

# 4th Grade American Online School

## SCIENCE CURRICULUM

### Exploring Living Systems, Energy, Technology, and the Human Experience

Version May/2025

## 1. Introduction

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### The Role of Science Education in 4th Grade

The 4th Grade Science curriculum empowers students to explore the world around them by observing, questioning, and investigating natural and man-made phenomena. Students develop foundational scientific thinking by learning how plants grow, how energy moves, how ecosystems work, and how humans interact with tools and technology. The program fosters curiosity and responsibility toward the living and physical world.

By the end of this course, students will:

- ✓ Conduct hands-on experiments using the scientific method.
  - ✓ Understand plant systems, senses, and energy transfer.
  - ✓ Explore stability, structure, and design in technological systems.
  - ✓ Observe and model ecological relationships in nature.
  - ✓ Communicate findings using models, diagrams, and clear explanations.
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## 2. Core Competence Areas

### SCI.1 Plants and Living Systems

#### Learning Outcomes

By the end of this course, students will be able to:

- ✓ Identify plant parts and explain their functions.
- ✓ Understand what plants need to grow and reproduce.
- ✓ Conduct investigations on plant life cycles and environments.

#### Competencies

##### SCI.1.A.1 – Exploring plant anatomy and growth.

- Label roots, stems, leaves, and flowers; explain photosynthesis.
- Grow a plant from seed and observe its changes.

##### SCI.1.A.2 – Connecting plants to ecosystems.

- Understand the role of plants in food chains and habitats.
- Create a “Plant Life Journal” to track variables in growth.

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### SCI.2 Electrical Energy and Simple Circuits

#### Learning Outcomes

By the end of this unit, students will be able to:

- ✓ Understand basic electricity and how circuits work.
- ✓ Build and test simple series and parallel circuits.
- ✓ Explain how energy flows through conductors and insulators.

#### Competencies

##### SCI.2.A.1 – Investigating sources and flow of electricity.

- Distinguish between batteries and power sources.
- Experiment with switches, wires, and bulbs.

## **SCI.2.A.2 – Applying knowledge to real-world systems.**

- Design a working flashlight model or alarm system.
  - Reflect on energy use and safety in everyday life.
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## **SCI.3 Ecology and Environmental Responsibility**

### **Learning Outcomes**

By the end of this unit, students will be able to:

- ✓ Define ecosystems and identify relationships among organisms.
- ✓ Analyze how changes in environments affect living things.
- ✓ Explore recycling, pollution, and environmental stewardship.

### **Competencies**

#### **SCI.3.A.1 – Understanding food chains and habitats.**

- Model producers, consumers, and decomposers.
- Create ecosystem posters or dioramas.

#### **SCI.3.A.2 – Practicing ecological awareness.**

- Track waste and recycling at home/school.
  - Propose ideas for reducing environmental impact.
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## **SCI.4 Tools and Force: Foundations of Physics**

### **Learning Outcomes**

By the end of this unit, students will be able to:

- ✓ Explore how tools use force and motion to make tasks easier.
- ✓ Identify simple machines and describe how they work.
- ✓ Analyze pushes, pulls, and balanced forces in systems.

## Competencies

### SCI.4.A.1 – Investigating simple tools.

- Use levers, inclined planes, pulleys, and wheels to complete tasks.
- Experiment with effort and load in classroom setups.

### SCI.4.A.2 – Exploring force and interaction.

- Measure distance and direction of motion using ramps or cars.
  - Record and compare results using charts and graphs.
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## SCI.5 Technology and Stability: What Holds and Why?

### Learning Outcomes

By the end of this unit, students will be able to:

- ✓ Understand how engineers test for balance and structural strength.
- ✓ Investigate materials and how they affect stability.
- ✓ Design and improve models based on testing results.

## Competencies

### SCI.5.A.1 – Identifying strong and stable structures.

- Explore bridges, towers, and earthquake-resistant design.
- Build and test models under load and wind conditions.

### SCI.5.A.2 – Applying design thinking.

- Sketch, test, and revise a structure that meets a challenge.
  - Present final prototypes and reasoning in a “Mini Expo.”
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## **SCI.6 The Human Senses and Sensory Processing**

### **Learning Outcomes**

By the end of this unit, students will be able to:

- ✓ **Describe the five senses and their corresponding organs.**
- ✓ **Explore how the brain interprets sensory input.**
- ✓ **Investigate how senses help us survive and understand our environment.**

### **Competencies**

#### **SCI.6.A.1 – Mapping senses to brain and body.**

- Label sense pathways (eye/vision, ear/hearing, etc.).
- Test sense accuracy using class experiments.

#### **SCI.6.A.2 – Creating sensory exploration stations.**

- Design smell jars, texture boards, and sound matching activities.
- Journal sensory experiences using descriptive language.

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## **SCI.7 Energy and its Forms**

### **Learning Outcomes**

By the end of this unit, students will be able to:

- ✓ **Identify different forms of energy (heat, sound, light, motion).**
- ✓ **Demonstrate how energy transfers and transforms.**
- ✓ **Describe how energy powers machines and natural systems.**

### **Competencies**

#### **SCI.7.A.1 – Exploring energy in action.**

- Use thermometers, tuning forks, and prisms to observe energy changes.
- Trace energy from sun to food to motion.

#### **SCI.7.A.2 – Designing energy experiments.**

- Build a solar oven or energy chain reaction.
- Reflect on energy conservation and future sources.

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## 3. Assessment and Evaluation

### Formative Assessments – Process and Practice

- ✓ Science notebooks and diagram labeling.
- ✓ Group discussion and observation logs.

### Summative Assessments – Project and Performance

- ✓ Plant Growth Journals.
- ✓ Electricity or Energy System Model.
- ✓ “Build-a-Bridge” Test and Reflection.

### Authentic Assessment – Public Engagement and Real-World Application

- ✓ “Engineer for a Day” challenge.
- ✓ Sustainability Action Plan.
- ✓ Class Science Fair Exhibition.

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## 4. Instructional Strategies for Online Learning

### Hands-On and Inquiry-Based Learning

- ✓ Lab rotations and science stations.
- ✓ Guided experimentation and open-ended exploration.

### Real-World Connection and Relevance

- ✓ Connect concepts to local environments and news.
- ✓ Include guest speakers (e.g., gardener, engineer, ecologist).

### Collaborative and Inclusive Culture

- ✓ Celebrate curiosity and creativity.
- ✓ Scaffold vocabulary and support emerging scientists of all backgrounds.

### Learning Culture

- ✓ Mistakes are part of discovery.
- ✓ Encourage “I notice, I wonder” language.
- ✓ Foster student-led question generation and observation.