

PHYSICAL SCIENCE

KEY



Virtual lab falls under this general category



Virtual lab matches specific performance expectation in NGSS



Virtual Lab matches aspects/components of core idea in performance expectation in NGSS

NGSS Standard	Virtual Labs					In Transition Projectable Parabolic Motion
	Currently Available					
	Phase Change	Free Fall	Mass & Weight	Liquid Density	Collisions	
MS-PS1: MATTER AND ITS INTERACTIONS	+			+		
Develop models to describe the atomic composition of simple molecules and extended structures.						
Analyze and interpret data on the properties of substances before and after the substances interact and determine if a chemical reaction has occurred.	★ ¹			★ ²		
Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.						
Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.	★ ³					
Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.						
Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.						
MS-PS2: MOTION AND STABILITY Forces and Interactions					+	+
MS-PS3: ENERGY		+				
Construct and interpret graphical displays of data to describe the relationships of kinetic energy to		★ ⁴				

¹ Task uses one substance, namely, ice; Lab incorporates the underlying core idea that each pure substance has characteristic

² Lab incorporates the underlying core idea that each pure substance has characteristic physical properties and that density is one such property

³ Written model; No particle motion; Lab specifically targets temperature and state only when thermal energy is added; Lab incorporates the core idea that heat is used only to refer to the energy transferred due to the temperature difference between two objects; Lab incorporates the cause and effect crosscutting concept

⁴ Task requires students to interpret tabular displays of data (initial and final kinetic energy).

SLINQ VIRTUAL LABS & NEXT GENERATION SCIENCE STANDARDS FOR MIDDLE SCHOOL

the mass of an object and to the speed of an object.						
Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.		✖ ⁵				
Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.						
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 particles as measured by the temperature of the sample.						
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-PS4: WAVES and their Applications in Technologies for Information Transfer						

⁵ Task requires students to generate written descriptions of the system to describe their model.

LIFE SCIENCE




NGSS Standard	Virtual Labs Under Development				
	Animal Cell Function	Genetics: Bug's Life	Ecosystem	EvoLife	Plant Cell Function
MS-LS1: FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES	+				+
Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.					
Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.	x				
Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.					
Use argument based on empirical evidence and specific 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.					
Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.					
Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.					
Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.					
Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.					
MS-LS2: ECOSYSTEMS: INTERACTIONS, ENERGY, AND DYNAMICS			+		
Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem			x		
Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.					
Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem			x		
Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.			x		
Evaluate competing design solutions for maintaining biodiversity and ecosystem services.					

MS-LS3: HEREDITY: INHERITANCE AND VARIANCE OF TRAITS

Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.






Develop and use a model to describe why asexual reproduction results in offspring with identical information and sexual reproduction results in offspring with genetic variation.

MS-LS4: BIOLOGICAL EVOLUTION: UNITY AND DIVERSITY

				
	 ⁶			
				

⁶ Lab addresses the inheritance of traits and genetic variation in sexual reproduction

EARTH SCIENCE

NGSS Standard	Virtual Labs Under Development	
	Plate Tectonics	Seasons
MS-ESS1: EARTH'S PLACE IN THE UNIVERSE		
Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons		
Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system		 ⁷
Analyze and interpret data to determine scale properties of objects in the solar system		
Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.		
MS-ESS2: EARTH'S SYSTEMS		
Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process		
Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.	 ⁸	
Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.	 ⁹	
Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.		
Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.		
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: EARTH AND HUMAN ACTIVITY		

⁷ Lab uses a model of the Earth-sun system to describe seasons. Addresses core idea about Earth's spin axis and tilt and how the seasons are a result of that tilt.

⁸ Lab incorporates underlying core idea that the movement of Earth's crustal plates causes both slow changes and rapid changes.

⁹ Lab focuses on how plate motions affect continental shapes and seafloor structures.