8/17/18

2018-2019 MIDDLE SCHOOL TRANSITION PLAN
Use this plan for 2018-2019 ONLY

8th Grade Unit 6 (~ 24 Days)

Earth and Human Impact

Performance Expectations included in Unit 6

8-MS-ESS3-2: Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

8-MS-ESS3-3: Apply scientific principles to design a method for monitoring and minimizing human impact on the environment.

8-MS-PS1-3: Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

Unit 6 Anchor Phenomenon: BP oil spill disentigrated an island

8-MS-ESS3-2 (Earth and Human Activity) Investigative Phenomenon: Mt. St. Helens disentigrates in enormous landslide

8-MS-ESS3-2 (Earth and Human Activity)		Concepts
Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.		Natural hazards can be the result of interior processes, surface processes, or severe weather events.
Clarification Statement		Some natural hazards, such as volcanic eruptions and severe weather, are preceded by phenomena that allow for reliable predictions, but others, such as earthquakes, occur suddenly and with no notice, and thus are not yet predictable.
Emphasis is on how some natural hazards, such as volcanic eruptions and severe weather, are preceded by phenomena that allow for reliable predictions, but others, such as earthquakes, occur suddenly and with no notice, and thus are not yet predictable. Examples of natural hazards can be taken from interior processes (such as earthquakes and volcanic eruptions), surface processes (such as mass wasting and tsunamis), or severe weather events (such as hurricanes, tornadoes, and floods). Examples of data can include the locations, magnitudes, and frequencies of the natural hazards. Examples of technologies can be global (such as satellite systems to monitor hurricanes or forest fires) or local (such as building basements in tornado-prone regions or reservoirs to mitigate droughts).		Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces, can help forecast the locations and likelihoods of future events.
		Data on natural hazards can be used to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
Science and Engineering Practice	**Disciplinary Core Idea**	
Analyzing and interpreting data: Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis. • Analyze and interpret data to provide evidence for phenomena.	**NATURAL HAZARDS** Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. (MS.ESS3B.a)	Data on natural hazards can include the locations, magnitudes, and frequencies of the natural hazards.
		Graphs, charts, and images can be used to identify patterns of natural hazards in a region.
		Graphs, charts, and images can be used to understand patterns of geologic forces that can help forecast the locations and likelihoods of future events.
		Technologies that can be used to mitigate the effects of natural hazards can be global or local.
		Technologies used to mitigate the effects of natural hazards vary from region to region and over time.
Crosscutting Concepts		Natural processes can cause sudden or gradual changes to Earth's systems.

PATTERNS
Graphs, charts, and images can be used to identify patterns in data.

Students should be able to: Develop ways to recognize, classify, and record patterns in the phenomena they observe, and by middle school, students can begin to relate patterns to the nature of microscopic and atomic-level structure—for example, they may note that chemical molecules contain particular ratios of different atoms.

Natural hazards such as earthquakes, tsunamis, volcanic eruptions, severe weather, floods, and coastal erosion, adversely affect humans.

Studying patterns of natural hazards allow scientists to assess potential risks so preparations can be made to minimize the hazards.

By mapping the natural events in an area and understanding the geological forces involved, future events can be predicted.

While humans cannot eliminate natural hazards, they can take steps to reduce their impacts.

Ways to check for understanding

Analyze and interpret data on natural hazards to determine similarities and differences and to distinguish between correlation and causation.

Sample Guiding Questions

What are some natural hazards that threaten the planet?
What is threatened by natural hazards?
How can we forecast the occurrence of natural hazards?
How can we mitigate the effect of natural hazards?
What technologies do we have to study natural hazards?
What technologies do we need to develop for more accurate forecasting?
What are the causes and effects of volcanic eruptions?
What are the causes and effects of earthquakes?
What are the causes and effects of mass wasting?
What are the causes and effects of tsunamis?
What are the causes and effects of hurricanes, tornadoes and floods?
How can we measure the locations, magnitudes and frequencies of natural hazards?
How are satellite systems used to study natural hazards?
What interior processes produce natural hazards?
What surface processes produce natural hazards?
How are forest fires managed to prevent massive wildfires?
How can buildings be designed for safety against earthquakes, tornadoes, etc.?
What is the role of reservoirs in preventing or mitigating the effects of drought?
How is drought in California measured and managed?

Additional Teacher Resources

ESS3A - Natural Resources
ESS3B - Natural Hazards
ESS3C - Human Impacts on Earth Systems
ESS3D - Global Climate Change

MS-ESS3-2 NGSS Evidence Statement

Sample Activities

Earthquakes: Finding Epicenters and Measuring Magnitudes
Weather Scope
Tsunamis
Hurricanes
Storm forecasting
Incoming Asteroid! What's the Problem?

Key Vocabulary

Natural hazards [Interior processes (e.g. earthquakes, volcanoes), Surface processes (e.g. mass wasting, tsunamis), Severe weather (e.g. hurricanes, tornadoes, and floods)], Predictability (volcanic eruptions and weather vs earthquakes), Technologies (e.g. satellite systems, warning sirens for tsunamis, storm shelters for tornadoes), Patterns

Assessment Items

Natural Hazards
Natural Hazards MC Items
Natural Hazards Answer Key
Natural Hazards Short Performance
Natural Hazards Short Performance Assessment
Natural Hazards Scoring Rubric
Planning for Extreme Weather Zip file

Sample 5E Lesson Plan

8-MS-ESS3-2 Sample Lesson Plan

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8-MS-ESS3-3 (Earth and Human Activity) Investigative Phenomenon: Human impact on environment

8-MS-ESS3-3 (Earth and Human Activity)

Apply scientific principles to design a method for monitoring and minimizing human impact on the environment.

Clarification Statement

Examples of the design process may include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts may include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as of the air, water, or land).

Science and Engineering Practice	Disciplinary Core Idea
Constructing explanations and designing solutions: Constructing explanations and designing solutions in 6–8 builds on K– 5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories. • Apply scientific ideas or principles to design, construct, and/or test a design of an object, tool, process or system.	**HUMAN IMPACTS ON EARTH'S SYSTEMS** Human activities, globally and locally, have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. (MS.ESS3C.a) Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MS. ESS3C.b) **DEVELOPING POSSIBLE SOLUTIONS** A solution needs to be tested to prove the validity of the design and then modified on the basis of the test results in order to improve it. There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. Models of all kinds are important for testing solutions. (ETS.MS.1B.a)

Crosscutting Concepts

CAUSE AND EFFECT
Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation.

Concepts

- Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species.
- Changes to Earth's environments can have different impacts (negative and positive) for different living things.
- Typically as human populations and per capita consumption of natural resources increase, so do the negative impacts on Earth, unless the activities and technologies involved are engineered otherwise.
- Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation.
- The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus technology use varies from region to region and over time.
- People can harm Earth's resources in a variety of ways (e.g., polluting, deforestation, overhunting, wasting water, and electricity, etc.).
- The growth in human activities is stretching natural resources to their limit.
- This may have a negative impact on Earth unless actions are taken to mitigate this impact.
- Some changes to Earth's environment can have a positive impact for living things.
- As the human population grows, so does the consumption of natural resources.
- As the human population grows, so do the human impacts on the planet.
- Some negative effects of human activities are reversible using technology.
- Design solutions must be tested.
- Tests are often designed to identify failure points or difficulties.
- Testing a solution involves investigating how well it performs under a range of likely conditions.
- Solutions are modified on the basis of the test results.

imply causation.

Students should be able to: Appreciate standard scientific theories that explain the causal mechanisms in the systems under study. Strategies for this type of instruction include asking students to argue from evidence when attributing an observed phenomenon to a specific cause.

Different solutions can be combined to create a better solution.

Designing solutions to problems is a systematic process.

There are many types of models.

Models can be used to investigate how a design might work.

Models allow the designer to better understand the features of a design problem.

Sample Guiding Questions

How do humans negatively and positively impact the environment?

How can we reduce the impact we have on the environment?

Ways to check for understanding

Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

Key Vocabulary

Human impact [- Water usage (e.g. withdrawal of water from streams and aquifers), - Land usage (e.g. urban development, agriculture, removal of wetlands), - Pollution (e.g. air, land, and water), Environment, Design solutions, Cause and Effect

Additional Teacher Resources

ESS3A - Natural Resources

ESS3B - Natural Hazards

ESS3C - Human Impacts on Earth Systems

ESS3D - Global Climate Change

MS-ESS3-3 NGSS Evidence Statement

Sample 5E Lesson Plan

8-MS-ESS3-3 Sample Lesson Plan

Sample Activities

Water Filtration

Pollution Patrol

Cleaning the Air

I Breathe WHAT??

Your Family's Carbon Footprint

Plastic, Plastic Everywhere!

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8-MS-PS1-3 (Matter and Its Interactions) Investigative Phenomenon: Synthetic Materials from Natural Resources

8-MS-PS1-3 (Matter and Its Interactions)

Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

Clarification Statement

Emphasis is on natural resources that undergo a chemical process to form synthetic materials. These natural resources may or may not be pure substances. Examples of new materials could include new medicine, foods, or alternative fuels, and focus is on qualitative as opposed to quantitative information.

Science and Engineering Practice	Disciplinary Core Idea
Obtaining, evaluating, and communicating information: Obtaining, evaluating, and communicating information in 6–8	**STRUCTURE AND PROPERTIES OF MATTER** Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) under normal conditions that can be used to

Concepts

Changes in particle motion, temperature, and state of a pure substance occur when thermal energy is added or removed.

Qualitative molecular-level models of solids, liquids, and gases can be used to show that adding or removing thermal energy increases or decreases the kinetic energy of the particles until a change of state occurs.

Gases and liquids are made of molecules or inert atoms that are moving about relative to each other.

In a liquid, the molecules are constantly in contact with others.

In a gas, the molecules are widely spaced except when they happen to collide.

communicating information in 6–8 builds on K–5 experiences and progresses to evaluating the merit and validity of ideas and methods.

• Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence.

conditions) under normal conditions that can be used to identify it. (MS.PS1A.b)

CHEMICAL REACTIONS
Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. (MS.PS1B.a)

Crosscutting Concepts

STRUCTURE AND FUNCTION

Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.

Students should be able to:
Visualize, model, and apply their understanding of structure and function to more complex or less easily observable systems and processes.

Develop their understanding of the relationships between structure and function.

Apply this knowledge when investigating phenomena that are unfamiliar to them.

Sample Guiding Questions

What are synthetic materials?

What are some examples of synthetic materials?

What natural resources are used to create synthetic materials?

How do synthetic materials impact society?

What are our natural resources?

What are some chemical processes that create synthetic materials?

What is a medicine created as a synthetic material?

What is a food created as a synthetic material?

What is an alternative fuel created as a synthetic material?

Key Vocabulary

Synthetic materials (e.g. medicine, foods, alternative fuels), Natural resources, Chemical processes (e.g. burning limestone produces cement), Societal needs (e.g. concrete for construction), Structure and Function

Sample 5E Lesson Plan

In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations.

The changes of state that occur with variations in temperature or pressure can be described and predicted using models of matter.

The term heat as used in everyday language refers both to thermal energy and the transfer of that thermal energy from one object to another.

Thermal energy is the motion of atoms or molecules within a substance.

In science, heat is used to refer to the energy transferred due to the temperature difference between two objects.

The temperature of a system is proportional to the average internal kinetic energy and potential energy per atom or molecule (whichever is the appropriate building block for the system's material).

The details of the relationship between the average internal kinetic energy and the potential energy per atom or molecule depend on the type of atom or molecule and the interactions among the atoms in the material.

Temperature is not a direct measure of a system's total thermal energy.

The total thermal energy (sometimes called the total internal energy) of a system depends jointly on the temperature, the total number of atoms in the system, and the state of the material.

Cause-and-effect relationships may be used to predict and describe changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed in natural systems.

Pure substances are made from a single type of atom or molecule.

Elements and compounds are pure substances (e.g., carbon, oxygen, water, sodium chloride, methane).

Pure substances have characteristics (physical and chemical properties) that are used to identify them.

A natural substance is made up of multiple elements found in nature.

A synthetic substance is made up of multiple substances in a lab by scientists (e.g., pesticides, medicines).

Substances react in characteristic ways (e.g., form gas, form precipitates, change color).

When a chemical reaction occurs, the parts that make up the original substance are regrouped in a new way that makes a new substance with new properties.

If atoms are rearranged, the ending result is a different substance.

Many substances react chemically with other substances to form new

8-MS-PS1-3 Sample Lesson Plan	substances with different properties.
	Ways to check for understanding
	Develop a model that predicts and describes changes in particle motion that could include molecules or inert atoms or pure substances. Use cause-and-effect relationships to predict changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed in natural or designed systems.
	PS1A - Structure and Properties of Matter PS1B - Chemical Reactions PS1C - Nuclear Processes **MS-PS1-3 Evidence Statement**
	Sample Activities
	NREL Research on Converting Biomass to Liquid Fuels

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