



6TH GRADE SCIENCE PACING GUIDE



UNDERLYING THEME: FOUNDATIONAL STRUCTURES

3 Weeks

1. Enduring Understanding: Scientists demonstrate and apply knowledge of science using appropriate safety procedures, equipment, and technology.

1. Essential Question: What are the appropriate safety procedures?

foundation

Science safety contract

2. Enduring Understanding: Scientific knowledge and process is gained using a structured process, including asking meaningful questions and conducting careful investigations, which generates knowledge about the natural world.

1. Essential Question: How is scientific knowledge gained and modified?

foundation

-Interactive Science Notebook
Distribute
Set up/Label

Interactive Science Notebook PPT

foundation

-What is *science*?
-What is a *scientist*?

Kids brainstorming sheet
"What is a Scientist" activity

foundation

-Apply components of *experimental design* use to produce *empirical evidence*
Scientific method
Tools
Hypothesis
Theory
Replication
Sample size
Control
Error
Dependent/independent variables

[Scientific Method Prezi](#)

2. Essential Question: What is the relationship between facts, opinions, laws, hypothesis, and theory?

foundation

-Distinguish between scientific fact and opinion
-Explain the role of prediction in the development of a hypothesis & theory
-Define and give examples of *laws* and *theories*

3. Essential Question: What is the purpose of displaying data?

foundation

Construct and interpret scientific data using
Data tables/charts
Bar graphs
Double bar graphs
Line graphs
Stem and leaf plots
Circle graphs

[Data Analysis \(graphs\) brain pop](#)

3. Enduring Understanding: People from ancient times to the present have investigated the world around us, answered scientific questions, and made discoveries about science.

1. Essential Question: How have scientists, technological advances and new discoveries changed science and scientific thinking?

foundation

What is a scientist?
Investigate scientists
Investigate careers
Investigate historical breakthroughs

[Leonardo da Vinci brain pop](#)
[Isaac Newton brain pop](#)
[Marie Curie brain pop](#)
[Galileo Galilei brain pop](#)

* Organisms *Earth's Systems *Human Activity
* Heredity *Energy *Engineering

5 Weeks

UNDERLYING THEME: SCIENCE OF LIFE: FROM CELLS to SYSTEMS

4. **Enduring Understanding:** All living things are made from cells, which in turn make up tissues, then larger organs, and finally, larger interacting systems.

1. **Essential Question:** What is the foundation for all life, plant or animal?

MS-LS1-1 DCI LSI.A	-What is "life?" What makes something "alive?" -Examining Bacteria , Archaea , and Eukarya	Origins of life 3 Domains
	-Examining and explaining viruses	Youtube video (bacteria vs. cell) YouTube Video (virus)
	- Unicellular vs. multicellular organisms	YouTube Video
MS-LS1-2 DCI LSI.A	-Examining <u>Plant Cell Structure</u> Nucleus - Directs all cell actions, including reproduction Chloroplasts - Captures energy from sunlight. Uses energy to produce cell Food, which is sugar. Process called photosynthesis . Mitochondria -Produces most of the cell's energy, which is ATP Cell Wall - Helps protect and support the cell. Gives a plant cell shape. Cell Membrane - Controls what goes in and out of the cell Endoplasmic Reticulum -Carries substances, like proteins, to various parts of the cell Cytoplasm -Houses gel-like fluids that support cell organelles Large Vacuole - Stores water, food, waste, and more. Golgi Body/Complex - Receives materials from endoplasmic reticulum, Distributes materials. Ribosome - Produces proteins Nucleolus - Produces proteins -Articulate and understand <u>plant cell organelle function</u> -Articulate and understand <u>whole plant cell function</u>	Cells (brainpop) Cell anatomy tutorial
MS-LS1-2 DCI LSI.A	Examining <u>Animal Cell Structure</u> Nucleus - Directs all cell actions, including reproduction Mitochondria -Produces most of the cell's energy, which is ATP Cell Membrane - Controls what goes in and out of the cell Endoplasmic Reticulum -Carries substances, like proteins, to various parts of the cell Cytoplasm -Houses gel-like fluids that support cell organelles Small Vacuole - Transport and stores materials, including waste Golgi Body/Complex - Receives materials from endoplasmic reticulum, Distributes materials. Ribosome - Produces proteins Nucleolus - Makes Ribosomes Lysosome -Contain chemicals that break down certain materials. Breaks Down dead cells. -Articulate and understand <u>plant cell organelle function</u> -Articulate and understand <u>whole plant cell function</u>	Cell Structure Brain pop Cell specialization
MS-LS1-2 LSI.A	-Develop a model of plant and/or animal cell -Label organelles -Articulate the function(s)	Make a model cell Parts/Model Cell Mint tin cell 3-D cell
MS-LS1-3 LSI.A	Cells<tissues<organs<organ systems<body -Examine tissue structures -Exam organ structures (body is a system of multiple interacting subsystems) Body functions of various organ systems * Circulatory system	Human Body brain pop Circulatory System brain pop Digestive System brain pop Respiratory system brain pop Nervous system brain pop

	<ul style="list-style-type: none"> * Excretory system * Digestive system * Respiratory system * Muscular system * Nervous system <p>-Examine interaction of subsystems within a system</p>	
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2. Essential Question: How do sensory receptors respond to stimuli?

<p>MS-LS1-8 DCI LS1.D</p>	<p>-sensory receptors</p> <ul style="list-style-type: none"> Electromagnetic Mechanical Chemical <p>-stimulus/stimuli</p> <p>-stimuli -> sensory receptor -> nerve cell -> message to brain -> action/memories</p>	
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4 Weeks

Underlying Theme: What Will I Inherit?

5. Enduring Understanding: Asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.

1. Essential Question: How do organisms reproduce?

<p>MS-LS3-2 DCI LS1.B</p>	<p>Transfer of genetic information to offspring</p> <ul style="list-style-type: none"> -Organisms reproduce sexually (resulting in genetic variations) -Organisms reproduce asexually (resulting in exact copies) 	<p>Genetics Brainpop</p>
<p>MS-LS3-2 DCI LS3.A</p>	<ul style="list-style-type: none"> -Punnett squares -Diagrams -Simulations 	

2. Essential Question How do variations of inherited traits between parent and offspring arise?

<p>MS-LS3-2 DCI LS3.A</p>	<ul style="list-style-type: none"> -Variations of inherited traits arise from genetic differences -Genetic differences result from the subset of chromosomes (therefore genes) Inherited. 	<p>Heredity Brainpop</p>
<p>MS-LS3-2 DCI LS3.B</p>	<ul style="list-style-type: none"> -In sexually reproducing organisms, each parent contributes half of the genes At random acquired by the offspring Punnett squares Diagrams simulations 	

3. Essential Question: How do environmental and genetic factors influence the growth & reproduction of organisms?

<p>MS-LS1-4 DCI LS1.B</p>	<ul style="list-style-type: none"> -Natural Selection Characteristic animal behaviors & specialized plant structures affect the probability of successful reproduction of plants and animals i.e. nest building, herding, vocalization, colorization, shells on nuts, odors 	<p>natural selection brain pop</p>
<p>MS-LS1-5 DCI LS1.B</p>	<p>Explain how environment and genetic factors influence organism growth</p> <ul style="list-style-type: none"> -Environmental factors: availability of food, light, space, water -Genetic factors: large breed cattle, grass species -Evidence: drought decreasing plant growth, fish growing larger in large ponds, 	<p>Diversity of life brain pop</p>

12 Weeks

Underlying Theme: Earth—the Final Frontier

6. Enduring Understanding: Water continually cycles among land, ocean, and atmosphere, moving in complex patterns determined by several environmental factors.

1. Essential Question: What are the roles of water in Earth's surface processes?

MS-ESS2-4 DCI ESS2.C	<ul style="list-style-type: none"> -Water cycles among land, ocean, and atmosphere <ul style="list-style-type: none"> Transpiration Evaporation Condensation Crystallization Precipitation Downhill flows -Design & develop a model of water cycle(s) 	Water Cycle brain pop
MS-ESS2-4 DCI ESS2.C	<ul style="list-style-type: none"> -Local weather patterns -Complex patterns of changes/movement of water in atmosphere <ul style="list-style-type: none"> Winds Landforms Ocean temperature & currents 	Local weather patterns
MS-ESS2-4 DCI ESS2.C	<ul style="list-style-type: none"> -Global movements of water -Changes in forms of water <ul style="list-style-type: none"> Sunlight gravity 	
MS-ESS2-4 DCI ESS2.C	<ul style="list-style-type: none"> -Ocean currents (global patterns) <ul style="list-style-type: none"> Variations in density Variations in temperature salinity 	Global Ocean Currents

7. Enduring Understanding: Several factors affect weather and regional climate, including natural phenomena as well as human impacts.

1. Essential Question: What causes weather conditions to change over time?

MS-ESS2-5 DCI ESS2.D	<ul style="list-style-type: none"> -What is <i>weather</i>? <ul style="list-style-type: none"> Temperature Pressure Humidity Precipitation Wind 	Weather Wiz Kids (weather vs. climate) Weather vs. climate doc
MS-ESS2-5 DCI ESS2.D	<ul style="list-style-type: none"> -What is <i>climate</i>? -Air masses -high pressure -low pressure -fronts 	Greenhouse Effect Brain pop
MS-ESS2-5 DCI ESS2.D	<ul style="list-style-type: none"> -Weather prediction <ul style="list-style-type: none"> Probability/probabilistic ranges Weather maps Diagrams Visualizations -Lab experiments Condensation 	How stuff works Weather Prediction Students ask "How to predict the weather?"
MS-ESS2-5 DCI ESS2.D	<ul style="list-style-type: none"> -Weather and climate influences <ul style="list-style-type: none"> Sunlight Ocean Atmosphere Ice Landforms Living things 	Factors that influence weather
MS-ESS2-5 DCI ESS2.D	<ul style="list-style-type: none"> -Variations in weather patterns <ul style="list-style-type: none"> Latitude Altitude Local/regional geography 	

MS-ESS2-5 DCI ESS2.D	-Effect on oceanic and atmospheric flow patterns -Weather prediction & probability	
2. Essential Question: How are the world's regional climates determined?		
MS-ESS2-6 DCI ESS2.D	-Patterns vary by... latitude altitude geographic land distribution	
MS-ESS2-6 DCI ESS2.D	-Atmospheric circulation Sunlight-driven latitudinal banding Coriolis effect Prevailing winds	
MS-ESS2-6 DCI ESS2.D	-Ocean circulation Transfer of heat by the global ocean convection cycle *Constraints Coriolis effect constraint Continent outlines	
MS-ESS2-6 DCI ESS2.D	-Absorption and release of energy (ocean) Release of energy Redistribution of energy through currents	
3. Essential Question: How can we monitor and minimize human impact on the environment?		
MS-ESS3-3 ESS3.C	-Examining human environmental impacts Water usage * Withdrawal of water from streams and aquifers *Construction of dams and levees Land Usage *Urban Development *Agriculture *Removal of wetlands Pollution *Air *Water *Land	
MS-ESS3-3 ESS3.C	-assessing solutions -designing and evaluating solutions	
4. Essential Question: What is global warming and what can we do about it?		
MS-ESS3-5	-What is global warming ?	Global Warming brain pop
MS-ESS3-5 ESS3.D	- Human Factors causing rise in global temperatures (past century) Fossil fuel combustion (release of greenhouse gasses) Cement production Agricultural activity -Evidence: tables, graphs, maps of global/regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities	
MS-ESS3-5 ESS3.D	- Environmental Factors causing rise in global temperatures (past century) Incoming solar radiation Volcanic activity -Evidence: tables, graphs, maps of global/regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities	
MS-ESS3-5 ESS3.D	-How can we reduce climate change ? Understanding climate science Reducing human vulnerability Understanding of human behavior Making wise decisions Choosing environmentally conscious activities	

4 Weeks

Underlying Theme: Where did you get all that energy?

8. **Enduring Understanding:** Water continually cycles among land, ocean, and atmosphere, moving in complex patterns determined by several environmental factors.

1. Essential Question: How can we affect thermal energy transfer

	<ul style="list-style-type: none"> -What is Energy? -Energy may take different forms <ul style="list-style-type: none"> Thermal Potential Kinetic -How does energy move? 	<ul style="list-style-type: none"> Types of Energy brain pop Energy technology brain pop Kinetic energy brain pop Potential Energy brain pop
<p>MS-PS3-4</p>	<ul style="list-style-type: none"> -Investigate the relationship among: <ul style="list-style-type: none"> Energy transferred Type of matter Mass Change in average kinetic energy of particles -Measure temperature of the sample -Temperature is a measure of the average kinetic energy of particles of matter -The amount of energy transfer needed to change the temperature of a matter sample by a given amount depends on the nature of the matter, the size of the sample, and the environment. 	<ul style="list-style-type: none"> Energy Lessons Variety lessons (energy)
<p>MS-PS3-3 DCI ETS3.A DCI ETS1.A</p>	<ul style="list-style-type: none"> -Design, construct, test a device that maximizes or minimizes thermal energy transfer <ul style="list-style-type: none"> *Energy is spontaneously transferred out of hotter regions or objects and into colder ones. *The more precisely a design task's criteria and constrains can be defined, the more likely it is that the solution will be successful. *A solution needs to be tested and modified 	

2. Essential Question: How can we examine kinetic energy transfer?

<p>MS-PS3-5 DCI ETS3.A DCI ETS1.A</p>	<ul style="list-style-type: none"> -Construct, use, and present arguments to support: "When kinetic energy of an object changes, energy is transferred to or from the object." <ul style="list-style-type: none"> *When the motion energy of an object changes, there is inevitable some other change in energy at the same time *The relationship between temperature and the total energy of a system depends on the types, states, and amounts of matter present. 	
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4 Weeks

Underlying Theme: Engineer your Life!

9. **Enduring Understanding: Designing a successful solution includes taking into consideration the long-term consequences, societal needs, and finally, building the best solution through testing, modification, and refinement.**

1. Essential Question: How can we best examine design problems to create successful solutions?

MS-ETS1-1	-Define criteria and constraints of a design problem with precision -Take into account scientific principles, impact on people and environment *The More precisely criteria and constraints can be defined, the more likely it is to be successful	
MS-ETS1-2	-Evaluate competing design solutions (using systematic process) *How well do they meet the criteria/constraints	
MS-ETS1-3	-Analyze data from tests to determine similarities and differences among solutions -Determine the best *sometimes parts of different solutions can be combined to create the best *one design may not perform the best across all tests	
MS-ETS1-4	- Develop a model to generate data for testing and modification to achieve Optimal design. *A solution needs to be tested and modified based on the test results	

Resources:

-Skill Sharpeners "Science Grade 6"

-Brainpop

-Activelylearn.com

- <http://www.resa.net/curriculum/curriculum/science/professionaldevelopment/ngss-pd/lesson-plans-exploring-ngss/>