SCIENCE·3D

GILA MONSTER

SCIENCE PERFORMANCE EXPECTATIONS AND DISCIPLINARY CORE IDEAS

In the Middle School Mission, students will address the following general topics. Keep reading below to find the NGSS standards for each component of the mission. We will be adding Math and Language Arts standards to the document soon! *Note: Be sure to complete the **Mission Reader** and **Mission Research** before viewing the full **Mission Video**. Explore How to Use Science 3D to get suggestions on how to pace the mission and options for the order of activities.*

- In the **Mission Reader,** *Gila Monster*, students will learn about these incredible animals along with lizard biodiversity, adaptations, change in environments through time, and weather and climate. They will learn about factors that cause the climate to change and how these changes can affect organisms. They will also investigate how natural products, like venom, can be used by humans.
- During **Mission Research**, students will create posters that explore the greenhouse effect, how humans can cause the climate to change, and the effects of climate change.
- In the **Science Mission**, students will graph temperature and precipitation data. Then, they will use these data and what they know about Gila monsters to develop and test hypotheses. Finally, they will use data to explore the effect of climate on the immune system and health of Gila monsters, and use the information to make projections about how future changes will influence their health and populations.
- In the **STEM Project**, students will explore some of the "grand challenges" in engineering. Using online resources, they will research some of the solutions engineers are working on to help reduce the impact of people on the environment.
- The **Explore Your Backyard** activity will take students on an exploration of biomes. They will use online resources to access local climate and weather data and compare it to data from other locations. They will use these data to predict the biome presented.

SCIENCE/ENGINEERING AND DESIGN DISCIPLINARY CORE IDEAS AND PERFORMANCE EXPECTATIONS

MISSION READER

MS-LS-1-4	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.
MS-LS1-5	Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. Focus us on environmental factors of animals.
LS1.B	Growth and development of organisms: plant and animal reproduction and behavior.
MS-LS2-1	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
LS2.A	Interdependent relationships in ecosystems.
MS-LS2-4	Construct and argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
LS2.C	Ecosystem dynamics, functioning and resilience: change through time possible.
MS-LS4-1	Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. Partial coverage of fossils and history of the Sonoran Desert.
LS4.A	Evidence of common ancestry and diversity: collection of fossils and placement is know from position and dating known as the fossil record; it documents existence, diversity, extinction. Partial coverage of fossils and history of the Sonoran Desert.
PS3.B	Conservation of energy and energy transfer: energy flows from hot to cold. Insulators and conductors.
PS3.B	Conservation of energy and energy transfer: the amount of energy to change the temp of matter depends on nature of the matter.
LS4.C	Adaptation.
MS-ESS2-2	Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

*ELA and Math standards to come

ESS2.C	The roles of water in Earth's surface processes: weathering and erosion above and underground. In this Mission, only above ground processes are considered.
ESS2.D	Weather and climate.
ESS3.C	Human impacts on Earth Systems.
MS-ESS3-4	Construct an argument supported by evidence for how increases in human population and per capita consumption of natural resources impact Earth's systems.
MS-ESS3-5	Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
ESS3.D	Global climate change.

MISSION RESEARCH

ESS3.C	Human impacts on Earth systems.
MS-ESS3-5	Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
ESS3.D	Global climate change.

SCIENCE MISSION

MS-LS2-1	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
MS-LS-1-4	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. Focus here is on animals. Plants are covered in other Missions.
MS-LS1-5	Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
MS-LS2-1	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
LS2.A	Interdependent relationships in ecosystems.
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.
MS-LS2-4	Construct and argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
LS2.C	Ecosystem dynamics, functioning and resilience: change through time possible.
LS4.C	Adaptation.
ESS3.C	Human impacts on Earth Systems.
ESS3.D	Global climate change.

STEM PROJECT

MS-LS2-5	Evaluate competing design solutions for maintaining biodiversity and ecosystem services.
MS-ESS3-3	Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
ESS3.C	Human impacts on Earth systems.
MS-ESS2-2	Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
ESS2.C	The roles of water in Earth's surface processes: weathering and erosion above and underground.
ESS3.C	Human impacts on Earth systems.
MS-ETS1-1	Define the criteria and constrains 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.
ETS1.A	Defining and delimiting engineering problems: more precision in constraints and criteria is better.
MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
ETS1.B	Developing possible solutions: systematic processes for evaluating solutions to make sure they meet criteria and constraints.
ETS1.C	Optimizing the design solution: iterative process leads to optimal solutions.

EXPLORE YOUR BACKYARD

MS-LS1-5	Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
MS-LS2-4	Construct and argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

*ELA and Math standards to come

LS4.C	Adaptation.
ES2.D	Weather and climate.
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.
LS4.C	Adaptation.

CROSS CUTTING CONCEPTS

Patterns: Mission Reader, STEM Project, Explore Your Backyard
Cause and effect: mechanisms and predictions: Mission Reader, Mission Research, Science Mission
Scale, proportion and quantity: Mission Reader, Science Mission, STEM Project
System and system models: All
Structure and function: All
Stability and change: Mission Reader, Explore Your Backyard

CONNECTION TO ENGINEERING, TECHNOLOGY AND APPLICATIONS OF SCIENCE

Interdependence of Science, Engineering and Technology: STEM Project
Influence of Science, Engineering and Technology on Society and the Natural World: STEM Project

CONNECTION TO NATURE OF SCIENCE

Scientific investigations use a variety of methods: Mission Reader, Science Mission, STEM Project
Scientific knowledge is based on empirical evidence: Mission Reader, Mission Research, Science Mission
Scientific knowledge is open to revision in light of new evidence: STEM Project
Science models, laws, mechanisms and theories explain natural phenomena: Mission Reader, Science Mission
Science is a way of knowing: Science Mission
Scientific knowledge assumes an order and consistency in natural systems: Science Mission, Explore Your Backyard
Science is a human endeavor: Science Mission, STEM Project
Science addresses questions about the natural and material world: All

SCIENCE AND ENGINEERING PRACTICES

Asking questions and defining problems: Science Mission, STEM Project
Developing and using models: Mission Reader, Mission Research
Planning and carrying out investigations: Science Mission
Analyzing and interpreting data: Science Mission, Explore Your Backyard
Using mathematics and computational thinking: Science Mission
Constructing explanations and designing solutions: Mission Reader, Science Mission, STEM Project
Engaging in argument from evidence: Mission Reader, Science Mission, Explore Your Backyard
Obtaining, evaluating and communicating information: Mission Research, Science Mission, STEM Project, Explore Your Backyard

*ELA and Math standards to come