

Grade 10 Science 10: Year at a Glance

Overview

The year begins with a look at how substances change at the chemical level. Your student will learn how atoms combine into compounds, why chemists follow strict naming rules, and how a balanced chemical equation captures what happens when substances react. Along the way, they will handle lab chemicals safely using WHMIS labels and symbols (the workplace system, which is similar in purpose to the hazard symbols on household cleaning products under your kitchen sink), and they will learn to calculate quantities of matter using the mole concept. [See the curriculum.](#)

Next comes a unit on the sun's role in shaping the climate. Your student will study how solar energy travels through the atmosphere and oceans to create different climate zones and biomes, from deserts to rain forests, and they will look at the evidence scientists use to track climate change. [See the curriculum.](#)

The third unit turns to the cell, the basic building block of all living things. Your student will learn how the invention of the microscope changed our understanding of life, how substances move in and out of cells, and how specialized plant cells work together to carry out functions like transporting water and exchanging gases. [See the curriculum.](#)

The year closes with a unit on energy in the machines and technologies we rely on every day. Your student will study the laws of thermodynamics, recognize that while energy is conserved, useful energy diminishes with each conversion, and examine why every energy conversion, from a car engine to a household appliance, loses some useful energy along the way. [See the curriculum.](#)

The year at a glance

Science 10

Unit	General outcomes	Specific outcomes
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Unit A (Nature of Science Emphasis) Overview: Chemical changes involve energy and transformations of matter.	Outcomes for Science, Technology & Society (STS) & Knowledge; Skill Outcomes; Attitude Outcomes	Students will: Explain, using the periodic table, how elements combine to form compounds, and follow IUPAC guidelines for naming ionic compounds and simple molecular compounds - illustrate an awareness of WHMIS guidelines, and... (see the curriculum); Students will: Identify and classify chemical changes, and write word and balanced chemical equations for significant chemical reactions, as applications of Lavoisier's law of conservation of mass - provide examples of household,... (see the curriculum); Students will: Describe the basic particles that make up the underlying structure of matter, and investigate related technologies - identify historical examples of how humans worked with chemical substances to meet their basic needs... (see the curriculum); Skill Outcomes (focus on scientific inquiry) Performing and Recording Students will: Conduct investigations into relationships between and among observable variables, and use a broad range of tools and techniques to gather and record... (see the curriculum); Skill Outcomes (focus on scientific inquiry) Initiating and Planning Students will: Ask questions about observed relationships, and plan investigations of questions, ideas, problems and issues - define and delimit problems to... (see the curriculum); Skill Outcomes (focus on scientific inquiry) Communication and Teamwork Students will: Work as members of a team in addressing problems, and apply the skills and conventions of science in communicating information and ideas and in... (see the curriculum); Skill Outcomes (focus on scientific inquiry) Analyzing and Interpreting Students will: Analyze data and apply mathematical and conceptual models to develop and assess possible solutions - describe and apply classification systems and... (see the curriculum); Mutual Respect Students will be encouraged to: Appreciate that scientific understanding evolves from the interaction of ideas involving people with different views and backgrounds *(e.g., recognize the contributions of Canadians to... (see the curriculum);
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Scientific Inquiry Students will be encouraged to: Seek and apply evidence when evaluating alternative approaches to investigations, problems and issues *(e.g., evaluate inferences and conclusions based on particles of matter that cannot... (see the curriculum); Interest in Science Students will be encouraged to: Show interest in science-related questions and issues, and confidently pursue personal interests and career possibilities within science-related fields *(e.g., apply concepts learned in... (see the curriculum); Collaboration Students will be encouraged to: Work collaboratively in planning and carrying out investigations, as well as in generating and evaluating ideas *(e.g., contribute to group work willingly, assume a variety of roles and... (see the curriculum); Safety Students will be encouraged to: Show concern for safety in planning, carrying out and reviewing activities *(e.g., acknowledge the need for regulations to govern the storage, handling and disposal of potentially hazardous... (see the curriculum); Stewardship Students will be encouraged to: Demonstrate sensitivity and responsibility in pursuing a balance between the needs of humans and a sustainable environment *(e.g., recognize that environmental consequences may arise from the... (see the curriculum)

Unit D (Social and Environmental Contexts Emphasis) Overview: Solar energy sustains life and drives the global climate systems on Earth.	Attitude Outcomes; Outcomes for Science, Technology & Society (STS) & Knowledge; Skill Outcomes	Safety Students will be encouraged to: Show concern for safety in planning, carrying out and reviewing activities *(e.g., demonstrate concern for self and others in planning and carrying out experimental activities involving the... (see the curriculum); Mutual Respect Students will be encouraged to: Appreciate that scientific understanding evolves from the interaction of ideas involving people with different views and backgrounds *(e.g., appreciate Aboriginal clothing and home designs... (see the curriculum); Scientific Inquiry Students will be encouraged to: Seek and apply evidence when evaluating alternative approaches to investigations, problems and issues *(e.g., view a situation from different perspectives, propose options and compare... (see the curriculum); Stewardship Students will be encouraged to: Demonstrate sensitivity and responsibility in pursuing a balance between the needs of humans and a sustainable environment *(e.g., recognize that human actions today may affect the... (see the curriculum); Interest in Science Students will be encouraged to: Show interest in science-related questions and issues, and confidently pursue personal interests and career possibilities within science-related fields *(e.g., expand their inquiries... (see the curriculum); Collaboration Students will be encouraged to: Work collaboratively in carrying out investigations and in generating and evaluating ideas *(e.g., choose a variety of strategies, such as active listening, paraphrasing and questioning, in... (see the curriculum); Students will: Analyze the relationships among net solar energy, global energy transfer processes, primarily radiation, convection and hydrologic cycle, and climate. (see the curriculum); Students will: Relate climate to the characteristics of the world's major biomes, and compare biomes in different regions of the world - describe a biome as an open system in terms of input and output of energy and matter and exchanges... (see the curriculum); Students will: Investigate and interpret the role of environmental factors on global
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energy transfer and climate change • investigate and identify human actions affecting biomes that have a potential to change climate (e.g., emission of... (see the curriculum); Students will: Describe how the relationships among input solar energy, output terrestrial energy and energy flow within the biosphere affect the lives of humans and other species • explain how climate affects the lives of people and other... (see the curriculum); Skill Outcomes (focus on the use of research and inquiry skills to inform the decision-making process) Performing and Recording Students will: Conduct investigations into relationships between and among observable variables, and use... (see the curriculum); Skill Outcomes (focus on the use of research and inquiry skills to inform the decision-making process) Communication and Teamwork Students will: Work as members of a team in addressing problems, and apply the skills and conventions... (see the curriculum); Skill Outcomes (focus on the use of research and inquiry skills to inform the decision-making process) Initiating and Planning Students will: Ask questions about observed relationships, and plan investigations of questions, ideas, problems... (see the curriculum); Skill Outcomes (focus on the use of research and inquiry skills to inform the decision-making process) Analyzing and Interpreting Students will: Analyze data and apply mathematical and conceptual models to develop and assess possible... (see the curriculum)

Unit C (Nature of Science Emphasis) Overview: The fundamental unit of life, the cell, is an example of an efficient open system comprised of a cell membrane and organelles that carry out the basic functions of all living organisms.	Attitude Outcomes; Outcomes for Science, Technology & Society (STS) & Knowledge; Skill Outcomes	Safety Students will be encouraged to: Show concern for safety in planning, carrying out and reviewing activities *(e.g., demonstrate concern for self and others in planning and carrying out experimental activities; select safe methods... (see the curriculum); Scientific Inquiry Students will be encouraged to: Seek and apply evidence when evaluating alternative approaches to investigations, problems and issues *(e.g., recognize that traditional Aboriginal cultures employed the principles of... (see the curriculum); Collaboration Students will be encouraged to: Work collaboratively in planning and carrying out investigations, as well as in generating and evaluating ideas *(e.g., assume responsibility for their share of the work in preparing for... (see the curriculum); Stewardship Students will be encouraged to: Demonstrate sensitivity and responsibility in pursuing a balance between the needs of humans and a sustainable environment *(e.g., show care and respect for all forms of life; evaluate the... (see the curriculum); Mutual Respect Students will be encouraged to: Appreciate that scientific understanding evolves from the interaction of ideas involving people with different views and backgrounds *(e.g., value the roles and contributions of men and... (see the curriculum); Interest in Science Students will be encouraged to: Show interest in science-related questions and issues, and confidently pursue personal interests and career possibilities within science-related fields *(e.g., apply concepts learned in... (see the curriculum); Students will: Describe the function of cell organelles and structures in a cell, in terms of life processes, and use models to explain these processes and their applications - compare passive transport of matter by diffusion and osmosis... (see the curriculum); Students will: Analyze plants as an example of a multicellular organism with specialized structures at the cellular, tissue and system levels - explain why, when a single-celled organism or colony of single-celled organisms reaches a... (see the curriculum); Students will: Explain the
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relationship between developments in imaging technology and the current understanding of the cell - trace the development of the cell theory: all living things are made up of one or more cells and the materials... (see the curriculum); Skill Outcomes (focus on scientific inquiry) Initiating and Planning Students will: Ask questions about observed relationships, and plan investigations of questions, ideas, problems and issues - define and delimit problems to... (see the curriculum); Skill Outcomes (focus on scientific inquiry) Analyzing and Interpreting Students will: Analyze data and apply mathematical and conceptual models to develop and assess possible solutions - compile and display, by hand or computer,... (see the curriculum); Skill Outcomes (focus on scientific inquiry) Performing and Recording Students will: Conduct investigations into relationships between and among observable variables, and use a broad range of tools and techniques to gather and record... (see the curriculum); Skill Outcomes (focus on scientific inquiry) Communication and Teamwork Students will: Work as members of a team in addressing problems, and apply the skills and conventions of science in communicating information and ideas and in... (see the curriculum)

Unit B (Science and Technology Emphasis) Overview: The first and second laws (conservation and conversion) of thermodynamics have been useful in the development of modern and efficient energy conversion devices.	Outcomes for Science, Technology & Society (STS) & Knowledge; Skill Outcomes; Attitude Outcomes	Students will: Explain the first law of thermodynamics (conservation of energy) and the second law of thermodynamics (conversion of energy) and apply these laws to analyze energy transformations and conversions in technological systems (see the curriculum); Students will: Analyze the efficiency of energy conversion devices and systems, and investigate and describe the relationship between mechanical energy, work and power (see the curriculum); Students will: Investigate and describe how thermal energy is transferred through conduction, convection and radiation, and explain how understanding thermal energy transfer is applied in technology (see the curriculum); Skill Outcomes (focus on scientific inquiry) Initiating and Planning Students will: Ask questions about observed relationships, and plan investigations of questions, ideas, problems and issues (see the curriculum); Skill Outcomes (focus on scientific inquiry) Performing and Recording Students will: Conduct investigations into relationships between and among observable variables, and use a broad range of tools and techniques to gather and record... (see the curriculum); Skill Outcomes (focus on scientific inquiry) Analyzing and Interpreting Students will: Analyze data and apply mathematical and conceptual models to develop and assess possible solutions (see the curriculum); Skill Outcomes (focus on scientific inquiry) Communication and Teamwork Students will: Work as members of a team in addressing problems, and apply the skills and conventions of science in communicating information and ideas (see the curriculum); Collaboration Students will be encouraged to: Work collaboratively in carrying out investigations and in generating and evaluating ideas *(e.g., select a variety of strategies, such as group brainstorming, active listening, paraphrasing... (see the curriculum); Interest in Science Students will be encouraged to: Show interest in science-related questions and issues, and pursue personal interests and career possibilities within science-related fields *(e.g., apply
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concepts learned in the... (see the curriculum); Stewardship Students will be encouraged to: Demonstrate sensitivity and responsibility in pursuing a balance between the needs of humans and a sustainable environment *(e.g., recognize that their choices and actions, and the choices and... (see the curriculum)

Across the year

- Energy shows up across three different units this year: as chemical energy in reactions, as solar energy driving climate, and as mechanical energy in technology. Pointing out these connections at home, such as noticing why a car engine gets warm, helps your student see energy in chemical changes [See the curriculum: 1, 2, 3.](#)
- Cells are described as open systems comprised of a cell membrane and organelles that exchange matter and energy with their surroundings [See the curriculum: 1, 2.](#)
- Safety habits carry through every unit, whether your student is handling lab chemicals, heating materials, or working with lab equipment. Reinforcing careful, safety-minded habits at home, such as reading labels before using household chemicals, supports what they practise in the lab. [See the curriculum: 1, 2, 3, 4.](#)
- Technology appears throughout the year as a tool that expands scientific understanding, from microscopes revealing the structure of cells to imaging technology furthering our understanding of cellular structure and function [See the curriculum: 1, 2, 3.](#)
- Scientific inquiry skills, such as asking questions, designing investigations, collecting data and communicating results, are built up unit by unit rather than taught once. Asking your student to explain what they measured and why in a recent lab is a simple way to check how these skills are developing. [See the curriculum: 1, 2, 3, 4.](#)