THE ACADEMY FOR GIFTED CHILDREN – P.A.C.E.
CURRICULUM OUTLINE AND ASSESSMENT AND EVALUATION
GRADE 7 SCIENCE

OVERALL EXPECTATIONS

STRAND A. STEM SKILLS AND CONNECTIONS

Throughout Grade 7, in connection with the learning in the Life Systems, Matter and Energy, Structures and Mechanisms, and Earth and Space Systems strands, students will:

STEM Investigation and Communication Skills

- Use a scientific research process, a scientific experimentation process, and an engineering design process to conduct investigations, following appropriate health and safety procedures.

Coding and Emerging Technologies (Skills learned in P.A.C.E.'s specialized Coding Curriculum)

- Use coding in investigations and to model concepts and assess the impact of coding and of emerging technologies on everyday life and STEM-related fields

Applications, Connections, and Contributions

- Demonstrate an understanding of the practical applications of science and technology, and of contributions to science and technology from people with divers lived experiences.

STRAND B. LIFE SYSTEMS – CELL DIVISION – locally designed by P.A.C.E.

- Describe the cell cycle in plants and animals and explain the importance of mitosis for the growth of cells and repair of tissues.
- Use a research process to investigate a disease or abnormality related to tissues, organs, or systems of humans.

STRAND C. MATTER AND ENERGY – PURE SUBSTANCES AND MIXTURES

- Evaluate the environmental and social impacts of the use and disposal of various pure substances and mixtures
- Demonstrate an understanding of the nature of matter, including the properties of pure substances and mixtures, and describe these properties using particle theory

STRAND D. STRUCTURES AND MECHANISMS – FORM, FUNCTION, AND DESIGN OF STRUCTURES

- Analyse personal, social, economic, and environmental factors that should be considered when designing and building structures
- Demonstrate an understanding of the relationship between structural forms and the forces acting on them

STRAND E. EARTH AND SPACE – HEAT IN THE ENVIRONMENT

- assess the benefits of technologies that reduce heat loss, and analyze various social and environmental impacts of the use of energy from renewable and non-renewable sources
- Investigate ways in which heat changes substances and describe how heat is transferred.
- Demonstrate an understanding of heat as a form of energy that is associated with the movement of particles and is essential to many processes within the Earth's systems.

COURSE CONTENT

STRAND A. STEM SKILLS AND CONNECTIONS

By the end of Grade 7 students will:

***** skills learned in P.A.C.E.'s specialized Coding Curriculum**

- use a scientific research process and associated skills to conduct investigations
- use a scientific experimentation process and associated skills to conduct investigations
- use an engineering design process and associated skills to design, build, and test devices, models, structures, and/or systems ***
- follow established health and safety procedures during science and technology investigations, including wearing appropriate protective equipment and clothing and safely using tools, instruments, and materials
- communicate findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes
- write and execute code in investigations and when modelling concepts, with a focus on planning and designing programs***
- identify and describe impacts of coding and of emerging technologies on everyday life, including skilled trades***
- describe practical applications of science and technology concepts in various occupations, including skilled trades, and how these applications address real-world problems ***
- investigate how science and technology can be used with other subject areas to address real-world problems ***
- analyze contributions to science and technology from various communities ***

STRAND B. LIFE SYSTEMS – CELL DIVISION – locally designed by P.A.C.E.

By the end of Grade 7 students will:

- demonstrate an understanding of cells, using cell theory
- examine different plant and animal cells under a microscope or microviewer
- and draw labelled biological diagrams to show how the cells' organelles differ
- explain the primary functions of a variety of systems in animals
- describe the cell cycle in plants and animals, and explain the importance of mitosis for the growth of cells and repair of tissues
- examine cells under a microscope or similar instrument to identify the various stages of mitosis in plants and animals
- investigate the rate of cell division in cancerous and non-cancerous cells, using pictures, videos, or images, and predict the impact of this rate of cell division on an organism
- explain the importance of cell division and cell specialization in generating new tissues and organs.

STRAND C. MATTER AND ENERGY – PURE SUBSTANCES AND MIXTURES

By the end of Grade 7 students will:

- develop/demonstrate a knowledge of the naming of chemical formulae and their use in communication
- analyze the social and environment impacts of the use and disposal of pure substances found in technological devices, considering local and global perspectives
- assess environmental and social impacts of different industrial methods used to separate mixtures
- demonstrate an understanding of the particle theory of matter
- use particle theory to distinguish between pure substances and mixtures
- distinguish between homogenous (solutions) and heterogenous (mechanical) mixtures

- use the particle theory to describe how different factors affect the solubility of a substance and the rate at which it dissolves
- describe the concentration of a saturated solution in both qualitative and quantitative terms, and differentiate between saturated and unsaturated solutions
- explain why water is referred to as the universal solvent
- explain various processes used to separate mixtures, including solutions, into their components, and identify some applications of these processes
- describe pure substances as elements and compounds consisting of atoms and combinations of atoms
- describe the difference between saturated and unsaturated solutions

STRAND D. STRUCTURES AND MECHANISMS – FORM, FUNCTION, AND DESIGN OF STRUCTURES

By the end of Grade 7 students will:

- evaluate environmental, social, and economic factors that should be considered when designing and building structures to meet specific needs for individuals and communities
- evaluate the impact of the ergonomic design of various tools, objects, and work spaces on a user's health, safety, and ability to work efficiently, and use this information to describe changes that could be made in their own spaces and activities
- classify structures as solid structures, frame structures, or shell structures
- describe ways in which the centre of gravity of a structure affects the structure's stability
- identify the magnitude, direction, point of application, and plane of application of the forces applied to a structure (external forces (e.g., wind, gravity, earthquakes) and internal forces (tension, compression, shear, and torsion))
- describe the role of symmetry in structures, and identify instances of symmetry in various structures
- describe factors that can cause a structure to fail
- identify the factors that determine the suitability of materials for use in manufacturing a product or constructing a structure
- design, construct, and use physical models to investigate the effects of various forces on structures
- use technological problem-solving skills to determine the most efficient way for a structure to support a given load
- describe methods engineers and other professionals use to assess, improve, and maintain the safety of structures

STRAND E. EARTH AND SPACE – HEAT AND THE ENVIRONMENT

By the end of Grade 7 students will:

- assess the social and environmental benefits of technologies that reduce heat loss in enclosed spaces or heat transfer to surrounding spaces
- analyse various social, economic, and environmental impacts, including impacts related to climate change, of using non-renewable and renewable sources of energy
- use particle theory to explain how heat affects the motion of particles in a solid, a liquid, and a gas
- demonstrate an understanding of various ways in which heat is generated
- use particle theory to explain the effects of heat on volume in solids, liquids, and gases, including during changes of states of matter
- use scientific inquiry/experimentation skills to investigate how heat is transmitted through conduction, and describe natural processes that are affected by conduction
- explain how heat is transmitted in liquids and gases through convection, and describe natural processes that depend on convection
- calculate the amount of energy created when adding heat to substances
- calculate the heat transferred between different substances

- explain how heat is transmitted through radiation, and describe the effects of radiation from the Sun on different kinds of surfaces
- describe the role of radiation in heating and cooling Earth, and explain how greenhouse gases affect the transmission of radiated heat through the atmosphere
- identify common sources of greenhouse gases, including sources resulting from human activity, and describe how humans can reduce emissions of these gases

RESOURCES
A variety of science resources locally designed by P.A.C.E.

ASSESSMENT AND EVALUATION

	Term 1 (Biology)	**Term 2 (Chemistry)**	**Term 3 (Structures and Mechanisms and Heat and the Environment)**
Assessment For Learning	**Activities** -Microscopic Diagrams of a Cheek Cell -Mitosis Activity -Planaria Activity -Using DNA in forensics	**Activities** - Identifying unknown substances using Qualitative Observations -Filter Challenge -Calculating Solubility **Practice Problems** -Atom Structure -Periodic Table -Naming Molecules -Bonding Atoms	**Activities** -Let's Talk Science Challenge STEM Activities - The Effects of Salt and Antifreeze on the Melting Point of Ice **Practice Problems** -Force and Structural Efficiency -Specific Heat Capacity
Assessment As Learning	-Individual and group conversations -Peer Evaluation -Self Reflection -Exit Cards	-Individual and group conversations -Peer Evaluation -Self Reflection -Exit Cards	-Individual and group conversations -Peer Evaluation -Self Reflection -Exit Cards
Assessment OF Learning	**Experiments** -Observations-following the procedure, making hypotheses, collecting data, drawing conclusions - Specialized Cell Lab -Osmosis Lab -Cancer Lab -Dissection **Biology Test**	**Experiments** Observations-following the procedure, making hypotheses, collecting data, drawing conclusions - Lab Reports -Physical and Chemical Changes -Bonding and Naming Atoms -Identifying types of Mixtures **Chemistry Test**	**Experiments** -Observations-following the procedure, making hypotheses, collecting data, drawing conclusions Observations-following the procedure, making hypothesis -Building and Designing Structures to withstand earthquakes -Building and Designing Structures Project -Heating Curve of Water -Specific Heat Capacity of different substances **Heat Test**
Weighting Per Performance Strand	**K/U: 20%** **T/I: 35%** **App: 30%** **Comm: 15%**	**K/U: 20%** **T/I: 35%** **App: 30%** **Comm: 15%**	**K/U: 20%** **T/I: 35%** **App: 30%** **Comm: 15%**