Unit 1: Structure and Properties of Matter **Instructional Days: 20**

Students build understandings of what occurs at the atomic and molecular scale. Students apply their understanding that pure substances have characteristic properties and are made from a single type of atom or molecule. They also provide a molecular level accounts to explain states of matter and changes between states. The crosscutting concepts of *cause and effect*, *scale, proportion and quantity*, *structure and function*, *interdependence of science, engineering, and technology*, and *the influence of science, engineering and technology on society and the natural world* provide a framework for understanding the disciplinary core ideas. Students demonstrate grade appropriate proficiency in *developing and using models*, and *obtaining, evaluating, and communicating information*. Students are also expected to use the scientific and engineering practices to demonstrate understanding of the core ideas.

This unit is based on MS-PS1-1 and MS-PS1-2.

Unit 2: Interactions of Matter **Instructional Days: 20**

Students provide molecular-level accounts of states of matter and changes between states, of how chemical reactions involve regrouping of atoms to form new substances, and of how atoms rearrange during chemical reactions. Students are also able to apply an understanding of optimization design and process in engineering to chemical reaction systems. The crosscutting concepts of *structure and function, cause and effect, interdependence of science, engineering, and technology, and influence of science, engineering, and technology on society and on the natural world* provide a framework for understanding the disciplinary core ideas. Students are expected to demonstrate grade appropriate proficiency in *obtaining, evaluating, and communicating information* and *developing and using models*. Students are also expected to use the scientific and engineering practices to demonstrate understanding of the core ideas.

This unit is based on MS-PS1-3 and MS-PS1-4.

Unit 3: Chemical Reactions **Instructional Days: 25**

Students provide molecular-level accounts of states of matters and changes between states, of how chemical reactions involve regrouping of atoms to form new substances, and of how atoms rearrange during chemical reactions. Students also apply their understanding of optimization design and process in engineering to chemical reaction systems. The crosscutting concept of *energy and matter* provides a framework for understanding the disciplinary core ideas. Students are expected to demonstrate proficiency in *developing and using models, analyzing and interpreting data, designing solutions*, and *obtaining, evaluating, and communicating information*. Students are also expected to use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

This unit is based on MS-PS1-5, MS-PS1-6, MS-ETS1-2, MS-ETS1-3, and MS-ETS1-4.

Unit 4: Structure and Function **Instructional Days: 15**

Students demonstrate age appropriate abilities to plan and carry out investigations to develop *evidence* that living organisms are made of cells. Students gather information to support explanations of the relationship between structure and function in cells. They are able to communicate an understanding of cell theory and understand that all organisms are made of cells. Students understand that special structures are responsible for particular functions in organisms. They then are able to use their understanding of cell theory to develop and use physical and conceptual models of cells. The crosscutting concepts of *scale, proportion, and quantity* and *structure and function* provide a framework for understanding the disciplinary core ideas. Students are expected to demonstrate proficiency in *planning and carrying out investigations*, *analyzing and interpreting data*, and *developing and using models*, Students are also expected to use these to use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

This unit is based on MS-LS1-1 and MS-LS1-2.

Unit 5: Body Systems **Instructional Days: 15**

Students develop a basic understanding of the role of cells in body systems and how those systems work to support the life functions of the organism. Students will construct explanations for the interactions of systems in cells and organisms. Students understand that special structures are responsible for particular functions in organisms, and that for many organisms, the body is a system of multiple-interaction subsystems that form a hierarchy, from cells to the body. Students construct explanations for the interactions of systems in cells and organisms and for how organisms gather and use information from the environment. The crosscuttings concepts of *systems and system models* and *cause and effect* provide a framework for understanding the disciplinary core ideas. Students are expected to demonstrate proficiency in *engaging in argument from evidence* and *obtaining, evaluating, and communicating information*. Students use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

This unit is based on MS-LS1-3 and MS-LS1-8.

Unit 6: Inheritance and Variation of Traits **Instructional Days: 20**

Students develop and use models to describe how gene mutations and sexual reproduction contribute to genetic variation. Students understand how genetic factors determine the growth of an individual organism. They also demonstrate understanding of the genetic implications of sexual and asexual reproduction. The crosscutting concepts of *cause and effect* and *structure and function* provide a framework for understanding how gene structure determines differences in the functioning of organisms. Students are expected to demonstrate proficiency in *developing and using models*. Students use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

This unit is based on MS-LS3-1 and MS-LS3-2.

Unit 7: Organization for Matter and Energy Flow in Organisms **Instructional Days: 15**

Students provide a mechanistic account for how cells provide a structure for the plant process of photosynthesis in the movement of matter and energy needed for the cell. Students use conceptual and physical models to explain the transfer of energy and cycling of matter as they construct explanations for the role of photosynthesis in cycling matter in ecosystems. They construct scientific explanations for the cycling of matter in organisms and the interactions of organisms to obtain matter and energy from an ecosystem to survive and grow. They understand that sustaining life requires substantial energy and matter inputs, and that the structure and functions of organisms contribute to the capture, transformation, transport, release, and elimination of matter and energy. The crosscutting concepts of *matter and energy* and *structure and function* provide a framework for understanding of the cycling of matter and energy flow into and out of organisms. Students are also expected to demonstrate proficiency in *developing and using models*. Students use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

This unit is based on MS-LS1-6 and MS-LS1-7.

Unit 8: Earth Systems **Instructional Days: 30**

Students examine geoscience data in order to understand processes and events in Earth's history. Important crosscutting concepts in this unit are *scale, proportion, and quantity*, *stability and change*, and *patterns* in relation to the different ways geologic processes operate over geologic time. An important aspect of the history of Earth is that geologic events and conditions have affected the evolution of life, but different life forms have also played important roles in altering Earth's systems. Students understand how Earth's geosystems operate by modeling the flow of energy and cycling of matter within and among different systems. Students investigate the controlling properties of important materials and construct explanations based on the analysis of real geoscience data. Students are expected to demonstrate proficiency in *analyzing and interpreting* data and *constructing explanations*. They are also expected to use these practices to demonstrate understanding of the core ideas.

This unit is based on MS-ESS1-4, MS-ESS2-1, MS-ESS2-2, and MS-ESS2-3.

Note: *The number of instructional days is an estimate based on the information available at this time. 1 day equals approximately 42 minutes of seat time. Teachers are strongly encouraged to review the entire unit of study carefully and collaboratively to determine whether adjustments to this estimate need to be made.*