Middle School Topic Model Course 1

Narrative and Rationale: This course model arranges the Performance Expectations (PEs) outlined in the first year of the California Integrated Middle School Model into four different bundles of PEs using a topical arrangement. The disciplinary core ideas of each standard were used in this model to arrange bundles that addressed the topics of human body systems, reproduction and growth, energy transfer and weather, and climates and human impacts.
The Disciplinary Core Ideas (DCIs) in physical science focus on the transfer of energy in systems and the kinetic energy of objects. In the life sciences, the DCIs address the growth and development of organisms, cell structures, and processes. Finally, in the earth and space sciences, the DCIs emphasize the role of water in shaping the processes of the Earth. These DCIs build conceptually throughout the year.

In this model, students begin to develop proficiency in the middle school-level Science and Engineering Practices over the course of the year, and the level of sophistication at which they are able to engage in them increases over time. It is important to note that the Practices and Crosscutting Concepts described are intended as end-of-instructional unit expectations and not curricular designations. Additional Practices and Crosscutting Concepts should be used throughout instruction toward each bundle.

Bundle 1: "How do the structures of organisms enable life's functions?" **~6 weeks**	**Bundle 2:** "How do organisms grow and reproduce?" **~6 weeks**	**Bundle 3:** "How can we measure the flow of energy in a system?" **~6 weeks**	**Bundle 4:** "What is contributing to the rise in global temperature?" **~6 weeks**
MS-LS1-1. Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells. **MS-LS1-2.** Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function. **MS-LS1-3.** Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.[1] **MS-LS1-8.** Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories. [1] **MS-ETS1-1.** 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.	**MS-LS1-3.** Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. [1] **MS-LS1-4.** 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. **MS-LS1-5.** Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. **MS-LS1-8.** Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories. [1] **MS-LS3-2.** 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. **MS-ETS1-1.** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into	**MS-PS3-3.** Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.* **MS-PS3-4.** 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. **MS-PS3-5.** Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. **MS-ETS1-3.** 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.	**MS-ESS2-4.** Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. **MS-ESS2-5.** Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions. **MS-ESS2-6.** Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates. **MS-ESS3-3.** Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.* **MS-ESS3-5.** Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. **MS-ETS1-2.** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

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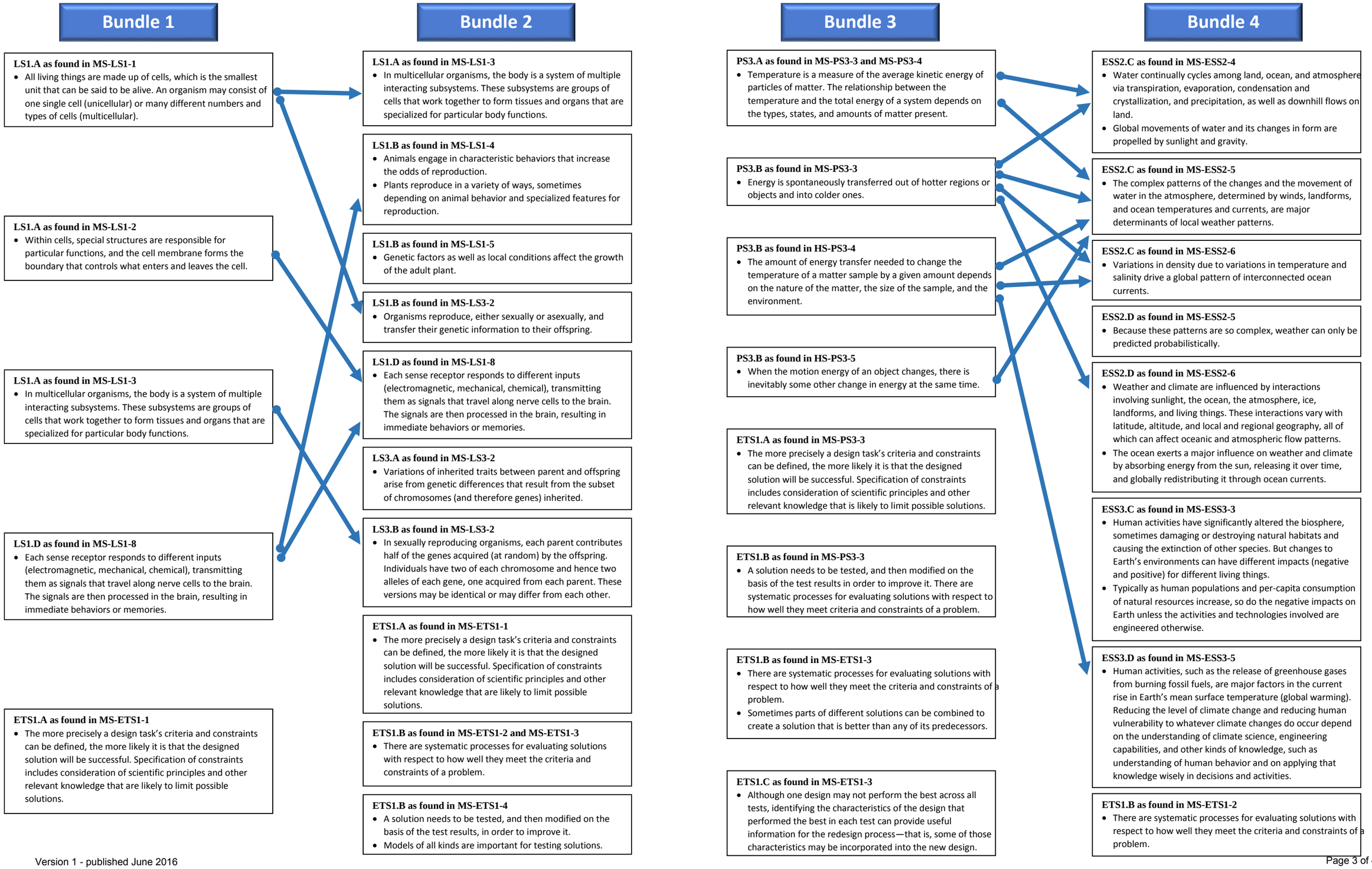
	account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. **MS-ETS1-2.** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. **MS-ETS1-3.** 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. **MS-ETS1-4.** 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.		

1. The bundle only includes part of this PE; the PE is not fully assessable in a unit of instruction leading to this bundle.

Middle School Topics Model Course 1 Flowchart



ETS1.B as found in MS-ETS1-3
- Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors.

ETS1.C as found in MS-ETS1-3
- Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of those characteristics may be incorporated into the new design.

ETS1.C as found in MS-ETS1-4
- The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution.