4th Grade Science

Key Instructional Activities

The Fourth Grade Georgia Standards of Excellence for science engage students in constructing meaningful models that allow them to gain understanding of the natural world. They speculate about observations they make. They add, subtract, multiply and divide whole numbers on paper, mentally, and with calculators. They list common materials for making simple mechanical constructions and for repairing things. Fourth graders gather and interpret data and use records, tables, or graphs to identify patterns of change. They write instructions and make sketches that allow others to carry out a scientific investigation. They determine whether or not a comparison is fair if conditions are different for each thing being compared. They question claims or statements made by people outside their field of expertise. The students will use these skills to compare and contrast the physical attributes of stars and planets, model the effects of the relative motion of the Earth and moon around the sun, use weather charts/maps to predict weather events, conduct investigations about the water cycle and understand their relationship with heat energy, communicate information about the nature of light and sound, study the effects of balanced and unbalanced forces on an object, and describe the flow of energy in an ecosystem and the roles organisms play in a community.

These science standards complement our English/Language Arts and mathematics standards, enabling classroom instruction to reflect a clearer picture of the real world, where solving problems often requires skills and knowledge from multiple disciplines. Further, these standards are designed to provide an equitable, high-quality science education to all of our students.

HOUSTON COUNTY BOARD OF EDUCATION
HIGH-ACHIEVING STUDENTS

As the current science standards are implemented in schools, they will enable students to:

- *Develop a deeper understanding of science beyond memorizing facts, and*
- *Experience similar scientific and engineering practices as those used by professionals in the field.*

HOW WILL STUDENTS LEARN SCIENCE IN THE CLASSROOM?

Each year, students in Georgia should be able to demonstrate greater capacity for connecting knowledge across, and between, the physical sciences, life sciences, earth and space sciences, and engineering design.

During grades 3–5, your child will begin to form deeper connections between concepts and skills previously learned in grades K–2, such as evaluating methods for collecting data, revising models based on evidence, and analyzing data to make sense of phenomena.

Classroom activities in Elementary School will look less like this:	And look more like this:
Students have infrequent exposure to science instruction or related activities.	Students engage with science concepts as a core part of instruction and are encouraged to connect lessons to their own personal experiences.
Students memorize the general structure and properties of matter.	Students use water and butter to investigate how some changes caused by heating or cooling can be reversed while others cannot.
Students learn that matter is made of particles.	Students collect data through activities, such as compressing air in a syringe, in order to create cognitive models of matter.
Students draw food webs for particular environments.	Students construct scientific arguments about how matter and energy move through ecosystems in different ways.
Students examine insects or bugs on the playground or during special events such as science fairs.	Students observe the life cycles of beetles, butterflies, and pea plants to identify patterns that are common to all living things.
Students draw static pictures of the sun to demonstrate where it is at different times of the day.	Students support claims about the movement of the sun by identifying an outdoor object that receives direct sunlight, then tracing an outline of its shadow at three different times during the day.
Students review the characteristics of various rocks and minerals.	Students gather evidence from rock formations to help determine the order in which rock layers were formed.
Students have infrequent exposure to discussions or activities related to engineering design.	Students consider or apply engineering design principles throughout each grade level.
Student discussions and activities are disconnected from mathematics or English/Language Arts instruction.	Student discussions and activities are thoughtfully integrated with mathematics and English/Language Arts instruction.

HOW CAN YOU SUPPORT YOUR CHILD'S SUCCESS?

With the adoption of more rigorous standards and changes in the way that science is being taught in the classroom, you will notice a change in how you will support your students at home.

Science instruction will occur as the students engage in the lessons and activities. In the past, you may have helped your child study using a textbook. Students will no longer be assigned a textbook but should come home with notes or worksheets from the lessons, which can be used to review concepts and start conversations about how they are applying these concepts.

Although Georgia's approach to teaching and learning K–12 science is different than the past, you can still actively support your child's success in the classroom!

1. Speak to your child's teacher(s) about how these important changes affect your school.
2. Ask your child's teacher thoughtful questions based on the information provided in this brochure.
3. Learn how you can help the teacher(s) reinforce classroom instruction at home.
4. Visit www.georgiastandards.org for more information.

4th Grade Science
System Pacing Overview

This guide provides an overview of what your student will learn in his or her fourth grade science course. It focuses on the key skills your student will learn, which will build a strong foundation for success in science studied throughout elementary, middle, and high school. This guide is based on the state-adopted Georgia Standards of Excellence.

August - September

Unit 1: Matter and Energy in Organisms and Ecosystems

This unit builds on earth science standards from second as well as earth and life science standards from third grade. Students will obtain, evaluate, and communicate information about the roles of organisms and the flow of energy within an ecosystem. Students will develop a model to describe the roles of producers, consumers, and decomposers in a community. (Clarification statement: Students are not expected to identify the different types of consumers – herbivores, carnivores, omnivores and scavengers.) Students will develop simple models to illustrate the flow of energy through a food web/food chain beginning with sunlight and including producers, consumers, and decomposers. Students will design a scenario to demonstrate the effect of a change on an ecosystem. (Clarification statement: Include living and non-living factors in the scenario.) Students will use printed and digital data to develop a model illustrating and describing changes to the flow of energy in an ecosystem when plants or animals become scarce, extinct or over-abundant.

September - October

Unit 2: Waves – Light

Building on physical science standards from first grade, students will obtain, evaluate, and communicate information about the nature of light and how light interacts with objects. Students will plan and carry out investigations to observe and record how light interacts with various materials to classify them as opaque, transparent, or translucent. Students will plan and carry out investigations to describe the path light travels from a light source to a mirror and how it is reflected by the mirror using different angles. Students will plan and carry out an investigation utilizing everyday materials to explore examples of when light is refracted. (Clarification statement: Everyday materials could include prisms, eyeglasses, and a glass of water.)

October

Unit 3: Waves – Sound

Building on physical science standards from first grade, students will obtain, evaluate, and communicate information about how sound is produced and changed and how sound and/or light can be used to communicate. Students will plan and carry out an investigation utilizing everyday objects to produce sound and predict the effects of changing the strength or speed of vibrations. Students will design and construct a device to communicate across a distance using light and/or sound.

November - January

Unit 4: Force and Motion

Building on physical science standards from kindergarten and second grade, students will obtain, evaluate, and communicate information about the relationship between balanced and unbalanced forces. Students will plan and carry out an investigation on the effects of balanced and unbalanced forces on an object and communicate the results. Students will construct an argument to support the claim that gravitational force affects the motion of an object. Students will ask questions to identify and explain the uses of simple machines (lever, pulley, wedge, inclined plane, wheel and axle, and screw) and how forces are changed when simple machines are used to complete tasks. (Clarification statement: The use of mathematical formulas is not expected.)

January

Unit 5: Earth Materials – Water Cycle

Students will obtain, evaluate, and communicate information to demonstrate the water cycle. Students will plan and carry out investigations to observe the flow of energy in water as it changes states from solid (ice) to liquid (water) to gas (water vapor) and changes from gas to liquid to solid. Building on what they have learned in the unit, students will develop models to illustrate multiple pathways water may take during the water cycle (evaporation, condensation, and precipitation). (Clarification statement: Students should understand that the water cycle does not follow a single pathway.)

cont.

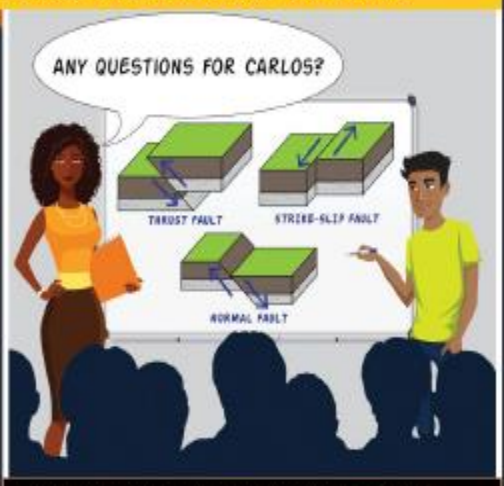
February
Unit 6: Weather
Building on earth science standards from first grade, students will obtain, evaluate, and communicate information to predict weather events and infer weather patterns using weather charts/maps and collected weather data. Students will construct an explanation of how weather instruments (thermometer, rain gauge, barometer, wind vane, and anemometer) are used in gathering weather data and making forecasts. Students will interpret data from weather maps, including fronts (warm, cold, and stationary), temperature, pressure, and precipitation to make an informed prediction about tomorrow's weather. Students will ask questions and use observations of cloud types (cirrus, stratus, and cumulus) and data of weather conditions to predict weather events. Students will construct an explanation based on research to communicate the difference between weather and climate.
March - April
Unit 7: Solar System – Earth, Moon, Sun
Building on earth science standards from kindergarten and second grade, students will obtain, evaluate, and communicate information to model the effects of the position and motion of the Earth and the moon in relation to the sun as observed from the Earth. Students will develop a model to support an explanation of why the length of day and night change throughout the year. Students will develop a model based on observations to describe the repeating pattern of the phases of the moon (new, crescent, quarter, gibbous, and full). Students will construct an explanation of how the Earth's orbit, with its consistent tilt, affects seasonal changes.
April - May
Unit 8: Solar System – Stars and Planets
Building on earth science standards from second grade, students will obtain, evaluate, and communicate information to compare and contrast the physical attributes of stars and planets. Students will ask questions to compare and contrast technological advances that have changed the amount and type of information on distant objects in the sky. Students will construct an argument on why some stars (including the Earth's sun) appear to be larger or brighter than others. (Clarification statement: Differences are limited to distance and size, not age or stage of evolution.) Students will construct an explanation of the differences between stars and planets. Students will evaluate strengths and limitations of models of our solar system in describing relative size, order, appearance and composition of planets and the sun. (Clarification statement: Composition of planets is limited to rocky vs. gaseous.)

How today's students learn SCIENCE

OBSERVING, POSING QUESTIONS MAKING SENSE OF REAL-WORLD OBJECTS AND EVENTS (PHENOMENA)

IN PHYSICS CLASS, JENNY DISCOVERS WHY STATIC ELECTRICITY MAKES HER HAIR STAND UP.

DEVELOPING MODELS TO EXPLAIN A REAL-WORLD OBJECT OR EVENT



MEANWHILE, IN MS. STURGEON'S EARTH SCIENCE CLASS, CARLOS EXPLAINS WHY CALIFORNIA HAS SO MANY EARTHQUAKES.

PLANNING AND CARRYING OUT INVESTIGATIONS AND ANALYZING DATA

STUDENTS INVESTIGATE THE QUALITY OF WATER IN A NEARBY POND.

DESIGNING SOLUTIONS USING ENGINEERING AND TECHNOLOGY

AFTER MANY DESIGNS, DEJA BUILT THE STRONGEST BRIDGE IN THE CLASS.

DISCUSSING, EXPLAINING, AND USING EVIDENCE FOR IDEAS

IN THE GYM, BOBBY DEMONSTRATES AND EXPLAINS HIS IDEAS ABOUT ENERGY TRANSFER

Adapted from NGSS@NSTA