NGSS Core Ideas Essential Questions

Physical Sciences

PS1: Matter and Its Interactions

How can one explain the structure, properties and interactions of matter?

PS1.A: Structure and Properties of Matter

How do particles combine to form the variety of matter on observes?

PS1.B: Chemical Reactions

How do substances combine or change (react} to make new substances?

How does one characterize and explain these reactions and make predictions about them?

PS1.C: Nuclear Processes

What forces hold nuclei together and mediate nuclear processes?

PS2: Motion and Stability: Forces and Interactions

How can one explain and predict interactions between objects and within systems of objects?

PS2.A: Forces and Motion

How can one predict an objects continued motion, change in motion, or stability?

PS2.B: Types of Interactions

What underlying forces explain the variety of interactions observed?

PS2.C: Stability and Instability in Physical Systems

Why are some physical systems more stable than others?

PS3: Energy

How is energy transferred and conserved?

PS3.A: Definitions of Energy

What is energy?

PS3.B: Conservation of Energy and Energy Transfer

What is meant by conservation of energy?

How is energy transferred between objects or systems?

PS3.C: Relationship between Energy and Forces

How are forces related to energy?

PS3.D: Energy in chemical Processes and Everyday Life

How do food and fuel provide energy?

If energy is conserved, why do people say it is produced or used?

PS4: Waves and Their Applications in Technologies for Information Transfer

How are waves used to transfer energy and information?

PS4.A: Wave Properties

What are the characteristic properties and behaviors of waves?

PS4.B: Electromagnetic Radiation

What is light?

How can one explain the varied effects that involve light? What other forms of electromagnetic radiation are there?

PS4.C: Information Technologies and Instrumentation

How are instruments that transmit and detect waves used to expand human senses?

Life Sciences

LS1: From Molecules to Organisms: Structures and Processes

How do organisms live, grow, respond to their environment and reproduce?

LS1.A: Structure and Function

How do the structures of organisms enable life's functions?

LS1.B: Growth and Development of Organisms

How do organisms grow and develop?

LS1.C: Organization for Matter and energy flow in Organisms

How do organisms obtain and use the matter and energy they need to live and grow?

LS1.D: Information Processing

How do organisms detect, process and use information about the environment?

LS2: Ecosystems: Interactions, Energy, and Dynamics

How (and why} do organisms interact with their environment and what are the effects of these interactions?

LS2.A: Interdependent Relationships in Ecosystems

How do organisms interact with the living and nonliving environments to obtain matter and energy?

LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

How do matter and energy move through an ecosystem?

LS2.C: Ecosystems Dynamics, Functions and Resilience

What happens to ecosystems when the environment changes?

LS2.D: Social Interactions and Group Behavior

How do organisms interact in groups so as to benefit individuals?

LS3: Heredity: Inheritance and Variation of Traits

How are characteristics of one generation passed to the next?
How can individuals of the same species and even siblings have different characteristics?

LS3.A: Inheritance of Traits

How are the characteristics of one generation related to the previous generation?

LS3.B: Variation of Traits

Why(How) do individuals of the same species vary in how they look, function and behave?

LS4: Biological Evolution: Unity and Diversity

How can there be so many similarities among organisms yet so many different kinds of plants, animals and microorganisms?

LS4.A: Evidence of Common Ancestry and Diversity

What evidence shows that different species are related?

LS4.B: Natural Selection

How does genetic variation among organisms affect survival and reproduction?

LS4.C: Adaptation

How does the environment influence populations of organisms over multiple generations?

LS4.D: Biodiversity and Humans

What is biodiversity, how do humans affect it, and how does it affect humans?

Earth and Space Sciences

ESS1: Earth's Place in the Universe

What is the universe, and what is Earth's place in it?

ESS1.A: The Universe and Its Stars

What is the universe, and what goes on in the stars?

ESS1.B: Earth and the Solar System

What are the predictable patterns caused by Earth's movement in the solar system?

ESS1.C: The History of Planet Earth

How do people reconstruct and date events in Earths planetary history?

ESS2: Earth Systems

How and why is Earth constantly changing?

ESS2.A: Earth Materials and Systems

How do Earths major systems interact?

ESS2.B: Plate Tectonics and Large-Scale Systems Interactions

Why do the continents move, and what causes earthquakes and volcanoes?

ESS2.C: The Roles of Water in Earth's Surface Processes

How do the properties and movements of water shape Earth's surface and affect its systems?

ESS2.D: Weather and Climate

What regulates weather and climate?

ESS2.E: Biogeology

How do living organisms alter Earth's processes and structures?

ESS3: Earth and Human Activity

How do the Earth's surface processes and human activities affect each other?

ESS3.A: Natural Resources

How do humans depend on Earth's resources?

ESS3.B: Natural Hazards

How do natural hazards affect individuals and societies?

ESS3.C: Human Impact on Earth Systems

How do humans change the planet?

ESS3.D: Global Climate Change

How do people model and predict the effects of human activities on Earth's climate?

Engineering, Technology and Applications of Science

ETS1: Engineering Design

How do engineers solve problem?

ETS1.A: Defining and Delimiting and Engineering Problem

What is a design for? What are the criteria and constraints of a successful solution?

ETS1.B: Developing Possible Solutions

What is the process for developing potential design solutions?

ETS1.C: Optimizing the Design Solution

How can various design solution be compared and improved?

ETS2: Links among Engineering, Technology, Science and Society

How are engineering, technology, science and society interconnected?

ETS2.A: Interdependence of Science, Engineering, and Technology

What are the relationships among science, engineering, and technology?

ETS2.B: Influence of Engineering, Technology and Science on Society and the Natural World

How do science, engineering, and the technologies that result from them affect the ways in which people live? How do they affect the natural world?