Teaching & Learning Standards

6th GRADE



Cherokee County School District

Science

6th Grade
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Course Description

The Sixth Grade Cherokee Teaching & Learning Standards for Science are designed to give all students an overview of common strands in earth science including, but not limited to, meteorology, geology, astronomy, and oceanography. Sixth grade students use records they keep and analyze the data they collect, plan and carry out investigations, describe observations, and show information in different forms. They can recognize relationships in simple charts and graphs and find more than one way to interpret their findings. They replicate investigations and compare results to find similarities and differences. Sixth graders study weather patterns and systems by observing and explaining how an aspect of weather can affect a weather system. They can construct explanations based on evidence of the role of water in Earth processes and can recognize how the presence of land and water, in combination with the energy from the sun, affect the climate and weather of a region. They use different models to represent systems such as the solar system and the sun/moon/Earth system. They study uses and conservation of Earth's natural resources and use what they observe about the Earth's materials to infer the processes and timelines that formed them.

Science standards integrate the three dimensions of **Science and Engineering Practices (SEPs)**, **Crosscutting Concepts (CCCs)**, and **Disciplinary Core Ideas (DCIs)** to provide a comprehensive framework that emphasizes active engagement, interdisciplinary connections, and core scientific principles. Together, they show how science standards engage *students* in obtaining, evaluating, and communicating information.

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Science and Engineering Practices are fundamental approaches that scientists and engineers use to investigate the natural world and solve practical problems. **Crosscutting Concepts** in science are overarching themes that bridge various disciplines, helping students and researchers see connections and deepen their understanding of the natural world. **Disciplinary Core Ideas** are fundamental concepts that students need to understand to develop a deep knowledge of science across various disciplines.

Semester 1 (August – December)

Unit 0 – Thinking Like a Scientist (2 weeks)

In this unit, students in sixth grade will advance their scientific thinking skills through engaging in the scientific method, critical analysis, and collaborative investigations. Students will expand their understanding of scientific terms and concepts, formulate hypotheses based on research questions, utilize tools to conduct investigations, analyze data, and collaborate to interpret experimental results. Thinking Like a Scientist standards should continue to be embedded and developed throughout the course across the entire school year. By the end of the year, students will have developed a deeper understanding of the scientific method, enhanced their critical thinking skills, and strengthened their ability to collaborate effectively in scientific investigations. They will be prepared to apply these skills to more complex scientific challenges and inquiries in subsequent grade levels and beyond.

Overarching Standard for Unit 0

TLS6-8: Advance critical thinking through scientific investigations or other problem-solving processes that include collaborating, analyzing data, and drawing evidence-based conclusions.

Supporting Standards for Student Mastery in Unit 0

TLS6-8.a Master and apply scientific vocabulary and concepts, including but not limited to inference, model, independent variable, dependent variable, argument, theory, validity, and bias.

TLS6-8.b: Develop and test hypotheses using systematic observations and experiments.

TLS6-8.c: Use advanced tools and technology (e.g., sensors, probes, software, simulations) for data collection and analysis. Identify and create proper graphs (including labels, scaling, etc.).

- 6th: Practice with metric conversions.
- 7th: Practice with probability, ratios, and calculating means.
- 8th: Practice with scientific notation and formulas.

TLS6-8.d: Collaborate to analyze findings, make predictions, and present detailed scientific arguments and reports using scientific terminology. Give, receive, and apply peer feedback to strengthen scientific arguments and discussions.

Unit 1: Solar System and Beyond (5 weeks)

In this unit, students will explore the dynamic and evolving nature of scientific views regarding the universe, focusing on how our understanding has changed over time with new discoveries and evidence. Students will engage in a variety of activities that include asking questions, developing models, analyzing data, and comparing celestial objects. They will be able to communicate information about the relative positions and characteristics of celestial bodies, and the forces that govern their motion.

Overarching Standard for Unit 1

6E1: Obtain, evaluate, and communicate information about current scientific views of the universe and how those views evolved.

6E1.a: Ask questions to determine changes in models of Earth's position in the solar system, and origins of the universe as evidence that scientific theories change with the addition of new information.

(*Clarification statement*: Students should consider Earth's position in geocentric and heliocentric models and the Big Bang as it describes the formation of the universe. Examples of evidence in support of the Big Bang Theory include composition of matter in the universe, motion of distant galaxies, and background radiation.)

6E1.c: Analyze and interpret data to compare and contrast the planets (inner and outer) in our solar system in terms of:

- size relative to Earth,
- surface and atmospheric features,
- relative distance from the sun, and
- ability to support life.

Supporting Standards for Student Mastery in Unit 1

6E1.b: Develop a model to represent the position of the solar system in the Milky Way galaxy and in the known universe.

6E1.d: Develop and use a model to explain the interaction of gravity and inertia that governs the motion of objects in the solar system.

6E1.e: Ask questions to compare and contrast the characteristics, composition, and location of comets, asteroids, and meteoroids.

Unit 2: Earth, Moon, and Sun (4 weeks)

In this unit, students will investigate the interactions between the sun, Earth, and moon, focusing on how their relative positions influence various natural phenomena like the phases of the moon, eclipses, seasons, and tides. Through model development, data analysis, and scientific explanations, students will gain a comprehensive understanding of these celestial dynamics and be able to effectively explain these interactions through scientific reasoning and visual representations.

Overarching Standard for Unit 2

6E2: Obtain, evaluate, and communicate information about the effects of the relative positions of the sun, Earth, and moon.

6E2.a: Develop and use a model to demonstrate the phases of the moon by showing the relative positions of the sun, Earth, and moon.

Supporting Standards for Student Mastery in Unit 2

6E2.b: Construct an explanation of the cause of solar and lunar eclipses.

6E2.c: Analyze and interpret data to relate the tilt of the Earth to the distribution of sunlight throughout the year and its effect on seasons.

6E3.d: Analyze and interpret data to create graphic representations of the causes and effects of waves, currents, and tides in Earth's systems.

Unit 3A: Earth's Changing Landscape: Plate Tectonics (4 weeks)

In this unit, students will explore the dynamic processes that shape Earth's surface. They will investigate the structure of Earth's interior, understand the mechanisms of plate tectonics, and examine the evidence from fossils to interpret changes in Earth's surface and climate over time. Students will develop skills in scientific inquiry, data analysis, and constructing evidence-based arguments.

Overarching Standard for Unit 3A

6E5: Obtain, evaluate, and communicate information to show how Earth's surface is formed.

6E5.f: Construct an explanation of how the movement of lithospheric plates, called plate tectonics, can cause major geologic events such as earthquakes and volcanic eruptions.

(*Clarification statement*: Describe landforms created by convergent, divergent, and transform plate boundaries.)

Supporting Standards for Student Mastery in Unit 3A

6E5.a: Ask questions to compare and contrast the Earth's crust, mantle, inner and outer core, including temperature, density, thickness, and composition.

6E5.g: Construct an argument using maps and data collected to support a claim of how fossils show evidence of the changing surface and climate of the Earth.

Unit 3B: Earth's Changing Landscape: Rocks and Minerals (3 weeks)

In this unit, students will investigate the processes that form and transform rocks, as well as the characteristics of minerals that compose them. Students will learn about rock classification, the rock cycle, and the properties of minerals through hands-on investigations and analysis to understand transformations within Earth's geologic systems.

Overarching Standard for Unit 3B

6E5: Obtain, evaluate, and communicate information to show how Earth's surface is formed.

6E5.c: Construct an explanation of how to classify rocks by their formation and how rocks change through geologic processes in the rock cycle.

Supporting Standards for Student Mastery in Unit 3B

6E5.b: Plan and carry out an investigation of the characteristics of minerals and how minerals contribute to rock composition.

Semester 2 (January – May)

Unit 3C: Earth's Changing Landscape: Weathering, Erosion, Deposition, and Soil (3 weeks)

In this unit, students will explore the natural processes that shape Earth's surface, including weathering, erosion, and deposition, as well as the composition and sustainability of soil. Students will develop critical thinking skills by engaging in questioning, modeling, and investigations to understand these processes and their impacts on the environment. They will design solutions to understand the interconnectedness of Earth's systems and the importance of conservation and sustainable practices.

Overarching Standard for Unit 3C

6E5: Obtain, evaluate, and communicate information to show how Earth's surface is formed.

6E5.e: Develop a model to demonstrate how natural processes (mechanical and chemical weathering, erosion, and deposition) and human activity change rocks and the surface of the Earth.

Supporting Standards for Student Mastery in Unit 3C

6E5.d: Ask questions to identify types of weathering, agents of erosion and transportation, and environments of deposition. (*Clarification statement*: Environments of deposition include deltas, barrier islands, beaches, marshes, and rivers.)

6E5.h: Plan and carry out an investigation to provide evidence that soil is composed of layers of weathered rocks and decomposed organic material.

6E6.b: Design and evaluate solutions for sustaining the quality and supply of natural resources such as water, soil, and air.

Unit 4A: Water in Earth's Processes: The Water Cycle (2 weeks)

In this unit, students will learn about the crucial role water plays in Earth's processes, focusing on its distribution, the water cycle, and the sun's energy in driving these processes. Students will engage in questioning, investigation, and communication to deepen their understanding of water's significance in maintaining Earth's systems.

Overarching Standard for Unit 4A

6E3: Obtain, evaluate, and communicate information to recognize the significant role of water in Earth processes.

6E3.b: Plan and carry out an investigation to illustrate the role of the sun's energy in atmospheric conditions that lead to the cycling of water. (*Clarification statement*: The water cycle should include evaporation, condensation, precipitation, transpiration, infiltration, groundwater, and runoff. Students should show how different amounts of the sun's energy lead to these processes within the water cycle.)

Supporting Standards for Student Mastery in Unit 4A

6E3.a: Ask questions to determine where water is located on Earth's surface (oceans, rivers, lakes, swamps, groundwater, aquifers, and ice) and communicate the relative proportion of water at each location.

Unit 4B: Water in Earth's Processes: The Ocean in Motion (2 weeks)

In this unit, students will study the composition, location, and subsurface topography of the world's oceans, utilizing graphs and maps to communicate findings. Students will analyze and interpret data to understand the causes and effects of oceanic phenomena such as waves, currents, and tides, and how these processes impact Earth's systems.

Overarching Standard for Unit 4B

6E3: Obtain, evaluate, and communicate information to recognize the significant role of water in Earth processes.

6E3.d: Analyze and interpret data to create graphic representations of the causes and effects of waves, currents, and tides in Earth's systems.

- Explain that waves, currents, and tides are different movements of water.

Supporting Standards for Student Mastery in Unit 4B

6E3.c: Ask questions to identify and communicate, using graphs and maps, the composition, location, and subsurface topography of the world's oceans.

Unit 5: Climate and Weather (7 weeks)

In this unit, students will enhance their skills in data analysis, scientific modeling, and explanation of complex processes to demonstrate their understanding of Earth's atmospheric layers. Students will also learn the composition and role of greenhouse gases, the process of heat transfer from the sun to air, land, and water. They will develop an understanding of how these elements interact to influence weather systems, air pressure, and meteorological events.

Overarching Standard for Unit 5

6E4: Obtain, evaluate, and communicate information about how the sun, land, and water affect climate and weather.

6E4.d: Construct an explanation of the relationship between air pressure, weather fronts, and air masses and meteorological events such as tornadoes and thunderstorms.

Supporting Standards for Student Mastery in Unit 5

6E4.a: Analyze and interpret data to compare and contrast the composition of Earth's atmospheric layers (including the ozone layer) and greenhouse gases.

(*Clarification statement*: Earth's atmospheric layers include the troposphere, stratosphere, mesosphere, and thermosphere.)

6E4.b: Plan and carry out an investigation to demonstrate how energy from the sun transfers heat to air, land and water at different rates.

(*Clarification statement*: Heat transfer should include the processes of conduction, convection, and radiation.)

6E4.c: Develop a model demonstrating the interaction between unequal heating and the rotation of the Earth that causes local and global wind systems.

6E4.e: Analyze and interpret weather data to explain the effects of moisture evaporating from the ocean on weather patterns and weather events such as hurricanes.

Unit 6: Human and Energy Needs (3 weeks)

In this unit, students will explore the different types of natural resources, their uses, and the importance of conserving these resources to mitigate their impact on Earth. Students will learn to differentiate between renewable and nonrenewable energy resources, evaluate solutions for resource conservation, and analyze the factors contributing to global temperature rise. They will develop skills in critical thinking, data analysis, and problem-solving, preparing them to contribute to discussions and actions regarding sustainable resource use and environmental conservation.

Overarching Standard for Unit 6

6E6: Obtain, evaluate, and communicate information about the uses and conservation of various natural resources and how they impact the Earth.

- Investigate and evaluate the effectiveness of current water, soil, and air conservation practices.

6E6.b: Design and evaluate solutions for sustaining the quality and supply of natural resources such as water, soil, and air.

- Communicate the impact of these plans on Earth's natural resources.

Supporting Standards for Student Mastery in Unit 6

6E6.a: Ask questions to determine the differences between renewable/sustainable energy resources (examples: hydro, solar, wind, geothermal, tidal, biomass) and nonrenewable energy resources (examples: nuclear: uranium, fossil fuels: oil, coal, and natural gas), and how they are used in our everyday lives.

6E6.c: Construct an argument evaluating contributions to the rise in global temperatures over the past century.

(*Clarification statement*: Tables, graphs, and maps of global and regional temperatures, and atmospheric levels of greenhouse gases such as carbon dioxide and methane, should be used as sources of evidence.)