Science - USA

NGSS - GRADE 7

Experience Level: **MIDDLE SCHOOL**

Number of Classes: **VARIABLE**

Age Range: **11 - 12 YEARS**

01 Life Sciences

- Matter and Energy in Organisms and Ecosystems
  - Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.
  - Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.
  - Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
  - Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

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01 Life Sciences (Contd.)

- Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
- Interdependent Relationships in Ecosystems
  - Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
  - Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

02 Earth and Space Systems

- History of Earth
  - Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
  - Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.
- Earth's Systems
  - Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
  - Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.
- Human Impacts
  - Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

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03 Physical Sciences

- Structure and Properties of Matter
  - Develop models to describe the atomic composition of simple molecules and extended structures.
  - Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.
  - Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
- Chemical Reactions
  - Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
  - Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.
  - Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.

04 Engineering, Technology, and Applications of Science

- Engineering Design
  - Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

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04 Engineering, Technology, and Applications of Science (Contd.)

- Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
- Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

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