Curriculum Map: 8th Grade Science

Course: 8 Science Sub-topic: General

Grade(s): 8

Course Description:

Using the Nature of Science, the focus of the curriculum is integrated across the spectrum of Biological & Physical Sciences, with an emphasis on preparation for 8th grade science PSSA's and laying a foundation for biology in 9th grade. Much of the material will be a deeper dive of the studies done in 6th grade. Students will complete course work in the areas of: **Structures of Property and Matter-**Study of physical/chemical properties and elements/ compounds/mixtures; thermal energy and states of matter; **Chemical Reactions-**Study of chemical reactions; **Definitions of Energy-** Study of forms of energy and energy resources and energy transfer; **Matter and Energy in Organisms and Ecosystems-** energy in ecosystems/ ecosystems and the cycling of matter/ population dynamics and ecosystem change;**Interdependent Relationships in Ecosystems -** Organism Interactions and Biodiversity; **Essential Questions:**

How do scientists & engineers solve a problem/question

What is the process for developing solutions? What are the criteria and constraints?

How can these process be compared, verified & improved

What are the relationships among science, engineering, and technology & how do they affect the ways in which people live and the natural world?

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

What is Chemistry?

How do Solids, Liquids, Gases differ?

What is the periodic table of elements?

How do compounds form?

Why are many natural and synthetic materials technologically useful?

What happens during a chemical reaction?

What is energy and how can it be transformed?

How can heat be transformed from place to place?

How are cells important to the structure and function of living things?

How do cells obtain the energy they need to carry out all their functions?

How are traits passed from parents to offspring?

What applications of science and technology have advanced the study of genetics?

What process leads to the evolution and diversity of organisms?

How do the living and nonliving parts of the ecosystem interact?

How do matter and energy flow through ecosystems?

Course Textbooks, Workbooks, Materials Citations:

HMH Science Dimensions Textbook Series and online learning system

Chromebooks and Canvas

Study Island and Mobymax

Various websites and print resources

Lab materials & equipment to develop lab skills and support classroom instruction

Resources:

Study Island will be used with each unit to reinforce concepts, prepare students for standardized tests, and assess student learning and performance levels.

We plan to begin using the basics of the Next Generation Science Standards within our classrooms.

Course Notes:

Pacing Guide:

Unit: Physical Science

Timeline: Week 1 to Week 11

Unit Description: Chemistry Unit

Unit Description: Study of Physical/Chemical Properties, Elements and Compound Mixtures, and Chemical Reactions.

Students will learn:

1. Develop models to describe the atomic composition of simple molecules and extended structures.

2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

3. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

4. 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.

5. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

6. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

7. 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.

8. Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.

Unit: Physical Science

Timeline: Week 12 to Week 15

Unit Description: Energy Unit

Unit Description: Forms if Energy/Energy Transformations/Heat Transfer/ Energy Resources

Students will learn

1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

2. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.

3. Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

4. Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.

Unit: Biology/Life Science

Timeline: Week 16 to Week 20

Unit Description: Cell Unit

Unit Description: Cells/ Living Things

Students will:

1. Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of

cells.

2. Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.

3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells

4. Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

Unit: Biology/Life Science

Timeline: Week 21 to Week 25

Unit Description: Genetics

Unit Description: Inheritance and Variation of Traits

Students will:

1. Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.

2. Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.

3. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

4. Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.

5. Use argument based on empirical evidence and scientific reasoning to

support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.

Unit: Biology/Life Science

Timeline: Week 26 to Week 30

Unit Description: Evolution Unit

Unit Descriptions:

Students will learn:

1. Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.

2. Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern fossil organisms to infer evolutionary relationships.

3. Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.

4. Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.

5. Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

Unit: Biology/Life Science

Timeline: Week 31 to Week 35

Unit Description: Ecosystems

Unit Description:

Students will learn

1. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

2. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and the flow of energy into and out of organisms.

3. 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.

4. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

5. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Unit:

This Curriculum Map Unit has no Topics to display