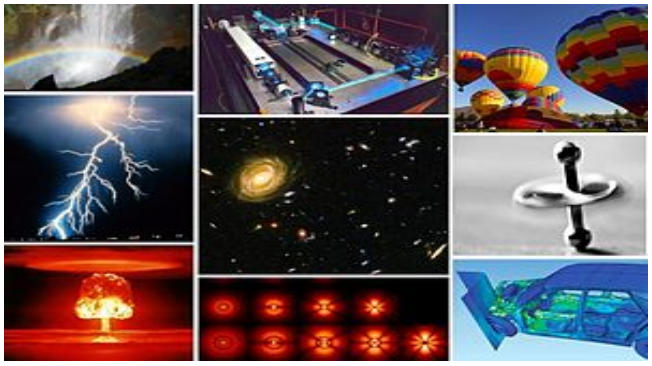
Physical Science

Science

Key Instructional Activities

The Physical Science Georgia Standards of Excellence are designed to continue student investigations of the physical sciences that began in grades K-8, and provide students the necessary skills to have a richer knowledge base in physical science. The standards in this course are designed as a survey of the core ideas in the physical sciences. Those core ideas will be studied in more depth during in the chemistry and physics courses. The physical science standards include abstract concepts such as the conceptualization of the structure of atoms and the role they play in determining the properties of materials, motion and forces, the conservation of energy and matter, wave behavior, electricity, and the relationship between electricity and magnetism. The idea of radioactive decay is limited to the understanding of whole half-lives and how a constant proportional rate of decay is consistent with declining measures that only gradually approach to zero. Students investigate physical science concepts through the study of phenomena, experiences in laboratory settings, and field work.



The Science Georgia Standards of Excellence drive instruction. Hands-on, student-centered, and inquiry-based approaches should be the emphasis of instruction. The standards are a required minimum set of expectations that show proficiency in science.

HOUSTON COUNTY BOARD OF EDUCATION
HIGH-ACHIEVING STUDENTS

What resources are available for students and parents?

EOC Physical Science Study Guide

- ✓ Online Science Textbook
- ✓ Parent Portal
- ✓ Overview of Units and Pacing

Physical Science Course Overview

Unit 1: Motion of Objects
Expected Dates: Beginning of School Year to Mid-August
Building on standards from middle school related to motion. Students will be able to plan and carry out an investigation to analyze the motion of an object using mathematical and graphical models.

Unit 2: Newton's Laws of Motion
Expected Dates: Mid-August to the End of August
Building on standards from middle school related to motion. Students will construct an explanation based on experimental evidence to support the claims presented in Newton's three laws of motion.

Unit 3: Mass and Gravitational Force of Falling Objects
Expected Dates: First Week of September
Building on standards from middle school related to force. Students will analyze and interpret data to identify the relationship between mass and gravitational force for falling objects.

Unit 4: Work, Mechanical Advantage and Simple Machines
Expected Dates: Second Week of September to Mid-September
Building on standards from middle school related to force. Students will use mathematics and computational thinking to identify the relationships between work, mechanical advantage, and simple machines.

Unit 5: Energy Transformations Within a System
Expected Dates: Mid-Sept. to End of Sept.
Building on standards from middle school related to energy. Students will construct explanations for energy transformations within a system.

Unit 6: Molecular Motion and Thermal Energy
Expected Dates: End of September to Beginning of October
Building on standards from middle school related to energy. Students will plan and carry out investigations to describe how molecular motion relates to thermal energy changes in terms of conduction, convection, and radiation.

Unit 7: Applications of Specific Heat
Expected Dates: First Week of October
Building on standards from middle school related to energy. Students will analyze and interpret specific heat data to justify the selection of a material for a practical application.

Unit 8: Flow of Energy During Phase Changes
Expected Dates: Beginning of October to Mid-October
Building on standards from middle school related to energy. Students will analyze and interpret data to explain the flow of energy during phase changes using heating/cooling curves.

Unit 9: Characteristics of Electromagnetic and Mechanical Waves
Expected Dates: Mid-October to End of October
Building on standards from middle school related to waves. Students will ask questions to compare and contrast the characteristics of electromagnetic and mechanical waves. Students will analyze and interpret data to identify the relationships among wavelength, frequency, and energy in electromagnetic waves and amplitude and energy in mechanical waves.

Unit 10: Wave Behavior
Expected Dates: First Week of November
Building on standards from middle school related to waves. Students will develop models based on experimental evidence that illustrate the phenomena of reflection, refraction, interference, and diffraction.

Unit 11: Speed of Sound and Light Waves Through Media
Expected Dates: Second Week of November
Building on standards from middle school related to waves. Students will analyze and interpret data to explain how different media affect the speed of sound and light waves.

Unit 12: Doppler Effect
Expected Dates: Mid-November to End of November
Building on standards from middle school related to waves. Students will develop and use models to explain the changes in sound waves associated with the Doppler Effect.

Unit 13: Voltage, Current and Resistance
Expected Dates: First Week of December
Building on standards from middle school related to electricity and magnetism. Students will use mathematical and computational thinking to support a claim regarding relationships among voltage, current, and resistance.

Unit 14: Currents and Circuits
Expected Dates: Second Week of December
Building on standards from middle school related to electricity and magnetism. Students will develop and use models to illustrate and explain the conventional flow (direct and alternating) of current and the flow of electrons in simple series and parallel circuits.

Unit 15: Magnetism and Electric Charge
Expected Dates: Third Week of December
Building on standards from middle school related to electricity and magnetism. Students will plan and carry out investigations to determine the relationship between magnetism and the movement of electrical charge.

Unit 16: Matter and Periodic Trends
Expected Dates: Beginning of January to Mid-January
Building on standards from middle school related to the periodic table. Students will develop and use models to compare and contrast the structure of atoms, ions and isotopes. Students will analyze and interpret data to determine trends of the following: 1) Number of valence electrons, 2) Types of ions formed by main group elements, 3) Location and properties of metals, nonmetals, and metalloids, 4) Phases at room temperature. Students will use the Periodic Table as a model to predict the above properties of main group elements.

Unit 17: Chemical Bonding
Expected Dates: Mid-January to Mid-February
Building on standards from middle school related to the periodic table. Students will analyze and interpret data to predict properties of ionic and covalent compounds. Students will develop and use models to predict formulas for stable, binary ionic compounds based on balance of charges. Students will use the International Union of Pure and Applied Chemistry (IUPAC) nomenclature for translating between chemical names and chemical formulas.

Unit 18: Conversation of Matter in Chemical Reactions

Expected Dates: Mid-February to End of February

Building on standards from middle school related to chemical reactions. Students will plan and carry out investigations to generate evidence supporting the claim that mass is conserved during a chemical reaction. Students will develop and use a model of a chemical equation to illustrate how the total number of atoms is conserved during a chemical reaction.

Unit 19: Nuclear Changes During Fission and Fusion Reactions

Expected Dates: First Week of March

Building on standards from middle school related to reactions. Students will develop a model that illustrates how the nucleus changes as a result of fission and fusion.

Unit 20: Radioactive Decay and Half-Life

Expected Dates: First Week of March

Building on standards from middle school related to reactions. Students will use mathematics and computational thinking to explain the process of half-life as it relates to radioactive decay.

Unit 21: Nuclear Energy

Expected Dates: First Week of March

Building on standards from middle school related to reactions. Students will construct arguments based on evidence about the applications, benefits, and problems of nuclear energy as an alternative energy source.

Unit 22: Atomic and Molecular Motion in Phases of Matter

Expected Dates: Second Week of March

Building on standards from middle school related to matter. Students will ask questions to compare and contrast models depicting the particle arrangement and motion in solids, liquids, gases, and plasmas.

Unit 23: Properties of Gases in a Closed System

Expected Dates: Third Week of March

Building on standards from middle school related to matter. Students will plan and carry out investigations to identify the relationships among temperature, pressure, volume, and density of gases in closed systems.

Unit 24: Properties of Solutions

Expected Dates: Fourth Week of March

Building on standards from middle school related to matter. Students will develop and use models to explain the properties (solute/solvent, conductivity, and concentration) of solutions.

Unit 25: Factors Affecting Solubility

Expected Dates: First Week of April

Building on standards from middle school related to matter. Students will plan and carry out investigations to determine how temperature, surface area, and agitation affect the rate solutes dissolve in a specific solvent. Students will analyze and interpret data from a solubility curve to determine the effect of temperature on solubility.

Unit 26: Structure and Properties of Acids and Bases

Expected Dates: Second Week of April

Building on standards from middle school related to matter. Students will obtain and communicate information to explain the relationship between the structure and properties (e.g., pH, and color change in the presence of an indicator) of acids and bases. Students will plan and carry out investigations to detect patterns in order to classify common household substances as acidic, basic, or neutral.

EOC Preparation/Administration and Enrichment

Expected Dates: Mid-April to End of School Year

Review all physical science standards. Students will take the Physical Science EOC. Students will participate in enrichment activities.

Helpful Tips for Parents and Guardians

Believe that every child can be successful in science.

Science has led to the discovery of everything from gravity to medicine. Science is a way of understanding the world, a perspective, and a pattern of thinking that begins in the very early years. That is why parent involvement is so important in a child's science education.

Tips to Help Children Learn Science

Explore, explore, explore. See science everywhere. Always encourage your child to question their surroundings, and then discuss. Parents can take opportunities to ask, "What would happen if …?" questions or present brainteasers to encourage children to be inquisitive and seek out answers.

Lead family discussions on science-related topics. Dinnertime might be an ideal time for your family to have discussions about news stories that are science based, like space shuttle missions, severe weather conditions, or new medical breakthroughs. Over time, children will develop a better understanding of science and how it affects many facets of our lives. Movies and TV shows with science-related storylines are also great topics for discussion.

Encourage girls and boys equally. Many fathers might be inclined to fix a problem for a daughter without challenging her to find the solution on her own. Many girls are left out of challenging activities simply because of their gender. Be aware that both girls and boys need to be encouraged and exposed to a variety of subjects at a very early age.

Do science together. Children, especially elementary-age children, learn better by investigating and experimenting. Simple investigations done together in the home can bolster what your child is learning in the classroom. Check with your child's teacher on what your child is currently learning in class and what activities you can explore at home. There are also many books on the market and numerous websites that present ideas for investigations.

In addition to exploring and communicating as a family, it is important to invest in your child's willingness to learn. There are many programs available that are fun and interactive, helping them build a solid foundation in science.

From life sciences to environmental science, physical science to earth science, when children express interests in these subjects, encourage them and learn with them.

How You Can Support Your Child's Success?

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.