Utah Science with Engineering Education (SEEd)

Grade 7

Adopted 2017

Forces are Interactions Between Matter

1. Carry out an investigation which provides evidence that a change in an object's motion is dependent on the mass of the object and the sum of the forces acting on it. Various experimental designs should be evaluated to determine how well the investigation measures an object's motion. Emphasize conceptual understanding of Newton's First and Second Laws. Calculations will only focus on one-dimensional movement; the use of vectors will be introduced in high school. 7.1.1
2. Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects in a system. 7.1.2
3. Construct a model using observational evidence to describe the nature of fields existing between objects that exert forces on each other even though the objects are not in contact. Emphasize the cause and effect relationship between properties of objects (such as magnets or electrically charged objects) and the forces they exert. 7.1.3
4. Collect and analyze data to determine the factors that affect the strength of electric and magnetic forces. 7.1.4
5. Engage in argument from evidence to support the claim that gravitational interactions within a system are attractive and dependent upon the masses of interacting objects. 7.1.5

Changes to Earth Over Time

1. Develop a model of the rock cycle to describe the relationship between energy flow and matter cycling that create igneous, sedimentary, and metamorphic rocks. Emphasize the processes of melting, crystallization, weathering, deposition, sedimentation, and deformation, which act together to form minerals and rocks. 7.2.1
2. Construct an explanation based on evidence for how processes have changed Earth's surface at varying time and spatial scales. Examples of processes that occur at varying time scales could include slow plate motions or rapid landslides. 7.2.2
3. Ask questions to identify constraints of specific geologic hazards and evaluate competing design solutions for maintaining the stability of human-engineered structures, such as homes, roads, and bridges. 7.2.3

	4. **Develop and use a scale model of the matter in the Earth's interior to demonstrate how differences in density and chemical composition (silicon, oxygen, iron, and magnesium) cause the formation of the crust, mantle, and core.** 7.2.4
	5. **Ask questions and analyze and interpret data about the patterns between plate tectonics and:<ol type="1"> - the occurrence of earthquakes and volcanoes. - Continental and ocean floor features. - the distribution of rocks and fossils. ** 7.2.5
	6. **Make an argument from evidence for how the geologic time scale shows the age and history of Earth. Emphasize scientific evidence from rock strata, the fossil record, and the principles of relative dating, such as superposition, uniformitarianism and recognizing unconformities.** 7.2.6
Structure and Function of Life	1. **Plan and carry out an investigation that provides evidence that the basic structures of living things are cells. Emphasize that cells can form single-celled or multicellular organisms, and that multicellular organisms are made of different types of cells.** 7.3.1
	2. **Develop and use a model to describe the function of a cell in living systems and the way parts of cells contribute to cell function. Emphasize the cell as a system, including the interrelating roles of the nucleus, chloroplasts, mitochondria, cell membrane, and cell wall.** 7.3.2
	3. **Construct an explanation using evidence to explain how body systems have various levels of organization. Emphasize understanding that cells form tissues, tissues form organs, and organs form systems specialized for particular body functions.** 7.3.3
Reproduction and Inheritance	1. **Develop and use a model to explain the effects that different types of reproduction have on genetic variation, including asexual and sexual reproduction.** 7.4.1
	2. **Obtain, evaluate, and communicate information about specific animal and plant adaptations and structures that affect the probability of successful reproduction.** 7.4.2
	3. **Develop and use a model to describe why genetic mutations may result in harmful, beneficial, or neutral effects to the structure and function of the organism. Emphasize the conceptual idea that changes to traits can happen because of genetic mutations. Specific changes of genes at the molecular level, mechanisms for protein synthesis, and specific types of mutations will be introduced at the high school level.** 7.4.3

	4. **Obtain, evaluate, and communicate information about the technologies that have changed the way humans affect the inheritance of desired traits in organisms. Analyze data from tests or simulations to determine the best solution to achieve success in cultivating selected desired traits in organisms.** 7.4.4
Changes in Species Over Time	1. **Construct an explanation that describes how the genetic variation of traits in a population can affect some individuals' probability of surviving and reproducing in a specific environment. Over time, specific traits may increase or decrease in populations. Emphasize the use of proportional reasoning to support explanations of trends in changes to populations over time.** 7.5.1
	2. **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.** 7.5.2
	3. **Construct explanations that describe the patterns of body structure similarities and differences between modern organisms, and between ancient and modern organisms, to infer possible evolutionary relationships.** 7.5.3
	4. **Analyze data to compare patterns in the embryological development across multiple species to identify similarities and differences not evident in the fully formed anatomy.** 7.5.4