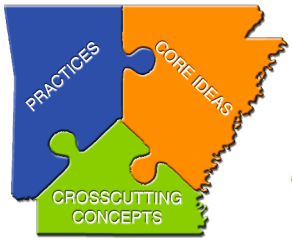


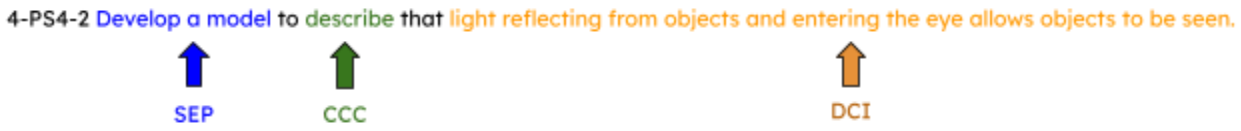
ARKANSAS
K-12 SCIENCE STANDARDS

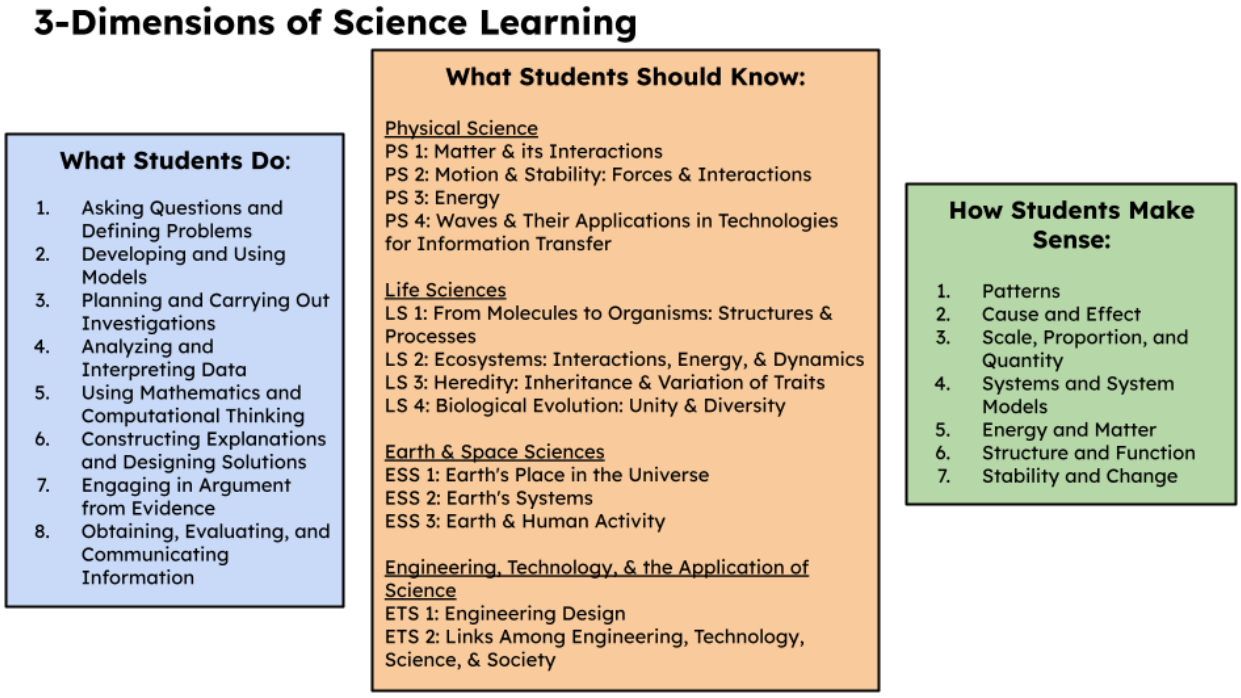
EDUCATION FOR A NEW GENERATION

Fundamental Science Content
4th Grade

2023

The Arkansas K-12 Science Standards are available here. The standards are three-dimensional, consisting of a Science and Engineering Practice (SEP), a Disciplinary Core Idea (DCI), and a Cross Cutting Concept (CCC). By the end of the grade level, students should be able to demonstrate the full scope of the standard. Example:





The focus of this document is specifically on the science core ideas in 4th grade. In Arkansas K-12 Science Standards, science content is found in the DCI portion of each standard. Three-dimensional learning and assessment best prepares students for success so that students have the opportunity to demonstrate both what they know *and* can do in science. Refer to the full standards document to find the corresponding science and engineering practice and cross cutting concept for each standard. The core ideas are organized into the following domains of science:

- Physical Science
- Life Science
- Earth & Space Science
- Engineering Technology & Applications of Science

Each domain contains core ideas organized into component ideas. By the end of 4th grade, students are expected to know the bulleted information under each component idea. Standards that address the bulleted information are included in parentheses and those with an asterisk include an engineering component.

Physical Science

*Asterisks indicate best opportunities to integrate ETS performance expectations into content.

Energy
Definitions of Energy
• The faster a given object is moving, the more energy it possesses. (4-PS3-1)
• Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2, 4-PS3-3)
Conservation & Transfer of Energy
• Light also transfers energy from place to place (ex. Energy radiated from the sun is transferred to Earth by light). (4-PS3-2)
• Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2, 4-PS3-3)
• Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced initially by transforming the energy of motion into electrical energy (ex. moving water driving a spinning turbine which generates electric currents). (4-PS3-2, 4-PS3-4*)
Energy & Forces
• When objects collide, the contact forces transfer energy and change the objects' motions. (4-PS3-3)
Energy in Everyday Life
• The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use (ex. produce electricity). (4-PS3-4*)
Waves
Wave Properties
• Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; the water does not move in the direction of the wave except when the water meets a beach. (4-PS4-1)
• Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1)
Electromagnetic Radiation
• An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2)
Waves in Information Technology

- Digitized information (ex. pixels of a picture) can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa. (4-PS4-3*)

Life Science

Molecules to Organisms
Structure and Function
• Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)
Information Processing
• Different sense receptors are specialized for particular kinds of information (ex. eyes > photoreceptors for light), which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2)

Earth & Space Science

*Asterisks indicate best opportunities to integrate ETS performance expectations into content.

Earth's Place in the Universe
The History of Planet Earth
• Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. (4-ESS1-1)
Earth's Systems
Earth's Materials
• Rainfall helps to shape the land and determines the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1)
Plate Tectonics
• The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features of Earth. (4-ESS2-2)
Biogeology
• Living things affect the physical characteristics (ex. beaver shelters alter the flow of water) of their regions. (4-ESS2-1)

Earth and Human Activity
Natural Resources
• Energy and fuels that humans use come from natural sources, and their use affects the environment in multiple ways. Some resources are renewable (sunlight) over time, and others (coal and oil) are not. (4-ESS3-1)
Natural Hazards
• A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot stop the hazards but can take steps to reduce their impacts (ex. developing warning systems). (4-ESS3-2*)

Engineering, Technology, and Applications of Science

Engineering Design
Defining Engineering Problems
• Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Solutions can be compared on the basis of how well each one meets criteria for success and takes constraints into account. (4-ETS1-1) (4-PS3-4*)
Developing Possible Solutions
• Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (4-ETS1-2)
• At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (4-ETS1-2)
• Tests are often designed to identify failure points or difficulties, which suggest the parts of the design that need to be improved. (4-ETS1-3)
Optimizing the Design Solution
• Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (4-ETS1-3) (4-PS4-3*)
Links Among Engineering, Technology, Science, and Society
Interdependence of Science, Engineering, and Technology
• Knowledge of relevant scientific concepts and research findings is important in engineering. (4-PS4-3*) (4-ESS3-1)
Influence of Engineering, Technology, and Science on Society and the Natural World

• Over time, people's needs and wants change, as do their demands for new and improved technologies. (4-ETS1-1) (4-ESS3-1)
• Engineers improve existing technologies or develop new ones. (4-ETS1-2) (4-PS3-4*) (4-ESS3-2*)