the production, characteristics, and behaviours of longitudinal and transverse mechanical waves (327-1)
- apply the universal wave equation to explain and predict the behaviour of waves (327-2)
- apply the laws of reflection and the laws of refraction to predict wave behaviour (327-7)

Subtopic: SOUND WAVES AND ELECTROMAGNETIC RADIATION

- apply the laws of reflection and the laws of refraction to predict wave behaviour (327-7)
- explain qualitatively and quantitatively the phenomena of wave interference, diffraction, reflection and refraction, and the Doppler-Fizeau effect (327-8)
- compare and describe the properties of electromagnetic radiation and sound (327-5)
- describe how sound and electromagnetic radiation, as forms of energy transfer, are produced and transmitted (327-6)

Note:

For Physics 12, teachers should ensure students have a solid grasp of dynamics, momentum and energy prior to engaging with the Physics 12 concepts.