	ORION'S QUEST	Worms in Space	Silicate Gardens	Butterflies in Space	Fruit Flies in Space	MESA Mission - Wee	Spiders in Space	Plant Growth in Space	Managing Microbes in Space	Stem on Station	Stem Cell Studies on Station	CuRE in Space - Cancer
e = mission suited for extension activities	MISSION NGSS MATRIX					Worms in Space						Microgravity Research Experiment
DCIs	- Disciplinary Core Ideas - HIGH SCHOOL											
Earth	and Space Science (basis of all missions)											
	Earth's Place in the Universe											
	HS-ESS1-1. Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation.	е	е	e	е	е	e	e	е	е	е	е
	HS-ESS1-3. Communicate scientific ideas about the way stars, over their life cycle, produce elements.		е									
	HS-ESS1-4. Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.	е	е	е	е	е	e	e	е	е	e	е
	Earth and Human Activity											
	HS-ESS3-6. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.							e				
Life S	cience											
	Molecules to Organisms: Structures and Processes											
	HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.			x			×	х		х	×	x
	HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.			х				х				
	HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.			е				е				
	Ecosystems: Interactions, Energy, and Dynamics											
	HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	е		е	е	е	е	е	е	е	е	е
	HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.			е	е		е	e				
	HS-LS2-4 . Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	e		е	е	е	е	e	е			
	HS-LS2-6. Evaluate claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	х		x	х	Х	х	х	х			
	HS-LS2-8. Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce.	х		Х	Х	Х	х		Х			Х
	Heredity: Inheritance and Variation of Traits											
	HS-LS3-2. Make and defend a claim based on evidence that inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.	х		x		x			x			
	Biological Evolution: Unity and Diversity											
	HS-LS4-2. Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.			e								

e = mission suited for extension	ORION'S QUEST MISSION NGSS MATRIX	Worms in Space	Silicate Gardens	Butterflies in Space	Fruit Flies in Space	MESA Mission - Wee Worms in Space	Spiders in Space	Plant Growth in Space	Managing Microbes in Space	Stem on Station	Stem Cell Studies on Station	CuRE in Space - Cancer Microgravity Research
activities	HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity			е								Experiment
Physi	cal Science											
	Matter and Its Interactions											
	HS-PS1-1. Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.		х									
	HS-PS1-2. Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.		х									
	HS-PS1-3. Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.		е									
	HS-PS1-5. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.		х									
	HS-PS1-6. Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.		е									
	HS-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.		х									
	Motion and Instability											
	HS-PS2-6. Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.		е									
Engir	eering Design Process											
	HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.	e	е	е	е	е	е	е	e	е	е	e
	HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.	х	х	×	×	×	х	×	х	х	×	x
	HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.	х	х	x	x	x	x	x	х	х	x	×
DCIs	MIDDLE SCHOOL - Disciplinary Core Ideas											
Earth	and Space Science (basis of all missions)											
	Earth's Place in the Universe											
	MS-ESS1-1. 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.	e	е	e	е	е	e	е	e	е	е	e
	MS-ESS1-2. Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.	Х	Х	×	Х	Х	Х	Х	×	Х	Х	×
	Earth's Systems											
	MS-ESS2-3. Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.							е				
	Earth and Human Activity											

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extension activities												Experiment
	MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.		e (ceme	nt production)								
Life S	cience											
	Molecules to Organisms: Structures and Processes											
	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.	е		е	е	е	е	е	e	х	×	x
	MS-LS1-2. Develop and use a model to describe the function of a cell as a whole and ways the parts of cells contribute to the function.									Х	×	×
	MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.	е		е	е	е	е	е	е	е	e	е
	MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.	x		X	×	×	X	X	х			
	MS-LS1-6. 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.							е				
	Ecosystems: Interactions, Energy, and Dynamics											
	MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.	х	х	х	х	х	х	×	х	х	×	х
	MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.			×	е		е	×				
	Biological Evolution: Unity and Diversity											
	MS-LS4-4. Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.			е								
Physi	cal Science											
	Matter and Its Interactions											
	MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures.		Х									
	MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.		х									
	MS-PS1-3. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.		×									
	MS-PS1-4. 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.		X (conv	X (convection - ground onl								
	MS-PS1-5. 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.		х									
	MS-PS1-6. Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.		е									
	Motion and Instability											
	MS-PS2-2. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.	е	е	е	е	е	е	е	е	е	е	е
	MS-PS2-4. Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.	х	х	х	х	×	×	×	х	х	х	Х

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MS-PS2-5. Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.	е	е	е	е	е	е	е	е	е	e	е
Waves and their Application in Technologies for Information Tra	nsfer										
MS-PS4-3. Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.	е	е	е	е	е	е	е	е	е	е	е
Engineering Design Process											
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.	х	х	х	х	x	x	x	х	х	x	×
MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.			x				x				
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.			x				х				
SEPs - Science and Engineering Practices - all levels											
Asking questions (for science) & defining problems (for engineering)	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	X
Developing & using models	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	X
Planning and carrying out investigati&		Х	Х				Х				
Analyzing & interpreting data	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	×
Using mathematics & computational thinking								Х	Х	Х	×
Constructing explanations (science) & designing solutions (engineering)	Х	Х	Х	Х	Х	Х	Х	X	Х	Х	×
Engaging in argument from evidence	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	×
Obtaining, evaluating, & communicating information	Х	X	Х	Х	Х	Х	Х	Х	X	Х	×
CCCs - Cross Cutting Concepts - all levels											
Patterns	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	×
Cause & effect	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	X
Scale, proportion, & quantity	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х
Systems & system models	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х
Energy & matter	е	Х	е	е	е	е	е	е	е	е	е
Structure & function	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х
Stability & change	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х
rev.2019											