Introduction

Science, Technology & Engineering, and Environmental Literacy & Sustainability (STEELS) Standards guide the study of the natural and human-made world through inquiry, problem-solving, critical thinking, and authentic exploration. This document displays a curriculum framework for Grade 5 Science. It is designed to focus curriculum and teaching, provide guidance for multiple approaches to curriculum development, encourage less reliance on textbooks as curriculum, and avoid activity-oriented teaching without focus/purpose.

Science Long Term Transfer Goals

In support of the Curriculum Framework, Long Term Transfer Goals (LTTG) provide the overarching practices that ground the foundation for a robust curriculum; thus, all curriculum should relate to one or more of the LTTGs detailed below – as they highlight the effective uses of understanding, knowledge, and skill that we seek in the long run; i.e., what we want students to be able to do when they confront new challenges – both in and outside of school.

Students will be able to engage as technological and engineering literate members of a global society, using their learning to:

1. Approach science as a reliable and tentative way of knowing and explaining the natural world and designed world.
2. Weigh evidence and use scientific approaches to ask questions, investigate, and make informed decisions.
3. Make and use observations to analyze relationships and patterns in order to explain phenomena, develop models, and make predictions.
4. Evaluate systems, in order to connect how form determines function and how any change to one component affects the entire system.
5. Explain how the natural and designed worlds are interrelated and the application of scientific knowledge and technology can have beneficial, detrimental, or unintended consequences.

Grade 5 Science

Organization for Matter and Energy Flow in Organisms

Big Idea	Essential Question	Standard	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concept	Vocabulary
Animals have external and internal sensory receptors that detect different kinds of information that then gets processed by the brain.	How do organisms detect, process, and use information about the environment?	**3.1.5.A** **Support an argument that plants get the materials they need for growth chiefly from air and water.**	**Engaging in Argument from Evidence** Support an argument with evidence, data, or a model.	Plants acquire their material for growth chiefly from air and water.	**Energy and Matter** Matter is transported into, out of, and within systems.	argument evidence materials systems matter

Interdependent Relationships in Ecosystems

Big Idea	Essential Question	Standard	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concept	Vocabulary
Ecosystems are complex systems that include both living (biotic) and non-living (abiotic) components that interact with each other.	How do organisms interact with the living and nonliving environments to obtain matter and energy?	**3.1.5.B** **Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.**	**Developing and Using Models** Develop a model to describe phenomena.	The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter.	**Systems and System Models** A system can be described in terms of its components and their interactions.	living non-living decomposers decomposition biotic abiotic food web consumer producer energy systems components

Structure and Properties of Matter

Big Idea	Essential Question	Standard	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concept	Vocabulary
All forms of matter exist as a result of the combination or rearrangement of atoms.	How do particles combine to form the variety of matter one observes?	**3.2.5.A** **Develop a model to describe that matter is made of particles too small to be seen.**	**Developing and Using Models** Use models to describe phenomena.	Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gasses are made from matter particles that are too small to see and that are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects.	**Scale, Proportion, and Quantity** Natural objects exist from the very small to the immensely large.	particles matter properties gases scale models
All forms of matter exist as a result of the combination or rearrangement of atoms.	How do particles combine to form the variety of matter one observes?	**3.2.5.B** **Make and communicate observations and measurements to identify materials based on their properties.**	**Planning and Carrying Out Investigations** Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.	Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic scale mechanism of evaporation and condensation.)	**Scale, Proportion and Quantity** Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.	standard units measurements properties materials observations model

All forms of matter exist as a result of the combination or rearrangement of atoms.	How do particles combine to form the variety of matter one observes?	**3.2.5.C** **Interpret and analyze data to make decisions about how to utilize materials based on their properties.**	**Planning and Carrying Out Investigations** Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.	Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic scale mechanism of evaporation and condensation.)	**Scale, Proportion and Quantity** Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.	characteristics properties matter standard units

Chemical Reactions

Big Idea	Essential Question	Standard	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concept	Vocabulary
The atoms of some substances combine or rearrange to form new substances that have different properties.	How do substances combine or change (react) to make new substances? How does one characterize and explain these reactions and make predictions about them?	**3.2.5.D** **Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.**	**Using Mathematics and Computational** Thinking Measure and graph quantities such as weight to address scientific and engineering questions and problems.	The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.)	**Scale, Proportion, and Quantity** Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume	hardness mass moh's scale porosity properties solubility volume scale standard units
The atoms of some substances combine or rearrange to form new substances that have different properties.	How do substances combine or change (react) to make new substances?	**3.2.5.E** **Conduct an investigation to determine whether the mixing of two or more**	**Planning and Carrying Out Investigations** Conduct an investigation collaboratively to produce data to serve as the basis for	When two or more different substances are mixed, a new substance with different properties may be formed.	**Cause and Effect** Cause and effect relationships are routinely identified and used to explain change.	cause and effect substance reactions chemical reaction predictions

	How does one characterize and explain these reactions and make predictions about them?	**substances results in new substances.**	evidence, using fair tests in which variables are controlled and the number of trials considered.			properties react trials

Types of Interactions

Big Idea	Essential Question	Standard	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concept	Vocabulary
All forces between objects, regardless of size or direction, arise from only a few types of interactions.	What underlying forces explain the variety of interactions observed?	**3.2.5.F** **Support an argument that the gravitational force exerted by Earth on objects is directed down.**	**Engaging in Argument from Evidence** Support an argument with evidence, data, or a model.	The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.	**Cause and Effect** Cause and effect relationships are routinely identified and used to explain change.	gravitational force cause and effect model

Energy in Chemical Processes and Everyday Life

Big Idea	Essential Question	Standard	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concept	Vocabulary
To produce energy typically means to convert some stored energy into a desired form.	How do food and fuel provide energy? If energy is conserved, why do people say it is produced or used?	**3.2.5.G** **Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.**	**Developing and Using Models** Use models to describe phenomena.	The energy released from food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. (secondary)	**Energy and Matter** Energy can be transferred in various ways and between objects.	energy flow model chemical process model matter conserved

The Universe and Its Stars

Big Idea	Essential Question	Standard	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concept	Vocabulary
We can infer information about stars based on observations we make from Earth.	What is the universe, and what is Earth's place in it?	**3.3.5.A** **Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.**	**Engaging in Argument from Evidence** Support an argument with evidence, data, or a model.	The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth.	**Scale, Proportion, and Quantity** Natural objects exist from the very small to the immensely large.	apparent brightness relative distance stars sun

Earth and the Solar System

Big Idea	Essential Question	Standard	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concept	Vocabulary
Observations of the sky can be explained by predictable patterns of the movement of Earth, moon, sun and planets.	What are the predictable patterns caused by Earth's movement in the solar system?	**3.3.5.B** **Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.**	**Analyzing and Interpreting Data** Represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships.	The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes.	**Patterns** Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena.	data graphical display patterns representation shadows

Plate Tectonics and Large - Scale System Interactions

Big Idea	Essential Question	Standard	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concept	Vocabulary

Plate tectonics explains the past and current movements and features of the rocks at Earth's surface.	Why do the continents move, and what causes earthquakes and volcanoes?	**3.3.5.C** **Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.**	**Developing and Using Models** Develop a model using an example to describe a scientific principle.	Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes, landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.	**Systems and System Models** A system can be described in terms of its components and their interactions.	atmosphere biosphere chemical change geosphere hydrosphere model system model scientific principle

The Roles of Water in Earth's Surface Processes

Big Idea	Essential Question	Standard	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concept	Vocabulary
Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things.	What regulates weather and climate?	**3.3.5.D** **Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.**	**Using Mathematics and Computational Thinking** Describe and graph quantities such as area and volume to address scientific questions.	Nearly all of Earth's available water is in the ocean. Most freshwater is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere.	**Scale, Proportion, and Quantity** Standard units are used to measure and describe physical quantities such as weight and volume.	distribution reservoir fresh water weight volume scientific question proportion weather climate

Human Impact on Earth Systems

Big Idea	Essential Question	Standard	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concept	Vocabulary
Human activities in agriculture, industry, and everyday life have had major impacts on the land, rivers, ocean, and air.	How do humans change the planet?	**3.3.5.E** **Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.**	**Obtaining, Evaluating, and Communicating Information** Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem.	Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.	**Systems and System Models** A system can be described in terms of its components and their interactions **Connections to Nature of Science** Science Addresses Questions About the Natural and Material World. Science findings are limited to questions that can be answered with empirical evidence.	atmosphere human impact systems resources
Human activities in agriculture, industry, and everyday life have had major impacts on the land, rivers, ocean, and air.	How do humans change the planet?	**3.3.5.F** **Generate and design possible solutions to a current environmental issue, threat, or concern.**	**Developing Possible Solutions** 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.	Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gasses, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment.	**Connections to Nature of Science** Science Addresses Questions About the Natural and Material World. Science findings are limited to questions that can be answered with empirical evidence.	environmental issue design solution design process empirical evidence conservationist