Carnahan, Dallas/Mandatory 5 Unit Development

Lesson Title: How does the Water Cycle Impact Me?

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Topic(s): Where does our water come from? What can be found in 3 different states of matter on earth? What is the water cycle? How does the sun interact with the ocean to drive the water cycle? How would the water cycle change if the sun were bigger or smaller? What if we had no sun at all?

Targeted Grade Level(s): 6th Grade

Time Needed: 10 to 15 class periods

Subject Integration: Science, Technology, ELA

Most of my students are hands on visual learners. They enjoy using computers with visual videos and activities that consist of Illustrate It activities. Using these data sources will peak the interest of my students and allow them to see how the Water Cycle is impacted by everyday life. They will be able to compare and predict the results of each task and be able to identify the changes in the water cycle.

Students will be able to use prior knowledge to make predictions and have a better understanding of how cause and effect will impact their everyday lives. I will be able to integrate art into this lesson by using charts and graphs that will be drawn and labeled. This will allow students to interpret the information given in the format.

Students will use information from the Kesler science site to research and obtain data (Science). To understand the movement and continuous cycle, they will need to know how to interpret and understand the graphs, and charts and create their own (ELA). They will use google forms and links to the Kesler Science web page to research and record their answers from the drag drop activities (technology). In this unit, science and art will reflect the impact on the water cycle by using images and charts. ELA solidifies the impact of the graphs and charts and asses the input of each station.

Justification:

Students will use information from the Kesler science site to research and obtain data (Science). To understand the movement and continuous cycle, they will need to know how to interpret and understand the graphs, and charts and create their own (ELA). They will use google forms and links to the Kesler Science web page to research and record their answers from the drag drop activities (technology). In this unit, science and ELA will reflect the impact on the water cycle by using images and charts. ELA solidifies the impact of the graphs and charts and asses the input of each station.

Resources to watch before beginning the water cycle unit/ Digital Interactive file

from Kesler Science.com. This will be given as a power point and students can interact by typing answers and manipulate shapes to complete the station task.

Standards:

Science Standards:

06-ESS2-1. Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process. [Clarification Statement: Emphasis is on the processes of melting, crystallization, weathering, deformation, and sedimentation, which act together to form minerals and rocks through the cycling of Earth's materials.] [Assessment Boundary: Assessment does not include the identification and naming of minerals.]

06-ESS2-4. Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. [Clarification Statement: Emphasis is on the ways water changes its state as it moves through the multiple pathways of the hydrologic cycle. Examples of models can be conceptual or physical.] [Assessment Boundary: A quantitative understanding of the latent heats of vaporization and fusion is not assessed.]

08-ESS3-1. Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes. [Clarification Statement: Emphasis is on how these resources are limited and typically non-renewable, and how their distributions are significantly changing as a result of removal by humans. Examples of uneven distributions of resources as a result of past processes include but are not limited to petroleum (locations of the burial of organic marine sediments and subsequent geologic traps), metal ores (locations of past volcanic and hydrothermal activity associated with subduction zones), and soil (locations of active weathering and/or deposition of rock).]

ELA Standards:

ELA/Literacy – RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-ETS1-1), (MS-ETS1-2),(MS-ETS1-3) RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

(MS-ETS1-3) RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

(MS-ETS1-2), (MS-ETS1-3) WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

(MS-ETS1-2) WHST.6-8.8 Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.

(MS-ETS1-1) WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.

(MS-ETS1-2) SL.8.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. (MS-ETS1-4)

NGSS Performance Expectations		
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts:
Developing and Using Models Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. Develop and use a model to describe phenomena. (06-ESS2-1) Develop a model to describe unobservable mechanisms. (06-ESS2-4) **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. Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (08-ESS3-1)	**ESS2.A: Earth's Materials and Systems** All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms. (06-ESS2-1) **ESS2.C: The Roles of Water in Earth's Surface Processes** Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. (06-ESS2-4) Global movements of water and its changes in form are propelled by sunlight and gravity. (06-ESS2-4) **ESS3.A: Natural Resources** Humans depend on Earth's	**Cause and Effect** Cause and effect relationships may be used to predict phenomena in natural or designed systems. (08-ESS3-1) **Energy and Matter** Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter. (06-ESS2-4) **Stability and Change** Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and processes at different scales, including the atomic scale. (06-ESS2-1) --- **Connections to Engineering, Technology, and Applications of Science** **Influence of Science, Engineering, and Technology on Society and the Natural World** All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment. (08-

	land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. (08-ESS3-1)	ESS3-1)

Common Core State Standards:

Kentucky Academic Standards Connections:

ELA/Literacy –

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (08-ESS3-1)

WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (08-ESS3-1)

WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research. (08-ESS3-1)

SL.8.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. (06-ESS2-1)

Other Standards

Technology: Students understand the role of technology in research and experimentation. Students engage in technology in developing solutions for solving problems in real world situations. Students will use technology for innovation and creation.

6.1 Students connect knowledge and experiences from different subject areas. Influence of Science, Engineering, and Technology on Society and the Natural World.

All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment. (08-ESS3-1)

Measurable Student Learning Objectives:

Students will be able to develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process. (DOK 3)

Students will be able to develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. (DOK 3)

Students will be able to construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes. (DOK 2)

Nature of STEM:

Students will be able to incorporate data and site research based on their findings on the data collected from the NASA web pages and the technology used in the classroom while learning how the water cycle works and where their water comes from.

Engaging Context/Phenomena:

Have you ever thought about the water you drink? Where does our water come from?

Data Integration:

https://svs.gsfc.nasa.gov/10885 https://svs.gsfc.nasa.gov/10883

https://oceantoday.noaa.gov/watercycle/

https://www.educationsoutheastwater.com.au/resources/natural-water-cycle-interactive

Using the links above students will be able to use and interpret data about where water comes from and how long water has existed on earth. From this information students will develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process and be able to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.

Differentiation of Instruction:

Students will work in groups, and students with learning disabilities will pair up with partners and readers will be available. Video instruction is also available throughout the lesson for students to be able to go back and reevaluate the lesson.

Real-life Connection:

All students drink water in some form during the day. If they understand where their water comes from and how important it is to keep it clean, they will understand how important it is in their lives to know what they are drinking and where it comes from.

Possible Misconceptions:

Without having prior knowledge of the water cycle, students may not understand how the water cycle works. Students may not know that the same water they drink today has at some time been under ground and has been here for billions of years.

Lesson Procedure:

5E Model	5E Lesson Elements
Engage Students will Brainstorm and make predictions.	**Procedure:** Teacher introduce the essential questions. What is the water cycle? Where does our water come from? What drives the water cycle? What impact does it have on our lives? **Modifications** Students will be working in groups. Students with a reading disability will be given a reader. **Standards Addressed** WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (08-ESS3-1) **Formative/Summative Assessments** Students are given materials needed to conduct an experiment on how the water cycle works. Pictures of the water cycle will demonstrate and reflect any misconceptions at this time. Students will draw what they see happening with a description of what they see happening. **Resources** **Middle School Science Curriculum** **https://www.keslerscience.com/** https://svs.gsfc.nasa.gov/10885 https://svs.gsfc.nasa.gov/10883
Explore *Water Cycle Station Lab*	**Procedure:** Students will now use the links to further research and find support for their answers to the questions. What is the water cycle? Where does our water come from? What drives the water cycle? What impact does it have on our lives? **Modifications** Students will be working in groups. Students with a reading disability will be given a reader.

	Standards Addressed 06-ESS2-4. Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. [Clarification Statement: Emphasis is on the ways water changes its state as it moves through the multiple pathways of the hydrologic cycle. Examples of models can be conceptual or physical.] [Assessment Boundary: A quantitative understanding of the latent heats of vaporization and fusion is not assessed.] **Formative/Summative Assessments** Water cycle station lab with input stations: read it, watch it, explore it, research it. Output stations: Organize it, illustrate it, asses it, write it, challenge it. **Resources** https://oceantoday.noaa.gov/watercycle/ https://www.educationsoutheastwater.com.au/resources/natural-water-cycle-interactive
Explain Students share in groups what they have found so far. This will grow understanding of the concepts in the lesson.	**Procedure:** This is a teacher led lesson with students building on their concepts and asking questions that relate to the topics. Think about it is a is a teaching strategy that allows students to develop critical thinking and communications skills through group responses. Students' thoughts and opinions are heard and processed. **Modifications** Teacher led note taking and visual graphs and charts are used. **Standards Addressed** 6.1 Students connect knowledge and experiences from different subject areas. Influence of Science, Engineering, and Technology on Society and the Natural World. All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment. (08-ESS3-1) WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and

	analysis of relevant content. (08-ESS3-1) **Formative/Summative Assessments** A formative assessment will be administered by asking questions while scribing for students. **Resources** Chromebook, smartboard
Elaborate Students will demonstrate their understanding of the questions.	**Procedure:** Students will now demonstrate an understanding of the phases of water as it travels through the hydraulic cycle. Students will simulate the journey of a water drop through the water cycle by using a simulation game activity. **Modifications** Students will be working in groups. Students with a reading disability will be given a reader. **Standards Addressed** 6.1 Students connect knowledge and experiences from different subject areas. Influence of Science, Engineering, and Technology on Society and the Natural World. All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment. (08-ESS3-1) RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (08-ESS3-1) **Formative/Summative Assessments** Students will complete a formative assessment by simulating the journey of a water drop through the water cycle with a simulation activity using their chrome books. **Resources** Chrome books, dice.
Evaluate Students will demonstrate understanding of the	**Procedure:** Students will complete a reading passage and complete question over the water cycle and state their own opinion based on what they have learned.

water cycle by using skills learned through the water cycle simulation.	**Modifications** Students with a reading disability will be given a reader and scribe. **Standards Addressed** RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (08-ESS3-1) WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (08-ESS3-1) WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research. (08-ESS3-1) **Formative/Summative Assessments** Summative assessment will be administered based on prior knowledge and readings. **Resources** Paper and pencil.

Teacher Background:

Knowledge of the water cycle and vocabulary related to the water cycle. Teacher also needs to know how to read and interpret the graphs, charts, and data of the water cycle.

References:

The Water Cycle
US Department of Commerce
https://oceantoday.noaa.gov/watercycle/

Natural water cycle
https://www.educationsoutheastwater.com.au/resources/natural-water-cycle-interactive

NASA Viz: The Water Cycle: Following The Water
https://svs.gsfc.nasa.gov/10885

NASA Viz: The Water Cycle: Steaming The Air
https://svs.gsfc.nasa.gov/10883

Middle School Science Curriculum
https://www.keslerscience.com/

Kentucky Academic Standards Science

The Kentucky Academic Standards for Science are written as a set of performance expectations that are assessable statements of what students should know and be able to do. An underlying assumption of these standards is that all students should be held accountable for demonstrating their achievement of all

https://education.ky.gov/.../kyacadstand/Documents/Kentucky_Academic_Standards_Science.pdf