



## Cambridge Science Learning Objectives

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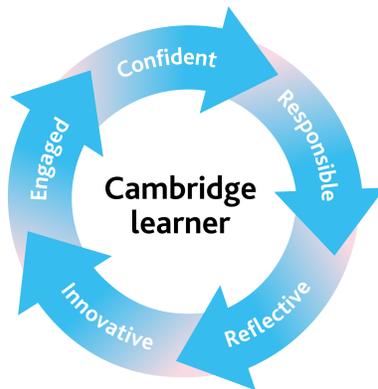
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Hillel Academy will welcome the Cambridge International Curriculum and Pedagogy for Physical Science for 8th-grade in the 2021 school year. This course provides a high school credit for students.

The Cambridge International Science Curriculum and Pedagogy for Kindergarten through 7th-grade will be adopted by Hillel Academy in the 2022 school year. In the meantime, Hillel Academy is committed to its current science curriculum, driven by Florida's Sunshine State Standards, and will continue to practice the philosophy that students learn about science by doing science.

The Cambridge Science curriculum supports learners in developing life-long curiosity about the natural world and enables them to seek scientific explanations to the phenomena around them. Learners develop a holistic approach to science by considering scientific thinking and practical skills alongside knowledge and understanding which is vital for explaining the world around us. This approach provides learners with the knowledge and skills they require to access and excel at science in later phases of education.

A unique feature of the Cambridge Science curriculum is a strand called Science in Context which supports demonstrating the relevance of science to learners. Improving learners' awareness of science in the world around them develops their sense that 'science is for me' and starts learners on a journey of connecting themselves to the subject.



**Responsible** – Learners are responsible for themselves and for working collaboratively with others when investigating science. They understand how the application of science can have impacts on others and on the environment. They appreciate the role science has in the modern world, including in their communities.

**Innovative** – Learners are able to use their scientific skills and understanding to adapt to new, unfamiliar and future challenges. They are flexible and critical thinkers when studying scientific phenomena.

**Confident** – Learners are secure in their scientific understanding of the world, confident in working with scientific information and ideas and ready to challenge their own thinking. They are able to present their findings and defend their conclusions as well as respect those of others.

**Engaged** – Learners are curious and want to deepen their scientific understanding. They are keen to develop their ability to do science and are open to new ideas. They are able to use science to participate constructively in society and the economy by making informed choices involving science, at personal, local, national and global levels.

**Reflective** – Learners are reflective as scientists, able to review their understanding of the world and discover more. They are concerned with the process of science as well as the products of science and develop skills to allow them to investigate science independently.

### Overview of teaching approaches

The Cambridge Science curriculum offers great flexibility through its three strand categories approach: skills strand, content strand, and context strand. The three types of strands are designed to support each other in every stage of learning to provide learners with a holistic science education.

Science is a practical subject and the teaching of science at Hillel Academy includes opportunities for learners to observe and carry out practical work.

## Kindergarten

Kindergarten students use a hands-on approach to understanding the scientific method and how to recognize and solve problems in the real world. Carrying out experiments and depending on their 5 senses, the students are asked to observe the world around them and to discover and describe how various systems work.

**Resources:**

- Pearson Interactive Science
- Scholastic News

**Physical Science**

- The Nature of Science: questions, observations, learning together, sharing knowledge
- Problem Solving: making a plan
- Objects: sorting, identifying different properties
- Your five senses
- Mixtures and Matter
- Motion

**Life Science**

- Living and Non-Living Things
- Plants and Animals

**Earth Science**

- Earth and Sky

## First Grade

First grade students use a variety of literature and hands-on teaching materials to learn about the “scientific method.” Students are encouraged to explore the world around them, formulate questions, investigate those questions, collect the appropriate data, and learn to evaluate and communicate information.

**Resources:**

- Pearson Interactive Science
- Scholastic News
- TIME for Kids

**Engineering and Technology**

- Inquiry: What questions do scientists ask? What skills do scientists use?
- The Design Process

### Life Science

- Living Things and Their Environments
- Plants and Animals

### Earth Science

- Earth and Sky
- Water

### Physical Science

- Matter
- Energy
- Movement

## Second Grade

Second grade students conduct experiments and participate in hands-on activities to learn and practice skills such as classifying, measuring, predicting, drawing conclusions, and using models.

### Resources:

- Pearson Interactive Science
- Scholastic News
- TIME for Kids

### Engineering and Technology

- The Nature of Science
- Technology and Tools

### Life Science

- Plants and Animals
- Growing and Changing

## Earth Science

- Earth's Materials
- The Solar System
- Weather

## Physical Science

- Matter
- Energy, Motion and Force

# Third Grade

The Third-Grade Science curriculum prepares the foundation for the Middle School Science program by focusing on the Earth Sciences. It includes a study of Weather and Climate, Earth's Surface, Earth Systems, and Space. Most importantly, the science program, as all science programs should be, is a hands-on exploration of the world around the students.

### Resources:

- Pearson Interactive Science

## Weather & Climate

- Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.
- Obtain and combine information to describe climates in different regions of the world.
- Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.

## Earth's Surface

- Identify patterns in rock formations and fossils in rock layers to support an explanation for changes in the landscape over time.
- Make observations and or measurements to provide evidence of the effects of weathering and the rate of erosion by wind, water, ice, or vegetation.
- Generate and compare multiple solutions to reduce the impact of natural Earth processes (earthquake, volcano, flood, tsunami) on humans.

## Earth Systems

- Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and atmosphere interact.

- Describe and graph the amounts and percentages of water and freshwater in various reservoirs to provide evidence about the distribution of water on Earth.
- Obtain and combine information about ways individual communities use science ideas to protect Earth's resources and environment.

## Space

- Support an argument that the gravitational force exerted by Earth on objects is directed down.
- Support an argument that the apparent brightness of the sun and stars is due to their relative distances from Earth.
- Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the season appearance of some stars in the night sky.

# Fourth Grade

The Fourth-Grade Science curriculum prepares the foundation for the Middle School Science program by focusing on the Life Sciences. It includes a study of Ecosystems, Life Cycles and Traits, and Plant and Animal Adaptations. Most importantly, the science program, as all science programs should be, is a hands-on exploration of the world around the students.

## Resources:

- Pearson Interactive Science

## Ecosystems

- Construct an argument that some animals form groups that help members survive.
- Analyze and interpret data from fossils to provide evidence of the organisms and the environment in which they lived long ago.
- Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.
- Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.
- Use models to describe that energy in animals' food (used for growth, body repair, motion and to maintain body warmth) was once energy from the sun.
- Use a model to describe that animals receive different types of information through their senses, process the information in their brain and respond to the information in different ways.

## Life Cycles and Traits

- Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.
- Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

- Use evidence to support the explanation that traits can be influenced by the environment.
- Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

### **Plant and Animal Adaptations**

- Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior and reproduction.
- Use a model to describe that animals receive different types of information through their senses, process the information in their brain and respond to the information in different ways.

## **Fifth Grade**

The Fifth-Grade Science curriculum prepares the foundation for the Middle School Science program by reviewing and building upon the knowledge and skills developed in elementary school as students prepare for their transition into higher level science study in middle school. Most importantly, the science program, as all science programs should be, is a hands-on exploration of the world around the students.

### **Resources:**

- **Pearson Interactive Science**

### **Engineering and Technology**

- Inquiry and Technology
- Design and Function

### **Life Science**

- Classifying Organisms
- Growth and Survival
- Human Body Systems
- Ecosystems

### **Earth Science**

- The Water Cycle and Weather
- Earth's Surface
- Earth and Space

### **Physical Science**

- Matter and Its Properties
- Forces and Motion
- Changing Forms of Energy

## Middle School Science Philosophy

As science and the interests of the students evolve, so do the details of Hillel Academy's middle school science curriculum. Science curricular units in the middle school follow the five E's instructional model (Engage, Explore, Explain, Elaborate, Evaluate), based on the constructivist approach to learning. With this in mind, lessons, projects, and laboratory experiments are designed to expose students to science and its many facets, emphasizing the development of deeper understanding rather than memorization.

Although the curriculum follows a general "one overall subject area per year" format, this does not exclude the extensive integration of all science disciplines into each subject area. Students do not see science as three isolated disciplines, but rather a much larger, well-integrated and evolving method to view and explore the world. Students also engage in project-based and laboratory practical assessments.

Overall, there is an extreme emphasis on depth rather than breadth in a gradual effort to teach students HOW to think rather than WHAT to think. Earth Sciences, Life Sciences, and Physical Sciences are used as curricular contexts to explore each student's sense of wonder and accomplish this goal.

Finally, Hillel Academy students graduate with a single science High School credit in Integrated Physical Science.

## Sixth Grade: Earth Science

### Resources:

- Interactive Science Earth's Structure
- Interactive Science Astronomy and Space Science (Pearson)

### Introduction to the Nature of Science

- Laboratory Safety and Equipment in Earth Science
- What is science?
- Evolving Nature of Science
- Measurement
- Broad Nature of Science
- The fallacy of "being right" or "proving" things

## Plate Tectonics

- Earth's Interior
- Convection and the Mantle
- Drifting Continents
- Sea-Floor Spreading
- The Theory of Plate Tectonics

## Earthquakes

- Forces in Earth's Crust
- Earthquakes and Seismic Waves
- Monitoring Earthquakes
- Earthquake Safety

## Volcanoes

- Volcanoes and Plate Tectonics
- Properties of Magma
- Volcanic Eruptions
- Volcanic Landforms

## Minerals

- Properties of Minerals
- How Minerals Form
- Using Mineral Resources

## Rocks

- Classifying Rocks
- Igneous Rocks
- Sedimentary Rocks
- Rocks From Reefs
- Metamorphic Rocks
- The Rock Cycle

## Earth, Moon, and Sun

- Earth in Space
- Gravity and Motion
- Phases, Eclipses, and Tides
- Earth's Moon

### **The Solar System**

- The Sun
- The Inner Planets
- The Outer Planets
- Comets, Asteroids, and Meteors
- Is There Life Beyond Earth?

### **Stars, Galaxies, and the Universe**

- Characteristics of Stars
- Lives of Stars
- Star Systems and Galaxies
- The Expanding Universe

### **Exploring Space**

- The Science of Rockets
- The Space Program
- Exploring Space Today
- Using Space Science on Earth

### **Marine Lab - Four day Marine Biology exploration in the Florida Keys**

- Data Collection and Analysis
- Field Research Process
- Florida Marine Environments
- Coral Ecology
- Invertebrate and Vertebrate Classification
- Shark and Squid Dissection

## **Seventh Grade: Life Science**

### **Resources:**

- Interactive Science Cells and Heredity

## Introduction to the Nature of Science

- Laboratory Safety and Equipment in Life Science
- What is science?
- Evolving Nature of Science
- Measurement
- Broad Nature of Science
- The fallacy of “being right” or “proving” things

## Cell Structure and Function

- Discovering Cells
- Looking Inside Cells
- Chemical Compounds in Cells
- The Cell in Its Environment

## Cell Processes and Energy

- Photosynthesis
- Cellular Respiration
- Cell Division
- Cancer and the Cell

## Genetics

- Gregor Mendel’s Work
- Probability and Heredity
- The Cell and Inheritance
- The DNA Connection
- Modern Genetics
  - Human Inheritance
  - Human Genetic Disorders
  - Advances in Genetics

## Bones, Muscles, and Skin

- Body Organization and Homeostasis
- The Skeletal System
- Diagnosing Bone and Joint Injuries

- The Muscular System
- The Integumentary System

### **Nutrition and Digestion**

- Food and Energy
- “Healthy” Eating
- The Digestive Process Begins
- Final Digestion and Absorption

### **Circulation and Respiration**

- The Body’s Transport System
- A Closer Look at Blood Vessels
- Blood and Lymph
- Cardiovascular Health
- The Respiratory System

### **Endocrine System and Reproduction**

- The Endocrine System
- The Male and Female Reproductive Systems
- The Human Life Cycle

### **The Nervous System**

- How the Nervous System Works
- Divisions of the Nervous System
- The Senses
- Alcohol and Other Drugs

## **Eighth Grade: Cambridge Physical Science**

Students receive a high school science credit upon the successful completion of this course.

**Cambridge Physical Science enables learners to:**

- increase their understanding of the technological world
- take an informed interest in scientific matters

- recognise the usefulness (and limitations) of scientific method, and how to apply this to other disciplines and in everyday life
- develop relevant attitudes, such as a concern for accuracy and precision, objectivity, integrity, enquiry, initiative and inventiveness
- develop an interest in, and care for, the environment
- better understand the influence and limitations placed on scientific study by society, economy, technology, ethics, the community and the environment
- develop an understanding of the scientific skills essential for both further study and everyday life.

### Resources:

- Introductory Physical Science

### Chemistry

- The particulate nature of matter
- Experimental techniques
- Atoms, elements and compounds
- Stoichiometry
- Electricity and chemistry
- Energy changes in chemical reactions
- Acids, bases and salts
- The Periodic Table
- Metals
- Air and water
- Carbonates
- Organic chemistry

### Physics

- General physics
- Thermal physics
- Properties of waves, including light and sound
- Electricity and magnetism
- Atomic physics