North Carolina Science

Grade 7

Motion and Stability: Forces and Interactions

1 **Understand motion, the effects of forces on motion, and the graphical representations of motion.** PS.7.1

1 Construct an explanation to summarize the motion of an object by its position, direction of motion, and speed in respect to some other object. PS.7.1.1

2 Use models to illustrate the effects of balanced and unbalanced forces acting on an object (including friction, gravity, and magnetism). PS.7.1.2

3 Analyze and interpret graphical data to summarize the motion of an object to show a change in position over a period of time. PS.7.1.3

4 Analyze and interpret graphical data to summarize the motion of an object to show a change in distance over a period of time for constant speed and variable motion. PS.7.1.4

Energy

2 **Understand forms of energy, energy transfer and transformation, and conservation in mechanical systems.** PS.7.2

1 Construct an explanation to summarize how kinetic and potential energy contribute to the mechanical energy of an object. PS.7.2.1

2 Engage in argument from evidence to explain how energy can be transformed from one form to another, specifically potential energy and kinetic energy (models could include roller coasters, pendulums, or cars on ramps as examples). PS.7.2.2

3 Carry out investigations to conclude that energy can be transferred from one system to another when two objects push or pull on each other over a distance (work) in a mechanical system using qualitative data. PS.7.2.3

4 Carry out investigations to compare the efficiency of simple machines in relation to their advantages for particular purposes (to include inclined planes, pulleys, levers and wheel and axles) using qualitative data. PS.7.2.4

From Molecules to Organisms- Structures and Processes

3 **Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life.** LS.7.1

1 Construct an explanation to conclude how the structures of single-celled organisms carry out all of the basic functions of life including: Euglena, Amoeba, Paramecium, Volvox. LS.7.1.1

2 Use models to explain how the relevant structures within cells (including cell membrane, cell wall, nucleus, mitochondria, chloroplasts, and vacuoles) function to support the life of plant, animal, and bacterial cells. LS.7.1.2

3 Use models to explain how the hierarchical organization of multicellular organisms from cells to tissues to organs to systems to organisms functions to support life. LS.7.1.3

4 Construct an explanation to summarize how the major systems of the human body interact with each other to support life (including digestion, respiration, reproduction, circulation, excretion, nervous). LS.7.1.4

Heredity- Inheritance and Variation of Traits

4 **Understand the relationship of the mechanisms of reproduction, patterns of inheritance, and potential variation among offspring.** LS.7.2

1 Construct an explanation supported with scientific evidence to summarize the role of genes on chromosomes as inherited cellular structures which contribute to an organism's traits (not to include the structure of DNA). LS.7.2.1

2 Use models to explain how asexual reproduction results in offspring with identical genetic information while sexual reproduction results in offspring with genetic variation (not to include specific phases of mitosis and meiosis). LS.7.2.2

3 Use models (Punnett squares) to infer and predict patterns of the inheritance of single genetic traits from parent to offspring (including dominant and recessive traits). LS.7.2.3

Earth's Systems

5 **Understand the atmosphere and how the cycling of water relates to Earth's weather and climate.** ESS.7.1

1 Analyze and interpret data to compare the composition, properties and structure of Earth's atmosphere to include: mixtures of gases and differences in temperature and pressure within layers. ESS.7.1.1

2 Use models to explain how the energy of the Sun and Earth's gravity drive the cycling of water, including changes of state, as it moves through multiple pathways in Earth's systems and relates to weather patterns on Earth. ESS.7.1.2

3 Analyze and interpret data to explain the relationship between the movement of air masses, high and low pressure systems, frontal boundaries and weather conditions that may result. ESS.7.1.3

4 Use models to predict weather conditions based on observations (including clouds, air masses, fronts), measurements (wind speed and direction, air temperature, humidity and air pressure), weather maps, satellites and radar. ESS.7.1.4

5 Use models to explain the influence of convection, global winds, and the jet stream on weather and climatic conditions. ESS.7.1.5

Earth and Human Activity

6 **Understand the reciprocal relationship between the atmosphere and humans.** ESS.7.2

1 Engage in argument from evidence to explain that the good health of humans and environment requires: monitoring of the atmosphere, maintaining air quality and stewardship. ESS.7.2.1

2 Analyze and interpret data to explain how changes in the structure and composition of the atmosphere affects the greenhouse effect and global temperatures. ESS.7.2.2

3 Obtain, evaluate, and communicate information to explain the impacts on humans and mitigation strategies of potentially hazardous environmental factors (including air quality index, UV index, Heat Index, Wildfires) and storms (hurricanes, blizzards, tornadoes, severe thunderstorms, floods). ESS.7.2.3