**Water Cycle STEM Lesson**

\*This lesson may take several days to complete.

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| **Text Title**: What is the Water Cycle?**Author**: <http://www.ducksters.com/science/the_water_cycle.php> | **Grade**: 4th**Unit 2** |
| **Utah ELA Core Standard(s)**:* RI.4.3 **Explain events**, procedures, ideas, or concepts in a historical, **scientific**, or technical text, including what happened and why, based on specific **information in the text**.
* W.4.2 Write informative/explanatory texts to examine a topic and **convey** ideas and **information clearly**.
* W.4.3 Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and **clear event sequences**
* W.4.2c **Link ideas** within categories of information using words and phrases (*e.g., another, for example, also, because)*.
* W.4.8: Recall relevant information from experiences or gather relevant information from print and digital sources; **take notes** and categorize information, and provide a list of sources.
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| **Science Core Objective**:**Science Standard 1**:  Students will understand that water changes state as it moves through the water cycle.* Objective 2:  Describe the water cycle.

e. Describe how the water cycle relates to the water supply in your community. | **Mathematics Core Objectives:** 4.MD.1 and 2**Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.** 1. Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two- column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...*
2. Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.
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| **Technology**:* Creating a dam that will hold water
 | **Social Studies*** Objective 3 Analyze how human actions modify the physical environment.

a. Describe how and why humans have changed the physical environment of Utah to meet their needs (e.g. reservoirs, irrigation, climate, transportation systems and cities). |
| **E Books and materials:**[Popular Water Cycle Books](http://www.goodreads.com/shelf/show/water-cycle)[Water Cycle](http://www.gobookee.org/get_book.php?u=aHR0cDovL3d3dy5wbndib2Nlcy5vcmcvU2NpZW5jZTIxL3BkZi9HcmFkZUZvdXJNaW5pUmV2aWV3VW5pdC5wZGYKR3JhZGUgRm91ciBNaW5pLVJldmlldyBVbml0IC0gUE5XIEJPQ0VT) pg. 22 – 30[Water Cycle](http://ww2.valdosta.edu/~laurewilliams/ebook.html) (good power point)[Water Cycle](http://ebookbrowsee.net/wa/water-cycle#.UnqPYSQ6yDo)[Water Cycle](http://www.epubbud.com/read.php?g=VPD3VKXD&tocp=2) – epubbud[Multiple e-book articles etc.](http://www.ewisa.co.za/misc/School/UsefulWaterLinks.htm) (See **Drinking water and the water cycle for kids**. Go to **Readers’ Theater script about the Water Cycle**.)[Water Cycle](http://k12opened.com/ebooks/sci/ebook-thewatercycle/index.html)[Water Shed & Water Cycle](http://k12opened.com/ebooks/sci/ebook-watersheds/index.html)[Down to Earth](http://down---to---earth.blogspot.com/2008/07/water-conservation-and-water-tanks.html) Article**Videos**[**Unit 2 Destiny Videos**](http://cbl.jordandistrict.org/files/2013/07/FOURTH-GRADE-UNIT-LINKS-unit-2.docx) | **Other online resources:**Water Cycle Articles:<http://www.ducksters.com/science/the_water_cycle.php><http://projectwet.org/flipped-day/water-cycle/><http://ga.water.usgs.gov/edu/watercyclesummary.html><http://ga.water.usgs.gov/edu/watercycle.html>Song:<http://www.fi.edu/guide/hongell/song.html>To She’ll Be Coming Around the Mt.<http://sciencepoems.net/sciencevideos/watercyclewvideoYT.aspx#.UnJopyQ6yDo>Water Cycle Boogie<http://www.youtube.com/watch?v=nWgpwldu8QU> |
| **Shared Reading Instruction (“I Do It”)** Modeled and Explicit Instruction with Teacher Talk  |
| * *“Today we will be talking about the Water Cycle. We will be using a sequencing graphic organizer to help us visualize how the water cycle works. What does “sequence or sequencing,” mean?”*  Discuss. “*What is a cycle?”* Discuss
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| **Whole Class Shared Reading (“We Do It”)** |
| * Pass out the [**Water Cycle article**.](http://cbl.ws.jordandistrict.org/files/2013/11/Water-Cycle4.docx) *“We are going to read this article together to learn more about the water cycle. There are a few words I would like to discuss before we read.”*  Discuss words from the article that you feel will be difficult for your students. Add these words to an alphabox to be used later in writing. (Sample words: evaporate, atmosphere, vapor, precipitation, condensation)
* Read the article orally together. Have students underline the vocabulary words that were discussed earlier. Periodically stop and locate on the diagram each place mentioned in the article.
* Have a student choose a card from the pile of cards you have created. (See student cards.) The teacher will model by pretending that she/he is water that begins at the place listed on the card and goes through the cycle until they return to the beginning place. Use the transitional words: **first**, **next** and **last** in your example. Show each place on the diagram. “*I am going to pretend that I am water and will tell you what happens to me from the time I leave the place named on the card to the time I get back to that place.* Example: The student draws the “I am in the ocean” card. “**First**, I begin in the ocean. **Next**, the sun heats the top of the water. **Next**, I evaporate into the atmosphere. **Next**, I gather with other water vapor and turn into a cloud. The cloud gets heavy over the mountains and drops me to the ground as snow. I sit in the mountains until the sun heats me and I melt. **Finally**, I flow back into the ocean*.”*
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| **Small Group/Partners Shared Reading – No Independent Work (“We Do It”)** Interacting and Reinforcing  |
| * Jigsaw: Give each student a card with a starting place. [**Sample Water Cycle cards**](http://cbl.ws.jordandistrict.org/files/2013/11/cards.pdf)
* Have all students with the same card get into a group. For example: All the students who were given the “I am water in the ocean” card will gather in one corner of the room. The group will discuss what happens to them in the water cycle until all students can describe the sequence of events. Expect students to use the vocabulary words that were put on the alphabox.
* Next, create groups that have one of each card in it. Each student will tell the group what happens to them in the water cycle. (Students should use the words written in the alphabox as much as possible.)
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|  **Writing Instruction (“I Do It”)**  Modeled and Explicit Instruction with Teacher Talk  |
| 1. Share the [**Sequence Chart graphic organizer**](http://cbl.ws.jordandistrict.org/files/2013/11/sequencing-chart.pdf) with the students. Model how to use this paper by writing about a typical student’s day. Example: **Topic**: My Day. **First**, I wake up. **Next**, I eat breakfast. **Next**, I get dressed. **Next**, I go to school. **Next**, I go to lunch. **Next**, I go home. **Next**, I get ready for bed. **Last**, I go to sleep. Note that this paper is also a cycle. Once we get to the end of the cycle, we start all over the next day with the first step.
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| **Writing Whole Class (“We Do It”)**Interactive with Explicit Teacher Talk |
| 1. Write a Sequence Chart together describing what the students did at school yesterday.
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|  **Writing in Small Group/Partners (“We Do It”)** |
| 1. Have each student partner with another student who had the same water cycle card. They will work together to write what happens to them in the water cycle. The final box should lead to the first box so that it is a cycle. They may not be able to use all of the “Next” boxes but encourage them to use as many as possible.
2. Jigsaw so that each group has someone with a different card. Share with the group what was written.
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|  **Independent Writing (“You Do It”)** |
| 1. Narrative Writing:
	1. Give each student a copy of the “[**Water Cycle Narrative Story Template**](http://cbl.ws.jordandistrict.org/files/2013/11/water-cycle-narrative.pdf)”. Model how to use the template by filling in a sample template as a class. Students will create a main character and 1-2 other characters using words relating to the water cycle. Example: **Main Character**: Rainy. **Other Characters:** Snowy and Evaporman. The **setting** will come from a place on the water cycle picture: puddle, ski slope, river. **Problem** example: *All the characters are playing together and Snowy disappears when the sun comes out.* The **events** will come from the Sequence Chart that was created. The characters will go through the water cycle trying to find the character that was lost.
	2. Have students partner up to brainstorm character and setting ideas. Allow them to work together on this writing if they want.
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| 1. Optional Water Cycle Activities that may be used for review, assessment, or shared reading: [**The Water Cycle: See It In Action**](http://cbl.ws.jordandistrict.org/files/2013/11/The-Water-Cycle-See-It-In-Action.docx)**,**

 [**Freshwater 101**](http://cbl.ws.jordandistrict.org/files/2013/11/Freshwater101Quiz.docx) **Quiz,** **Drinking Water and Sanitation Facts,**[**Water Outlook in Utah**](http://cbl.ws.jordandistrict.org/files/2013/11/Water-Outlook-in-Utah.docx) **and** [**Freshwater: Why Care About Water?**](http://cbl.ws.jordandistrict.org/files/2013/11/Freshwater-Why-Care-About-Water_.docx) |

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|  **Integration**  |
|  **MATH**  |
| 1. [Drop in the Bucket](http://www.uen.org/Lessonplan/preview?LPid=31636) Prepare a large bucket with 5 gallons of water: Represents all the water on earth. Take out 1 cup = ice caps/glaciers. Take out 1/3 cup = ground water. 1/8th of a teaspoon = freshwater lakes. 1/8th teaspoon = inland seas. 1 drop = our atmosphere. 1 flick = rivers. Which are drinkable water sources?
2. Why is it that we need to protect the water that we use? How do we make sure we will have the water that we need.
3. Polar Ice Caps: Don’t have access to it. Surface water: Need to find a way to get to this water.
4. Watch: [Water Usage](http://video.nationalgeographic.com/video/environment/freshwater/env-freshwater-whycare/)

<http://video.nationalgeographic.com/video/environment/freshwater/env-freshwater-whycare/>1. **Water Usage Log**. Create a water usage log of the water students use daily for one week. Work in small groups and with the entire class to calculate how much water is used in one week.
2. Possible Writing Prompt: “*What can I do to limit my water use?”*
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|  **Social Studies** |
| 1. *Why do we need to learn about the water cycle? Is there an endless supply of water for what we need? What would happen if we didn’t have enough precipitation? What do we do to conserve the water when it does rain so that we will have it to use later? What has Utah done to the environment so that we will have the water we need during the years when we don’t have much snow or rain? (reservoirs, irrigation systems, dams, etc.)*
2. *One place we collect water is in a dam. The Glen Canyon Dam collects water that flows down the Colorado River. That water forms Lake Powell.* Allow a few minutes for students to share what they know about Lake Powell. *We have changed the physical environment in Utah to meet the needs of the people living here.*
3. *The level of water in Lake Powell has changed over the years.* *Let me show you what has happened to Lake Powell since 1999.* [*World of Change: Water Level in Lake Powell*](http://earthobservatory.nasa.gov/Features/WorldOfChange/lake_powell.php) *(*<http://earthobservatory.nasa.gov/Features/WorldOfChange/lake_powell.php>) Project the map for the students to see. Click on the bubbles to change the years.
4. You may want to use portions of this article as another shared reading passage.
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| Science/Technology |
| 1. Review the water cycle, the need for storing the precipitation that falls so that we can use it later, and ways Utah has changed our environment to collect the water we have.
2. *Today we will be engineering a way to keep water in one place so that we can use it later. You will be given a supply of materials. Your job will be to design a reservoir that will hold water.*
3. **Engineering Challenge: (**See link on JDS Science for materials and demonstration pictures)
	1. Build a reservoir that will hold the most ml of water within one end of the plastic container.
4. Provide students with the following materials: clay, bucket, water
	1. Hint: Smooth clay to the bottom as much as possible
	2. Provide reinforcement materials for students to use if they want: straws, cups, toothpicks, foil, popsicle sticks, mesh
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**\*\*This could be a multiple day lesson.**