Ocean Depth and Pressure Activity and Video Short

Follow the journey of a styrofoam cup to the bottom of the Ocean and apply math to determine any change to that cup.

Grade level	Academic Standards			
	Preformance Expectation	**Sci. & Engineering Practice**	**Disciplinary Core Idea**	**Crosscutting Concept**
K-2				
3-5 (starting with Grade 5)	**5-PS1-2**. Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. **5-PS1-3**. Make observations and measurements to identify materials based on their properties	USING MATHEMATICAL AND COMPUTATIONAL THINKING • Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions.	• Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) (**5-PS1-3**) • The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (**5-PS1-2**) • No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.) (**5-PS1-2**)	CAUSE AND EFFECT • Cause and effect relationships are routinely identified and used to explain change. (**5-PS1-4**) SCALE, PROPRTION, AND QUANITY • Natural objects exist from the very small to the immensely large. (**5-PS1-1**) • Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. (**5-PS1-2**),(**5-PS1-3**)
6-8		ANALYZING AND INTERPRETING DATA • Analyzing data in 6–8 builds on K–5 and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis. • Construct and interpret graphical displays of data to identify linear and nonlinear relationships. (**MS-PS3-1**) ENGAGING IN ARGUMENT FROM EVIDENCE • Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed worlds. • Construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon. (**MS-PS3-5**) SCIENTIFIC KNOWLEDGE IS BASED ON EMPIRICAL EVIDENCE • Science knowledge is based upon logical and conceptual connections between evidence and explanations (**MS-PS3-4**),(**MS-PS3-5**)	**PS3.C**: RELATIONSHIP BETWEEN ENERGY AND FORCES • When two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object. (**MS-PS3-2**) **ETS1.A**: DEFINING AND DELIMITING AN ENGINEERING PROBLEM • The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that is likely to limit possible solutions. (**secondary to MS-PS3-3**)	SCALE, PROPORTION, AND QUANTITY • Proportional relationships (e.g. speed as the ratio of distance traveled to time taken) among different types of quantities provide information about the magnitude of properties and processes. (**MS-PS3-1**),(**MS-PS3-4**)

Academic standards for 9-12 on the next page

Grade level	Academic Standards			
	Preformance Expectation	**Sci. & Engineering Practice**	**Disciplinary Core Idea**	**Crosscutting Concept**
9-12		PLANNING AND CARRYING OUT INVESTIGATIONS • Planning and carrying out investigations to answer questions or test solutions to problems in 9–12 builds on K–8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models. • Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (**HS-PS3-4**) USING MATHEMATICAL AND COMPUTATIONAL THINKING • Mathematical and computational thinking at the 9–12 level builds on K–8 and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions. • Create a computational model or simulation of a phenomenon, designed device, process, or system. (**HS-PS3-1**)	• Energy cannot be created or destroyed, but it can be transported from one place to another and transferred between systems. (**HS-PS3-1**),(**HS-PS3-4**) • Mathematical expressions, which quantify how the stored energy in a system depends on its configuration (e.g. relative positions of charged particles, compression of a spring) and how kinetic energy depends on mass and speed, allow the concept of conservation of energy to be used to predict and describe system behavior. (**HS-PS3-1**) • The availability of energy limits what can occur in any system. (**HS-PS3-1**) • Uncontrolled systems always evolve toward more stable states—that is, toward more uniform energy distribution (e.g., water flows downhill, objects hotter than their surrounding environment cool down). (**HS-PS3-4**)	CAUSE AND EFFECT • Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system. (**HS-PS3-5**) SYSTEMS AND SYSTEM MODELS • When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models. (**HS-PS3-4**) • Models can be used to predict the behavior of a system, but these predictions have limited precision and reliability due to the assumptions and approximations inherent in models. (**HS-PS3-1**) ENERGY AND MATTER • Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system. (**HS-PS3-3**) • Energy cannot be created or destroyed—only moves between one place and another place, between objects and/or fields, or between systems. (**HS-PS3-2**) SCIENTIFIC KNOWLEDGE ASSUMES AN ORDER CAND CONSISTENCY IN NATURAL SYSTEMS • Science assumes the universe is a vast single system in which basic laws are consistent. (**HS-PS3-1**)