Resource Guide for Educators and Parents

Ideas and Activities to use with the Spokane Valley_Rathdrum Prairie Aquifer Atlas as an Educational Tool

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Name: Jessica Stafford	
Subject: Writing	Water Conservation
The big idea(s) or essential question(s): Conserving water helps to preserve the planet's natural resources, and ensures there is enough to go around.	
Core standards addressed: CCSS: W.6.7	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	Explain a way in which to conserve water.
TSWBAT	Create a plan that you can implement at home.
Materials and/or technology *The Spokane Valley-Rathdrum Aquifer Atlas* p. 16. Internet access for research Paper and pencil	
Activities/procedures (include anticipated time for each)	
Introduction/activator Salt water accounts for more than 97% of the water on Earth. 3% is fresh water, but not all of that is accessible for us to use. With such a small amount available for our everyday use, we will research how we can conserve water.	
Class activities (what you/students will do) Ask the students about how they use water at home. Write a list on the white board, and have students also write a list. Ask students whether they know of ways to conserve water. (5 minutes) Direct students to different water conservation sites, including SAJB's Educational page on Water Conservation: http://www.spokaneaquifer.org/education-awareness/water-conservation/. Students will write a five-paragraph paper on water conservation over the next week. They begin on a rough draft about one conservation method, and will research more over the week. The paper will end with a description of steps their family can take to conserve water.	Class activities (why you will do them) Access current lists of conservation methods. Provide necessary resources to complete the assignment; walk around the room as students begin researching and then writing their conservation plans. Provide additional in-class research time to get students started on the right track, before completing the assignment at a later date, or at home.
Closure/reminders How much water can be saved by conserving at home?	
Assessment (how you will know students met the objectives - include rubrics) Did the student discuss achievable methods of water conservation? Did the student provide information on their sources? Did the student describe a way in which they will work on water conservation as an individual? Was the paper clear and easy to follow?	

Have the students answer a series of prediction questions: • What do you think will happen to the water? • How long do you think it will take for the water to evaporate? Do you think evaporation needs cold or hot water? What is the sun doing to the water? How much water do you think will eventually collect in the small container? (20 minutes) Observe the model over the next few days. Note whether salt deposits are being left in the large bowl as water evaporates from the large bowl, condenses on the underside of the plastic wrap, and eventually drips run down to the low point and drop into the small container.
Closure/reminders The class will be making observations of what is taking place over the next few days. Does the water condensing on the underside of the plastic wrap have any color? How about the water in the small container? Watch as salt deposits form on the large bowl as water evaporates. Ask students if solids can evaporate, like water can? Ask if they think the water in the small container is salty or nice and fresh? Would the water in the large bowl taste even saltier than it was before the experiment? The teacher can taste the water from the small bowl and confirm whether it is salty or fresh.
Assessment (how you will know students met the objectives - include rubrics) By predicting what will happen during the experiment demonstrates their understanding of how the water cycle works.

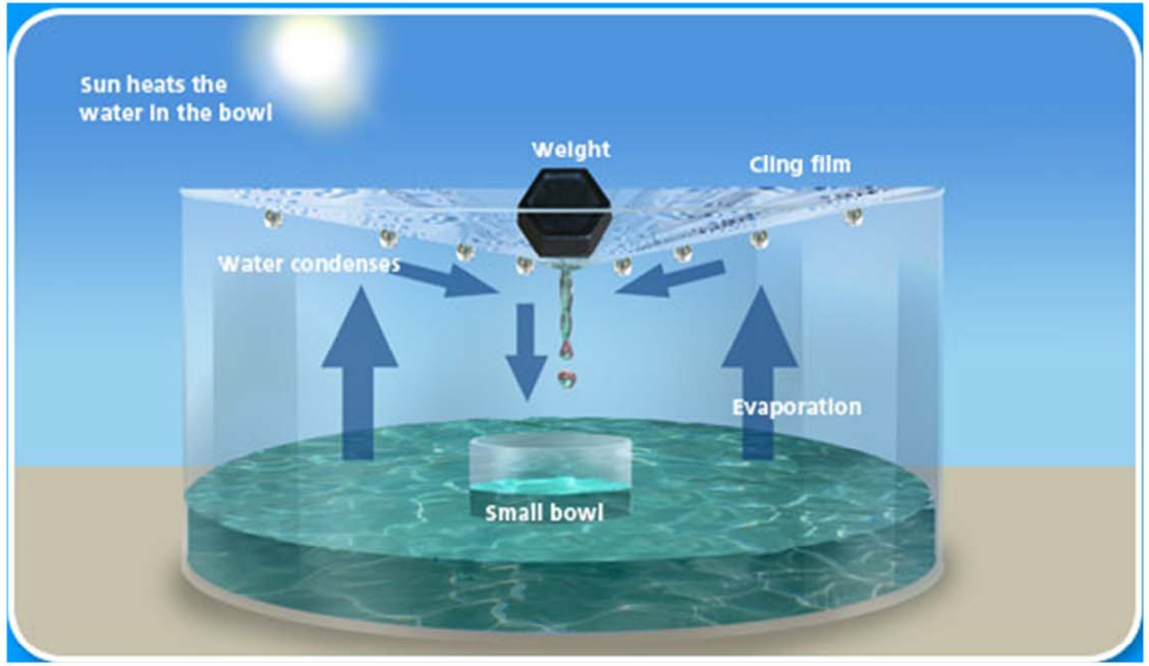


Photo Credit: http://shoalwater.nsw.gov.au/education/watercycle_experiment.htm. Additional information about this experiment is available here, too.

A Letter from the Editor

2015 Aquifer Atlas Teacher Resources: Outline

Dear Teachers, Parents, School Administrators, and Students,

Welcome! The Idaho-Washington Aquifer Collaborative members are so very happy that you have found your way to this useful teaching tool. The Teacher Resource Guide is designed to provide a list of curricula, activities, and student projects related to developing content knowledge in the science related to the Rathdrum-Spokane Aquifer, and tied to ID/WA Common Core Math and the Next Gen Science Standards.. The authors see this guide as the "cookbook" to use to develop standard-based lessons that relate to the magnificent aquifer below our feet; it is the only source of drinking, farming, and industrial-use water for almost all of us who live, work, and play from Farragut State Park near Athol, ID to the upper end of Long Lake and Nine-Mile Falls area. The science, technology, engineering, and mathematics (STEM) lessons, not to mention art, literacy, writing, and social science skills, that can be taught through the use of the Atlas in the classroom are vast. These are only a starting point, and this Guide will continually be updated, expanded, and improved. Please contact the University of Idaho Extension, Northern District, IDAH$_2$O program with ideas, questions, corrections, and other information.

This guide follows the Aquifer Atlas and provides descriptions of at least one lesson or activity per grade band for each Atlas section. Grade bands include,

K-3 (Lower Elementary School)

3-6 (Upper elementary School)

Future versions will include lesson plans for middle and high school grade bands.

7-8 (Middle School)

9-12 (High School)

These curricular resources have been developed collaboratively by educators and scientists, and are assembled here so that teachers can more easily use the Atlas as an effective science and math teaching tool.

There are two sections to this guide. The first section includes resources that are available for teachers beyond the classroom. This section relates closely with the Aquifer Tour pages (page 10), as many of these resources are field experience locations. The second section includes lesson plans that relate directly to pages in the aquifer, for a range of grade bands and supporting a variety of CC and NGSS standards. These are arranged more or less in order of the 2015 Aquifer Atlas, then by grade band.

Sincerely,

—Jim

Jim Ekins
Area Water Educator, UI Extension
Northern District
208-292-1287
jekins@uidaho.edu

Section 1: Resources related to the Aquifer Atlas

How can I find what is readily available for teachers, educators, and parents? A list of places to go, potential field excursions, and sources of information related to the Atlas Aquifer.

Water-based Curriculum: External sources of lessons and activities

Project WET

Project WET provides teachers and resource professionals with accredited workshops designed to provide non-advocacy, hands-on, interdisciplinary water education materials and instruction. This program trains teachers in use and application of the "Project WET Curriculum and Activity Guide", ground water flow models, Enviroscapes and water history trunks.

Idaho Project WET:

322 E. Front Street, Suite 242
Boise, ID 83702
Contact: Julie Scanlin: jscanlin@uidaho.edu or 208- 332-4414

Idaho Project WET is housed within the Idaho Water Resources Research Institute at iwrri@uidaho.edu

Washington Project WET:

Washington Department of Ecology

4601 N Monroe

Spokane, WA 99205

Contact: Brook Beeler: BBEE461@ECY.WA.GOV or 509.329.3478

Washington Project WET is housed within the WA Dept. of Ecology in Spokane: http://www.projectwet.org/where-we-are/partners/washington-department-ecology

Name: Jessica Stafford and Ashley Bear	
Subject: Science Experiment	Water Cycle Experiment
The big idea(s) or essential question(s): All things are affected by the water cycle, but the cycle is big and complex; models can help us understand complex things.	
Core standards addressed: CCSS: RST 6-8.3	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	Formulate how the water cycle functions using a model.
Materials and/or technology *The Spokane Valley-Rathdrum Aquifer Atlas* pg. 11. Large containers or bowls, small containers or bowls (large and small yogurt containers, bowls that fit completely inside each other, etc.) The large container must be significantly taller than the small container. Water, food coloring, salt, saran wrap, cup for scooping and measuring.	
Activities/procedures (include anticipated time for each)	
Introduction/activator Have the students gather around a table so everyone can see the demonstration. Introduce the materials and ask students to problem solve how these materials will help them learn about the water cycle. Then, provide students (in pairs or groups if necessary) with the materials for their own experiment. (5 minutes)	
Class activities (what you/students will do) We will create a model to demonstrate evaporation, condensation, and precipitation, and how the process cleans out impurities from the water. (20 minutes) Steps: Place the small container or bowl into the large bowl and weight it down with one of the stones. Add lots of salt to the water and thoroughly mix. Pour salty water gently into the big bowl, being careful to not let the small container float, or to splash water into the small container. Cover the large bowl with plastic wrap and secure it well with the elastic band. Place the second stone in the middle of the plastic wrap, and directly over the small container. This creates a depression in the plastic wrap, with the lowest point directly over the small container. Place the bowl in a sunny spot for a few days (if no sunny spot, place it near the heater, or other particularly warm area).	Class activities (why you will do them) Preparation will take time. Be sure to have enough of each type of container/ bowl. Demonstrates how the water cycle works, as a model. Allows students to see the processes first-hand. This demonstration captures the students' attention and allows them to visually conceptualize the water cycle process. Modeling large and complex systems helps us to better understand how they work. This expands their understanding of the water cycle, and how it can purify water, and allows the students a chance to predict what will happen.

Sixth Grade

Name: Jessica Stafford	
Subject: Language Arts	Water Cycle Vocabulary Match
The big idea(s) or essential question(s): Water cycle has multiple parts, and you should learn the names of the parts and what they are.	
Core standards addressed: CCSS: W.3.8	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	Complete a vocabulary lesson on the water cycle with definitions to match.
Materials and/or technology *The Spokane Valley-Rathdrum Aquifer Atlas* p. 26-27 Vocabulary Match Worksheet (not included) Pencil and dictionaries.	
Activities/procedures (include anticipated time for each)	
Introduction/activator Class, let's see who can match all the water cycle vocabulary words correctly to their definitions.	
Class activities (what you/students will do) Introduction/activator: hand out pre-prepared worksheets, or have students copy a list of vocabulary words from the whiteboard (copies from the *Aquifer Atlas* Glossary). (3 minutes) Time to work on the worksheet, or to look up and write out definitions in their own words. (20 minutes) Grade neighbor's worksheet or list and definitions. (5 minutes).	Class activities (why you will do them) Prepare a vocabulary worksheet with words from the *Aquifer Atlas* Glossary. Prepare students for the activity. Students will look up the definitions of words they are unsure of, but cannot just copy the definitions; they must write out definitions in their own words. Allows students to see where misunderstandings may have occurred, and to correct those misunderstandings.
Closure/reminders The water cycle and the aquifer plays a big role in all cultures, and it is important to understand the vocabulary that describes the water cycle.	
Assessment (how you will know students met the objectives - include rubrics) Did students match 10 out of 12 words, or provide proper definitions, written in their own words? Was the student able to navigate the dictionary or glossary to find unknown definitions?	

Cooperative Extension Service of the University of Idaho and Washington State University

University of Idaho Extension

Washington State University Smith-Lever Act 100 1914-2014 University Extension

Extending Knowledge and Changing Lives

The University of Idaho and Washington State University have a wide variety of natural resources and environmental education related 4-H curriculum and activities available, far beyond just aquifers and groundwater. For University of Idaho projects: http://extension.uidaho.edu/canyon/files/2013/02/Project-Requirements-Handbook-2013-2014.pdf. For Washington State University Projects: http://cru.cahe.wsu.edu/CEPublications/em2778/EM2778_2014.pdf.

University of Idaho Extension's Volunteer Water Quality Monitoring Program, IDAH$_2$O Master Water Stewards is a citizen-science project that provides training for volunteers who would like to do regular water quality monitoring on surface waters across Idaho. http://www.uidaho.edu/cda/idah2o

University of Idaho Extension IDAH$_2$O MASTER WATER STEWARDS

4-H

4-H2O Online: a community for youth to learn about water quality, water conservation and watershed issues. Throughout this site you'll find 4-H's "Exploring Your Environment" Grab-n-Go's and information on how youth nationwide are addressing water issues in their communities. Get started by watching the vodcast series "A Day Without Water" to learn more about how you can make an impact in your community! http://www.4-h.org/youth-development-programs/4-h-science-programs/environmental-science-alternative-energy/4h2online/

18 USC 707

There's No New Water: There's No New Water! is a 4-H water conservation and water quality curriculum grounded in a simple yet powerful concept that water is a finite natural resource whose quantity and quality must be responsibly preserved, protected, used, and reused.

The There's No New Water! curriculum is designed for high school age youth, with six sequential learning modules that utilize effective pedagogy and scaffold learners' knowledge and skills. The curriculum is intended for delivery in out of school group settings and facilitated by an adult.

The curriculum begins with an exploration of the natural water cycle; explores human interventions that affect water quality and quantity; examines the effects of the urban/rural interface on water quality and quantity; includes the identification and implementation of service-learning projects that address local water conservation issues; and culminates with a set of activities for younger youth and families designed to be led by teens as teachers.

All activities in the curriculum are designed around the use of inquiry and experiential learning. Inquiry is a teaching strategy where individuals are engaged in learner-centered activities that involve observing and manipulating objects and phenomena and acquiring or discovering knowledge. http://www.4-h.org/resource-library/curriculum/4-h-theres-no-new-water//

Community Water Resources Center (CWRC) at University of Idaho-Coeur d'Alene:

provides resources for all ages on a wide range of water related topics. Educational programs include the development of "station-style" events at which larger numbers of students are divided into groups of ten to fifteen, and rotate among a given number of stations. Each station is a hands-on lesson lasting from 15– to 45 minutes. CWRC has a laboratory open for K-12 use under the supervision of our Lab Coordinator, a certified science teacher who can help you meet your curricular needs. Contact the CWRC at UI for additional information: http://www.uidaho.edu/cda/cwrc and http://www.uidaho/cda/extension-outreach/outreach-opportunities

West Valley Outdoor Learning Center:

The purpose of the West Valley Outdoor Learning Center is to give teachers and students an opportunity to have experiences in an outdoor setting while instilling an appreciation for fish, wildlife, and our natural resources. All activities are tied to the Washington State Essential Academic Learning Requirements. http://www.wvolc.org/

West Valley Outdoor Learning Center
8706 E. Upriver Drive
Spokane, WA 99212
Phone: 509.340.1028
Jami Ostby, Environmental Educator: Jami.Ostby@wvsd.com

Additional Resources: Regional and National Aquifer-Education-Based online resources
Idaho Department of Environmental Quality, Kids:

Water Does a Lot for Us... What Can We Do For Water?

www.deq.idaho.gov/media/570548-water_quality_kids_brochure.pdf
www.deq.idaho.gov/media/570573-water_kids_tips_fs_2006.pdf

Ground Water in Idaho: Aquifers

www.deq.idaho.gov/water-quality/ground-water/aquifers.aspx

Rathdrum-Spokane Aquifer Specific Educational Tools:

https://www.deq.idaho.gov/regional-offices-issues/coeur-dalene/rathdrum-prairie-aquifer/educational-tools.aspx

Ground Water in Idaho: Overview

I will ask students to pull out a piece of paper and a pencil and to begin working on their assignments as I walk around the room and monitor their understanding of the assignment (15 minutes). I will ask students to partner up to share stories with each other (3-5 minutes). I will have the students turn their assignments into my turn in box on my desk.	I will monitor students work by walking around the room to help students with ideas to help them meet the story requirements. I will give students the opportunity to share their stories with each other to give other students a different point of view of the aquifer.
Closure/reminders: I will call on three volunteers to tell me what role the characters in their narrative story play and share it with the class.	
Assessment (how you will know students met the objectives - include rubrics) I will assess students' progress through the writing assignment by reviewing their story drafts and correcting spelling, grammar and punctuation errors. I will also add comments so students are aware of how they are progressing.	

Name: Linley Devlin	
Subject: Language Arts, Writing	Aquifer Vocabulary and Story
The big idea(s) or essential question(s) Across all cultures, water plays an important role.	
Core standards addressed: CCSS: 4 W.3; CCSS: 4 W.3.a	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	Use effective technique in a descriptive and sequential story about the aquifer.
TSWBAT	Introduce at least two characters and organize an event sequence using at least five vocabulary words.
Materials and/or technology *The Spokane Valley-Rathdrum Aquifer Atlas* pg. 28 -Smart Board -Paper, pencil -White Board and marker	
Activities/procedures (include anticipated time for each)	
Introduction/activator: I will introduce the lesson by turning to page 28 and displaying the image of the force team. (1 minute)	
Class activities (what you/students will do) I will begin with the introduction and passing out the atlas (2 minutes) I will explain to the students that they will be creating a narrative story of their own using characters from the aquifer defense force team that includes aquifer vocabulary words (1-2 minutes). I will ask the students to turn to the glossary and definitions in the back of the atlas and have them review and read about the aquifer defense force team. I will call on students at random using name sticks. (5 minutes). After the students review the defense team and vocabulary words, I will review the vocabulary words I want them using by writing them on the white board and reviewing their relevance to the aquifer: aquifer, basalt, cobbles, discharge, domestic consumption (use), evaporation, glacier, groundwater, Hydrologic cycle, ice age, monitoring site or well, permeability, precipitation, recharge, sediment, septic system, transpiration, water budget, water cycle, and water pollution (5 minutes). I will explain to them that they are required to use at least five of the vocabulary words written on the board and at least two characters from the aquifer defense team. I will refer back to my story to model the characters and terms I used in the story. I will ask students to point out some of the details I used in my story as I highlight them on the smart board as they give me feedback (5 minutes).	Class activities (why you will do them) I will introduce the assignment to familiarize them with it. I will explain the idea of the assignment to review the idea of it. I will give them the tools needed to help them with the assignment. I will give them a list of vocabulary terms they are required to pick from to give them the content they need while reviewing the definitions. I will review the requirements to help them understand their responsibilities.

www.deq.idaho.gov/water-quality/ground-water.aspx

Water Quality: Educational Tools:

www.deq.idaho.gov/assistance-resources/educational-tools/teacher-resources.aspx

Washington Department of Ecology, for Educators and Students

Ecology provides environmental education materials for classroom teachers and students' research, community educators' programs and for individuals choosing to make a difference. Learn what you can do...and have fun!

http://www.ecy.wa.gov/services/ee/index.html

U.S. Geological Survey :

Groundwater Information Pages: http://water.usgs.gov/ogw/

U.S. Environmental Protection Agency:

Find an array of environmental and science based lesson plans, activities and ideas about teaching water science. http://www.epa.gov/students/teachers.html#epawater

A Citizen's Guide to Ground Water Protection: www.epa.gov/ebtpages/wategroundwaterprotection.html

Drinking Water and Ground Water Kids' Stuff: www.epa.gov/safewater/kids/index.html

The Groundwater Foundation:

Get Informed: www.groundwater.org/gi/gi.html

Kids Corner: www.groundwater.org/kc/kc.html

Spokane Valley-Rathdrum Prairie Aquifer (Eastern Washington University website)

http://web.ewu.edu/groups/geology/2003Newsletter.pdf

Spokane Aquifer Joint Board, Education and Awareness

Provides some virtual field trips relating to water conservation and aquifer protection; printable coloring/comic books, fun facts about water and household water use, tips for water conservation, and more.

http://www.spokaneaquifer.org/education-awareness/

Programs and Hands-On Activities

Groundwater Model: A mobile window into the aquifer

Courtesy: This program can be delivered by the IDAH2O WatershEducation Program as a U-Idaho Extension Program. Alternately, a high school classroom instructor with some basic carpentry experience can build an aquifer model using wood, plexiglass and other materials. See the EPA "Building a Model Aquifer" page at (http://water.epa.gov/learn/kids/drinkingwater/upload/2009_04_29_kids_activity_grades_9-12_buildingamodelaquifer.pdf). See also Groundwater Model Lesson Plan in section 2 of this Guide.

Grades: 4-9

Context: Aquifer Atlas pages

Overall Goals: Students will use a hands-on model to understand and demonstrate aquifer concepts, aquifer components and structure, and interrelationships among the aquifer, river, and water well use.

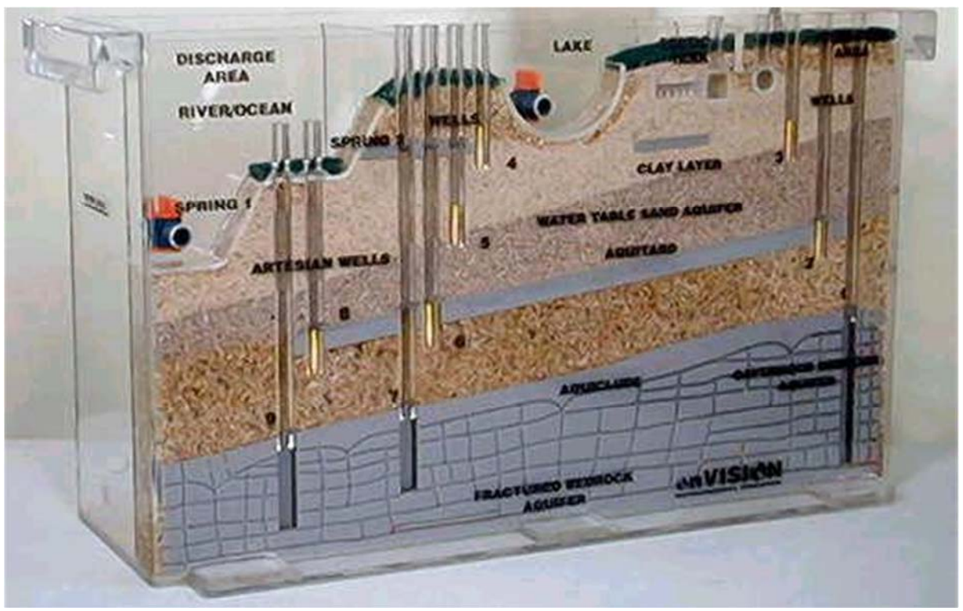
Learning Objectives: Students will:

- build and/or view a model aquifer;
- define and explain what they have observed from using a scientific model;
- learn to differentiate an explanation from a description.

Time Required: Setup 15 minutes (with existing aquifer model) to 2 hours (if building a new model), activity 45 minutes.

Materials:

For additional details, see the EPA Aquifer Model as described above and also other aquifer modeling activity descriptions such as Wessels Learner Model Aquifer, or the Active Watershed Education Curriculum's Testing out an Aquifer.



The students will open up their writing journals and begin writing their story. As they finish up with their stories, they may grab a piece of construction paper from the back table and illustrate a drawing of their story using utensils from their personal supply box. (25-30 minutes). I will have the students turn their writing journals into my desk so I can check completion of the assignment (1-2 minutes). Any students who completed a drawing of their super hero and wants to display it, may add it their portfolio folder.	I will have them complete the assignment and move on to illustrations to extend learning. I will check for completed assignments by having them turn it in and grade them using our standing writing rubric.
Closure/reminders: I will close the lesson by reminding students that any art work they would like to display or add to their portfolio can be put into the folder when completed. I will also remind them that an artist statement will also need to be included for any portfolio art.	
Assessment (how you will know students met the objectives - include rubrics) I will assess students work by reviewing and grading their superhero story. They will receive 1 point for each of the five paragraphs, and one point each for the 3 requirement questions, as well as another point for neatness and lastly a point for punctuation and spelling making the total assignment worth 10 points.	

Name: Linley Devlin	
Subject: Language Arts	Water Superhero Story
The big idea(s) or essential question(s): Across all cultures, water plays an important role.	
Core standards addressed: CCSS: W 5.3.a.	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	Students will develop imagined experiences using descriptive details including their superhero and their "powers."
TSWBAT	Students will establish a situation and introduce their character in a situation relating to water.
Materials and/or technology: Students: *The Spokane Valley-Rathdrum Aquifer Atlas* any pages, but especially p. 26. -Writing journal, pencil -Construction Paper, Markers Teacher: -Smart Board, White Board, markers	
Activities/procedures (include anticipated time for each)	
Introduction/activator: I am going to put page 26 on the smart board displaying the Aquifer Defense Force Team. I will tell the call that Molly is my favorite of the characters because she keeps the aquifer clean. I will then take 3 volunteers to tell me who their favorite character is and why. (3-4 minutes)	
Class activities (what you/students will do) I will begin with the introduction about Molly (3-5 minutes). Extending on our theme of water and the aquifer, I will ask the students to create a superhero of their own that contributes to helping protect our aquifer and keeping it clean. I will explain that each superhero has to have super powers that relates to saving the aquifer or improving water quality that is NOT a power one of the members already has. I will use the example of Vicky the Vacuum who sucks out all hazardous materials from our aquifer (2 minutes). I will remove the atlas from the smart board and put on my sheet of questions that will help guide students in creating their superhero. (1-2 minutes): What powers does your superhero have? What does his or her costume look like? Who are your superhero's archenemies OR what is a weakness they have? Then, I will explain that students will be writing a story about a situation where the aquifer or water quality is in danger and how their superhero will solve the problem. The requirement for the story must be a minimum of three paragraphs long and five sentences each. (3 minutes).	Class activities (why you will do them) I will spark their attention by asking them who their favorite character is and why. I will spark their attention again with the idea of them creating their own superhero and how it contributes to our aquifer I will give them an example to give them an idea of what they can do to create their own superhero. I will ask these questions to help students think about their superhero's characteristics to help them develop a more rounded character and to give them subjects for their body paragraphs. I will give my students the requirements of the assignment so they are aware what they will be graded on.

Get the scoop on… wastewater!: Class tour of local wastewater treatment/water reclamation plant

Courtesy: There is nothing like a tour of a local wastewater treatment plant to help kids understand what happens after the bathtub drain is unplugged, or the toilet is flushed. Tours can be arranged for the Spokane Valley Water Resources Center, and/or the Community Water Resources Center at the University of Idaho Coeur d'Alene and Coeur d'Alene Wastewater Reclamation Facility.

Grades: 5th and up

Context: Aquifer Atlas pages 10 (Aquifer Tour Map)

Overall Goals: To provide students with a field experience at a real wastewater treatment facility or associated learning center.

For additional information, call or email the Community Water Resources Center at the University of Idaho or the Spokane Valley Water Resources Center. Because of the nature of a wastewater reclamation facility, students younger than 5th grade are not allowed at the Coeur d'Alene Wastewater Reclamation Facility.

Spokane Valley Community Water Center and Wastewater Reclamation Facility (can take students younger than 5th grade. Inquire for more info.)

1004 N. Freya St

Spokane, WA 99202

(509) 477-3604

http://www.spokanecounty.org/utilities/waterreclamation/content.aspx?c=2916

Coeur d'Alene Wastewater Reclamation Facility

765 W Hubbard Ave

Coeur d'Alene, ID 83814

208-769-2281

http://www.cdaid.org/156/departments/wastewater/plant-tours

Post Falls Wastewater Reclamation Facility

208-773-1438

Mobile Bug Lab: Who else is in your favorite swimming hole?

Courtesy: This program can be delivered by the IDAH2O WatershEducation Program as a U-Idaho Extension Program. It is generally offered as a part of large events, for instance with multiple classrooms. It is less-closely related to the Aquifer Atlas specifically, but more oriented toward water quality in general, and will expose the students to the use of basic scientific equipment.

Grades: 4, 6, 10

Context: Aquifer Atlas pages

Overall Goals: Students will capture, view, describe, draw, and learn about what aquatic macroinvertebrates can tell us about water quality in local streams and rivers, some of which feed the Aquifer.

Learning Objectives: Students will:

- Differentiate between the terms, macro and micro, aquatic and terrestrial, and vertebrate and invertebrate
- Learn two pollution sources and four types of water pollution
- Differentiate between visible pollution, visible signs of invisible pollution, and invisible pollution
- Identify types of macroinvertebrates using an identification key (younger students) or a dichotomous key (older students)
- Create written descriptions and/or technical drawings of individual macroinvertebrates
- Learn how to use a basic microscope

Standards or Curriculum:

Time Required: Setup 30 minutes, activity 20—45 minutes.

Materials: Table(s) for microscopes and bug viewers (provided).

• 1995- IDEQ adopts guidelines for land applying waste water over the aquifer • 1999- efforts to halt a new train refueling depot evolve into grass roots aquifer protection movements 2007- Kootenai county residents vote to form and fund an aquifer protection district to form aquifer programs. (16-18 minutes) Have students turn "IN" their timeline for a completion grade and come back and sit at their desks with everything put away (2 minutes) Assessment questions- see below (5 minutes)	Once we have completed the timeline as a class, I will have students turn in their work so I can assess students work. Because we worked on the timeline as a group, I am going to use assessment questions to further gauge students understanding about timelines and important events that shaped the aquifer.
Closure/reminders "What are other timelines you have seen? What else could we make a timeline about?" "How is a timeline similar to a number line?"	
Assessment (how you will know students met the objectives - include rubrics) 1. Why are timelines important? (Answer: Organize information, show sequence of events, shows how things/events/people build on each other…) 2. What major role did "Friends of the Aquifer" play? (Answer: Protecting the aquifer from pollution and contamination that was likely to happen if a refueling depot was built.) 3. The timeline ends in 2014; does this mean the timeline is over? Explain. 4. Why is it important that these events took place?	

Name: Linley Devlin	
Subject: History	Aquifer Timeline
The big idea(s) or essential question(s) Throughout all cultures, water plays an important role.	
Core standards addressed: CCSS: RI. 5.5	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	Learn about the chronology of events that took place in making the Spokane Valley Rathdrum Prairie Aquifer.
Materials and/or technology *The Spokane Valley-Rathdrum Aquifer Atlas* p. 3-4. Teacher: Smart Board, Timeline worksheet Students: colored pencils, Worksheet, pencil	
Activities/procedures (include anticipated time for each)	
Introduction/activator (show time line) "I was born in 1988 in Long Island NY. In 2006 I graduated from High school. In 2009 I had my daughter, Harley. And in 2016 I graduated college. Timelines are used to chronologically show sequences of related events. Today, you will use your Aquifer Atlas to identify important events and people that have played a role in our aquifer." (3 minutes)	
Class activities (what you/students will do) Introduce timeline assignment. (3 minutes) Pass out timeline. Ask students to take out their colored pencils. We will draw a small picture of each year discussed as a class. Every student will fill out their own time line. After a student answers what happens in each year, a different student will be asked to suggest a picture that would easily represent that year. (2 minutes) Using cold call, ask students to answer what happened in the following years on the Aquifer timeline: • 1908- Aquifer replaces Spokane river as primary source of drinking water • 1923- Dr. Bretz discovers the catastrophic event that occurred and created the aquifer • 1938- survey of major rivers found the Spokane river the foulest water body in the state • 1978- EPA designates the aquifer as a "sole source aquifer" • 1980- Spokane county and Panhandle health district initiate a ground water monitoring program	Class activities (why you will do them) I will show students a timeline to review what we are doing. By using a time line about my life, students will be able to associate it with more than just the aquifer. I will use cold call to read aloud what different events took place at the years listed to ensure students are actively engaged and paying attention. I am going to have students draw a small picture to help relate it to the event. It will help aid in further understanding of what happened during that year and give another way to remember and process it.

Water Quality Monitoring: Be a Water Superhero

Courtesy: This program can be delivered by the IDAH2O WatershEducation Program as a U-Idaho Extension Program. Alternately, a high school classroom instructor with some basic carpentry experience can build an aquifer model using wood, plexiglass and other materials. See the EPA "Building a Model Aquifer" page at (http://water.epa.gov/learn/kids/drinkingwater/upload/2009_04_29_kids_activity_grades_9-12_buildingamodelaquifer.pdf). Contact University of Idaho WatershEducation Program, 208-292-1287 or jekins@uidaho.edu.

Grades: 4-9

Context: Aquifer Atlas pages

Overall Goals: Students will use a hands-on model to understand and demonstrate aquifer concepts, aquifer components and structure, and interrelationships among the aquifer, river, and water well use.

Learning Objectives: Students will:

- build and/or view a model aquifer;
- define and explain what they have observed from using a scientific model;
- learn to differentiate an explanation from a description.

Standards or Curriculum:

Time Required: Setup 15 minutes (with existing aquifer model) to 2 hours (if building a new model), activity 45 minutes.

Materials: a $20 fee to cover the cost of materials can be sent to UI Extension. Call for more details

I will then gather my poster board and show students how to make an outline of the aquifer using the outline. The map should fill the whole board within reason. Next I will show how to draw in the different sections. Have students label each section with pencil as they go. Lakes will be drawn next. Remind students that we will need to draw the river and creeks in after we have our map put together. After stenciling the aquifer and lakes, grab a piece of recycled material from the class bucket and cut out a portion to fit one section. Explain to the students to estimate how much material they will need for each section. They can cut it with more detail after. (Students will continue this process with each section of the aquifer before gluing.) Cut section of recycled material to closely resemble section of aquifer it is to represent. (Once <u>all</u> sections are closely cut by students they may move on to gluing) Glue on section to the correct area. Remind students they need to have all their sections cut in detail before they may start gluing. Lastly, use pre-made toothpick markers (in top right corner of cabinet) to identify the sections after all sections are glued in place. (1 hour) Have students place finished projects on drying racks. Any unfinished projects should be placed on the back table.	I will demonstrate one part of each step of the process so that all the students have an idea about how they should be cutting, labeling, and constructing their map project. I will instruct students on where their projects will be placed so there will not be confusion and so that projects are not damaged or lost.
Closure/reminders Summarize at the end of the allotted time how far each group has left on their project.	
Assessment (how you will know students met the objectives - include rubrics) As students work on the project I will walk around the room. Ensure students are using their section and rivers, lake and creek lists to properly represent each area. Summative assessment will be completed on students completed maps.	

Name: Linley Devlin	
Subject: Art, Science	Recycling and Maps
The big idea(s) or essential question(s) Earth is our livelihood- Reduce, Reuse & Recycle.	
Core standards addressed: CCSS: 5 W.9; CCSS: 5 SL.2	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	Construct and label a map using recycled materials that they gathered.
Materials and/or technology *The Spokane Valley-Rathdrum Aquifer Atlas* p. 23 or front cover can be photocopied. Atlas companion place-mat map can also be used. -smart board -Bucket of recycled materials -scissors, glue, poster board -location markers, pencil	
Activities/procedures (include anticipated time for each)	
Introduction/activator Recycling video (1 minute, 12 seconds) http://www.youtube.com/watch?v=395RMWTvTAU	
Class activities (what you/students will do) I will ask students to gather in their groups for the recycled map project that they chose last week.(2 minutes) Following the week long homework assignment of gathering recycled items and bringing them to class, we will review why it is important to recycle though class discussion. Reuse: Citrus peels (make potpourri) too small t-shirt (give to younger sibling, donate, make cleaning rag), tires (tire swing) Reduce: Use of electricity, use appliances that use less power Recycle: batteries, food jars (pickles, jelly) How does recycling affect our water supply? (5 minutes) I will present the Aquifer Model Map on page 23 to the class on the smart board. I will point to the 7 different colored areas: northern Rathdrum prairie, southern Rathdrum prairie, eastern Spokane valley, Spokane area, western arm, Hilliard trough and little Spokane river arm. I will locate and point out the connecting rivers, lakes, and creeks: Spokane river, Long, Lake, Deep Creek, Little Spokane River, Hangman Creek, Liberty Lake, Newman Lake, Hauser Lake, Coeur d'Alene Lake, Fernan Lake, Hayden Lake, Twin Lakes, Spirit Lake and Lake Pend Oreille. (3 minutes) I will pass out the list of aquifer sections and lakes, rivers and creeks to each group. They will use these to ensure they have all parts of their map labeled at the end of the project. (2 minutes)	Class activities (why you will do them) I will introduce the lesson to remind students how important recycling is I will review recycling to help students choose materials for their project that accurately follow the "reduce, reuse and recycle" moto. This will be another step in aiding their understanding of recycling I have made a printed list for students' easy referral and so they can check off items as they move along in their project. It will be a good way for me to see how much they have done and how far they have to go.

Section 2: Aquifer-Related Lesson Plans and Activities

Lesson Plans, mapped to standards, to be used with the Aquifer Atlas

The following lesson plans and activities were created my many individuals and organizations. Some of these are developed by organizations and agencies devoted to protecting the aquifer, and adapted to fit this publication. Others were developed by the University of Idaho, College of Education, Department of Curriculum and Instruction students in a class called Teaching Culturally Diverse Learners. A major component of this class is development of lesson plans for a wide variety of ages, and then mapping those lesson plans to state standards in science, math, and English language arts (known as the Common Core ELA and Next Generation Science Standards), as a service-learning project.

There are two subsections. First is a section of activities and experiments that can apply to a broad range of grade bands. The second subsection is a series of elementary-grade-level lesson plans developed by UI College of Education students. These sometimes refer back to the activities described in the first subsection.

Each lesson plan is organized in a similar manner.

Title and Subtitle

Courtesy: Each lesson plan is referenced to the author or source. Often lesson plans and activities have multiple sources, or have been copied from earlier sources, and therefore variations that might fit a class need might be found with some searching. The editors of this publication were not able to delve into the history of every lesson plan. Please address needs for additional information or clarifications to the editors.

Grades: Most of these lessons can be used for a range of student ages or within a broader grade band.

Context: Each lesson plan or activity is related to a specific Aquifer Atlas page or pages.

Overall Goals: of each lesson plan or activity are described.

Learning Objectives: of each lesson plan or activity are described, using the sentence: "The student will…"

Standards or Curriculum: A list of relevant connections to Common Core standards, and usually Next Generation Science Standards, is provided with each lesson plan or activity.

Time Required: Includes an estimated time needed for activity setup, as well as the activity itself.

Materials: a list of materials required for each activity is provided.

For additional details: some of these are part of a larger set of lessons or activities, or for which there are additional materials or program information available.

The Hydrologic Cycle

Where does water come from, and where does water go?

Courtesy: Idaho Department of Environmental Quality: Gary Stevens, 06/09

Grades: 3-6

Context: Aquifer pages 11 and 12 (Water Cycle and Water Budget)

Overall Goals: Learn about the hydrologic cycle:

Learning Objectives: Students will:

Explain at least five places where water is found

Know the steps of the hydrologic cycle

Know five hydrologic cycle terms and place them in proper location on a water cycle diagram

Describe how water moves from one step to another

Standards or Curriculum: Common Core ELA:

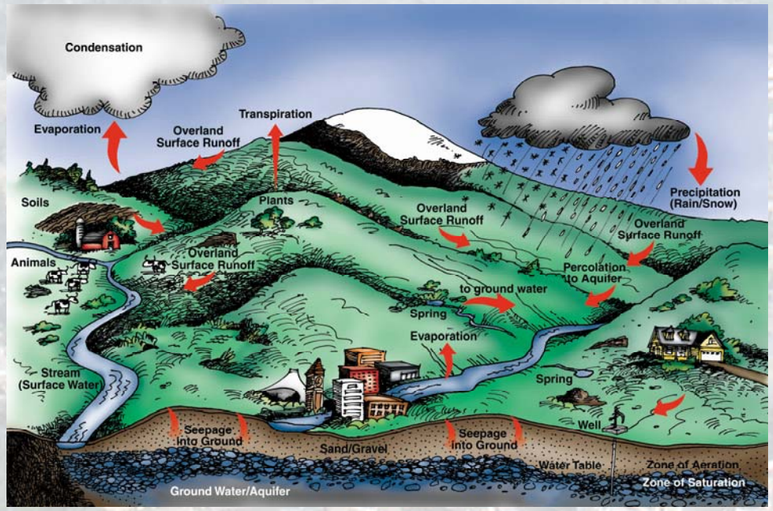
- 3rd Grade: W.3.9 (3-LS4-1); SL.3.4 (3-LS4-2)(3-LS4-3)(3-LS4-4)
- 4th Grade: SL.4.4 (4-LS1-2); W.4.7 (4-ESS3-1); W.4.8 (4-ESS3-1)
- 5th Grade: RI.5.7 (5-LS2-1)

Time Required: Setup 20 minutes, activity 60 minutes

Materials: Hydrologic cycle illustration, hydrologic cycle animation (WMV or SWF format), small beaker, a houseplant, plastic wrap, and tape

For additional details and the entire lesson plan, go to the following web address and click on Lesson #1: Where does water come from, and where does it go? (https://www.deq.idaho.gov/regional-offices-issues/coeur-dalene/rathdrum-prairie-aquifer/educational-tools.aspx)

Hydrologic Cycle: The water on earth is always on the move, and eventually it ends up right back where it started. This movement is called the hydrologic cycle or water cycle.



Next I will show how I used this measurement to cut out my first line on the bar graph "+91" represents a gain of 91 million gallons per day. I will cut out the length with scissors and use the glue stick to put it in place. Using the same sharpie, label the bar "+91" as shown on the Streamflow graph. (Step 4-8, 5 minutes) I will leave my completed bar graph on the smart board for students to reference. I will then have students take out their aquifer atlas and turn it to page 14 so they can use the data to construct their bar graph (1 minute) I will tell students they can open their supply box and start on their graphs. While they work on their bar graphs I will circle the room to ensure students are on track and are understanding the assignment. (20 minutes)	I will all students to take their supplies out at the end of my instructions so as to not distract them during my presentation. As students work, I will walk around the room to assess students' progress and understanding
Closure/reminders I will take out my water bottle pour half of it out. I will ask students to silently think about whether there was a gain or loss of water from my water bottle. Was it a negative loss or positive gain?	
Assessment (how you will know students met the objectives - include rubrics) What does the color orange represent on the streamflow graph? What is the difference between orange and blue on the graph? Why do they use "-" to represent loss? Do you think the same loss and gain	

Name: Linley Devlin	
Subject: Mathematics	Topic: Streamflow Graph
The big idea(s) or essential question(s) Water plays an important role in all societies. Make a line plot to display a data set of measurements in fractions of a unit.	
Core standards addressed: CCSS: 5.MD 2	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	Create a line graph utilizing positive and negative stream flow gains and losses with 75% accuracy
Materials and/or technology Students: *The Spokane Valley-Rathdrum Aquifer Atlas* pgs. 12-15. Construction paper, pencil, ruler, sharpie Teacher: completed bar graph, smart board, aquifer atlas	
Activities/procedures (include anticipated time for each)	
Introduction/activator I will display my finished bar graph on the smart board to the class and ask them to identify what kind of graph it is. I will then ask why there are bars below the line.	
Class activities (what you/students will do) I will show my bar graph for the introduction. (2 minutes) I will set out the scrap paper basket at the back of the classroom. Row leaders will be asked to grab two sheets for every student in their row. While they do that, I will hand out plain sheet of construction paper to which they will make their bar graph. I will also ask students to get their supply box out and place it on the side of their desk until it is time to use. (4 minutes) I will put the Aquifer Atlas on the smart board on page 14 displaying the stream flow gain and loss in 2005. We will review what loss is: Where the water table is below the bed of the river…in these locations the river is losing water & what gain is: where the water table is higher than the river bed…in these areas the reach of the river is gaining (3 minutes) I will then put the bar graph on the smart board display and show where the gains and losses are located. Next I will explain to the class that we are going to create our bar graph using the data given to us on page 14. Have students fold large construction paper in half (hotdog style). They will use this crease to trace with sharpie, a line that represents "0". Using a ruler, students will make a dash on the side of the paper for every 1" above and below 0. These will represent 50 million gallons of water per dash (loss and gain)	Class activities (why you will do them) I will ask students questions during the introduction to gather an understanding of where students understanding is at. I will have other students help pass things out while I do the same to make things go faster. I will review the information on the graph in the atlas to show students the similarities in the graphs we have been working on in math. I will verbally explain the directions of the assignment and show them the step by step process to ensure students feel comfortable working on their own and to ensure students understand what is expected of them.

We can start any place, so let's start with **precipitation**. Precipitation is another name for rain and snow. When rain falls on the land or snow melts, it flows into rivers or streams. After a lot of rain or in the spring when all the snow melts, streams and rivers often have a lot more water in them. In the water cycle, this is called **surface runoff**. The water in the streams and rivers can flow all the way to lakes and eventually even the ocean.

The rain and melted snow can also be absorbed into the ground. When this happens, it's called **infiltration.** The infiltrated water adds moisture to the soil and rock. If enough water is added, it will completely fill all the empty spaces in the soil and rock.

If all the empty spaces are full of water then we have an aquifer. The water in an aquifer is also called ground water. Moving ground water is called **ground water flow.** Ground water moves very slow, usually only a few feet a day.

Plants need water and nutrients to live. Plants get water and nutrients from the soil through their roots. When plants absorb water and nutrients from the ground it's called **root uptake**.

The water goes up through the plant to its leaves where it's released into the air. The process of plants releasing water into the air is called **transpiration**. A mature tree can transpire 50 to 100 gallons of water a day in the summer.

Some water doesn't make it to streams or rivers. When the sun comes out, the heat causes the water on plants or on the surface of the land to evaporate back into the air. The combined process of evaporation and transpiration are called **evapo-transpiration.**

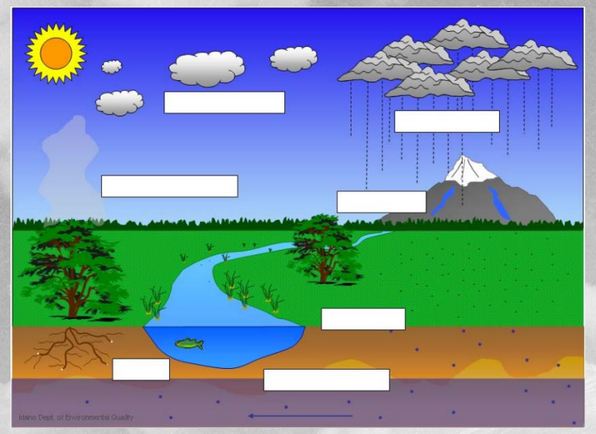
All evapotranspirated water rises up into the atmosphere where the air is very cold. The water starts to collect together in a process called **condensation**. When there is enough condensation, clouds form. When there is enough water in the clouds, it starts to rain and snow or **precipitate**. Now we are right back where we started on the first page! Water from precipitation will move again through the hydrologic cycle.

Activities:

1. Download the hydrologic animation at *www.deq.idaho.gov/ rathdrumprairieaquifer .*
2. Fill in the empty boxes of the illustration of the hydrologic cycle.

   Fill in the empty boxes with the steps of the hydrologic cycle.

   Draw arrows from one box to another showing the direction of the cycle.



Beaker or Measuring Cup Experiment

Fill a measuring cup with exactly 1cup of water. Leave the cup out on a table or window sill. The water will start to disappear. Fill out the table on Page 4 and explain how this relates to the hydrologic cycle. What might make the water disappear fast-er?

Start with exactly 250 milliliters or 1 cup of water in container. Every day measure how much water is left and record the information in this table.

Date	Time	How much water is in the measuring cup?

Take a house plant and lightly water it. Then loosely cover the plant or one branch with clear plastic wrap. Gently secure the plastic wrap around the pot or base of the branch with some tape. Make sure you just tape the pot or the plastic around the branch instead of the plant itself. Wait a few days and water will start to form on the inside of the plastic. What is happen-ing? How does this relate to the hydrologic cycle?

Observe the model over the next few days. Note whether the water in the smaller container, or the water that condenses on the underside of the plastic wrap has color in it, (Optional, note whether salt deposits are being left in the large bowl) as water evaporates from the large bowl, condenses on the underside of the plastic wrap, and eventually drips run down to the low point and drop into the small container.
Closure/reminders The class will be making observations of what is taking place over the next few days. Watch as salt deposits form on the large bowl as water evaporates. Ask students if solids can evaporate, like water can? Ask if they think the water in the small container is salty or nice and fresh? Would the water in the large bowl taste even saltier than it was before the experiment? The teacher can taste the water from the small bowl and confirm whether it is salty or fresh.
Assessment (how you will know students met the objectives - include rubrics) By predicting what will happen during the experiment demonstrates their understanding of how the water cycle works.

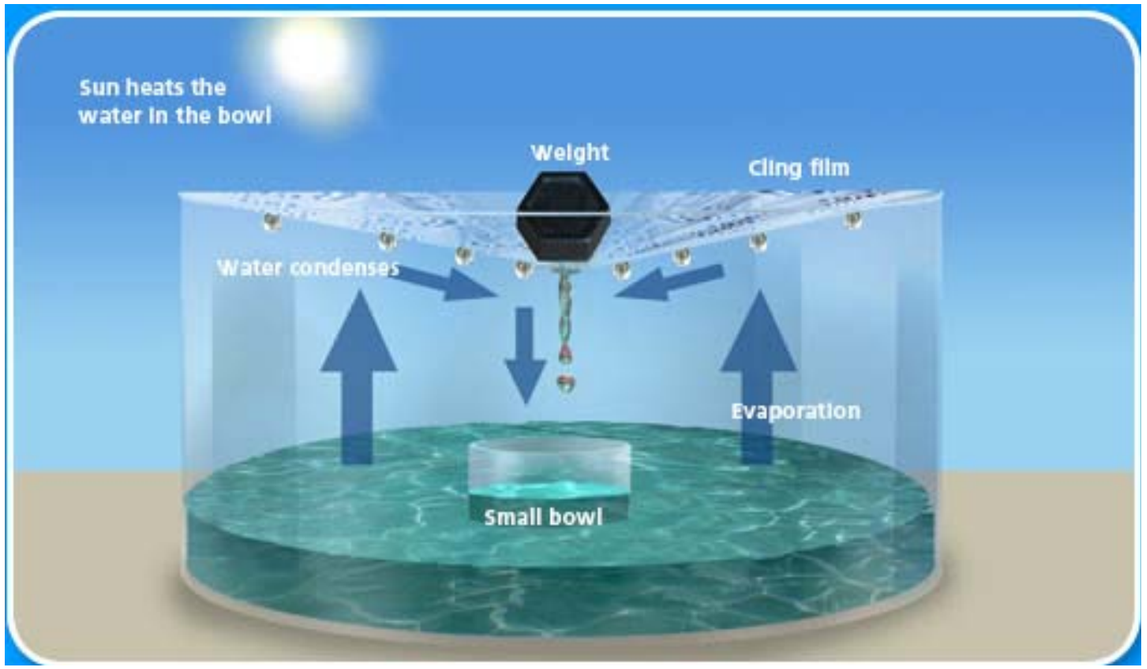


Photo Credit: http://shoalwater.nsw.gov.au/education/watercycle_experiment.htm Additional information about this activity can be found here, too.

Name: Ashley Bear	
Subject: Reading	Water Cycle Experiment
The big idea(s) or essential question(s): Water is a crucial resource and the water cycle demonstrates how water is recycled through our environment.	
Core standards addressed: CCSS: RI.5.3	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	Explain the step-by-step process and the concepts that took place in the water cycle/ evaporation-condensation demonstration.
Materials and/or technology *The Spokane Valley-Rathdrum Aquifer Atlas* pgs. 11-12. Large bowl, small yogurt container, two small stones, plastic wrap, large elastic band, water, food coloring, salt. Pencil and paper	
Activities/procedures (include anticipated time for each)	
Introduction/activator Have the students gather around a table so everyone can see the demonstration. Introduce the materials and ask students to problem solve how these materials will help them learn about the water cycle. (5 minutes)	
Class activities (what you/students will do) We will create a model to demonstrate evaporation, condensation, and precipitation, and how the process cleans out impurities from the water. (20 minutes) Steps: Place the small container or bowl into the large bowl and weight it down with one of the stones. Add drops of food coloring (and/or salt) to the water and thoroughly mix. This is "polluted" or "sea" water; water that is unfit to drink. Pour colored, salty water gently into the big bowl, being careful to not let the small container float, or to splash water into the small container. Cover the large bowl with plastic wrap and secure it well with the elastic band. Place the second stone in the middle of the plastic wrap, and directly over the small container. This creates a depression in the plastic wrap, with the lowest point directly over the small container. Place the bowl in a sunny spot for a few days (if no sunny spot, place it near the heater, or other particularly warm area). Have the students answer a series of prediction questions (20 minutes): • What do you think will happen to the water? • How long do you think it will take for the water to evaporate? • Do you think evaporation needs cold or hot water? What is the sun doing to the water? How much water do you think will eventually collect in the small container?	Class activities (why you will do them) This demonstration captures the students' attention and allows them to visually conceptualize the water cycle process. Modeling large and complex systems helps us to better understand how they work. This expands their understanding of the water cycle, and how it can purify water, and allows the students a chance to predict what will happen.

Groundwater Model

A mobile window into the aquifer

Courtesy: This program can be delivered by the IDAH2O WatershEducation Program as a U-Idaho Extension Program. Alternately, a high school classroom instructor with some basic carpentry experience can build an aquifer model using wood, plexiglass and other materials. See the EPA "Building a Model Aquifer" page at (http://water.epa.gov/learn/kids/drinkingwater/upload/2009_04_29_kids_activity_grades_9-12_buildingamodelaquifer.pdf).

Grades: 4-9

Context: Aquifer Atlas pages

Overall Goals: Students will use a hands-on model to understand and demonstrate aquifer concepts, aquifer components and structure, and interrelationships among the aquifer, river, and water well use.

Learning Objectives: Students will:

build and/or view a model aquifer;

define and explain what they have observed from using a scientific model;

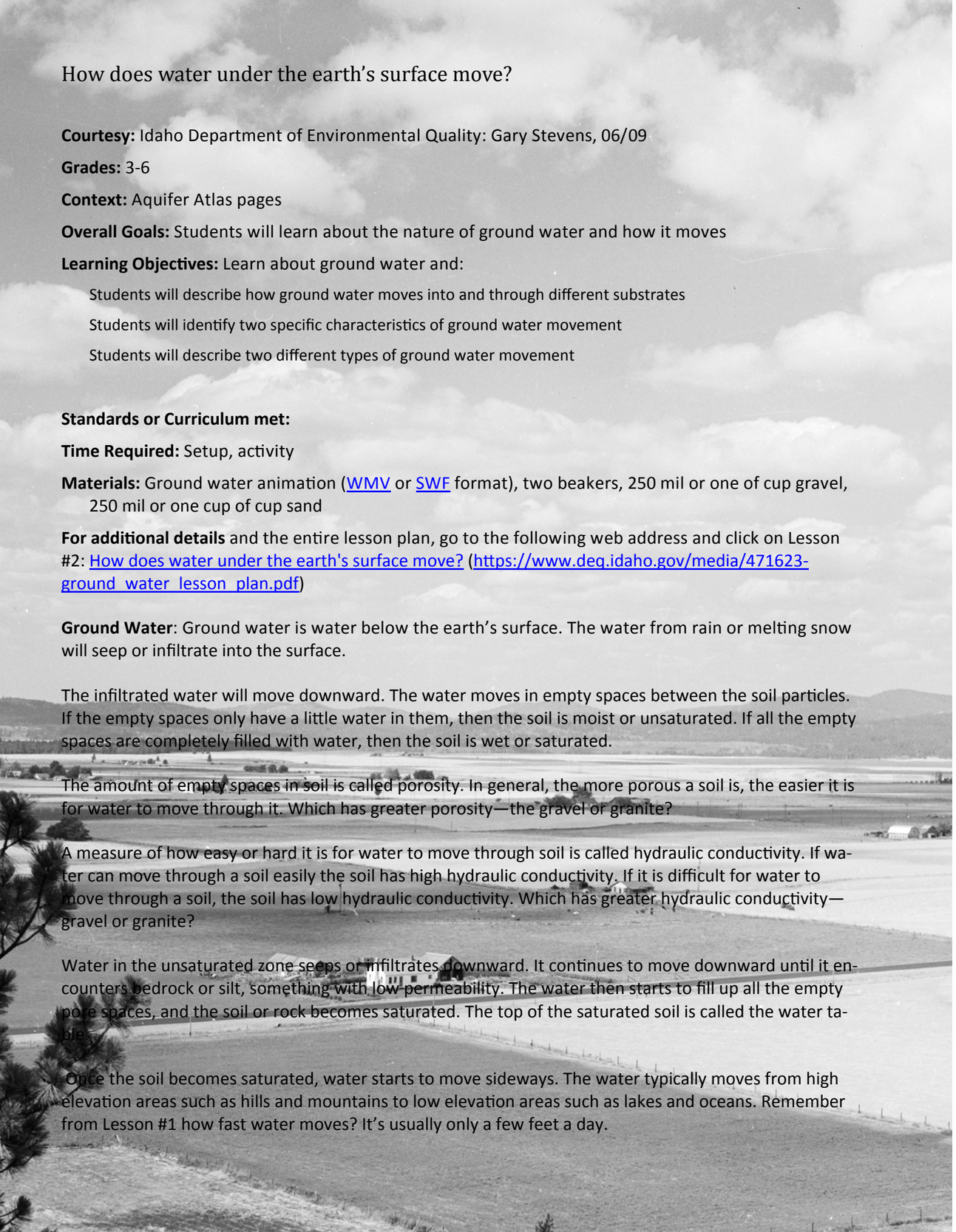
learn to differentiate an explanation from a description.

Standards or Curriculum:

Time Required: Setup 15 minutes (with existing aquifer model) to 2 hours (if building a new model), activity 60 minutes

Materials:

For additional details, see the EPA Aquifer Model as described above and also other aquifer modeling activity descriptions such as Wessels Learner Model Aquifer, or the Active Watershed Education Curriculum's Testing out an Aquifer.



How does water under the earth's surface move?

Courtesy: Idaho Department of Environmental Quality: Gary Stevens, 06/09

Grades: 3-6

Context: Aquifer Atlas pages

Overall Goals: Students will learn about the nature of ground water and how it moves

Learning Objectives: Learn about ground water and:

Students will describe how ground water moves into and through different substrates

Students will identify two specific characteristics of ground water movement

Students will describe two different types of ground water movement

Standards or Curriculum met:

Time Required: Setup, activity

Materials: Ground water animation (WMV or SWF format), two beakers, 250 mil or one of cup gravel, 250 mil or one cup of cup sand

For additional details and the entire lesson plan, go to the following web address and click on Lesson #2: How does water under the earth's surface move? (https://www.deq.idaho.gov/media/471623-ground_water_lesson_plan.pdf)

Ground Water: Ground water is water below the earth's surface. The water from rain or melting snow will seep or infiltrate into the surface.

The infiltrated water will move downward. The water moves in empty spaces between the soil particles. If the empty spaces only have a little water in them, then the soil is moist or unsaturated. If all the empty spaces are completely filled with water, then the soil is wet or saturated.

The amount of empty spaces in soil is called porosity. In general, the more porous a soil is, the easier it is for water to move through it. Which has greater porosity—the gravel or granite?

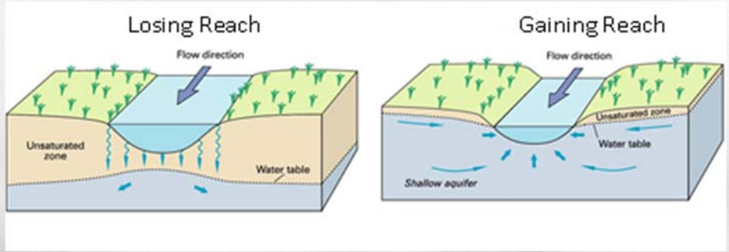
A measure of how easy or hard it is for water to move through soil is called hydraulic conductivity. If water can move through a soil easily the soil has high hydraulic conductivity. If it is difficult for water to move through a soil, the soil has low hydraulic conductivity. Which has greater hydraulic conductivity—gravel or granite?

Water in the unsaturated zone seeps or infiltrates downward. It continues to move downward until it encounters bedrock or silt, something with low permeability. The water then starts to fill up all the empty pore spaces, and the soil or rock becomes saturated. The top of the saturated soil is called the water table.

Once the soil becomes saturated, water starts to move sideways. The water typically moves from high elevation areas such as hills and mountains to low elevation areas such as lakes and oceans. Remember from Lesson #1 how fast water moves? It's usually only a few feet a day.

To spark imaginations, I will prompt students with these questions by writing them on the white board (2 minutes): •Where did the water drop go on its journey? •What did it see? What adventures did the drop have? •How did it feel at different times? •Did the drop meet any plants, animals, or people? If so, how did the water drop help them? •How long did the drop's trip take? •Where does the water drop want to go on its next journey? I will encourage students to use the picture of the water cycle in the aquifer atlases to help them as they begin working on their water drop stories. I will walk around the room to answer questions and remind the students of appropriate grammar (15-20 minutes). Toward the end of the lesson, I will ask if any students want to share their story with the class. As a class, we will briefly discuss the stages of the water cycle in each story. I will then have students turn in their assignment to my turn in box on my desk (5 minutes).	I will ask the prompt questions to evoke thought and give them ideas to help make their stories more complete with details and facts. I will walk around the room to help students with ideas to promote well-rounded descriptive stories.
Closure/reminders I will ask students if and how writing in first person helped them understand the water cycle. I will ask them how the story would look different if we were writing in third person.	
Assessment (how you will know students met the objectives - include rubrics) I will proofreading their stories in their writing journals and check to see if they met the requirements of using 3 parts of the water cycle & vocabulary terms. I will also use red pen to mark any errors in spelling and punctuation. If students meet requirements, I will put a star at the top right corner so students know they are ready to move onto their final drafts.	
Reflection/evaluation (after lesson is taught) The prompts worked really well in opening the class's imagination. I noticed 90% of the class was able to move though the story without having to stop and think of what to write next. Next time: Review descriptive words that we don't commonly use as much. Ex: instead of scared: frightened, alarmed, panicked	

Name: Linley Devlin	
Subject: Language Arts, Writing	Water Cycle Story
The big idea(s) or essential question(s) Across all cultures of the world, water plays an important role.	
State of Idaho and/or common core standards addressed: CCSS: W 5.3:	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	Write about their journey as a water molecule through the water cycle in a three paragraph story.
TSWBAT	Write an informative text examining the water cycle including at least two relatable facts and details.
Materials and/or technology *The Spokane Valley-Rathdrum Aquifer Atlas* p. 11-12. -Writing journals and pencil -White Board, markers -Smart Board -Colored Pencils or Markers, Scrap Paper basket	
Activities/procedures (include anticipated time for each)	
Introduction/activator YouTube video "The Water Cycle": http://www.youtube.com/watch?v=StPobH5ODTw (0:00-01:57).	
Class activities (what you/students will do) I will begin the lesson with "the Water Cycle video" (2 minutes). After viewing the YouTube video, we will discuss as a class the different stages of the water cycle that occurred in the video. I will ask students to raise their hands and share what they saw in the video that relates to the water cycle as I write it on the white board (3 minutes). I will then tell the students that we are going to write about the experiences of one water drop as it travels through the water cycle. I will explain to the students that they will write from the water drop's point of view (1st person). Have students work independently to each write a story about one water drop's journey. I will answer any questions students may have about the assignment (3 minutes). I will give students the option to begin their journeys in different places. I will write the following ideas on the white board: a puddle on a farm, a mountain lake, a stream in a meadow, or a large ocean (2-3 minutes). I will encourage students to use what they just learned, as well as their imaginations, to tell an interesting story that needs to be at least three paragraphs long (minimum of 5 sentences each). I will explain to them the requirements for the assignment and how they need to include at three stages of the water cycle in their story, including: Evaporation, Transpiration, Condensation, and Precipitation. I will write these on the board for the students to see the requirements and be able to refer to them while writing their stories (3-5 minutes).	Class activities (why you will do them) I am going to play this video to give an example of a story using first person perspective. I am discussing the lesson requirements to give students an overview of their responsibility in regard to the assignment and giving them a chance to clear up any confusion they may have. I will suggest different options for their journeys to give them ideas as to where to start their assignment and help streamline the process.



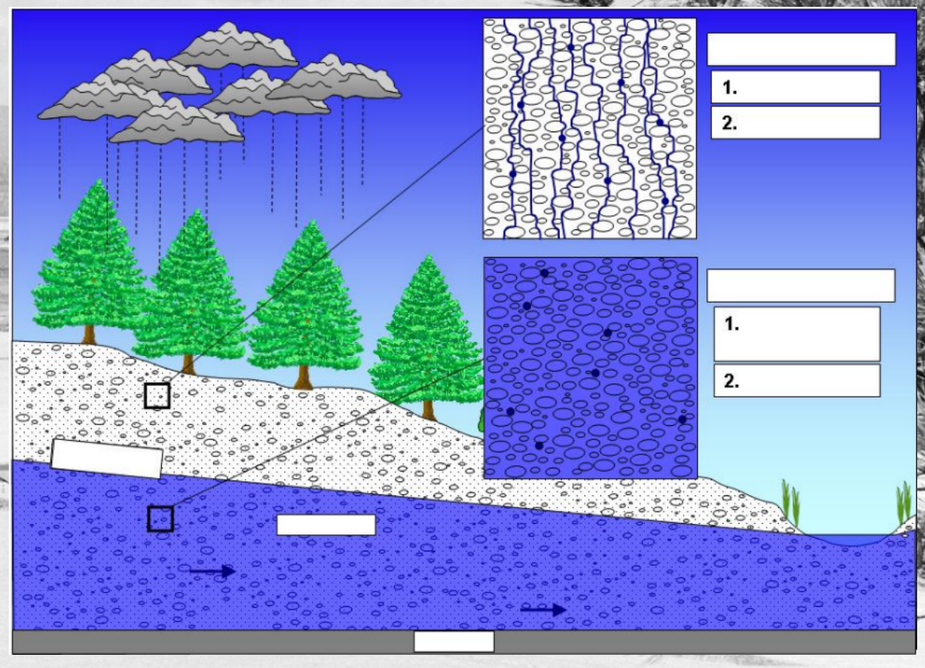
Notice on the right side of the diagram above, the top of the water table is the same as the top of the stream.

The ground water is flowing into the stream. This is called a gaining stream. Sometimes the water table is below a stream, like on the left side above, and the stream loses water by seeping out of the bottom. The water then flows downward to the water table. This is called a losing stream.

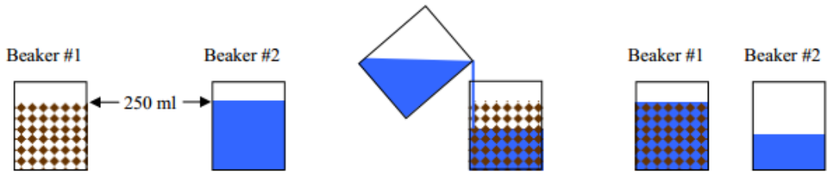
Exercises:

Download the hydrologic animation at www.deq.idaho.gov/Rathdrumprairieaquifer.

Fill in the empty boxes in the illustration of ground water movement, describing the two types of zones.



Fill a beaker with exactly 250 ml of sand Take another beaker and fill it with exactly 250 ml of water. Slowly pour the water from the beaker into the beaker with the sand. How much water can you pour into the sand before the water flows over the top of the sand? Determine at what point the sand is unsaturated and when it's saturated.



Now remove the sand and perform the experiment again but instead of sand use gravel. What's the difference between the two? Which one has greater porosity? Which one has greater hydraulic conductivity?

Note: you can also do the experiment with a mixture of soil and gravel or sand. How does it differ from the experiments above?

Type of soil (potting soil, sand, gravel)	How much soil is in the beaker #1?	How much water is in the beaker #2?	How much water is left over in the beaker #2?

I will continue the video and have students draw a scene on another third of their circle representing condensation representing rain and snow recharging the aquifer (5 minutes). Watch the remainder of the video (1-2 minutes). I will give the students time to finish up their drawings and representation of the water cycle on their papers (5-8 minutes). I will then have students pair up with a partner and share their drawings of the water cycle and how they contribute to the aquifer. I will walk around the room to listen and check for student understanding (5 minutes). After the students are finished discussing and sharing their drawings with their partners, they will turn in their assignments to the turn in box on my desk.	I will give students some time to finish up any drawing they didn't complete as we moved along. They can also add color at this point if they haven't received the chance to. I will have students pair up to compare and contrast the different images, colors and ideas they came up with. I will have students turn in their work so I can assess their understanding
Closure/reminders: I will ask students if they learned anything new about the water cycle or if they made any new connections about the water cycle that they learned in previous grades.	
Assessment (how you will know students met the objectives - include rubrics) I will assess students as we work as a class by calling on different students through cold call to help explain the cycles and drawings that represent it. I will also review students turned in work and make notes on students papers.	
Accommodations/differentiation: For the advanced ALP students who finish the assignment early, I will extend the assignment by having students personalize the water cycle by connecting it to where they live and how nearby water features connect to the nearest ocean.	

Name: Linley Devlin	
Subject: Art & humanities, Science	Water Cycle Diagram
The big idea(s) or essential question(s) Across all cultures, water plays an important role. It is important to conserve our water in order to keep it.	
Core standards addressed: CCSS: 5 RI.9	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	Interpret information presented visually and show an understanding of the water cycle through a completed diagram.
TSWBAT	Draw or paint all 3 main parts of the water cycle and describe each step.
Materials and/or technology: *The Spokane Valley-Rathdrum Aquifer Atlas* p. 11. Water cycle placemats from SAJB (Optional) -Water Cycle Cartoon on You Tube: http://www.youtube.com/watch?v=UDyPkjQxkas -Crayons or colored pencils -Smart Board, White Board, Expo Board -Scrap Paper and pencil.	
Activities/procedures (include anticipated time for each)	
Introduction/activator I will pull up the water cycle PowerPoint I put together and have them watch the YouTube video on the PowerPoint. http://www.youtube.com/watch?v=UDyPkjQxkas	
Class activities (what you/students will do)	Class activities (why you will do them)
I will have the designated classroom paper passer outers help me distribute scrap paper out to the class. As they are doing so, I will ask the students to grab crayons or colored pencils. (2 minutes). I will pull up the water cycle PowerPoint. I will begin the video for the students to watch (5 minutes). As the students watch the video, I will have them write down anything they found important or interesting. I will use the white board and I will ask the students the different forms of precipitation. I will call on students and draw their idea of a form of precipitation on the board. Once we have come up with the different forms together as a class and it is illustrated on the white board, I will have the students draw a scene on one of the thirds of their paper representing precipitation in all forms: rain, snow, hail, sleet (5-8 minutes). I will continue the video and pause the video at EVAPORATION. The students will brainstorm appropriate images to represent evaporation. The students may draw water rising into the air from plants, people, and rivers in the form of water vapor (5 minutes).	I will have the students pass out the papers and grab supplies while I pull up the power point to show the class. I will have students take notes during the presentation so we can discuss those points as a class. I will write down students' answers on the board so we can come back and reference them. Having students translate their ideas into drawing will help gain understanding and represent the ideas visually for those who learn better in that style. I will continue this same procedure for all the steps to help students follow along.

Aquifer in a Cup

The Incredible, Edible Aquifer

Courtesy: Many versions of this activity exist. Some use ice and other lower-calorie/sugar ingredients.

Grades: Any; best fits grades 4-8

Context: Aquifer Atlas pages

Overall goal: to illustrate the geologic formation of an aquifer, how pollution can get into ground water, and how this pollution can end up in drinking water wells.

Learning Objectives:

Students will describe how surface pollution can affect ground water

Students can describe different layers and parts of an aquifer

Students will learn five vocabulary terms specific to aquifers and groundwater and definitions

Standards or Curriculum met:

Time Required: 30 minutes setup; ~30 minutes for activitiy (can be longer or shorter depending on discussion)

Materials: (Class of 25)

Chocolate sprinkles: 2 (3 oz.) containers

Clear plastic cups: 25–30 (12 or 16 oz.) cups

Clear soda (e.g., lemon-lime): 4 liters

Crushed ice (the smaller the better): ≈1 bag

Mini marshmallows: 1 (16 oz.) bag

Chocolate chips: 4 (12 oz.) bags

Puffed cocoa cereal: ≈1/4 cup per student

Red Kool-Aid® (sweetened and dry): 4 small pkgs.

Spoons: 25–30

Straws (preferably clear): 25–30

Vanilla ice cream: 25–30 single serving cups

For additional details, go to Idaho Department of Environmental Quality's Education Resources for Teachers page (http://www.deq.idaho.gov/assistance-resources/educational-tools/teacher-resources.aspx) for additional details and other activities.

Focus: Students will build their own edible aquifers and learn about different geologic layers, different types of aquifers, how aquifers become contaminated, and the need to protect and conserve ground water resources.

Background:

Ground water supplies 95% of the drinking water in Idaho. Wells are drilled through soil and rock into ground water aquifers to supply drinking water. Unfortunately, ground water can become contaminated by improper use or disposal of chemicals such as fertilizers and household cleaners. These chemicals can percolate down through the soil and rock into an aquifer and eventually into drinking water wells. This contamination can pose a significant threat to human health.

Vocabulary:

Aquifer: A natural underground area where large quantities of ground water fill the spaces between rocks and sediment.

Confined Aquifer: An aquifer overlain by one or more layers of impermeable rock or soil (aquitard/confining layer) that restrict water to within the aquifer.

Confining Layer: An underground layer over an aquifer that is impermeable or significantly less permeable than the aquifer below it. It helps protect the aquifer from contamination and is usually made of rock and/or clay. Also called an "aquitard."

Conserving Water: Not wasting water.

Porous: Full of pores (small spaces). Water can easily pass through it.

Protecting Water: Keeping water clean.

Saturated Zone: An underground layer or area where water fills most of the pores (spaces) in the soil and rock.

Unconfined Aquifer: An aquifer that is not overlain by a layer of impermeable rock or soil.

Unsaturated Zone: An underground layer or area where air fills most of the pores (spaces) in the soil and rock.

Water Table: The top of an unconfined aquifer.

Procedure:

Step 1: Fill a clear plastic cup 1/3 full (total) with a layer of crushed ice followed by a layer of each like the picture shows of mini marshmallows and chocolate chips.

These represent gravels and sands that make up the aquifer. Notice the different sizes and shapes and

Name: Ashley Bear	
Subject: Writing	Bodies of Water in North Idaho
The big idea(s) or essential question(s): Identifying the types of water bodies within north Idaho and creating a map.	
Core standards addressed: CCSS: W.5.7	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	Identify the different bodies of water within N Idaho
TSWBAT	Construct a map of local bodies of water, incorporating all the essential elements a map should have.
Materials and/or technology *The Spokane Valley-Rathdrum Aquifer Atlas* pgs. 5, 6, 9, 10, 24. Construction paper, markers, computers, classroom maps.	
Activities/procedures (include anticipated time for each)	
Introduction/activator Ask the class to state local lakes or rivers they went to over the summer. Write the list on the white board. Then ask the class to imagine what it would be like to live in an area that didn't have a place to swim during the summer. (5 minutes)	
Class activities (what you/students will do) I will have the class use the classroom resources, including computers and maps of N Idaho, to research local bodies of water within our area. Find four facts about each body of water. (15 minutes) Students will create a replica of the maps they found that include all the essential elements of a map: north arrow, scale, legend, and the bodies of water they researched. (20 minutes)	Class activities (why you will do them) Discovering local bodies of water through research allows students to become familiar with the water resources within our area. Creating a replica map shows understanding of where the local bodies of water are located.
Closure/reminders The students will share a local body of water within our area that they have never been to. How many lakes are there in N. Idaho? (5 minutes)	
Assessment (how you will know students met the objectives - include rubrics) Students demonstrate understanding of the local bodies of water within our area, and where they are located, by creating their own map.	
Reflection/evaluation (after lesson is taught) Did the students make effective use of the resources in the classroom to find the necessary level of research to create their own maps? Did the maps clearly demonstrate an understanding of the different bodies of water within our area, and facts about each?	

Name: Ashley Bear	
Subject: Writing	Water Conservation at Home
The big idea(s) or essential question(s): Water is important and should not be wasted or used carelessly.	
Core standards addressed: CCSS: W.5.7	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	Explain ways to conserve water at home.
Materials and/or technology *The Spokane Valley-Rathdrum Aquifer Atlas* pg. 16. Pencil, paper, computers.	
Activities/procedures (include anticipated time for each)	
Introduction/activator Give a statistic on how much water each person uses on average at home. (2 minutes)	
Class activities (what you/students will do) Have the students partner up into pairs and conduct research using the internet on ways people use water in the home. Note that households in different places might use more or less water. Have the students consider why this might be and write these ideas down on their paper. Have the students find other discrepancies in water use. (10 minutes) Have the students go online and research ways that people can conserve water at home. (10 minutes) SAJB's online Water Conservation Trailhead for Elementary Students (http://www.spokaneaquifer.org/education-awareness/elementary-water-conservation/) is a good place to start. Have the students present what they found about water use and water conservation in the home, one pair at a time. Write these in a list on the whiteboard, and have students add ideas that they had not found to their lists. (5 minutes)	Class activities (why you will do them) This allows students to showcase their researching skills. Finding discrepancies make them think about how living in a desert, or in a forested area might require using more or less water. This allows students to collaborate with each other on research and presenting on the research.
Closure/reminders Have each group share their ways to conserve water with the class. (5 minutes)	
Assessment (how you will know students met the objectives - include rubrics) Students demonstrate their researching skills and build knowledge on importance of water by collaborating with their partner on ways to conserve water at home.	
Reflection/evaluation (after lesson is taught) Did the students make use of their time to research on the internet? Did it work to have students work with a partner?	

how the pieces have spaces or "voids" between them.

Step 2: Add enough soda to almost reach the top of the layer.

The soda represents ground water. Notice that the soda fills all of the spaces among the marshmallows, chocolate chips, and ice. The aquifer is now saturated with soda; it is a "saturated zone." In an unconfined aquifer (see Step 3), the top of the saturated zone is called the "water table."

Step 3: Add a layer of ice cream. (Optional.) (For a tight seal, gently spread out the ice cream to the inside edges of the cup and slightly up the sides using the back of a spoon.)

This layer, called a "confining layer" or an "aquitard," is impermeable or significantly less permeable than the aquifer below it (it is difficult for water to soak through). It helps protect the aquifer from contamination and is usually made of rock and/or clay. An aquifer under a confining layer is called a "confined aquifer." An aquifer without a confining layer or above a confining layer is called an "unconfined aquifer."

Some aquifers, such as the Spokane Valley-Rathdrum Prairie Aquifer in north Idaho, do not have a confining layer. *Since this aquifer does not have a confining layer, consider omitting the ice cream or having half the class use ice cream and half not to compare the results.*

Step 4: Add puffed cocoa cereal (or use more crushed ice) on top of the confining layer/water table.

This represents the unsaturated zone, the area where air fills most of the pores (spaces) in the soil and rock.

Step 5: Scatter chocolate sprinkles over the top.

The sprinkles represent the soil, which is very porous.

The aquifer is now complete. Your aquifers will probably be messy and not look like the picture on the front page. That's OK! Real aquifers aren't neatly layered either. Next you will explore how contaminants and wells interact with your aquifer.

Step 6: Sprinkle Kool-Aid® over the top of the soil.

The Kool-Aid® represents contaminants on the ground (e.g., fertilizer). Does anything happen to the Kool- Aid® right away? (Usually nothing will happen.)

Step 7: Using a drinking straw, "drill" a "well" into the center of the aquifer.

Observe the aquifer and Kool-Aid®. What, if anything, happens when the well is drilled?

Step 8: Begin to "pump" the well by slowly sucking on the straw.

Watch the decline in the level of soda and observe what happens to the contaminants. Do contaminants (Kool-Aid®) leak through the confining area (ice cream) and get sucked into the well? If so, do more contaminants get into wells in confined or unconfined aquifers? (Applicable if your class made both; see Step 3.)

Step 9: Pour a small amount of soda over the top.

The soda represents precipitation. It recharges the aquifer (adds new water). Watch how the Kool-Aid® dissolves and moves into the aquifer. The same thing happens when contaminants are spilled on the ground. Do you think you could get the Kool-Aid® back out of the soda?

Review what you have learned and eat your aquifer! Use these questions to start the discussion.

Questions for Discussion:

What observations/results surprised you? What did not?

How did results compare among different aquifers? (Even if all students used the same option in Step 3, each aquifer will be somewhat different.)

What parts of the activity were most/least like what would happen with a real aquifer? Why?

What happens if all of the water is pumped out of an aquifer? Where does more ground water come from? How long do you think it would take? Is there always more ground water, or could we run out?

Do you think a contaminated aquifer can be cleaned? If so, how?

How can we conserve (save) ground water? What specifically can kids do?

How can we protect ground water (keep it clean)? What specifically can kids do?

Assessment/Follow-Up:

Before the Activity:

Ask students to define "ground water" and "aquifer." Record their key words on a white board to compile relatively accurate definitions. Leave the definitions on the board.

After the Activity:

Complete "Questions for Discussion," above.

Refer back to the definitions students wrote before the activity. Ask if they would like to modify them.

Have students list as many potential ground water contaminants as they can.

Include vocabulary in spelling lists.

Test on definitions of vocabulary.

Have students research ground water and aquifers in your area and compile an oral or written report.

Name: Ashley Bear	
Subject: Writing	Water and Human Health
The big idea(s) or essential question(s): Written explanation of why water is one of the important elements of life.	
Core standards addressed: CCSS: W.5.7	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	Explain the role of water and its importance to human health.
Materials and/or technology *The Spokane Valley-Rathdrum Aquifer Atlas* p. 16 Poster board and sharpies Computer and projector	
Activities/procedures (include anticipated time for each)	
Introduction/activator Have a glass full of water and state that this clear liquid is one of the most important compounds within the world. Ask the class if they like water. (5 minutes)	
Class activities (what you/students will do) Separate the class into groups of 3 and have them research the importance of water for the human body, and develop a list of facts about water. (30 minutes) SAJB educational web pages (and especially, Fun Facts: http://www.spokaneaquifer.org/education-awareness/fun-facts/) is a good place to start. Have the students create a poster board, listing the information they discovered through their research. (15 minutes)	Class activities (why you will do them) Having the students separate into groups requires them to work as a team to research the importance of water. Having the students create a group poster board displays their understanding of what they found through research.
Closure/reminders Have the students hang their poster boards at the front of the class and compare the information each group found. (15 minutes)	
Assessment (how you will know students met the objectives - include rubrics) Students demonstrate a clear understanding of the importance of water by the information displayed on their poster board.	
Reflection/evaluation (after lesson is taught) Did separating the students into groups benefit their understanding? Do the poster boards represent a clear understanding of their research? What worked and what did not?	

Name: Linley Devlin	
Subject: Language	Spelling Vocabulary Terms
The big idea(s) or essential question(s) Throughout the world, water plays an important role.	
Core standards addressed: CCSS: 5.L 2.e	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	Correctly spell 15 out of 20 vocabulary terms from the Aquifer Glossary
Materials and/or technology *The Spokane Valley-Rathdrum Aquifer Atlas* pgs. 26 and 27 Teacher: White board, Markers, Spelling list Students: plain sheet of paper, pencil, highlighter	
Activities/procedures (include anticipated time for each)	
Introduction/activator I will introduce the lesson by displaying the terms on page 26 & 27 and reminding students that they will only be tested on 20 of these terms, not all 60. (1 minute)	
Class activities (what you/students will do) Students will be asked to get out paper and pencil from their desks (1-2 minutes) Students will fold paper "hotdog" and rip in half, creating two sheets (2 minutes) I will write glossary terms on the white board for students to copy on to one of their sheets (5 minutes) I will explain to students that they will pick a partner, move to a private spot and each person will pre-test their partner on spelling. Any words spelt wrong will be highlighted by the tester and studied over the week for a summative evaluation On Friday with same partner. Students will pick a partner and move to a spot where they can assess each other (3 minutes) Students will test each other and grade their paper by high lighting any words spelt incorrectly. (10-12 minutes) I will instruct students to put their spelling lists in their homework folder. (2 minutes)	Class activities (why you will do them) I will have students get out their supplies so they are ready for instruction I will walk students step by step through what I want them to do so there are minimal question and mistakes. I will write the glossary terms students will be tested on on the board so they can see the word written. I will have students test each other so they are looking at the word and processing it spelling structure. I will have students correct their papers so they can fix their own mistakes and are aware of what they need to work on. I will have students store their spelling list in the homework folder so they can go home and practice for the test.
Closure/reminders: Reminder- everyone will have a summative evaluation on Friday for any words you missed on the pre-test. Please study every night before bed.	
Assessment (how you will know students met the objectives - include rubrics) With the same partners, students will administer a spelling on Friday. Any students who do not have their original pre-test will be tested on all 20 words. Students must accurately spell 15 out of 20 vocab terms.	

Thurston's Groundwater Movement Activity

A window into the earth so you can see what's beneath your feet

Courtesy: U.S. EPA Office of Water (http://www.epa.gov/ogwdw/kids/pdfs/activity_grades_k-3_groundwatermovement.pdf), and adapted from the National Project WET Program. Project WET provides teachers and resource professionals with accredited workshops designed to provide non-advocacy, hands-on, interdisciplinary water education materials and instruction. This program trains teachers in use and application of the "Project WET Curriculum and Activity Guide", ground water flow models, Enviroscapes and water history trunks. Contact information for Idaho and Washington's Project WET Programs are located in Section 1. In addition, the Environmental Protection Agency provides many educational resources for kids, families, and educators, here: http://water.epa.gov/learn/.

Thurston's Groundwater Movement Activity (http://www.epa.gov/ogwdw/kids/pdfs/activity_grades_k-3_groundwatermovement.pdf)

Grades: K-3 (Project WET's activity is suitable for middle school and high school)

Context: Aquifer Atlas pages

Overall Goals: Ground water must be able to move through underground materials at rates fast enough to supply useful amounts of water to wells or sprints in order for those materials to be classified as an aquifer. For water to move in an aquifer, some of the pores and fractures must be connected to each other. Water moves through different materials at different rates, faster through gravel, slower through sand, and even slower through clay. Gravels and sands are possible aquifers; clays usually are not aquifers. The following activity demonstrates how different sizes of rock materials that make up an aquifer affect water movement.

Learning Objectives: After this activity, students will:

Identify several sources of rock materials that make up an aquifer

Discuss how water moves through gravel, sand, and clay

Standards or Curriculum:

Time Required: Preparation time: 30 minutes; Activity time: 20-30 minutes

Materials: at least 10 students, and a large area to conduct the activity. For the "Extended" portion, 250 mL each (a cup or so) of pea gravel, sand, and clay (ground up plain kitty litter), three funnels, cheesecloth, three quart-sized containers or bowls.

Teacher Preparation:

This activity can be conducted in the classroom, gymnasium, or outside the school building. If conducted in the classroom, move all furniture to allow for sufficient room for the movement of students. This is a three-part demonstration that may create some excitement.

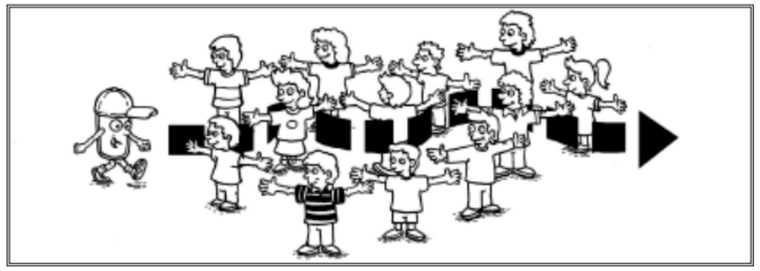
Procedures:

Select two or three students to be molecules of water. The remaining students will be rock materials. Have the students think about and draw or describe what it is like underground, in the aquifer.

Select two or three students to be molecules of water (or, for younger students, “drops” of water). The remaining students will be rock materials.

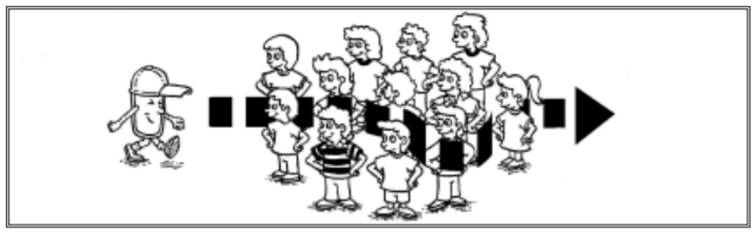
Activity 1: Water movement through gravel

The students will represent gravel by holding arms outstretched, leaving a 15– to 30– centimeter (cm) space between their outstretched arms. Locate these students in the center of the activity area. The students representing water molecules are to start on one side of their “gravel” classmates and move through them, exiting on the other side. The water molecules will move easily through the gravel.



Activity 2: Water movement through sand

The students represent sand by extending arms, bending them at the elbows, and touching their waists with their fingers. Locate these students in the center of the activity area, spacing them approximately 15 cm apart. Once again, have the water molecules slowly make their way through their “sand” classmates. The water molecules will experience some difficulty, but should still reach the other side.



Activity 3: Water movement through clay

Students become clay particles by placing their arms straight down the sides of their bodies and standing approximately 10 cm apart. Locate these students in the center of the activity area. It will be a formidable task for water molecules to move through the clay. The water molecules may not be able to move through the clay at all.

Fifth Grade

Name: Linley Devlin	
Subject: Language	Aquifer Vocabulary
The big idea(s) or essential question(s) Across all cultures, water plays an important role.	
Core standards addressed: CCSS: 5.L 4	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	Identify 7 out of10 glossary words to their correct definition in the aquifer atlas.
Materials and/or technology *The Spokane Valley-Rathdrum Aquifer Atlas* p. 26-27. Aquifer cross word (not supplied: use crossword generator with glossary words. Pencil.	
Activities/procedures (include anticipated time for each)	
Introduction/activator There will be a quick introduction to the lesson by reminding students about the spelling test that will happen on Friday. In order to get better acquainted with those words, I would like students to attempt to spell the glossary words without looking at the spelling on page 26 first.	
Class activities (what you/students will do) With students sitting at their desk, I will pass out the atlas and cross word (2 minutes) As a class, we will discuss the 20 glossary words by having students read the definition (pull name sticks): Aquifer, Basalt, Cobbles, Discharge, Evaporation, Glacier, Groundwater, Hydrologic cycle, monitoring site, permeability, precipitation, recharge, transpiration, water cycle, water pollution, Well, Runoff, Sediment, wastewater. (20 minutes) I will answer any specific questions regarding glossary terms from students with their hands raised (3 minutes) The students will work individually on their crosswords and may correspond with their desk partner if needed (15 minutes) Students will turn in finished crosswords in the “IN” bin before leaving for lunch—unfinished crosswords will be completed during afternoon break.	Class activities (why you will do them) I will pass out the atlas for students to reference during the assignment I will discuss the glossary words so students are mentally and verbally processing the terms. I will answer any questions to ensure students understand the assignment and what is required of them. I will have students work individually on the crosswords first before corresponding with their desk partners to see how much students are able to do on their own without assistance.
Closure/reminders Please turn in your completed cross word to the “IN” basket before going to lunch or break.	
Assessment (how you will know students met the objectives - include rubrics) Students will be assessed on their completed crosswords that will be handed in. There is one point for every word placed correctly on the crossword.	
Reflection/evaluation (after lesson is taught): Reviewing the glossary terms before students worked on their individual cross words helped students work through the crosswords quicker. 90% of the class was finished within the time allotted.	

Name: Jennifer A Jensen	
Subject: Science	Water Purification by Filtration

The big idea(s) or essential question(s)
Show How Water is Purified

Core standards addressed:
CCSS: W.4.7; W.4.8

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Create a small water purification system and demonstrate how it works.
TSWBAT	

Materials and/or technology
For each student: 1 coffee can pre-punched with five to ten small holes, sand, muddy water, clean clear container upon which the coffee can is able to sit.

Activities/procedures (include anticipated time for each)

Introduction/activator
Before water can be drunk from many sources it needs to be filtered to remove contaminants. You can make a very easy filter to do this.

Class activities (what you/students will do)

Instruct the students to take out a paper and pencil. Tell them they will be doing a science experiment and all scientists take notes of their observations. Remind them to write down every step the do in this experiment as well as to write down anything they observe of interest.

Have the students place about three inches of sand into their coffee cans. (Remind them to make notes)

Instruct them to set their coffee cans on top of their clean containers.
Have the students slowly pour muddy water over the sand.

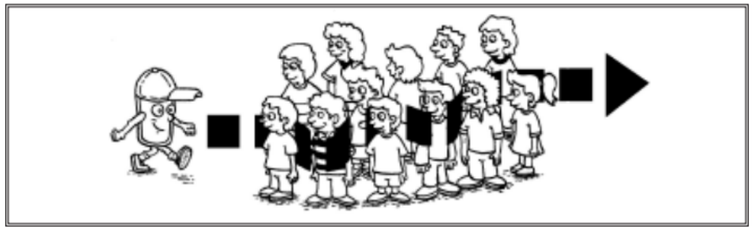
As the water filters through, instruct them to watch the water flowing into the clear container underneath the coffee can. What do they notice about this water? Is it cleaner than the muddy water they poured in? Remind the students to make notes of what they are observing.

If a student's water does not come out cleaner than they started, remind them that in science experiments, sometimes things go wrong. They should make note of what went wrong and try the experiment again.
Class activities (why you will do them)

Closure/reminders
Even simple systems can help make our water cleaner!

Assessment (how you will know students met the objectives - include rubrics)
Students should have followed instructions to correctly create their filter. The water should come out cleaner than it went in. Their notes should show every step they took in the experiment as well as their thoughts and observations of the process.

Accommodations/differentiation
Students can watch the teacher perform the experiment and answer questions about the why they think each step is performed.



Interpretive Questions:

1. Which one of the materials, gravel, sand, or clay, was the easiest for the water molecules to move through? (Answer, Gravel, then sand, then clay.) Why? (Answer: Because there are larger spaces between the gravel particles.)
2. If there were three rock units, one of gravel, one of sand, and one of clay, all containing the same quantity of water, in which would you drill a well? (Answer: Gravel; water moves easier ghrough gravel than sand or clay.)

Extension:

Obtain 250 milliliters (mL) of sand, 250 mL of pea-size gravel, 250 mL of clay (ground-up kitty litter will work), and three large funnels (top diameter approximately 12 cm). Force a piece of cheesecloth onto the top of the spout of each funnel. This will prevent material from going through the funnel spout. Put each funnel into separate clear containers so that the spout of the funnel is at least 5 cm above the bottom of the container. Pour the sand into the first funnel, pea-size gravel into the second funnel, and the clay into the third funnel. Pour equal amounts of water (approximately 200 ml, or one cup) onto the materials contained in the funnels. Select three students to pour water, creating a permeability race. Time how long it takes the water to flow through the materials. Record on a data sheet. Which material did the water flow through the fastest? Why?

University of Idaho Coeur d'Alene College of Education Student-Written Lesson Plan

Table of Contents

Name: Jennifer A Jensen	
Subject: Science	Evaporation and Water Purification

The big idea(s) or essential question(s)
What is Water Purification?

Core standards addressed:
CCSS: RI.4.3; RI.4.7

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Understand the mechanics of how a distillation/evaporative water purification system actually purifies the water.
TSWBAT	Model the processes of evaporation, condensation, and precipitation within the water cycle.

Materials and/or technology
1 large clear bowl, plastic wrap, 1 glass, salt, food coloring, drinking water and a pebble (and a sunny day)

Activities/procedures (include anticipated time for each)

Introduction/activator
Natural flowing water in lakes and streams often contain impurities. Before we can drink the water it is important that we clean it. We call this cleaning purification.

Class activities (what you/students will do)

This is an excellent lesson to start first thing in the morning and return to at the end of the school day.

One of the ways to purify water is to create a solar still.

Place the glass into the bowl. The glass needs to be heavy enough that it doesn't float.
Mix salt and food coloring into the water.
Pour this mixture into the bowl, being sure not to get any in the glass.
Cover the bowl with plastic wrap.
Place the pebble on top of the saran wrap directly over the glass. The plastic wrap should bow inward a little.
Place the bowl in the sunshine.

Explain to the class that the heat from the sun will be trapped under the plastic wrap. This heat will be absorbed by the dirty water. The temperature in the bowl will rise causing the water in the solution to evaporate.

This vapor will rise toward the plastic wrap and cling to it. Because the pebble is creating a slant, the water now clean water will run down the plastic and into the glass

Once this process is finished, the water should be drinkable.
Class activities (why you will do them)

Closure/reminders
Remind the students how important it is to have clean drinking water

Assessment (how you will know students met the objectives - include rubrics)
The students should be able to explain back the basics of the experiment, demonstrating they understand how the heat was able to pull the water away from the contaminants and place it in the glass.

Name: Jennifer A Jensen	
Subject: Science, Art	Water Cycle Diorama

The big idea(s) or essential question(s)
What Would a Three Dimensional Display of a Water Cycle Look Like?

Core standards addressed:
CCSS: SL.4.2

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	As a group create a large diorama displaying a three dimensional version of an aquifer

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas p. 11
Cardboard box, glue, tape, scissors, construction paper, fabric, beads, paint, cotton balls, popsicle sticks

Activities/procedures (include anticipated time for each)

Introduction/activator
Just like there are cycles in life where we from baby to old age, water has a cycle. The water cycle is continuous.

Class activities (what you/students will do)	Class activities (why you will do them)
Explain to the class that water can exist in three states in the water cycle - solid, liquid, and gas. Solid water is in ice. Liquid water is found more easily in bodies of water, precipitation, groundwater, and living organisms. Gaseous water is found in the atmosphere. Looking at the map in the picture on the placemat or in the book, identify places water is stored. (Bodies of water, atmosphere, precipitation, glaciers, groundwater and living beings. Set up a medium sized cardboard box. Have students take turns bringing up craft supplies to help build a three dimensional version of a water cycle. Make sure they depict bodies of water, evaporation, clouds, precipitation, aquifers and so on, including as much detail as possible showing how water cycles through its three stages.	This is meant to be a class activity encouraging students to work together to create a piece of art. Another option is to have the students create their own smaller three dimensional depictions of aquifers using shoe boxes.

Closure/reminders
Remind students that while the water we drink or bathe in is liquid, water can be in other states. The cycle of water is to be absorbed into the clouds, rain or snow back onto Earth, seep into the ground or freeze. The freeze can melt and then be evaporated back up again in an endless cycle.

Assessment (how you will know students met the objectives - include rubrics)
There should be at least one representation of each of the three stages of the water cycle if students create their own dioramas. If the students work together on one diorama, there should be multiple representations. All students should be encouraged to contribute to the group version of the diorama.

Name: Deborah York	
Subject: Science	A is for Aquifer

The big idea(s) or essential question(s): The student will understand where water is stored throughout the world.

Core standards addressed:
CCSS: RL.1; W.2

Objectives (what the students will be able to do as a result of the lesson): The student will understand the Aquifer is an underground layer of earth that yields water.

TSWBAT	The student will understand water is underneath our feet at some level.
TSWBAT	Water is stored underground in some places throughout the earth.

Materials and/or technology:
Diagram from *The Spokane Valley-Rathdrum Prairie Aquifer Atlas* , p. 11.
Work sheet about the letter "A" (not supplied), crayon, marker, and coloring pencil.

Activities/procedures (include anticipated time for each)

Introduction/activator
The Aquifer is water stored underground, and there are Aquifers in other places throughout the Earth. It is under our feet as we speak.

Class activities (what you/students will do)	Class activities (why you will do them)
The students will listen to the reading of the Aquifer on page two of the *Atlas*. Next, the students will be asked questions. Why is the Aquifer important? Could there be water underneath our feet? Does anyone have a question? Students will have a work sheet about the letter "A." It will have the letters A, and a, to be circled. They will be mixed in with other letters. The work sheet will also have pictures that start with the letter A. One example is Alligator, and this will be circled. There will be other pictures that do not start with the letter A. An example is Tree. The students will color the work sheet.	The Aquifer on page two will be read to the students. The students will be asked questions. They will be given a work sheet to complete.

Closure/reminders
We will discuss the topic of the day.

Assessment (how you will know students met the objectives - include rubrics)

The presentation will be followed by a discussion and this will show their understanding of the subject, along with a work sheet.

Reflection/evaluation (after lesson is taught)
The student will be sent home with a note of the day's events, which will need to be signed by the parent or guardian.

Name: Deborah York	
Subject: Science	Topic: Polluted Water: Aquifer in a Cup 1

The big idea(s) or essential question(s): It is important to keep water clean.

Core standards addressed:
CCSS: SL5; CCSS: SL3

Objectives (what the students will be able to do as a result of the lesson): The students will understand how careless use and disposal of harmful contaminants above the ground can potentially end up in the drinking water below the ground.

TSWBAT	The students will understand how ground water can become contaminated.
TSWBAT	The students will understand how this contamination ends up in drinking water.

Materials and/or technology
Pictures of contaminated water, *The Spokane Valley-Rathdrum Prairie Aquifer Atlas.*

Activities/procedures (include anticipated time for each)

Introduction/activator
Thirstin Builds an Aquifer in a Cup (Aquifer on the Go), http://www.epa.gov/ogwdw/kids/pdfs/activity_grades_k-3_aquiferinacup.pdf, will be divided into two lessons; it is too large for one single kindergarten lesson. First a lecture will be presented to the class on pollution to drinking water supplies such as: septic systems, farm chemicals, trash, and used motor oil.

Class activities (what you/students will do)	Class activities (why you will do them)
We will discuss contaminants in the water, and also how clean our own water supply is. According to the *Aquifer Atlas*: "The sole source of water for most people in Spokane County, WA, and Kootenai County, ID. It is a large underground rocky formation containing high -quality water called the Spokane Valley-Rathdrum Prairie Aquifer. It is also commonly known as the "Rathdrum-Spokane Aquifer."	A presentation will be delivered to the students on water. There will be questions and answers following the discussion.

Closure/reminders
It is our responsibility to ensure ground water is kept clean.

Assessment (how you will know students met the objectives - include rubrics)

An assessment will be made of the students' understanding from the homework assigned to the student.

Reflection/evaluation (after lesson is taught)

Homework: a discussion with the students on ways in which their own community's water supply could become contaminated. Students will be instructed to discuss this subject with their parents or guardians, and bring these ideas to class the next day.

Then, I will explain that students will be writing a story about a situation where the aquifer or water quality is in danger and how their superhero solved the problem. The requirement for the story must be a minimum of three paragraphs long. (2 minutes) The students will open up their writing journals and begin writing their story. As they finish up with their stories, they may grab a piece of construction paper from the back table and illustrate a drawing of their story. (20 to 25 minutes) I will have the students turn their writing journals in so I can check for completion of the assignment. (1-2 minutes)	I will give my students the objectives for the assignment so they know what needs to be met. I will have them complete the assignment and move on to illustrations to extend learning. I will check for completed assignments by having them turn them in.

Closure/reminders
I will close the lesson by asking if a few students would like to come up to the front of the class and share their stories and illustration if completed. If not, I will remind students that they can finish up later, or at home.

Assessment (how you will know students met the objectives - include rubrics)
I will check writing journals for story completeness (three paragraphs), sentence structure, grammar, punctuation, and spelling.

Name: Victoria Cozad	
Subject: Language Arts	Water Superhero Story

The big idea(s) or essential question(s): Write narrative to develop a sequence of events or situation involving protecting the aquifer.

Core standards addressed:
CCSS: W.4.3.a

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Students will develop imagined experiences using descriptive details including their superhero and their "powers."
TSWBAT	Students will establish a situation and introduce their character in a situation relating to water.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas pg. 3, 4, 24, 26 and 27.
SAJB Educational Coloring and Comic Books featuring Aqua Duck and the Aquifer Protection Team. These can be downloaded and printed.
http://www.spokaneaquifer.org/education-awareness/coloring-comic-books/
Writing journal and pencil, construction paper and markers
White board and markers
Smart Board and computer

Activities/procedures (include anticipated time for each)

Introduction/activator
I will display the Aquifer Defense Force Team from the comic books online, on the smart board or projected onto the screen. I will describe why Mallory is my favorite character from the Defense Force Team; because she helps protect our aquifer by keeping it clean. I will then ask my students what their favorite character is and why.

Class activities (what you/students will do)	Class activities (why you will do them)
I will begin with the introduction/activator. (3-5 minutes) Extending on our theme of water and the aquifer, I will ask the students to create a superhero of their own that contributes to helping protect our aquifer and keeping it clean. I will also explain that each superhero has to have super powers that relates to saving the aquifer or improving water quality. (1-2 minutes) I will go to the white board and write the following superhero questions that need to be answered in the story. Students need to draw and describe (1-2 minutes): • What powers does your superhero have? • What does his or her costume look like? • Who are your superhero's archenemies?	I will spark their attention by asking them who their favorite character is and why. I will spark their attention again with the idea of creating their own superhero and how it contributes to the aquifer. I will ask these questions to help students think about their superhero's characteristics and to help them develop a more well-rounded character.

Name: Deborah York	
Subject: Science	Polluted Water: Aquifer in a Cup 2

The big idea(s) or essential question(s): It is important for people to keep water clean.

Core standards addressed:
CCSS: SL5; CCSS: SL3

Objectives (what the students will be able to do as a result of the lesson): The students will understand potential sources of pollution to the drinking water supplies. Students will understand what an aquifer is like underground.

TSWBAT	The students will understand how ground water can become contaminated.
TSWBAT	The students will understand that an aquifer is made up of earth and sand with tiny gaps where the water can be.

Materials and/or technology
Clear plastic cup, modeling clay, gravel, sand, and food coloring. Aquifer Atlas page 9. See Thirstin Builds an Aquifer on page (XX) within this guide.

Activities/procedures (include anticipated time for each)

Introduction/activator
A class discussion on pollution will tie to the previous lesson and homework about pollution to drinking water supplies such as septic systems, farm chemicals, trash, and used motor oil. A demonstration on contaminating ground water, "Thirstin Builds an Aquifer in a Cup (Aruifer on the Go), adapted from EPA's Ground Water and Drinking Water webpage."

Class activities (what you/students will do)	Class activities (why you will do them)
1. Students will pour ¼" of sand in the bottom of each cup. 2. Students will pour only enough water into the sand to wet it completely with no standing water. 3. Students will observe that the water is absorbed in the sand by remaining around the sand particles. This is as it is stored underground as an aquifer. 4. Students will flatten the clay like a pancake and cover half of the sand with the clay. Students will press the clay to one side of the container to seal off that side. 5. There will be a discussion with students on how this clay represents a "confining layer" that keeps water from passing through it. 6. Students will pour a small amount of water onto the clay. The students will see how the water remains on top of the clay, only flowing into the sand below in areas not covered by the clay. 7. Students will place the rocks over the sand and clay, covering the entire container. To one side of the cup, the students slope the rocks, forming a hill and a valley. 8. Students will pour water into the aquifer until the water in the valley is even with the bottom of their hill. Students will see the water stored around the rocks. 9. Students will notice a "surface" supply of water that may be referred to as a lake. 10. Students will put a few drops of food coloring on top of the rock hill as close to the inside wall of the cup as possible. 11. Students will examine how the color moves down the side of the cup, through the rocks, as well as into the surface water and the white sand at the bottom of their cup.	The students will be guided through steps to make an Aquifer in a Cup. After step 7: Explain to students that these layers represent some of the many layers contained in the earth's surface. After step 8: Explain that these rocks have small spaces around them, allowing storage of water in the openings between them. After step 10: Ask students what might contribute to a contaminated water source (farm chemicals, trash, used motor oil, spills at a gas station, etc.).

Closure/reminders It is our responsibility to ensure our ground water is kept clean.
Assessment (how you will know students met the objectives - include rubrics) An assessment will be made of the students' understanding from the homework assigned to the student.
Reflection/evaluation (after lesson is taught) A discussion with the students on ways in which their own community's water supply could become contaminated. Instruct students to copy these ideas in their journal to discuss in class the next day.

Name: Victoria Cozad	
Subject: Language Arts/Writing	Aquifer Story
The big idea(s) or essential question(s): Write narratives to develop real or imagined experience related to the aquifer, or water.	
Core standards addressed: CCSS: 4.W.3; 4.W.3.a	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	Use effective technique in a descriptive and sequential story about the aquifer.
TSWBAT	Introduce at least two characters and organize an event sequence using at least five vocabulary words.
Materials and/or technology *The Spokane Valley-Rathdrum Aquifer Atlas* pg. 3, 4, 24, 26 and 27. SAJB Educational Coloring and Comic Books featuring Aqua Duck and the Aquifer Protection Team. http://www.spokaneaquifer.org/education-awareness/coloring-comic-books/ These can be downloaded and printed. Paper and pencil, white board and markers	
Activities/procedures (include anticipated time for each)	
Introduction/activator I will use the smart board to display a written story (one of the comic books in .pdf format) that includes the Aquifer Defense Force Team and vocabulary words from the *Aquifer Atlas*. I will display pictures of the force team from the aquifer before I read the story to the class.	
Class activities (what you/students will do): I will explain to the students that they will be creating a narrative story of their own using characters from the Aquifer Defense Team that includes aquifer vocabulary words. (1-2 minutes) I will have my paper passer-outers help me provide *Aquifer Atlases* to the class. I will ask the students to turn to the glossary on page 26 and 27 and have them review and read about them. I will also have them read about the members of the Aquifer Defense Force Team. (5 minutes) After the students review the defense team and vocabulary words, I will review the vocabulary words I expect them to use by writing them on the white board and reviewing their definitions and relevance to the aquifer (5 minutes):	Class activities (why you will do them) I will introduce the assignment to familiarize them with it. I will give them the tools needed to help them with the assignment. I will give them the list of vocabulary terms they are required to pick from and give them the content they need while reviewing the definitions.
• Aquifer • Basalt • Cobbles • Discharge • Domestic consumption (use) • Evaporation • Glacier • Groundwater • Hydrologic cycle • Ice age • Monitoring site or well • Permeability • Precipitation • Recharge • Sediment • Septic system • Transpiration • Water budget • Water cycle • Water pollution	

Name: Jennifer A Jensen	
Subject: English	Native American Aquifer History

The big idea(s) or essential question(s)
Link a Native American Historical account to the Atlas

Core standards addressed:
CCSS: RI.4.1 RI.4.3; RI.4.7; RI.4.9; W.4.2; W.4.9; SL.4.4
NGSS: 4-ESS2-2

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Identify major characters on a map of Washington that are described in the myth, understanding that the characters represent geographical features.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas p. 3-4
paper, pen

Activities/procedures (include anticipated time for each)

Introduction/activator
The story on *Atlas* p. 3 will be read to the class. The students will be instructed to envision the characters in the story as it is read. Then the students are given the story and the map of Washington state.

Class activities (what you/students will do)	Class activities (why you will do them)
Students are given a story and a map. The students are instructed to read the story and take notes about the historical understanding of the aquifer. Students are given a map of the aquifer and told to take out pen and paper. The student will write their own story of how the aquifer was created.	The story is a Native American understanding of the topography of the Aquifer, and its connection between lakes and the Spokane River. The student does deductive work to take a historical story and apply it to the modern geography of the region.

Closure/reminders
The students return to their seats with their own papers.

Assessment (how you will know students met the objectives - include rubrics)
Students will write a complete description of how the aquifer was created, including complete sentences, proper grammar and spelling.

Accommodations/differentiation
Students will be placed in mixed pairs and encouraged to help and challenge one another. Pairs will be selected by the instructor to mix higher and lower students in an effort that the students work together.

Name: Deborah York	
Subject: Science	Edible Aquifer

The big idea(s) or essential question(s): It is important for all people to keep water clean.

Core standards addressed:
CCSS: SL5; CCSS: SL3

Objectives (what the students will be able to do as a result of the lesson): Students will recognize the importance of ground water.

TSWBAT	The students will understand how ground water can become contaminated.
TSWBAT	Students will recognize the importance of ground water.

Materials and/or technology
The Spokane Valley-Rathdrum Prairie Aquifer Atlas pg. 7-10.
See the Edible Aquifer section on page (xx) of this Guide.
Clear plastic cups, ice cream scoop, spoons, drinking straws, blue and red food coloring, fruity sorbet (or vanilla ice cream), clear soda pop, small gummy bears, chocolate chips, crushed cookies, breakfast cereal, or crushed ice. Variety of colored cake decoration sprinkles.

Activities/procedures (include anticipated time for each)

Introduction/activator
This demonstration will follow our lesson, Thurstin Builds an Aquifer. We are going to make an Edible Aquifer model.

Class activities (what you/students will do)	Class activities (why you will do them)
Begin to construct your edible aquifer by filling a clear plastic cup 1/3 full with any of these: Gummy bears, chocolate chips, or crushed ice These represent sand and gravel below the earth's surface Add enough soda (representing water) to just cover the material in that bottom 1/3 of the cup. Add a layer of sorbet (ice cream) to serve as a "confining layer" over the water-filled aquifer. Then add more "sand and gravel" on top of the confining layer. Colored sugars and sprinkles represent soils and should be sprinkled over the top to create the porous soil layer.	The students will be instructed to build an edible aquifer by following these steps: Gummy bears, chocolate chips, or crushed ice represents sand and gravel. The layer of soda represents water. The sorbet/ice cream layer is the "confining layer" over the water-filled aquifer. Then add more "sand/gravel" on top of the confining layer. Colored sugars and sprinkles represent soils and should be sprinkled over the top to create the porous top layer.

Now add the food coloring to the soda. The food coloring represents contamination. Pour the colored soda over the “soil.” Watch as the “contamination” filters through the soil Students place a straw into the aquifer. Students can drink from the aquifer.	Add food coloring to the soda to represent contamination. Watch what happens when it is poured on top of the aquifer. The students will be told the same thing happens when contaminants are spilled on the earth’s surface. Using a drinking straw, drill a well into the center of your aquifer. Slowly begin to pump the well by sucking on the straw. Watch the decline in the water table. Notice how the contaminants can get sucked into the well area and end up in the lowest layer by leaking through breaks in the confining layer. Now recharge your aquifer by adding more soda, representing a rain shower or water flowing from a local lake or the Spokane River. Review what was learned as the students enjoy eating their edible aquifer.

Closure/reminders
We will reflect on how the edible aquifer is a model of a larger feature of the earth that can’t be seen from the surface.

Assessment (how you will know students met the objectives - include rubrics)

Our project will reflect the students’ understanding of the lesson.

Accommodations/differentiation: check with the participants before conducting this activity to see if anyone is diabetic or lactose intolerant, or has any other food restriction or preference. Make substitutions if needed.

Reflection/evaluation (after lesson is taught)

The students will be encouraged to explain our lesson to their parents.

Name: Jennifer A Jensen	
Subject: Social Studies	Geography, Maps 2

The big idea(s) or essential question(s)
Draw a Map of an Aquifer

Core standards addressed:
CCSS: RI.4.7; W.4.8

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Draw a map of the aquifer used in their essay, identifying all major contributions to the aquifer.

Materials and/or technology
Paper; pens, pencils, paints or crayons; access to books of maps or the internet

Activities/procedures (include anticipated time for each)

Introduction/activator
This lesson is designed to follow a previous lesson where students research another aquifer in the world.

Class activities (what you/students will do)

Remind the students that they had previously researched an aquifer somewhere else in the world.

Instruct them to visit the pages in the map or the websites they used for research to draw their own map of the aquifer they selected.

Have the students identify all major water contributions to their aquifers. Compare and contrast the other aquifer with the Spokane Valley-Rathdrum Prairie Aquifer. Find three things that are similar and three things that are different. Write these on your map.

Closure/reminders
While all aquifers are different, they all provide important water to the people where they exist. Some aquifers are more vulnerable to pollution than others. Aquifers can “look” different but are still useful as large reservoirs of water.

Assessment (how you will know students met the objectives - include rubrics)
The drawings should depict the approximate shape of the aquifer they researched with all major water contributions identified.

Name: Jennifer A Jensen	
Subject: Social Studies	Geography, Maps 1

The big idea(s) or essential question(s)
Write a Short Essay of Another Aquifer

Core standards addressed:
CCSS: RI.4.7; W.4.8

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Identify one other aquifer in the world and write a one page report detailing its history and impact.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas p. 6- 10.
Paper, pen, access to books of maps or the internet

Activities/procedures (include anticipated time for each)

Introduction/activator
There are aquifers all over the world that provide water to other people. Where are some of these Aquifers?

Class activities (what you/students will do)	Class activities (why you will do them)
Have the students take out a piece of paper and pen. Provide them with access to map books or the internet. Instruct them to find an aquifer somewhere else in the world. Instruct the students to write a one page report on this other Aquifer. They should include the name of the aquifer, where it is located, bodies of water that feed into it as well as the people whose life it impacts. Remind the students to include details about the aquifer that they find interesting. Give the students 30 minutes to research and write. After 30 minutes open a discussion in the class where students talk about the aquifers they found and have them tell the class all about them.	Research of other places in the world that have similar geographical features to local geography shows students that there are similarities throughout the world.

Closure/reminders
Thank the class for teaching each other about other aquifers around the world.

Assessment (how you will know students met the objectives - include rubrics)
The essays should be approximately one page in length, written in complete sentences with proper spelling and grammar. At a minimum they should include the name of the aquifer, where it is located and the names of bodies of water that feed into it.

Name: Deborah York	
Subject: Science	Water Cycle: Drippy the Raindrop

The big idea(s) or essential question(s): Does our water leave the earth. How does rain happen?

Core standards addressed:
CCSS: RL2; CCSS: RL3

Objectives (what the students will be able to do as a result of the lesson): Students will understand rain and the water cycle.

TSWBAT	Students will understand that water goes around in an endless cycle called the water cycle.
TSWBAT	Vocabulary includes: evaporation (and transpiration from plants), condensation, precipitation, and collection.

Materials and/or technology
The Spokane Valley-Rathdrum Prairie Aquifer Atlas, p. 11.
The online book: Ito the Mountain and Back: Drippy the Raindrop. www.drippytheraindrop.com, written by Joel Kimball.

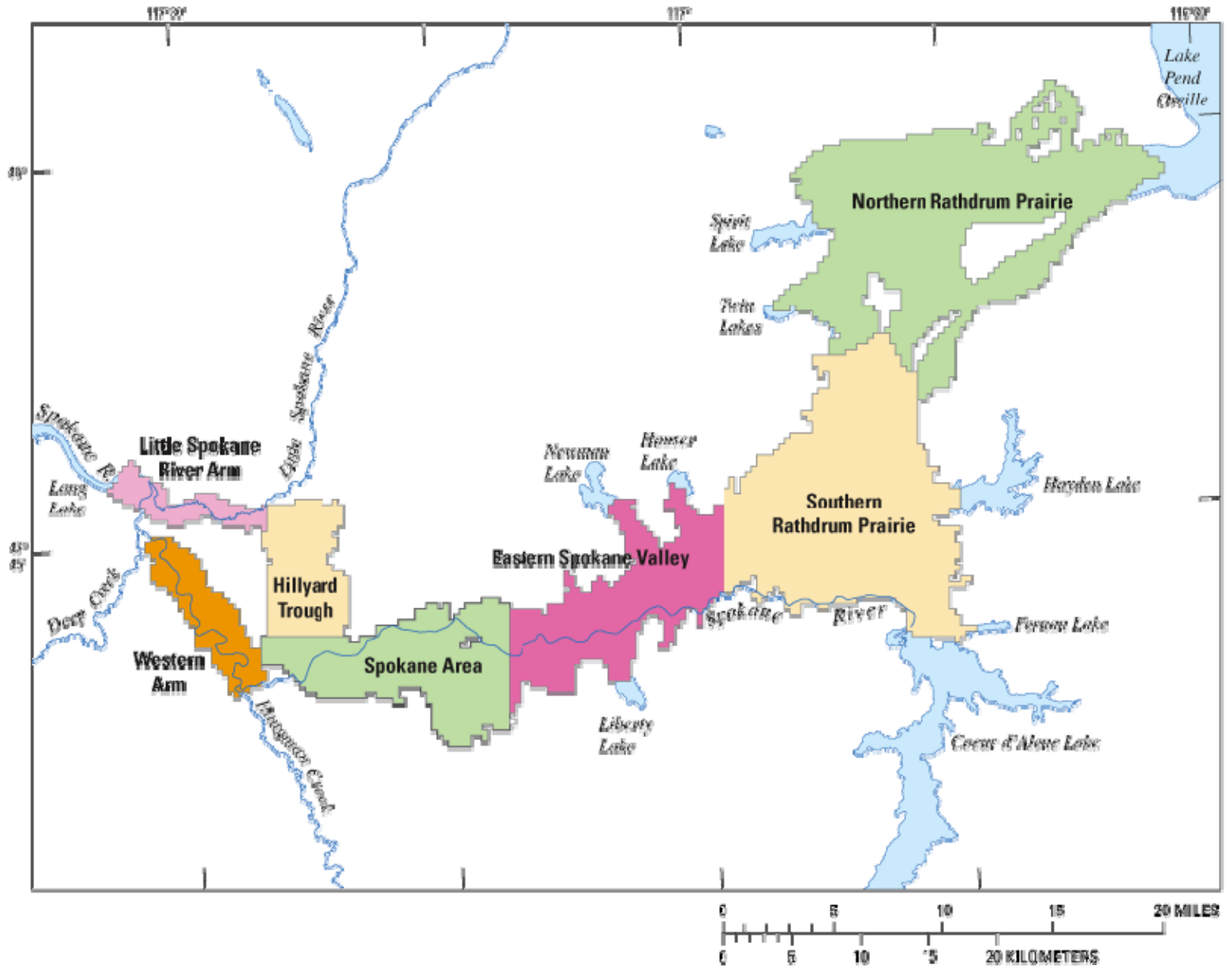
Also see the Water Cycle section on pages (xx) of this Guide.

Activities/procedures (include anticipated time for each)

Introduction/activator
To the Mountain and Back: Drippy the Raindrop is a story of how wonderful and important water is as a resource. The earth has a limited amount of water. That water keeps going around and around and around in what we call "The Water Cycle." This cycle is made of a few main parts: evaporation (and transpiration from plants), condensation, precipitation, collection.

Class activities (what you/students will do)	Class activities (why you will do them)
Students will listen to the book, *To the Mountain and Back.* After the book is read, they will answer questions such as: Do plants sweat? What happens after a while in a cloud? Is there any new water?	The book *To the Mountain and Back* will be read to the students. Concepts are as follows: 1. Evaporation: Drippy evaporates. Why? (Answer: the heat of the sun causes him to evaporate and become a vapor that goes up and he becomes part of the cloud. 2. Condensation: Drippy is now in the cloud and meets another raindrop who has also evaporated – Captain Salty. While way up in the cloud, it is colder and drippy is condensing and turns into water again. 3. Precipitation: what happens after a while in the cloud? Yes, it starts to bounce and shake. Why? It gets very heavy now that Drippy is water, and all the other raindrops that have accumulated have also turned into water). The air cannot keep Drippy and the other raindrops up there. The cloud bounces and shakes (precipitates) and Drippy and all the water in the clouds come down as rain drops or rainfall. Now sometimes it comes down as rain, or it can be snow, or sleet, or hail; it depends on how cold it is.

	1. Collection: Finally, Drippy ends up falling on a stream and then into the river, which carries him back to the ocean. This will happen all over again; this is called collection. It is important to add that some of the rain will fall on the land and soak in and become ground water. This is the water that plants use, and that we get from a well. When water falls back to earth as precipitation, it may fall right back onto the oceans. Or it can fall directly to lakes or rivers. Or, it can fall onto land, where it might soak into the earth and become ground water that plants can drink; or, it can run over the soil to collect in the nearest stream or river or lake or ocean to start the cycle all over again.
Closure/reminders There will be a brief recap of the story.	
Assessment (how you will know students met the objectives - include rubrics) Students will answer questions above to assess how well they understand the water cycle.	
Reflection/evaluation (after lesson is taught) The students will write (with their parents or guardians' help) or draw about the water cycle. This can be signed by parents and brought back to class the next day.	



Subregions of the Spokane Valley-Rathdrum Prairie aquifer.

Source: http://pubs.usgs.gov/sir/2007/5044/figure51.html

Name: Jennifer A Jensen	
Subject: Social Studies	Local History, Geography, Mapping

The big idea(s) or essential question(s)
Draw a Map of the Aquifer

Core standards addressed: CCSS: RI.4.7; W.4.8

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Draw a map of the Aquifer and identify how the water flows into and out of it

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas pg. 8 and back cover.
Paper; pens, pencils, paints or crayons, map handout

Activities/procedures (include anticipated time for each)

Introduction/activator
Bodies of water are often on the surface of the Earth, but sometimes a body of water can be below the dirt. Our drinking water comes from one of these bodies of water called the Aquifer.

Class activities (what you/students will do)

Open the map books to page 5 or go to <http://pubs.usgs.gov/sir/2005/5227/section5.html>. Have the students study the map of showing the Glacial Lake Missoula Flood Deposits. Then turn to page 14 or go to <http://pubs.usgs.gov/sir/2007/5044/figure51.html> and have the students study the image of the Aquifer with all of the bodies of water feeding into it.

Hand out the maps for coloring. Instruct the students to draw in the Aquifer approximately where it is found on the map, referring to the web sites or map book for guidance. Instruct them to also identify on the map three sources of water that contribute to the Aquifer.

Closure/reminders
We are surrounded by water. One of the most beautiful bodies of water flows under us, providing us with the water we need for our daily lives.

Assessment (how you will know students met the objectives - include rubrics)
The Aquifers should be drawn onto the map approximately where it is located underground. There should be three bodies of water contributing to the Aquifer identified on the map.

Accommodations/differentiation
Maps could be provided with the Aquifer already drawn onto it. Have the students identify and label three bodies of water that contribute to the Aquifer.

Name: Deborah York	
Subject: Science	Our Bodies Need Water

The big idea(s) or essential question(s)
Water is important in sustaining people and societies around the world.

Core standards addressed:
CCSS: RL; CCSS: RL.3

Objectives (what the students will be able to do as a result of the lesson): Students will understand that our bodies depend on water for survival.

TSWBAT	Water is essential for us to live

Materials and/or technology
The Spokane Valley-Rathdrum Prairie Aquifer Atlas, pgs. 16, 20, 21
Work Sheet with a picture of an animal, trees, flowers, and a house (not provided), crayons, scissors

Activities/procedures (include anticipated time for each)

Introduction/activator
Water is very important to all living things. In some creatures, up to 90% of their body weight comes from water. Up to 60% of a human's body is water.

Class activities (what you/students will do)	Class activities (why you will do them)
Students will listen to a short lecture on why water is important. 1. We will discuss our bodies are made up of a large percent of water. Question: does anyone know how much of us is water? (Answer: something around 60%) We will talk about how much water we need to drink. Ask about what happens to a plant or a flower if it does not get enough water (it wilts). Then the students receive a work sheet with a picture of an animal, trees, flowers, and a house. Ask if the students to imagine how much water each of these things need in a day. Students are instructed to color any object that must have water to survive.	A lecture will be delivered to the students. After the lecture, questions will be asked about water. The students will be given a work sheet to help answer the questions, and then the students will be instructed to color the worksheet.

Closure/reminders
A brief review of water will end our lesson.

Assessment (how you will know students met the objectives - include rubrics)

The discussion will display the students' understanding of water, and what needs water, along with their worksheet.

Reflection/evaluation (after lesson is taught)
The students will write or draw (with their parents' or guardians' help) how important water is. This can be signed by the parents and returned to class the next day.

Name: Deborah York	
Subject: Science	Waste Water

The big idea(s) or essential question(s): The student will understand it is important to keep water clean, and that everyone can help keep water clean.

Core standards addressed:
CCSS: RL.1; CCSS: W.2

Objectives (what the students will be able to do as a result of the lesson): Students will identify ways that water can be wasted, and how to conserve it.

TSWBAT	Students will identify ways water is wasted or can be conserved.

Materials and/or technology
The Spokane Valley-Rathdrum Prairie Aquifer Atlas pgs. 16, 19, 20, 21

Activities/procedures (include anticipated time for each)

Introduction/activator
We will learn a song which will help us understand that water is a precious resource that needs to be protected, and to be conserved by not using too much.

Class activities (what you/ students will do)	Class activities (why you will do them)
The students will be taught this water song; it is sung to the tune of "The Itsy Bitsy Spider" and the students will sing it aloud together: *There's water all around us* *In oceans, lakes and streams.* *We want it to be healthy,* *So let's help keep it clean!* *Water all around us –* *It helps us grow and live.* *If we all try not to waste it* *We'll have some left to give!*	First, it will be explained to the students that the song is about keeping our water sources healthy by keeping it clean. The students will be asked, "What are some ways that water in our oceans, lakes, and streams gets dirty?" (Answer: pollution, people throwing trash in it, etc.). Then they will be asked, "What can we do to help keep it clean?" (Answer: Throwing trash away, not pouring things out into the gutter or streams, etc.) It will be pointed out to the students the song is also about trying not to waste water. The students will be asked, "What are some ways that people waste water?" (Answer: leaving the water hose on too llong, leaving the tap on while brushing teeth, etc.) Then they will be asked, "What are some ways that you can help save water?" (Answer: Turning off water while brushing teeth or washing hands, telling a parent about a leaky faucet, etc.)

Closure/reminders
We will sing the water song to close the lesson.

Assessment (how you will know students met the objectives - include rubrics)

Our discussion will demonstrate the students' understanding of wasting water and stopping pollution.

Reflection/evaluation (after lesson is taught)
The students will be asked to write or draw in their journal, "What are some ways that people waste water?" with help from their parent or guardian. Have the parent sign this and return to class the next day.

Name: Victoria Cozad	
Subject: Science/Reading	Hazardous Waste Disposal

The big idea(s) or essential question(s): Clean water is important to protect since it plays an important role in all cultures around the world.

Core standards addressed: CCSS: RI.4.1

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Explain who, what, where, why, and when proper hazardous material disposal is important and refer to details as to what contributes to water pollution.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas pg. 20 and 21.
Short video by KSPS, Spokane (1 minute, 45 seconds): "Keep our Drinking Water Clean: Spokane Aquifer." (https://www.youtube.com/watch?v=c_6pltuqspo)

Computer and projector, pencil and paper, white board and markers

Activities/procedures (include anticipated time for each)

Introduction/activator: Watch the KSPS Spokane video, "Keep our Drinking Water Clean."

Class activities (what you/students will do)	Class activities (why you will do them)
After viewing the video, I will engage the class in a discussion about hazardous materials. I will begin to write on the white board the ideas the students gave me as we go over each topic. The topics I will bring up include: • How many hazardous materials are disposed of improperly? – Hazardous materials are disposed of improperly when they are thrown in the trash, dumped in vacant lots, and poured down the drain. • How does not properly disposing of these materials contribute to water pollution? – These materials leak into our water supply and contaminate it so that we cannot drink it. • How will polluted water affect us? – We will lose drinking water; we can face having to buy bottled water shipped in from far away. (10 minutes) I will write all the ideas in a list on the board. Have each student think of and remember one type of hazardous waste. After our class discussion, I will ask students to go to the Spokane Aquifer Joint Board website about household contaminants (http://www.spokaneaquifer.org/household-contaminant-disposal/), and the Get Rid of my Waste directory (http://spokaneriver.net/wastedirectory/vendor/) to find places to bring the hazardous waste type students were asked to remember. Students should write down the complete list from the whiteboard, including their hazardous waste, and a list of places they can dispose of them.	I will use the video to introduce the class to keeping the water clean and engage them by using a local video. I will evoke thought about hazardous materials seen in the video and how we are affected by polluted water through ask and answer. I will give them the materials they need to complete the assignment. I will model how to find information by looking into an online directory. I will give the students my expectations so they understand what I expect from them during this assignment.

Closure/reminders: As the students wrap up the assignment, I will ask them the following questions: what is something new that you learned today? Did you realize that things like batteries and paint needed to be disposed of separately from your regular trash? (2 minutes)

Assessment: I will walk around the room to check to see if students are completing the research assignment. Afterward, I will correct any incomplete or incorrect journal entries.

Name: Jennifer A Jensen	
Subject: Social Studies	Geography, Local History

The big idea(s) or essential question(s)
What is an Aquifer? How does water move through it?

Core standards addressed:
CCSS: RI.4.1; W.4.8; W.4.7

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Write a minimum five sentence paragraph defining and describing an aquifer.
TSWBAT	Understand how water moves through an aquifer.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas p. 6-9.
Paper, pen

Activities/procedures (include anticipated time for each)

Introduction/activator
How does water move through an aquifer? What are some of the ways it enters and exits?

Class activities (what you/students will do)	Class activities (why you will do them)
Have students brainstorm how water enters an aquifer. Explain that the term "recharge" refers to water entering the aquifer. Recharge occurs when water goes into permeable formation and enters the aquifer. Ask the students to describe ways recharge can occur (stream, lakes, rain, sewers, anything that can allow water to ooze underground.) Explain the terminology of "reach" as it pertains to aquifers. Losing Reach is when a river loses water into the aquifer. Gaining Reach is when a river gains water from the aquifer. Transitional Reach is when the water can change between losing and gaining. Instruct the students to write a minimum five sentence paragraph explaining the ways an aquifer can gain or lose water.	Understanding how water enters and exits the aquifer helps students understand how we can affect our drinking water with liquids that can seep through the ground.

Closure/reminders
Remind students that anything that can soak into the ground can enter our aquifer.

Assessment (how you will know students met the objectives - include rubrics)
Paragraphs should include a minimum of five complete sentences. Students should use the terms "Reach" and "Recharge" in their writing demonstrating their understanding of these terms as they apply to the aquifer.

Accommodations/differentiation
Paragraphs should include a minimum of five complete sentences. While students might not use the terms "Reach" and "Recharge" in their writing, they should be able to demonstrate in their writing that they understand that water flows into and out of the aquifer at various points.

Name: Deborah York	
Subject: Legends and History	Water and History

The big idea(s) or essential question(s): The student will understand water is essential to all cultures.

Core standards addressed:
CCSS: RL.2; CCSS: RL.3

Objectives (what the students will be able to do as a result of the lesson): The students will understand that there is a very limited amount of water available to us.

TSWBAT	Students will understand how little fresh water we have and the need to conserve.
TSWBAT	Students will understand how water bodies are often connected in ways we cannot see.

Materials and/or technology
The Spokane Valley-Rathdrum Prairie Aquifer Atlas, pgs. 3 and 4. Note specifically, the Coeur d'Alene Tribe Story.
Printed maps ready to color. Crayons.

Activities/procedures (include anticipated time for each)

Introduction/activator
The story told by the Coeur d'Alene Tribe describes knowledge that the Lake Pend Oreille is connected to the Spokane River through some tiny hidden passage underground. To show how little water is readily available, we will look at a map of the area.

Class activities (what you/students will do)	Class activities (why you will do them)
The students will be read the story and be asked for feedback. The students will re-tell the story. We will look at the map of the area to see how much of it has surface water, and how much is dry land. If using a world map, note how much of the surface is covered with oceans – salt water that we cannot drink. Students are given a print out of a map. Students will color the map to understand where the water is located.	Students will be read the story, and then asked to re-tell the story. Students are asked for feedback throughout. Students are given a map to study and color.

Closure/reminders
I will have the students tell me where the water is located on our map. I will ask questions about how much of the surface has water on it. I will ask, do you think it could run out? Should we waste water?

Assessment (how you will know students met the objectives - include rubrics)

Their map will show they understand where water is and is not located. They will answer questions about the amount of water distributed through the world or the region.

Reflection/evaluation (after lesson is taught)
Students are assigned to go home and ask their parents to work with them to come up with ways the family could save water. Students can present their ideas to the class the next day.

Name: Deborah York	
Subject: English	Alphabet Activity: W is for Water

The big idea(s) or essential question(s): The student will understand water is universal throughout the world.

Core standards addressed:
CCSS: RF.3a; CCSS: RL.3

Objectives (what the students will be able to do as a result of the lesson): The students will identify the letter "W"

TSWBAT	The student will be able to identify the letter W.
TSWBAT	The student will realize the sound the letter W makes.

Materials and/or technology
The Spokane Valley-Rathdrum Prairie Aquifer Atlas any pages.
Work sheet about the letter W (not provided), crayons or coloring pencil.

Activities/procedures (include anticipated time for each)

Introduction/activator
We will work with the letter W to reinforce letter W practice, and to identify words with the letter W

Class activities (what you/students will do)	Class activities (why you will do them)
The student will trace the letter W with their finger in upper and lower case on their coloring page and also sound out the letter. The student will trace the dotted letter with their choice of crayon or coloring pencil. The student will be instructed to circle the letters W or w. Next, the student will color the W-related and water-related images. The student will be asked about other words that start with the same, "W" sound.	The students will be given a work sheet (not supplied here) with the letter W, lower and upper case, written in broken or dashed lines. The work sheet will also contain water images. The student will be instructed to color the water images. The student will trace the letter W's with their finger in upper and lower case as each also sounds out the letter. Each student will be visited to make sure they have identified the letter W's. The student swill be asked to come up with different words that have the same beginning sound, and these words will be written on the chalkboard.

Closure/reminders
We will make the "W" sound all together before the student goes home.

Assessment (how you will know students met the objectives - include rubrics)

The students' work sheets will be evaluated to measure their understanding of the letter W.

Reflection/evaluation (after lesson is taught)
The student will be asked to talk about the letter W with their parent or guardian. The student will be sent home with a note outlining the day's events, which can be signed by the parent or guardian and returned to school the next day.

I will model the assignment by writing a few sentences from the water drop's point of view. I will use the following example: "As a water drop floating down the Spokane River, I was scared to see a fish swimming toward me. It was a blur, but I went around the fish and stayed in the river." I will continue with the process of evaporation. (3 minutes) To spark imaginations, I will prompt students with these questions by writing them on the white board (2 minutes): Where did the water drop go on its journey? What did it see? What adventures did the drop have? How did it feel at different times? Did the drop meet any plants, animals, or people? If so, how did the water drop help them? How long did the drop's trip take? Where does the water drop want to go on its next journey? I will encourage the students to use the picture of the water cycle on page 11 of the *Aquifer Atlas* or the placemat to help them as they begin working on their water drop stories. I will walk around the room to answer questions and remind the students of appropriate grammar, sentence structure, and spelling. (15 – 20 minutes) Toward the end of the lesson, I will ask if any students want to share their story with the class. As a class, we will briefly discuss the stages of the water cycle in each story. I will then have students turn in their assignment to me for grading and review. Students should also look at their Ocean in a Cup experiment to see if there are any signs of evaporation, condensation, and/or precipitation.	I will ask a set of questions to evoke thought and give them ideas to help make their stories more complete with details and facts. I will walk around the room to help students with ideas, and to promote well-rounded descriptive stories. I will give the students an opportunity to share their stories with the class to give other students new ideas of their point of view on the water cycle.

Closure/reminders
After conducting the research, I will ask the students what they believe will happen to their plastic cups of water after a few days. I will remind them that we will check on the plastic cups throughout the week, and they will keep tabs on the project by writing changes they observe down in their journals. I will ask the students their favorite part of the water cycle, and how writing from the water drop's point of view helped them understand more about the water cycle.

Assessment (how you will know students met the objectives - include rubrics)
I will be helping students with their experiments and assessing if they are following directions. I will also review the research they conducted to see if they began to understand more about the water cycle.

I will proofread their stories in their writing journals and check to see if they meet the requirements of good grammar, sentence structure, punctuation, and spelling. For the next class, the students will write a final draft for their writing portfolios.

Accommodations/differentiation
For advanced ALP students, extend the lesson by helping students revise and edit their story and encourage them to turn it in to their school literary magazine. The students who finish early may also draw pictures to match their story.

Slower writers should be encouraged to focus on fewer steps in the water cycle (e.g., two instead of three) and focus on better writing.

I will ask the students to imagine that the water in the cup is the ocean, and have them check it daily to observe what happens. I will inform students that they will be making observations, and connecting their obse5rvations to the processes of evaporation, condensation, and precipitation. I will explain to students that each day the water level gets lower, the water evaporates. The top of the bag gets cloudy as water condenses, and eventually water drops appear on the side of the bag and at the bottom as the water precipitates. (5 minutes) I will ask a few students to help me hand out the following materials: plastic cup, water, re-sealable plastic bag, and markers. I will ask students to write their names on their plastic bag and wait for the next directions. (3 minutes)I will have rows bring me their cups by the sink so I can fill them up with water. As rows are doing so, I will ask students to use computers, iPads, or their *Aquifer Atlas* to conduct research on the stages of the water cycle. They will write the information about the water cycle in their journals. (15 minutes) I will allow students to work with each other in groups of two or three to conduct research together to enrich their understanding of the water cycle. (5 minutes) Then I will ask the students to return to their seats, and work on the rest of the assignment individually. Using their journal notes and what they know from the video and the ocean in a cup activity, to think about the journey that one drop of water might take through the water cycle. (3 minutes) I will then tell the students that we are going to write about the experiences of one water drop as it travels through the water cycle. I will explain to the students that they will each write from the water drop's point of view. (3 minutes) I will give the students the option to begin their journeys in different places. I will write the following on the white board: a puddle on a farm, a mountain lake, a stream in a meadow, or a large ocean. (2-3 minutes) I will encourage students to use what they just learned, and their imaginations, to tell an interesting story. The story needs to be at least three paragraphs long. I will explain that they need to include at least three stages of the water cycle in their story. I will write these on the board (evaporation and transpiration, condensation, and precipitation) for the students to refer to while writing their stories. (3 minutes)	We will discuss the possibility of the stages of the water cycle occurring in this situation to introduce the assignment. I will provide a visual example so they can see the inquiry (ocean in a cup) they are going to do. I will ask students to imagine the water in the cup is the ocean, and the air in the plastic bag is the atmosphere, to help them make real-world connections. I will call students up by rows to make sure the class is not crowded around the sink. The rest of the class begins conducting research to understand the process of the experiment. I will allow the students to work together to have them bounce research ideas off each other and to engage in effective group discussions. After the Ocean in a Cup experiments are all on the window sills, I will remind the students to leave them alone for a while. We will come back later to see if there are any changes. I will discuss the lesson requirements to give students an overview of their responsibility in regards to the assignment. I will suggest different options for their journeys to give them ideas as to where to start the assignment. I will encourage imagination and creativity to get students motivated. I will review to make sure they understand the assignment. I will model an example to give them an idea of what I would like to see out of their stories.

Name: Sarah Worthington	
Subject: Science	Condensation
The big idea(s) or essential question(s): What is condensation?	
Core standards addressed: CCSS: RI.1.1; RI.1.10	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	Comprehend the concept of condensation.
TSWBAT	Answer questions about the text they read.
Materials and/or technology *The Spokane Valley-Rathdrum Aquifer Atlas* p. 11. First grade-level worksheet (not provided) with information and questions on condensation (optional). Other readings on clouds from online sources (optional). Pencils	
Activities/procedures (include anticipated time for each)	
Introduction/activator Today we will learn about the opposite of what we did in the previous lesson. Then we learned about evaporation; now we will learn about condensation. Does anyone know what condensation is?	
Class activities (what you/students will do) Discuss that clouds are full of little water droplets that accumulate together. Give students five minutes to read any information about clouds or condensation that is available. Ask the class questions about clouds and what they have observed. Ask the students to explain condensation in their own words. When it seems that all the students have a clear understanding of the subject, tell them to work on the worksheet (optional).	Class activities (why you will do them) Teacher will need to provide some external materials, or to explain the water cycle diagram in the *Aquifer Atlas* page 11, and where condensation is depicted. Check for understanding. Give students additional information and explanation to help develop understanding of condensation.
Closure/reminders Next time, we will learn about how these processes (evaporation, condensation) come together with precipitation to complete the water cycle.	
Assessment (how you will know students met the objectives - include rubrics) Correct any written products and check for understanding through students' correct answers to questions.	
Accommodations/differentiation Have lowest-level readers sit at front table and read information with me as a group; provide direct assistance to students experiencing difficulty with the concept of condensation.	
Reflection/evaluation (after lesson is taught)	

Name: Sarah Worthington	
Subject: Science	Water and Evaporation

The big idea(s) or essential question(s): What is Evaporation?

Core standards addressed:
CCSS: L1.1; L1.5.C

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Define Evaporation
TSWBAT	Give one example of evaporation in a complete sentence with correct spelling, grammar, and punctuation.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas pg. 11
Definition of evaporation, Information on evaporation (not provided)
Pictures showing evaporation (not provided)
White Board, markers, lined paper, pencils

Activities/procedures (include anticipated time for each)

Introduction/activator
Have you ever wondered where water goes when things dry out? Think about the summer time when you drip-dry at the beach or make wet footprints on cement; how quickly do they dry? This is because of something called evaporation.

Class activities (what you/students will do)	Class activities (why you will do them)
Define evaporation and write on white board. Read a few paragraphs about evaporation out loud to the class. Discuss evaporation with the students. Show pictures that have examples of evaporation, and give many examples of evaporation; ask the students for their input. Ask each student to copy the definition of evaporation onto a piece of paper. Below the definition, ask the students to write one sentence giving an example of evaporation.	Find more information on evaporation from online or other sources. Find discussion points about evaporation related to the water cycle. Check students understanding and give them a chance to participate. Use visual information from multiple sources, including the *Aquifer Atlas* to develop better understanding. Help to remember what, exactly, evaporation is. Check that students understand the concept.

Closure/reminders
Evaporation is just one part of the water cycle, which we will be learning about in subsequent lessons.

Assessment (how you will know students met the objectives - include rubrics)

Check that each student wrote a correct definition of evaporation. Check the example sentence for correct spelling, grammar, punctuation, and understanding of the topic.

Accommodations/differentiation
Ensure that all students can see the definition clearly in order to copy it.
Go over rules of a complete sentence.

Name: Victoria Cozad	
Subject: Science writing	Earth's Water/Water Cycle

The big idea(s) or essential question(s): Water is transported around the world through the water cycle.

Core standards addressed:
CCSS: 4.W.2; W.4.7

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Understand the processes of evaporation, condensation, and precipitation through research and experiments.
TSWBAT	Write an informative text, examining the water cycle through the journey of a water molecule, including at least two relatable facts of the water cycle.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas p. 11.
Water cycle video (two minutes): https://www.youtube.com/watch?v=StPobH5ODTw

Plastic cup, re-sealable bag, water
Markers
Journals and pencils
Computers and/or iPads (Optional)

Activities/procedures (include anticipated time for each)

Introduction/activator
I will get tout a plastic water bottle and ask the students what they think will happen to the water if I left it out by the window sill for a few days in the sunlight. We will discuss possible answers, or hypotheses, as a class. Total lesson time: 50 minutes.

Class activities (what you/students will do)	Class activities (why you will do them)
I will begin with the introduction/activator (3 minutes) I will discuss with the class that we are going to test our hypotheses by conducting an experiment so we can see what happens to our water. I will evoke thought of the water cycle through use of the video, and having the students raise their hands and share their definitions to the terms, condensation, precipitation, and evaporation. by asking questions as to how water would disappear in the sunlight. (5 minutes) I will show them the already-made example I have of an ocean in a cup. I will explain that students will fill a plastic cup halfway with water, place it in a re-sealable plastic bag, close the bag, and set it on a sunny windowsill (this can work without a sunny spot, but it works better in a sunny place). (2 minutes)	I will introduce the topic and evoke thought about the idea of the water cycle. Before class, I will get a cup and plastic bag ready for the demonstration. I will introduce the concept, "hypothesis." A hypothesis is a hunch, or an idea. It has not been tested and supported with a lot of evidence like a theory. If you have an idea about how something might work, but you are not sure, and would like to find out if it is true, it is a hypothesis.

Name: Jennifer A Jensen	
Subject: Science	Water Cycle Drawing

The big idea(s) or essential question(s)
Draw the Water Cycle

Core standards addressed:
CCSS: W.4.8; W.4.9; W.4.7

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Draw a water cycle, identifying the 3 stages of water in the cycle.

Materials and/or technology
Paper; pens, pencils, paints or crayons, Aquifer map book or placemat

Activities/procedures (include anticipated time for each)

Introduction/activator
Just like there are cycles in life where we from baby to old age, water has a cycle. The water cycle is continuous.

Class activities (what you/students will do)	Class activities (why you will do them)
Explain to the class that water can exist in three states in the water cycle - solid, liquid, and gas. Solid water is in ice. Liquid water is found more easily in bodies of water, precipitation, groundwater, and living organisms. Gaseous water is found in the atmosphere. Looking at the map in the picture on the placemat or in the book, identify places water is stored. (Bodies of water, atmosphere, precipitation, glaciers, groundwater and living beings. Have the students draw and color their own water cycle, identifying storage locations and the processes by which water is moved from one location to another.	This is to show the students that water can exist in various states and still be water. This explains these states more fully. This allows the students to show on the picture their comprehension of ways water exists in our world.

Closure/reminders
Remind students that while the water we drink or bathe in is liquid, water can be in other states. The cycle of water is to be absorbed into the clouds, rain or snow back onto Earth, seep into the ground or freeze. The freeze can melt and then be evaporated back up again in an endless cycle.

Assessment (how you will know students met the objectives - include rubrics)
The students should be able to depict on their water cycle at least one of each stage of water in the water cycle.

Name: Sarah Worthington	
Subject: Science	Precipitation 1

The big idea(s) or essential question(s)
What is precipitation?

Core standards addressed:
CCSS: SL1.2; SL1.5

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Name several types of precipitation.
TSWBAT	Draw a picture to illustrate each type.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas Pg. 11.
White Board, markers
Blank paper, colored pencils
Picture of different types of precipitation, at end of this lesson (sourced from http://cueflash.com/decks/Science_Explorer,_Weather_and_Climate,_Ch.2,_Sec5, 12/20/2014).

Activities/procedures (include anticipated time for each)

Introduction/activator
Does anyone know what precipitation is? Raise your hand if you do. Okay, now, how many of you know what rain is? Raise your hand. Everyone! Well, guess what: rain is one form of precipitation. And today, we are going to learn about the other types, too.

Class activities (what you/students will do)	Class activities (why you will do them)
Explain to students what precipitation is. Explain to them that it is formed when cold air meets warm moist air. Ask students if they know any other types of precipitation besides rain. Make a list of their correct answers on the board, making sure they get the four main types (rain, freezing rain, sleet, snow). Show the picture on the projector and go over it with the class. Ask for 5 students to tell you something they just learned. Ask the children if they have any questions about precipitation. Hand out one piece of white paper to each student. Tell the students they will be making a labeled drawing of the four main types of precipitation. Walk around and check that students are progressing on the assignment.	Begin to give them an understanding of the topic. Provide additional information about precipitation. Get students involved in the lecture. Validate their ideas. Give a visual of the topic, e.g., the picture. Check for understanding. Giving clear directions so the students know what is expected fo them. Provide help for students if they need it.

Closure/reminders Remember to think about what is actually going un up in the sky next time you see precipitation coming down.
Assessment (how you will know students met the objectives - include rubrics) Check for students' understanding through questions aloud during and after the lesson. Check that students correctly name the four main types of precipitation and label them appropriately on their drawings.
Accommodations/differentiation Allow students who do not finish the drawing to take the assignment home and bring it the next day.

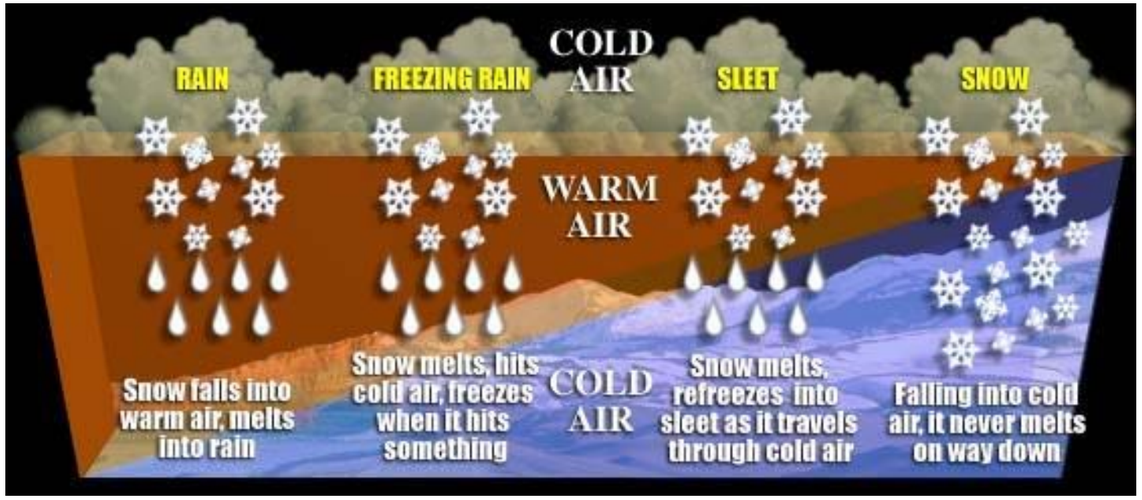


Photo credit: http://cueflash.com/decks/Science_Explorer,_Weather_and_Climate,_Ch.2,_Sec5, sourced 30 December 2014.

Name: Jennifer A Jensen	
Subject: Science	Outdoor Water Use
The big idea(s) or essential question(s) Can the Student Measure Water Usage?	
Core standards addressed: CCSS: W.4.8, W.4.7; RI.4.3	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	Perform the "tuna can" test at home and write a minimum half page essay on the results of their test.
Materials and/or technology Aquifer Atlas pg. 16. Sprinkler tuna can test from city of Spokane: https://static.spokanecity.org/documents/publicworks/water/tuna-can-test.pdf Empty tuna can, paper, pen, instruction sheet	
Activities/procedures (include anticipated time for each)	
Introduction/activator How much water is actually falling?	
Class activities (what you/students will do) Hand out a photocopy of the Tuna Can Test from the website above. Explain to the class how running a sprinkler might not seem like a lot of water is going into the ground, but it adds up. Instruct the students to conduct the tuna can test at home using their own sprinkler. Once they are done conducting their test, they need to measure the amount of water in the can using a tablespoon measuring device to know how much water actually fell. They need to write this number down and bring it to school the next day. The next day, have students compare their findings. Ask them if they were surprised by how much water actually fell from the sprinkler head.	Class activities (why you will do them) As a homework assignment this is excellent to measure how much water a sprinkler gives out.
Closure/reminders Remind students that whenever a faucet is running, water is being used. It is fun to play in the sprinkler on a warm day, but we need to be aware that while it does not feel like much water is coming out of the sprinkler head, there is actually quite a bit.	
Assessment (how you will know students met the objectives - include rubrics) Students should be able to explain how they performed the test as well as measure their findings.	

Name: Jennifer A Jensen	
Subject: Science	Water Usage

The big idea(s) or essential question(s)
Assess Your Water Waste

Core standards addressed:
CCSS: W.4.1; W.4.7

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Using simple methods check a sink and toilet for leaks.

Materials and/or technology
Access to a bathroom, food coloring or a colored punch packet

Activities/procedures (include anticipated time for each)

Introduction/activator
Leaks can cause a waste of water! Help save water by checking for these leaks. You can save gallons each day!

Class activities (what you/students will do)	Class activities (why you will do them)
Take the class into a bathroom to check for leaks. Check the toilet for leaks. The teacher removes the lid from the tank of the toilet. A student volunteer pours the food coloring or punch in the tank. Do not flush the toilet. Now go check the sink for leaks. Listen and watch for drips. If you hear dripping, try tightening the faucet. Check all of the faucets. After 15 minutes go back and check the toilet bowl. If the water is colored, there is a leak. If not, no leaks. Return to the classroom and have the students right a short essay on how they checked for leaks and what the results were.	Arrange with a janitor ahead of time to be sure he/she is ok with you doing this. This could be done for all of the toilets to allow for more students involvement.

Closure/reminders
Remind the students of the importance of water and that regular checking for leaks can save water. Also remind them to always be sure they turn off the faucet when they are done at the sink.

Assessment (how you will know students met the objectives - include rubrics)
The essays should cover the steps taken to check for the leaks as well as a description of the results found.

Accommodations/differentiation
Students can verbally describe the steps and the results found.

Name: Carrie Corbin	
Subject: Earth Science	Precipitation 2

The big idea(s) or essential question(s)
Everyone in the world requires clean water to survive.

Core standards addressed:
CCSS: RI.1.1

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Students will be able to describe evaporation and condensation by correctly filling in three vocabulary terms that are shown in the picture on the handout.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas pgs. 11
Copies of the handout on the last page of this lesson plan.
Any diagrams of precipitation or water cycle found online.
Paper, pencils, and crayons; scissors and glue sticks (optional).

Activities/procedures (include anticipated time for each)

Introduction/activator
(Sing) Raindrops keep falling on my head.
How does water fall from the sky? When I turn on my faucet, the water doesn't fly, "whoosh!" up into the sky. What causes rain to fall on my head?
Time: 10 minutes for information on condensation and evaporation. 5 minutes to fill in the blanks and color the picture.

Class activities (what you/students will do)	Class activities (why you will do them)
Review from evaporation: How does the water get into the sky? Discuss how water evaporates from lakes and rivers, causing water to change into a gas. Gas vapors travel upwards into cooler air and forms clouds (condensation). When the clouds get too heavy with water droplets, they fall back to earth through the process of precipitation. Precipitation can be rain, freezing rain, sleet, or snow.	Discuss the student's ideas about how they think water turns into a cloud. Show overhead pictures of clouds and rain, as well as light clouds with sunshine. Make sure to use vocabulary words: evaporation, condensation, precipitation (rain, freezing rain, sleet, snow), sun, lake, and clouds. Using pg. 11 of the *Aquifer Atlas* discuss evaporation, condensation, and precipitation, and how they contribute to aquifer recharge. Review condensation and evaporation by asking a few questions or having them tell how their first ideas were different than what they have just learned.

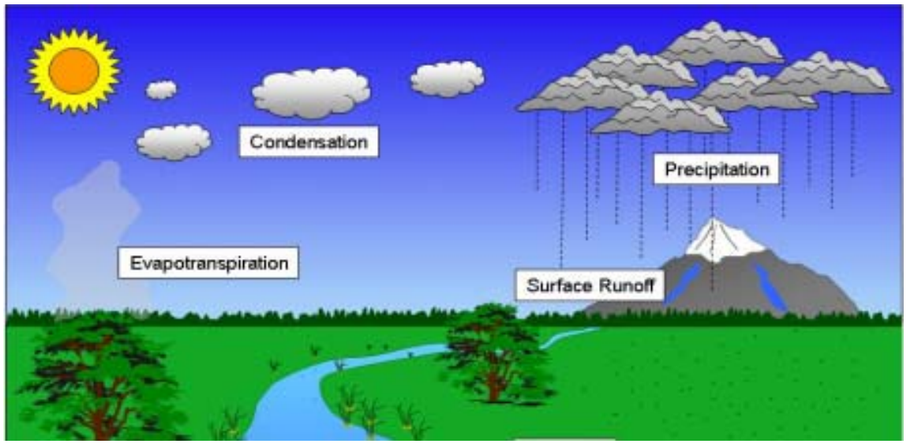
Closure/reminders
Condensation and evaporation are constantly happening all over the world at the same time.

Assessment (how you will know students met the objectives - include rubrics)

Place all three labels in the correct blank on the water cycle handout at the end of this plan.

Accommodations/differentiation
Allow students to take the assignment home if they do not finish it in time.

Reflection/evaluation (after lesson is taught): Remind students: precipitation is part of a larger water cycle.

Name: Sarah Worthington	
Subject: Science	Water Cycle 1
The big idea(s) or essential question(s) What is the Water Cycle?	
Core standards addressed: CCSS: SL1.2	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	Label water cycle parts on a drawing.
TSWBAT	Know at least three main parts of the water cycle.
Materials and/or technology *The Spokane Valley-Rathdrum Aquifer Atlas* p. 11 Copy this diagram, and/or use the diagram at the end of this lesson (from https://www.deq.idaho.gov/media/471614-hydrologic_cycle_lesson_plan.pdf)., and also found on page (xx) of this *Guide*. White board, markers  	
Activities/procedures (include anticipated time for each)	
Introduction/activator We all know we use water in many ways, but where does that water come from? Is there any new water? The answer is that the water is all the same that has ever been, and it goes around in a big cycle.	
Class activities (what you/students will do) Show the students the detailed picture of the water cycle on the projector. Explain the stages of the water cycle and get examples from the students of each stage. List the examples on the board. Ask the students questions about what we have gone over. Hand out copies of the water cycle picture with blanks as a worksheet. Ask the students to fill in the blanks.	Class activities (why you will do them) Familiarize the students with the water cycle. Give the students a better understanding through walking them through the diagram. Help the students to understand and check their understanding. Walk around the room to check to be sure they are on the right track. Students can show me what they have learned.

Name: Jennifer A Jensen	
Subject: Science	Water Usage
The big idea(s) or essential question(s) How is Water Used at Home?	
Core standards addressed: CCSS: RI.4.7; W.4.7	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	Identify ten ways water is used around the house.
TSWBAT	Identify five ways to save water at home.
Materials and/or technology Paper, pen	
Activities/procedures (include anticipated time for each)	
Introduction/activator The class will discuss ways we use water every day around the house.	
Class activities (what you/students will do) The students will take out a pen and paper and write a paragraph identifying ten ways water is used around the home. They will then write a paragraph identifying five ways to save water at home.	Class activities (why you will do them) This is to show that students are aware of the importance of water for their daily lives. This is to show students are thinking about how to conserve water. Page 25 in the Aquifer Map Book shows several examples.
Closure/reminders Students will hand in their papers to be assessed	
Assessment (how you will know students met the objectives - include rubrics) Students will be required to use complete sentences as well as proper spelling, grammar and punctuation. The ten ways water is used at home must be ways that are actually found in the home.	
Accommodations/differentiation Reduction in the required number of ways water is used around the house.	

Name: Jennifer A Jensen	
Subject: Science	Water Molecule Model

The big idea(s) or essential question(s)
What Does the Molecule Look Like?

Core standards addressed:
CCSS: RI.4.1

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Draw an accurate picture of a water molecule.
TSWBAT	

Materials and/or technology
Paper; pens, pencils, paints or crayons, table of elements

Activities/procedures (include anticipated time for each)

Introduction/activator
What is the chemical formula of water? H_2O. What does H_2O represent?

Class activities (what you/students will do)	Class activities (why you will do them)
Referring to a table of elements have the students discuss what the H and O represent in the water molecule. Explain to the class about the number following the atom. This tells us there are two of those atoms. If there is no number, then there is only one atom. There are 2 hydrogen and one oxygen in H_2O. Have the students draw a water molecule. Have them label the hydrogen and oxygen.	This explains the components of the molecule. This explains to students how you read chemical formulas and understand what they contain as well as how much of each atom are present. Point out to the students that a molecule of water looks a lot like a "Mickey Mouse" head.

Closure/reminders
Remind the students that water is a fairly simple molecule. And that while we can't see the molecules with our naked eyes, this object is the basic component of water.

Assessment (how you will know students met the objectives - include rubrics)

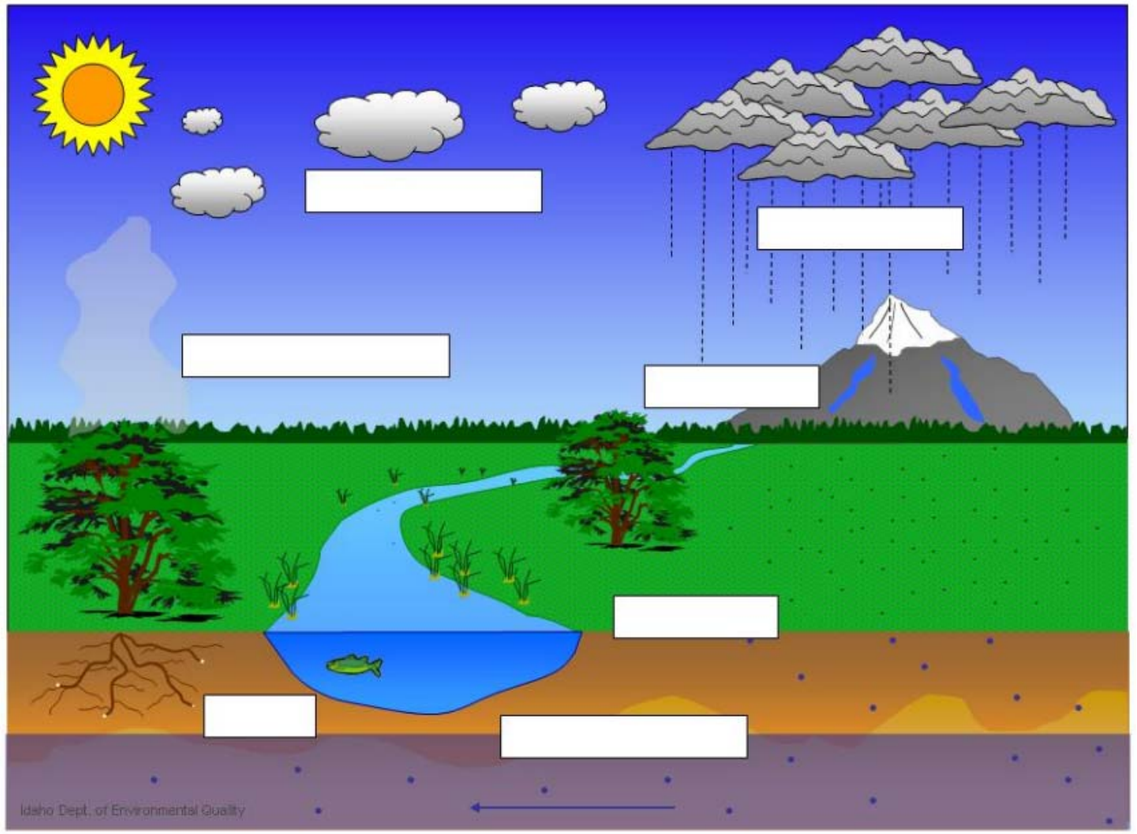
Students should be able to explain that water is made up of H_2O molecules. Each molecule has two hydrogens and one oxygen. We know this because the way to write a water molecule is H_2O. If we could see the molecule it would look like a "Mickey Mouse" head.

Accommodations/differentiation
Students can be provided with a printed out molecule that they can color in with two colors, showing the difference between the hydrogen and oxygen atoms.

Closure/reminders
Tonight when you go home, start thinking about all the ways water is used in your home. Remember what you thought of because we will be discussing it tomorrow in class.

Assessment (how you will know students met the objectives - include rubrics)
Check for understanding through questions during lecture.
Check for correct answers on the worksheet.

Accommodations/differentiation
If students do not finish in the time allotted, they will be able to take assignment home to finish it.



Name: Carrie Corbin	
Subject: Science, writing	Water Cycle 2

The big idea(s) or essential question(s)
Condensation and evaporation are constantly happening all over the world at the same time.

Core standards addressed:
CCSS: RI1.1; W.1.2

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	The students will be able to name one part of the water cycle and explain in three or more sentences what is happening with the water in that part of the cycle.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas pgs. 11-12
Pencils, paper

Activities/procedures (include anticipated time for each)

Introduction/activator
Yesterday we discussed condensation, evaporation, and precipitation. These are all part of the water cycle
Today we are going to pick one part of the water cycle and write about it.
Time 5 to 8 minutes for review on condensation, evaporation, and precipitation. 7 minutes to draw a picture and write in their own words about the water cycle.

Class activities (what you/ students will do)	Class activities (why you will do them)
Discuss the water cycle briefly as we just covered it yesterday. Have the students choose between condensation or evaporation and write three or more sentences explaining what is happening to the water in the process.	Ask a few questions to see what they remember. What part of the water cycle is it raining in? (Answer: precipitation.) What is the form of water that travels up into the sky? (Answer: evaporation) Show some pictures of clouds and rain, as well as sunshine, and discuss what is happening in the water cycle. Write: evaporation, condensation, precipitation on the board and let them choose which one they want to write about. Leave a picture of the water cycle on the board for them to look at while writing. Review condensation and evaporation. Ask what season do we get very little precipitation? (Answer: summer.) When do we get a lot of rain? (Answer: fall and spring.) When do we get a lot of snow? (Answer: winter.)

Closure/reminders
Understanding the water cycle helps us to see how important water is to us and our environment.

Assessment (how you will know students met the objectives - include rubrics)
The student will explain one part of the water cycle in three or more sentences.

Reflection/evaluation (after lesson is taught)
Combine with the weather in a cup experiment to set up the writing assignment so that the students can describe what they see happening in the cup.

Name: Jennifer A Jensen	
Subject: Science	Writing about Water

The big idea(s) or essential question(s)
What is the importance of water?

Core standards addressed:
CCSS: RI.4.1; CCSS: W.4.8; CCSS: W.4.7;
NGSS: 3-LS4-3.

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Write minimum five sentence paragraph explaining the importance of water in our daily lives

Materials and/or technology
Paper, pen, scale

Activities/procedures (include anticipated time for each)

Introduction/activator
Water is important. Why?

Class activities (what you/students will do)	Class activities (why you will do them)
The class will discuss in what ways water is important to human life for 10 minutes. Pull out the scale and have each student weigh themselves. Tell them we will use math to figure out how many gallons of water we each have in our body. Use the following math problem, explaining each step to the students. Step 1: Weigh yourself Step 2: Multiply your weight by 2 Step 3: Divide this answer by 3 to determine how many pounds of water are in your body. Step 4: A quart of water is 2 pounds. Divide your current number by 2. Step 5: there are 4 quarts in a gallon, so divide the current number by 4. This number is how many gallons of water you have in your body. Once the discussion is over, students will pull out a piece of paper and a pen and write a paragraph explaining the importance of water.	Cass discussion is to encourage students to learn to discuss and debate in a respectful setting.

Closure/reminders
Papers are handed in with a reminder to drink plenty of water every day.

Assessment (how you will know students met the objectives - include rubrics)
Paragraphs should be a minimum of five sentences long. It should be written in complete sentences as well as utilize spelling and grammar.

Accommodations/differentiation
Reduction in the required number of sentences, providing the paragraph is pertaining to the importance of water.

Name: Jessica Stafford	
Subject: Math	Measurements

The big idea(s) or essential question(s)
Water plays an important role in our lives, and in many situations, accuracy of measurement is just as important.

Core standards addressed:
CCSS: 3.MD.A.2

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Measure amounts of water accurately.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas pgs. 12-15, 17-20.
Measuring cups, water
Paper and pencil
Conversion information chart (not supplied) e.g., 1 gallon = 16 cups.

Activities/procedures (include anticipated time for each)

Introduction/activator
Most of us have a gallon of milk at home in the fridge. What exactly is a gallon? How many cups are in a gallon? What makes up a cup?

Class activities (what you/students will do)	Class activities (why you will do them)
Students will work in small groups of 4 (or 5). Try to figure out how many cups are in a gallon/ How would you do this? (Let them provide ideas out loud, and write them down on the board. Answer: measure how many cups of water fit in a gallon jug of water.) Note that since a gallon jug might hold a little more than a gallon, the students might come up with a count of cups that is too high. Explain that there might be a little extra capacity in the milk jug to make it easier to fill, or to allow room in case it gets a little bit squished in transport. Students will measure how many cups fit in a gallon of water. Students will measure how many fluid ounces fit in a cup. Students will then figure out how many ounces fit in a gallon.	Get the students thinking about items at home, recipes, etc. and how measurements apply. This lesson is a real world application of measurements. Team collaboration reduces the time needed for individual measurements. Two students can figure out how many cups are in a gallon, while the other two or three can figure out how many ounces are in a cup. Then the students can discuss amongst their group what they discovered.

Closure/reminders
Today we learned exactly how much of one thing equals another, for instance, cups to gallon, ounces to cup, ounces to gallon, etc.

Assessment (how you will know students met the objectives - include rubrics)
Did the groups come up with the correct measurements?
Did the groups effectively discuss their discoveries?
Did the groups make the ounces to gallon conversion?
Were the students on task and taking notes/writing down their work as they went along?

Name: Sara Worthington	
Subject: Science	Water Cycle 3

The big idea(s) or essential question(s)
What is the water cycle?

Core standards addressed:
CCSS: SL.1.5

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Draw and label a picture of the water cycle that has at least three parts.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas pg. 11.
Aquifer placemat/poster (if available)
Blank white paper, colored pencils

Activities/procedures (include anticipated time for each)

Introduction/activator
Since we learned about parts of the water cycle in previous lessons, here is your chance to put it all together and draw your own water cycle.

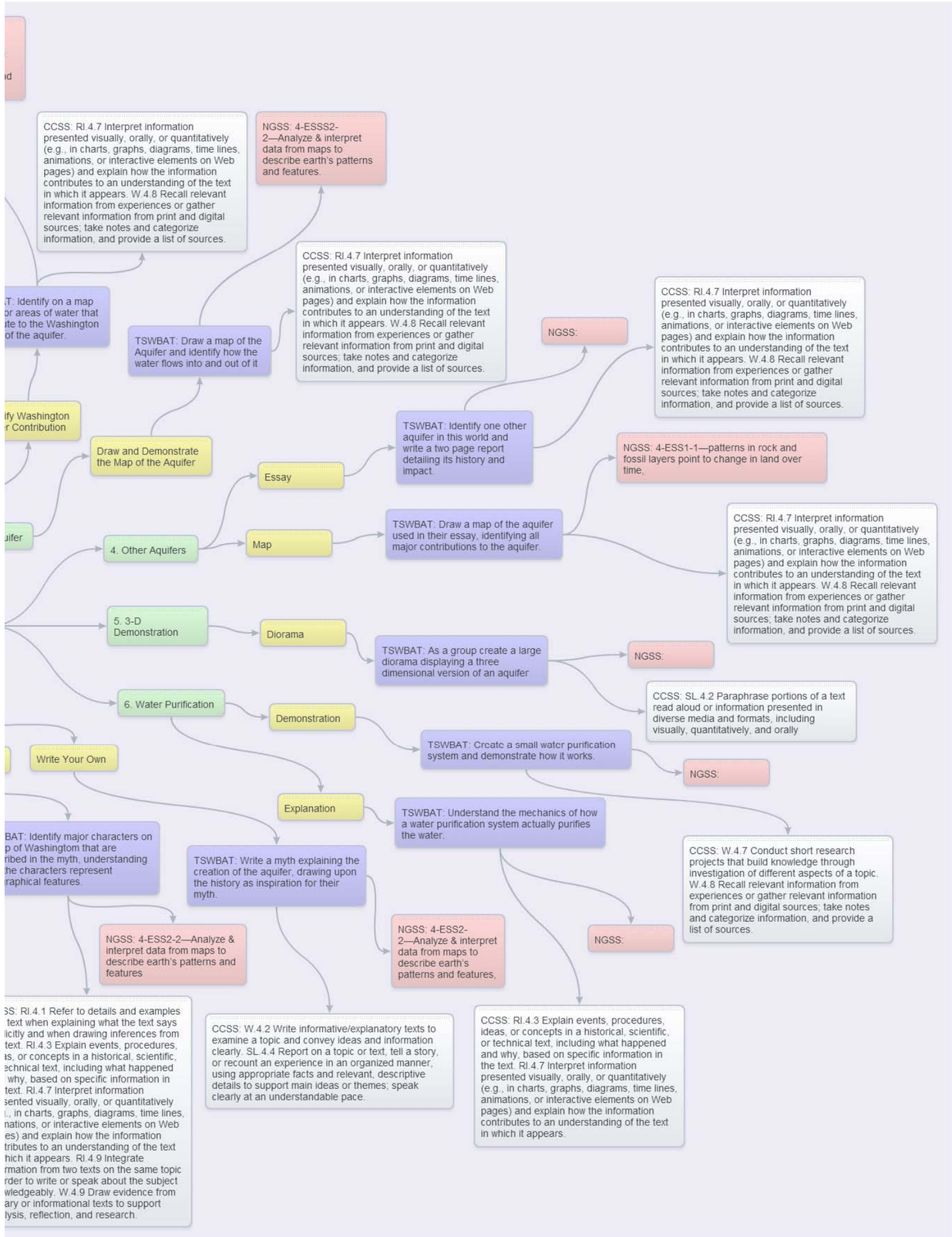
Class activities (what you/students will do)	Class activities (why you will do them)
Put the picture of the water cycle from the *Aquifer Atlas* up on the projector. Go over the parts of the water cycle: evaporation, condensation, precipitation. Hand out blank white pieces of paper. Tell the students their water cycle must have at least three parts that show different stages of the cycle. (Parts include, rain/precipitation, a lake/surface water storage, humidity/evaporation, snow/precipitation, or even the faucet/human water use. Remind students that they can use examples off of the other work they did on parts of the water cycle. Ask that they label each part with the name of what it is and what stage of the water cycle it is showing. Ask they use colored pencils instead of markers or crayons so they can show more detail.	Help to jog students' memories of previous lessons. Provide clear and precise directions and expectations of the elements required on the drawing of the water cycle. Be sure to use pencils to provide better detail in the pictures. Let the students know you will be walking around to look at their work, answer questions, and give help to students who need it.

Closure/reminders
Think of all the things we are learning about how water travels around the water cycle. This is how water gets transported all around the world and back to the oceans.

Assessment (how you will know students met the objectives - include rubrics)
Look at each student's drawing and check for three different parts with the correct labels on them.

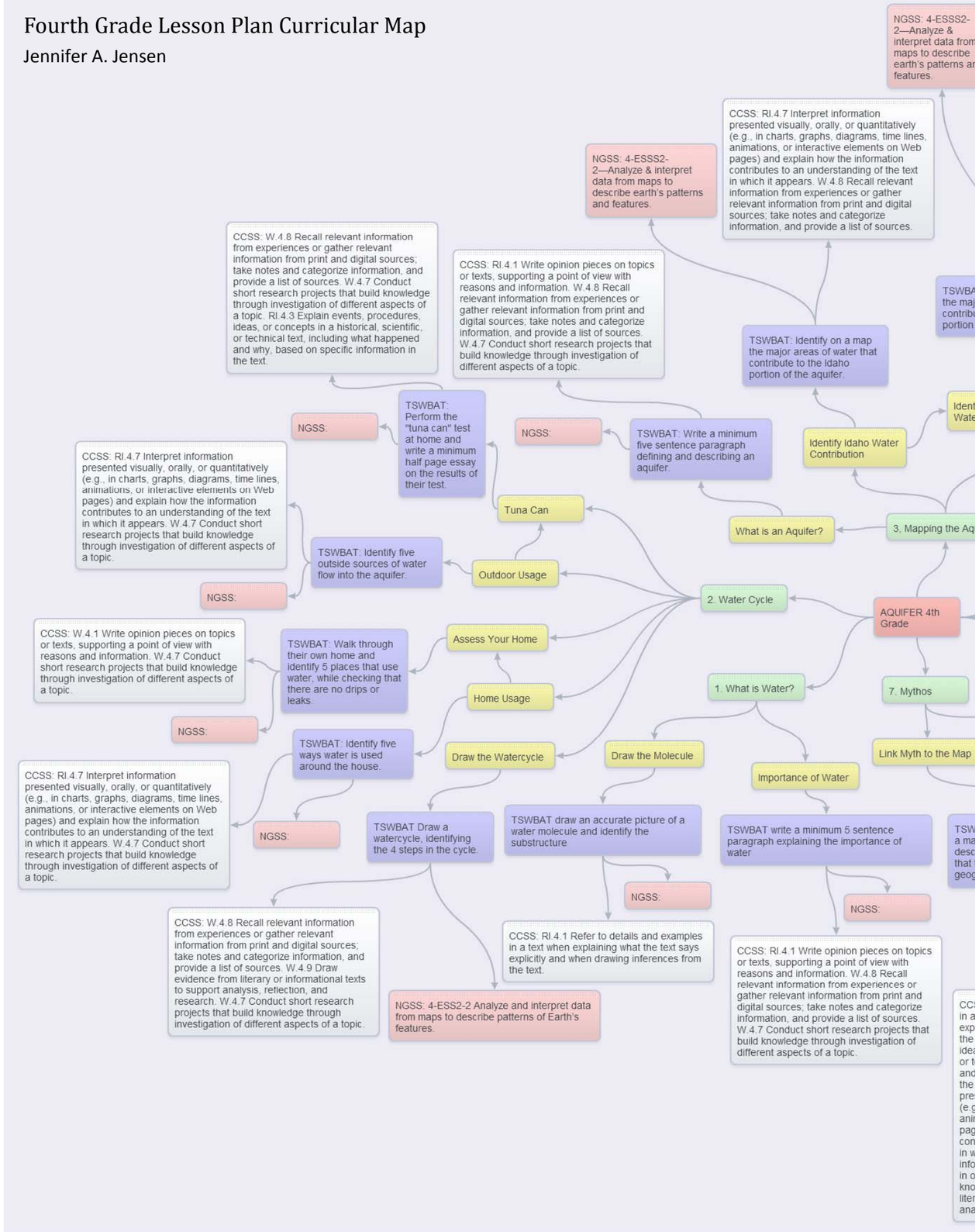
Accommodations/differentiation
Students will be allowed to finish later in class if they are not done at the end of the time allotted for the lesson.

Name: Sarah Worthington	
Subject: Science	Water Pollution
The big idea(s) or essential question(s): What is water pollution and how can we help prevent water pollution?	
Core standards addressed: CCSS: L1.1; L1.2; SL1.5; W1.7	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	Identify at least two sources of water pollution.
TSWBAT	Write complete sentences about water pollution using correct grammar, spelling, punctuation; and/or draw a picture illustrating how to help prevent water pollution.
Materials and/or technology *The Spokane Valley-Rathdrum Aquifer Atlas* pg. 21, (other?) Water pollution types and sources information found online (not provided). Lined paper, pencils White board and markers Blank white paper and colored pencils	
Activities/procedures (include anticipated time for each)	
Introduction/activator We have learned so much about the importance of water already. Today we will learn about water pollution. Each of us will write two sentences stating a type of pollution and its source. We will also illustrate our sentences and will create a book titled, "How to Prevent Water Pollution."	
Class activities (what you/students will do) Hand out information on water pollution from the *Aquifer Atlas* and any other outside sources found online. Have the students take turns reading the materials aloud. Ask and answer questions about what was read. Ask students to recall as many types of and sources of water pollution as they can think of. Make a list of all the types and sources of water pollution on the white board. When the list is finished, ask each student to take out a piece of paper. Ask that they write two complete sentences stating a type of water pollution and where it comes from.	Class activities (why you will do them) Students will get practice with using reading skills to get information. Clarify misconceptions or difficult subjects. Get the students involved and thinking deeper about the subject. Students should be able to read, see, and remember the information. Give precise directions about the expectations of the sentences. Remind them to use correct spelling, grammar, and punctuation. Walk around to help students when needed. Ask that all students tell you what they plan to write, so that you can start planning for assembling the book. Once they have finished writing and then choosing a good sentence, ask that they draw a picture to illustrate what is being said in the sentence.



Fourth Grade Lesson Plan Curricular Map

Jennifer A. Jensen



Students must pick their favorite of the two sentences to include in the book. (an example sentence might be: "People throwing trash in the water is one source of pollution." Might be improved to say, "Do not throw your trash in the water, because that is a source of pollution."	Remind them that it will be a better book if it has more different topics in the sentences, so try to make your sentence and illustration different from everyone else's. Do not copy from their friend's work. Once everyone has finished the illustration and sentence, take the work home and bind them together to form a book.
Closure/reminders Remember to do your best work because it will be published in a book for everyone to see.	
Assessment (how you will know students met the objectives - include rubrics) Check that each student wrote their sentence correctly. Check that each student drew an illustration to go with and help explain the sentence.	
Accommodations/differentiation Allow students who need extra time to finish later in the day.	

Name: Carrie Corbin	
Subject: Earth Science	Aquifer Location

The big idea(s) or essential question(s): Everyone in the world needs clean water to survive.

Core standards addressed:
CCSS RI.1.1

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	The students will be able to describe the aquifer in three sentences using facts from the atlas.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas pgs., 9, 10, 23, and 24.
Pencils and paper.
Placemat/poster of the aquifer (not supplied)
Clear plastic pop bottle (or other clear plastic container)
Two cups of gravel (or coarse sand) that will fit into the opening of the container. Water
Pump-sprayer (optional)

Activities/procedures (include anticipated time for each)

Introduction/activator
There is water all around us. Remember from the water cycle that there is water in the air. Water fills the lakes and rivers in our area. But, did you know there is water below our feet?
Time about 10 minutes for aquifer information, five minutes to write about where the aquifer is located.

Class activities (what you/students will do)	Class activities (why you will do them)
Discuss where the aquifer is located and what is it like in the ground. Have a student come to the front of the class and place rocks/sand in the clear container. (Optional) Insert a pump sprayer into the container before the rocks are placed inside. Then have another student pour water over the rocks until it is just below the level of the top of the rocks. The students will be able to see how water fills in the spaces around the rocks. (Optional) use the pump sprayer to show that a well can pull water up from the aquifer. Have the students write three complete sentences about where the aquifer is, what it is like (e.g., small spaces around the sand and gravel where water can collect), and how we can get to the nice clean water that is located there.	Show enlarged pictures from the *Aquifer Atlas* pages 6 and 11. Illustrate the aquifer and point out where the school is located on the map, above the aquifer, so they can visualize and relate to the information. Draw a rough sketch of the aquifer on the board to help them. Show the diagram from page 11 and discuss how water fills in around the rocks and gravel and sand in an area far beneath the ground we stand on.

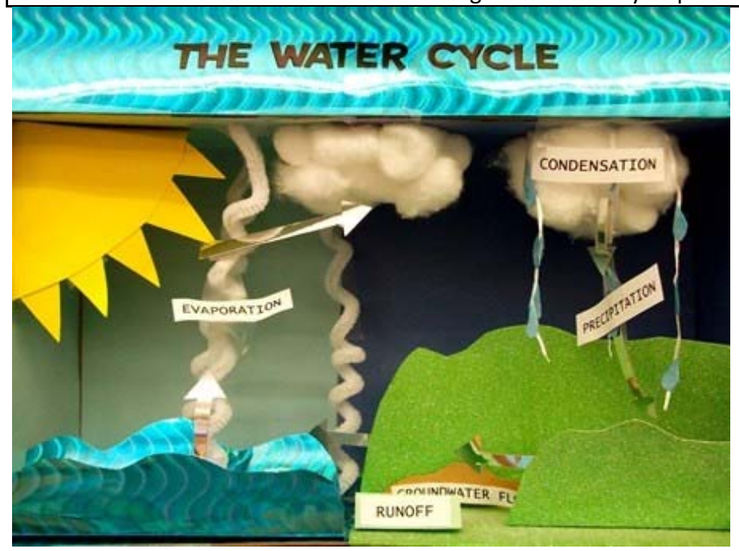
Closure/reminders
The aquifer is spread out from north of Coeur d'Alene, and all the way through and past Spokane and provides us with clean water to drink.

Assessment (how you will know students met the objectives - include rubrics)
The student sentences will describe the aquifer, where it is located, in three or more sentences. Check for complete sentences, spelling, grammar, etc.

Reflection/evaluation (after lesson is taught): The container with gravel and water is a model, and models can help us to understand complex things, and things that we cannot actually see but know exist.

Closure/reminders
All living things are affected by the water cycle. This activity provided us with the opportunity to make a model of the water cycle, whether a diagram or diorama. Models help us to understand and learn more about complex things, or to visualize how different parts work together in a setting that might be too big for us to see all of at once.

Assessment (how you will know students met the objectives - include rubrics)
Did the students illustrate major processes of the water cycle correctly? Were key elements incorporated into the model?
Were the students creative in their drawing or use of materials? Was their use of time and supplies efficient?
Did the students demonstrate understanding of the water cycle process through making the model?



Water Cycle Diorama, sourced from: https://www.pinterest.com/pin/282882420314592161/ on 29 December 2014

Water Cycle on a Plate, sourced from: http://messyjofu.blogspot.com/2013/06/summer-school-water-cycle.html on 29 December 2014

Name: Jessica Stafford	
Subject: Arts	Water Cycle Model

The big idea(s) or essential question(s): All things are affected by the water cycle. The water cycle can be more easily understood through modeling it.

Core standards addressed:
CCSS: SL.3.4

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Construct a model, diorama, or illustration that accurately demonstrates the different parts of the water cycle.
TSWBAT	Explain how the model was designed and why each symbol or material was used.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas pgs. 11-14
Any water cycle diagrams found online, or previous water cycle work the students did before.
Pencil and paper. Shoe boxes, colored paper, markers, blue, tape, scissors (for diorama)
Paper Plates, scissors, colored paper, markers, crayons, colored pencils, erasers, glue (for illustrations or paper plate model)

Activities/procedures (include anticipated time for each)

Introduction/activator
We will be working on creating a detailed diagram or model of the water cycle to help explain it and all its parts. (Here, the teacher should either choose one type of project, or allow the students each to choose which type they will work on. Either way, the students' creative project should demonstrate comprehensive knowledge of the water cycle.) This whole exercise should take about an hour, including an introduction.

Class activities (what you/students will do)	Class activities (why you will do them)
Introduction: share model or illustration ideas. Provide materials to the students. Walk through a diagram of the water cycle that is projected onto the screen. Discuss all the elements that should be depicted in the diorama or diagram. Have the students sketch their ideas with pencil first. Students should be working on their actual diagram or diorama by about 20 minutes into the activity. Have students demonstrate their model of the water cycle to the class, at whatever stage of completion they are in at the end of the activity. Students can continue to work on their models at home and share with the class later (within three days). Clean up time: 5 minutes.	Remind students of previous work with the water cycle and the aquifer. Remember how important clean water is to us all? Provide guidance and assistance to students, especially in remembering the parts of the water cycle, and thinking about how these might be depicted in the diorama or diagram. Remind students that this is individual work, and that the idea is to demonstrate understanding of the water cycle. Allow students to bring their models home and maybe add unique touches with items they have at home. This allows for additional creativity and more in-depth models to share. When sharing, students get to see each other's drawings and discover new ways of representing information. Allow students to explain their thought processes when drawing or building the diorama of the water cycle.

Name: Sara Worthington and Carrie Corbin	
Subject: Social Science	Importance of the Aquifer

The big idea(s) or essential question(s): Why is the aquifer water important to us for survival?

Core standards addressed: CCSS: SL.1.1; SL.1.5; L1.1; RI.1.1

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Students will be able to identify who uses the aquifer and list four ways in which the water from the aquifer is used in daily life.
TSWBAT	Create a drawing of one way the student uses water, and write one sentence about the picture, using correct grammar, punctuation, and spelling.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas pg. 11 and 16.
Pencils and paper, dry erase board and markers, crayons or colored pencils

Activities/procedures (include anticipated time for each)

Introduction/activator
Everyone here knows about water, but have you ever thought about how important it is to so many things? Why is the aquifer important to you and how do you use it every day?
Time about ten minutes for information sharing and discussion about the importance of the aquifer and about 15 minutes to draw one or more ways they use water and to write a good sentence about the drawing.

Class activities (what you/students will do)	Class activities (why you will do them)
Ask students to raise their hand and tell about some way water is used. Ask the students if they can think of anything that they or their parents do that involves water from the aquifer. List all these uses on the white board. Once the list feels complete, hand out blank sheets of paper. Ask the students to draw one way they use water on the blank paper. Ask that they also write at least one sentence on the paper by their drawing that explains what the picture is about. Use correct spelling, grammar, and punctuation.	Show an overhead picture of *Aquifer Atlas* page 11 and discuss the different uses seen in this picture for the water from the aquifer. This will get the students to begin thinking about the importance of and uses of water. Give the students a minute to think about what they and their family do that may use water from the aquifer. Both of these will help the students think a little bit deeper about the subject. Prompt the students with subtle clues if they are forgetting important uses of water. Clearly instruct the students to draw a picture of one way they use water on the blank paper. And then, to write at least one sentence using correct spelling, grammar, and punctuation to describe the picture.

Closure/reminders
The aquifer provides us with high-quality water that helps keep us healthy and strong. Having the aquifer in our community is a wonderful natural resource that benefits everyone. Ask students to go home and pay attention to how much water is actually used every day in their home.

Assessment (how you will know students met the objectives - include rubrics)
Check for completion of assignment: one finished drawing of a way they use water and a complete sentence describing the picture.

Accommodations/differentiation: Provide crayons or colored pencils for students who need them.

Reflection/evaluation (after lesson is taught)
Have all students line up and get a drink of water before or after I begin the lecture. Then tell them that they have just used the aquifer. This will connect the aquifer directly with them.

Name: Carrie Corbin and Sarah Worthington	
Subject: Earth Science	Water Conservation

The big idea(s) or essential question(s): Every person in the world uses water. What is water conservation? How can we help conserve our water?

Core standards addressed:
CCSS: RI.1.1; RI.1.10

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	The students will be able to list three ways they can help conserve water use in their daily lives.
TSWBAT	Read and comprehend the worksheet on water conservation and answer questions about the subject.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas pg. 16
Spokane Aquifer Joint Board Virtual Field Trip about water conservation: http://www.spokaneaquifer.org/education-awareness/elementary-water-conservation/field-trip/

Worksheet on last page of this plan. Pencils, paper.
Slides with pictures of water use (not supplied)

Activities/procedures (include anticipated time for each)

Introduction/activator
We use water every day, right? What are some of the ways use used water today? This lesson is on water conservation so there is enough to go around for everyone.
Time about 20 minutes to go through the field trip information and five minutes to write about ways we use water and about five minutes to write about ways to use less water.

Class activities (what you/students will do)	Class activities (why you will do them)
Hand out the worksheet on the last page of this plan. Give the students time to look through the pictures. Open the virtual field trip and go through as much as possible in the time allotted. Discuss conservation ideas from the virtual field trip. Ask the class questions about what they have just seen and read. What are some things that we do that use water? Ask, "do you think that some of the water we use gets wasted? What are some ways we may be careless about our water use? Can you think of any ways to help reduce the amount of water we use in a day? Get any ideas they have on how to conserve water. Students will write three sentences, one each about how they might use less water at home or school. Students can color the worksheet and can "X" out pictures showing careless use of water.	Use the Virtual Water Conservation Tour to demonstrate water use and conservation principles. Keep a list of ways we use water on the white board. Ask about wasting water, and explain that means being careless with using the water that comes out of the faucet. Explain the concept of conservation: that we should be careful about the water that we use, and to try to use less.

Closure/reminders
We have learned how important water is, and now we have learned how to conserve it. Saving water is a good thing for everyone, so keep this in mind when you are using water at home.

Name: Jessica Stafford	
Subject: Language Arts	Writing, Importance of Water

The big idea(s) or essential question(s)
Water plays an important role in the lives of all living things.

Core standards addressed: CCSS: W.3.7; W.3.8

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Explain through writing how water is important in their lives
TSWBAT	Describe how their family uses water at home, and how usage varies depending on the time of year.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas p. 16.
Internet: look up how others use water, locally and around the world. Paper and pencil

Activities/procedures (include anticipated time for each)

Introduction/activator: This morning, I took a shower, brushed my teeth, and made breakfast. What do these all have in common? How does your family use water at home? Think about indoor uses and outdoor uses. Does your family use water differently depending on the time of year?

Class activities (what you/students will do)	Class activities (why you will do them)
Ask students to think about how they use water on a daily basis and how life would be if they did not have water to use. Think about a memorable experience with water. Discuss water use on a larger scale. Think critically about how usage varies throughout the year. Students will write a short story about all the ways they use water, and why water is important to them. Or, students can write about an experience they have had with water, such as a fun time at the beach or on a boat. Why is clean water important to having fun like that? Have the students describe what it would be like if the water ran out or became polluted (e.g., muddy and bad-smelling). Students then draw four illustrations, one each for the different seasons, about how water is used around the house. They should include, watering lawns and plants, playing in the sprinkler, washing cars, etc.	Ask students to think about how they use water on a daily basis and how life would be if they did not have water to use. (use examples such as the drought in California or other parts of the world. Find information about very dry places in the world, such as the Sahara Desert, or even the Columbia Basin. Ask students each to suggest a way water is used. Write these ideas on the board. They can include recreation, like swimming, boating, fishing, or splashing around in a stream. This allows the students to share the experience, and to directly relate water usage from the aquifer (or from a recharge area such as a beach at one of the local lakes). Students can use these ideas in their short story. Walk around the room to assist students who need prompting. Identify how crucial water is in each of our lives. Through drawing water use during each of the four seasons, they can see that water use increases in the summer months.

Closure/reminders: Water plays an important role in the lives of all living things. Today we realized just how much water we use and that we need water every day, and that we can have fun with water. We also saw that the usage varies throughout the year.

Assessment (how you will know students met the objectives - include rubrics)
Students should have come up with up to five ways they use water around the house. Student should describe this and others, and why water is important to them in the short story.
Student should illustrate and list seasons and different water uses during those seasons.

Third Grade

Name: Jessica Stafford	
Subject: Language Arts	Rainfall Story

The big idea(s) or essential question(s)
Water plays a significant role in our lives.

Core standards addressed:
CCSS: W.3.5

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Create a short story about rain using creative writing strategies and imagination.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas pgs. 11 and 12
Paper and pencils

Activities/procedures (include anticipated time for each)

Introduction/activator
Talk about rain, and where it might have been yesterday.

Class activities (what you/students will do)	Class activities (why you will do them)
Introduction: answer questions about the water cycle. Look at the water cycle diagram (*Aquifer Atlas* pages 11 and 12). (5 minutes) Discuss how water can travel from one part of the world to another through the water cycle (10 minutes) Write a short story about rain. Be creative and imaginative. (25 minutes)	Provide background information about the water cycle. Ask students if they have heard of the water cycle, or its parts, like evaporation, condensation, precipitation, etc. Explain that the water cycle moves water all around the globe; kind of like an airport for rain. Where could it have been yesterday? Where is it going tomorrow? Assist students to write creatively.

Closure/reminders
Water plays an important role in our lives. I hope your writing helps you visualize the water cycle and how rain can travel to us from far away places via the water cycle.

Assessment (how you will know students met the objectives - include rubrics)

Did the student demonstrate creativity?
Did the student use proper grammar, sentence structure, spelling, and punctuation?
Was the story descriptive of the water cycle, or a portion of it?

Assessment (how you will know students met the objectives - include rubrics)
Review and correct worksheets and sentences for understanding and completeness.

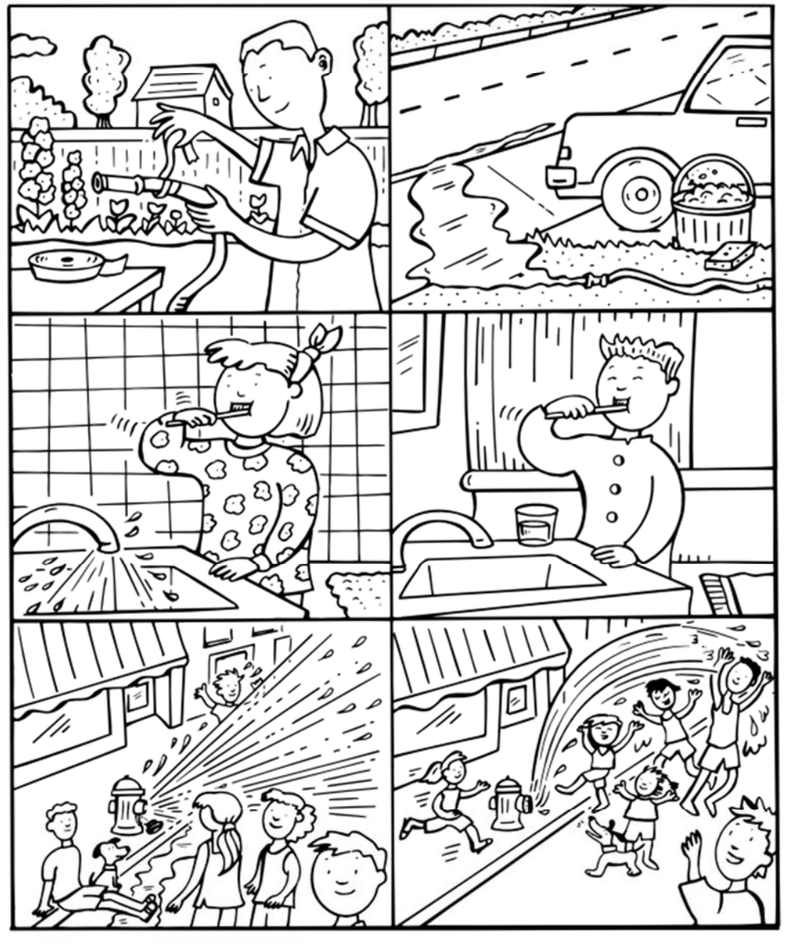
Accommodations/differentiation
Lower-reading levels can sit at the front table and read information with the teacher as a group to provide more direct help.

Reflection/evaluation (after lesson is taught)
Look for a local area special guest to come in and talk about water use in the community. Let a faucet drip slowly into a measuring cup or container with a known volume; keep track of how long it takes to fill, and then calculate how much that dripping faucet would waste in a day.

Name _____

Explore Activity

Conserving Water



Notes for Home Your child colored pictures to show water savers and crossed out pictures to show water wasters.
Home Activity: Ask your child to tell you how people can save water while brushing their teeth.

Name: Carrie Corbin	
Subject: Geography	Maps

The big idea(s) or essential question(s): maps are ways to model the world so that we know how to travel around and understand where things are.

Core standards addressed:
CCSS: RI.1.1

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Students will be able to identify four geographical items that are on maps.
TSWBAT	Students will create their own map with a complete legend with at least four commonly found symbols.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas any page with a map.
Media of several different maps of the area (not supplied)
Copy of image/symbol worksheet in this lesson.
Copies of Barefoot Island map on last page of this lesson.

Activities/procedures (include anticipated time for each)

Introduction/activator
Have you ever been lost, or simply not known what direction to go? Did you ever look at a map to help you get somewhere, or to know where something is relative to where you are? Today we will learn about geographical points on a pam and how maps work by using symbols to show where things are located.

Class activities (what you/students will do)	Class activities (why you will do them)
Discussion about what they see on the map and what they think it means. Discuss how big an area the map shows and how long it might take to drive from a familiar point to another familiar point. Hand out the worksheet with the pictures to label. Label each picture with what you think it represents. These are not real mountains or rivers, but symbols we recognize as a mountain or river. Symbols are important on maps to show us where different things are. Which symbols would you use to help describe an area on a map if you made one. How do these symbols help us when we are looking at a map? But maps use different symbols, and we need to know what the symbol means on a given map. Does anyone know what a map legend is?	Maps show us where we are and where we are going. There are pictures and symbols that indicate different land forms in relation to other places. Let's see if we can pick some of these out. Inquire more deeply about the symbols. Use the worksheet with drawings of symbols to demonstrate that, for instance, it isn't a mountain but a symbol for a mountain. Can they tell us if it is rough terrain, or if there is a road, or where the sun might come up? Explain that a map legend is how map makers describe what all the symbols mean. All maps have a set of common features, and a legend is one of them. Other common features include • Legend • Compass (N. S., E., and W.) • Scale (an inch on the map represents a set distance on the ground) • Information to place the map within a larger context (such as an inset map that shows where the map is in relation to the whole United States.)

Name: Kristin Wanner	
Subject: Speaking and Listening	Aquifer Topic Review Poster

The big idea(s) or essential question(s): The aquifer is something people throughout the region use all the time. We will go back and remind ourselves of the aquifer lessons we have done. Displays are used for people to look back on, or to use as a guide to explain a topic.

Core standards addressed: CCSS: 2.SL.3; 2.W.7

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	The student will be able to demonstrate their knowledge of the aquifer and answer at least one question that relates to the aquifer.
TSWBAT	The student will be able to combine three of their aquifer assignments and create a poster presentation.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas
Paper and pencils, glue stick, markers, poster paper, and three aquifer assignments.

Activities/procedures (include anticipated time for each)

Introduction/activator
We have learned a lot about the aquifer. By now you should all have a good understanding about some parts of the aquifer. Today, for review, I am going to ask each of you a question about the aquifer: answer them as best as you can, adding as much information as you can think of. Time: about 15 to 20 minutes. (Optional: create a test about aquifer-related subjects, and then use the *Aquifer Atlas* to find the topic and then revise those answers.)

The second part of this is a fun lesson. You have all worked very hard on all of your aquifer assignments, and today we are going to take a few of them and put them on poster board so that we can display them along the classroom walls. I would like you to take out your water cycle worksheet (or, use the water cycle diagram in the *Aquifer Atlas* pg. 11, or the Aquifer Placemat). I also need you to take out the story you wrote using the vocabulary words. Take out your mapping work, too, where you measured distances. The last thing is the list of ways we use water that we completed after the aquifer trail/online overhead activity. You will get a poster board, a glue stick, and markers. Provide 20-30 minutes for this assignment.

Class activities (what you/students will do)	Class activities (why you will do them)
Students are given a poster board and supplies. The students are instructed to give the poster a title (such as "The Aquifer"). Glue any work that has been done about the aquifer to the poster. The students can draw images of the aquifer, of the story from *Aquifer Atlas* page 3, water use and conservation around the home, and mapping concepts learned.	This activity is helpful in allowing me to see if the students retained the information from previous lessons about the aquifer. If many students struggle with any question, I might need to provide further review. The purpose of this activity is to tie everything together and have it displayed for the class and the school. They will be able to look over their work and continue to learn about the aquifer by seeing what others display.

Closure/reminders: The aquifer is an interesting thing, and we rely on it every day. It is good to know something about the aquifer, which is located right under our feet. We have created a poster about all that you have learned to help you to remember.

Assessment (how you will know students met the objectives - include rubrics)
The student will have answered at least one question that relates to the aquifer. The student will have created a poster to present the subjects they have learned.

Name: Kristin Wanner	
Subject: Writing, speaking, and listening	Water Use and Conservation

The big idea(s) or essential question(s): Water us used throughout the world for many things. But there isn't much fresh water around, so we should conserve it.

Core standards addressed: CCSS: 2.W.8; 2.SL.2

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	The student will be able to use their knowledge of the aquifer and provide at least two ways they use the water from the aquifer.
TSWBAT	The student will be able to list at least three ways they can conserve water at home.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas pg. 16. SAJB Elementary Water Conservation education site: http://www.spokaneaquifer.org/education-awareness/elementary-water-conservation/.
White board, markers., Paper and pencil.

Activities/procedures (include anticipated time for each)

Introduction/activator: Today we are going to learn some ways that each of our classmates uses the aquifer. I am going to call on you and you need to tell me two ways that you use the aquifer. Then I want you to write down the answers I put on the board so you can have them for later. This portion should require about 15 minutes.

To learn about why it is important to conserve water, we will go through an online water conservation trail, and you will see why it is important to use less water. You will think about all the ways we might be a little careless about water use. Then we will list them out on the board, and you will copy the list so that you can have them for later. This portion should take about 20 minutes.

Class activities (what you/students will do)	Class activities (why you will do them)
Students will be called upon to give an example of how they use water. Start with their use this morning (e.g., brushing teeth, or drinking). Then expand into other household uses. Write the responses on the board, but also have the students write them down so that they can use the list later. Students should be asked individually to provide input as we progress through the water trail. The students will make a list on their paper of different ways they can conserve water at home. I will walk around the room providing assistance to those who need it. I will have each of them tell me one of the things they listed, and then write it on the board. Once we have completed a list on the board, the students will write down anything they had not written on their paper before.	The point of this activity is for the students to get an understanding of the many different ways we use the water in the aquifer every day. By having the students write down the different ways we use the aquifer, it allows them to see how important the aquifer is to us. Then the students will see that there are many different ways we can conserve water. Note that California is in a long term drought, and that there is very little water to go around. Then, start the water conservation trail activity by accessing the online trail at the URL provided above. Go through as much of this as possible in the time allotted.

Closure/reminders: Now that we know how we use water and how we can use a little less, keep these lists with you and think about other ways that water is used, and sometimes wasted.

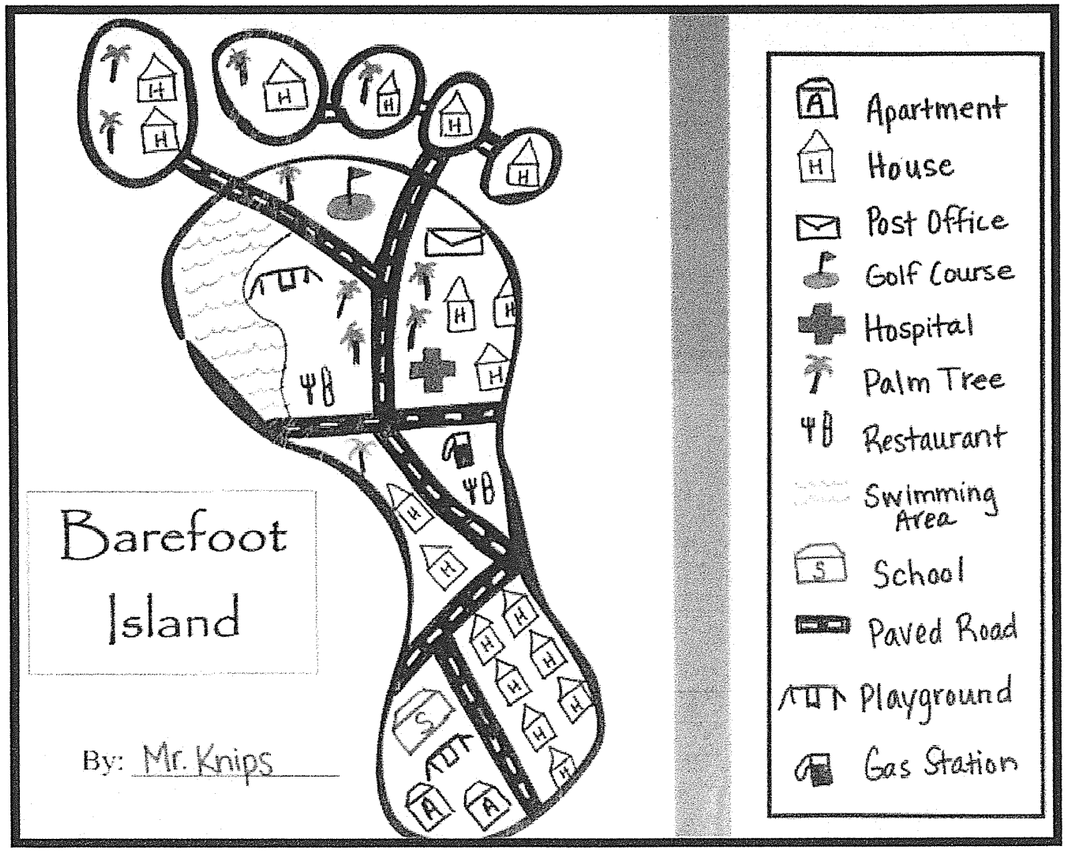
Assessment (how you will know students met the objectives - include rubrics)
Students will have handed in a list of ways they use water and ways they can conserve. Be sure that spelling is correct, and that a complete list of each is provided.

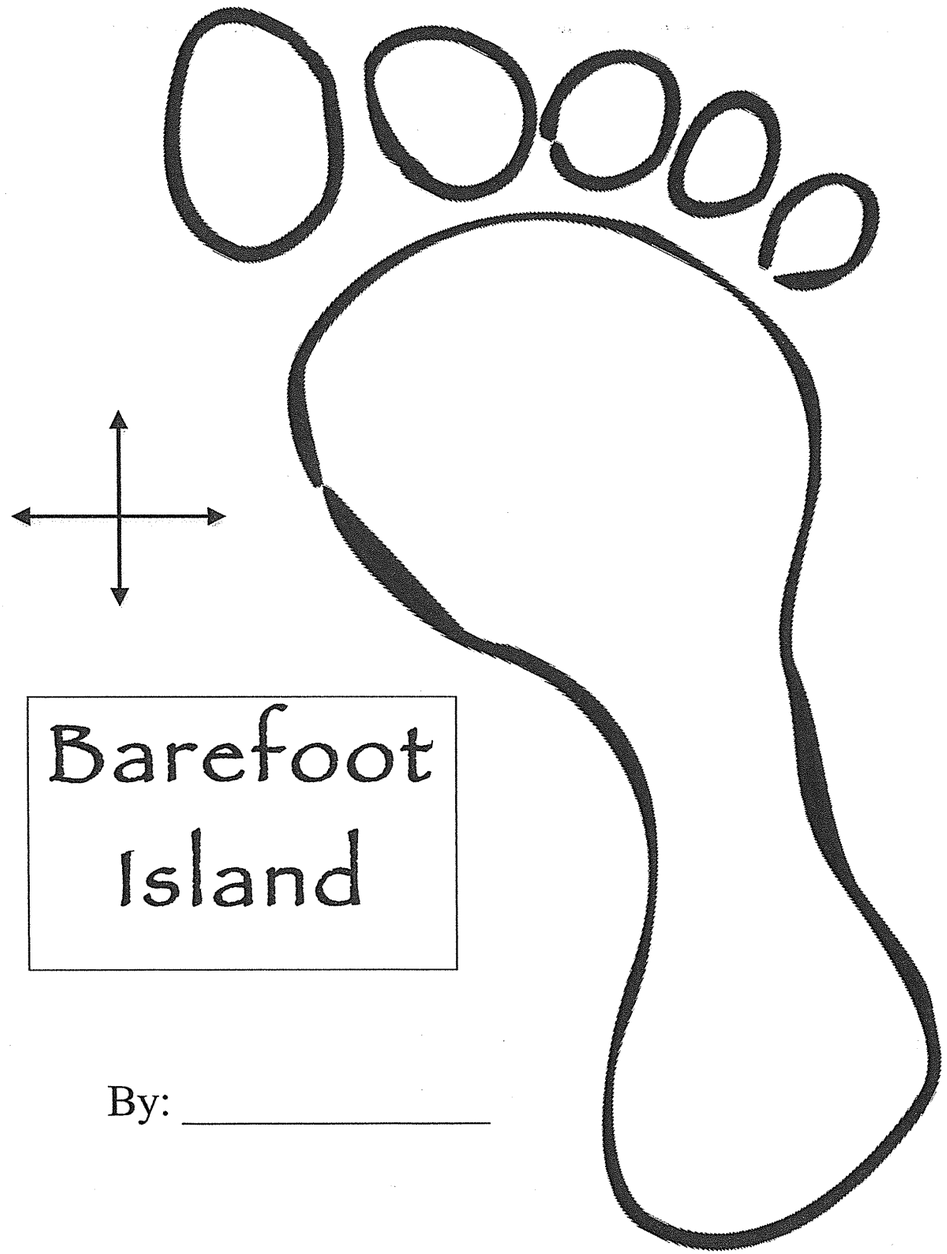
What symbols do you see on the example map and the legend of Barefoot Island? You are going to create your own legend and map. Its name is barefoot Island and you get to decide what goes on your island. Have a few students bring their map and legends up to put on the overhead as examples.	Hand out or display the example map of Barefoot Island. Go over the features that all maps should have: Legend What is it missing? • Compass • Scale Context map Go ahead and add these (optional) Hand out empty Barefoot Island Map. Students should create their own map.

Closure/reminders: Maps are a great way to learn about an area and become familiar with where everything is located. Maps can help us plan a trip by telling us what the area is like.

Assessment (how you will know students met the objectives - include rubrics)
Did the students use a minimum of five symbols and the required features on a map?
Completed handout with at least three of four answers right.

Reflection/evaluation (after lesson is taught): Find other maps that the students might be familiar with. For instance, maps of the school, or the town.





Name: Kristin Wanner	
Subject: Reading	Spelling and Vocabulary
The big idea(s) or essential question(s) Everyone uses words, but to use them, you need to know what they mean and how to spell them properly.	
Core standards addressed: CCSS: 1.RI.4	
Objectives (what the students will be able to do as a result of the lesson)	
TSWBAT	The students will be able to spell at least 10 vocabulary words from the *Aquifer Atlas* Glossary, and will be able to determine the meaning of them.
Materials and/or technology *The Spokane Valley-Rathdrum Aquifer Atlas* pgs. 26 and 27. Pencil and paper.	
Activities/procedures (include anticipated time for each)	
Introduction/activator I hope everyone has been studying for their spelling test. For the test, I am going to tell you the word and then I will also give it to you in a sentence. If you are having a hard time remembering how to spell a word, be sure to try your best and sound it out. Please take everything off your desk except for a pencil and paper. This portion should take 10 minutes. Now that we have taken a spelling test, I want you do demonstrate that you know what these words mean. Write the definition of each of the words you wrote down during the spelling test; if you need more space, re-write some of them on the back of the sheet, or on another piece of paper. If you are having trouble with one, skip it and do the ones you know, and that way, you can get all the ones you do know down, and can work on those you are less sure of at the end of the exercise. This should take about 20 minutes.	
Class activities (what you/students will do) I will give the students a word and use it in a sentence. Students should write the word down on their paper, leaving space for writing a definition later. Once the spelling test is completed, the students will write down the definitions of the words. Take out the *Aquifer Atlases* and try to find all ten words. If this helps you to edit your definitions to make them better, then go ahead and edit them.	Class activities (why you will do them) The purpose of this activity is to familiarize the students with words associated with the aquifer, and to improve their spelling. I will choose ten words from the *Aquifer Atlas* Glossary that are at an appropriate level for the students, and will prepare a handout with the words and the definitions for them to study with at home or in class.
Closure/reminders: Put your name on your paper and pass it to me. I will grade them and return them to you. Keep them so that if you ever are having trouble remembering what a word means, you can look back at your work.	
Assessment (how you will know students met the objectives - include rubrics) I will know the students have met the objectives because they will have turned in completed work. This means they will have written the vocabulary words and their definitions.	

Name: Kristin Wanner	
Subject: Writing	Aquifer vocabulary

The big idea(s) or essential question(s): Writing is used every day throughout the world for various reasons such as, stories, paperwork, and lists.

Core standards addressed:
CCSS: 2.W.2

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	The student will be able to write a story related to the aquifer using at least five of the vocabulary words in the glossary of the *Aquifer Atlas*.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas pgs. 26 and 27.
Pencil and paper.

Activities/procedures (include anticipated time for each)

Introduction/activator
Today we are going to write a story about the aquifer. You need to use at least five of the aquifer vocabulary words that are listed in the Glossary pages of the *Aquifer Atlas.* Your story can be about anything you want, as long as it has something to do with water. This is going to be fun, since you can use your imaginations. Allow students 20 minutes to write on their own.

Class activities (what you/students will do)	Class activities (why you will do them)
Be sure each student has a copy of the *Aquifer Atlas*. Each student should have a pencil and paper out and ready to write on. Students are instructed to write a story that relates to water and includes at least five of the vocabulary words found in the *Atlas* Glossary.	The point of this activity is that the students become familiar with some of the vocabulary words, and to use those words in a story to demonstrate understanding of the words. Observe and walk around the room, answering questions the students may have. Some vocabulary words are over the students' heads, so prompt the students to use words they are able to comprehend.

Closure/reminders
I hope you enjoyed connecting the vocabulary words with your imagination and writing a creative story. I will look over these and then you can revise them later in the week. We will revise them so that we can improve our writing. There will also be a spelling test over the vocabulary words that you used in the stories (optional).

Assessment (how you will know students met the objectives - include rubrics)
Ensure that five words were used in each story. Determine whether the words were used correctly, demonstrating understanding of the vocabulary.

Accommodations/differentiation
Many words in the Glossary will be above some students' ability level. Work with students of different abilities to grasp the vocabulary words they are able.

Adapted from similar plans written by Sara Worthington and Carrie Corbin

Subject: Earth Science	Water budget

The big idea(s) or essential question(s): Aquifers all over the world have a water budget. Equal water flows out as flows in to maintain a balance of constant water.

Core standards addressed: CCSS: RI.1.1

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	The students will be able to find and list three of the large water sources that flow in and out of the aquifer.
TSWBAT	The students will be able to find and list three places along the river where river water is contributing to, or recharging, the aquifer.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas p. 11, 12, 13, and 14.
Paper and pencil

Activities/procedures (include anticipated time for each)

Introduction/activator
How does the aquifer refill and maintain water for us to use? Do the area lakes and rivers have something to do with that? Where does the water in the aquifer go, eventually?

Class activities (what you/students will do)	Class activities (why you will do them)
Discuss what the students see on page 14. Discuss how to read a graph. Ask, "has anyone ever used a graph before?" What information does it tell usa bout the aquifer? What other ways can we use graphs? How many places are listed on the map on page 14. What can you ell about the graph? What does the blue on the graph mean? What does orange mean? Find the three sources of water that contribute the most to the aquifer and write them down on your paper. Locate these three places on the map. Find the three largest sources of water that leaves the aquifer. Write them down.	Discuss how graphs work. Make a simple graph of the number of boys in the class, compared with the number of girls. Which number is larger? What kind of information does this graph tell us? Make another graph of students who "like cats" and "like dogs" and "like both." Which number is larger? How can this help us make comparisons? Discuss the concepts of "losing reach" (that water is being lost from the river because it is flowing into the aquifer), and "gaining reach" (that the water is flowing out of the aquifer, and into the river). Note that this page shows us the interaction of places listed on the map where the river and the aquifer interact in different ways. Water also leaves the aquifer from our use. We pump water out of the aquifer for industry, agriculture, and household use. Show the advanced students more complex information, like that surface flow provides 28 million gallons per day to the aquifer. Show them where to find the information.

Closure/reminders: The aquifer has a water budget, where water flowing in equals water flowing out. Water that flows into the aquifer helps to keep the water level up and ensure that we have fresh clean water. Think back to the lessons on pollution prevention and water conservation.

Assessment (how you will know students met the objectives - include rubrics)
Did students list three places of surface water and aquifer interaction from the map? Students should have listed, "Spokane River," "lakes," and "areal recharge."

Reflection/evaluation (after lesson is taught): This is an advanced lesson for first grade. It can be adapted for grades 1-3. Also, it might be incorporated with the use of an aquifer model such as the one on page (xx) of this *Guide*.

Second Grade

Name: Kristin Wanner	
Subject: Math	Mapping and distances

The big idea(s) or essential question(s): Different points on a map or atlas are represented in a way that people can locate the real points on the ground.

Core standards addressed:
CCSS: 2.RI.7

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	The student will be able to locate Mt. Spokane (or other familiar points on a map).

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas pgs. 5, 19.

Activities/procedures (include anticipated time for each)

Introduction/activator
We are going to be learning about maps. We will be learning how to read a map, how to use a compass, and how to measure different distances. For this lesson, we are going to learn how to locate Mt. Spokane on a map in the *Aquifer Atlas*. (Time allotted is about fifteen minutes for this whole exercise: Introduction for 5-minutes; 5-minutes to demonstrate some familiar places on the map; 5-minutes for students to locate Mt. Spokane.

Class activities (what you/students will do)	Class activities (why you will do them)
Hand out one copy of the *Aquifer Atlas* to each student, or to pairs of students. Students, look at this map, and find lake Coeur d'Alene, or Hayden Lake. Find the Spokane River, and where it goes. Now, locate Mt. Spokane on this map.	I will do this activity so that when I teach the measuring lesson, the students will be able to identify objects on a map easily. This is a key piece of that future assignment because they are going to measure the distance between two points; to do that, they need to be able to locate points on a map. Once every student has an atlas, I will demonstrate what some familiar features (such as a river or a lake) are on the *Atlas* map on page 5 or page 19. I will walk around the room to be sure each student has correctly identified the mountain.

Closure/reminders
After today's lesson, you should be familiar with how to find points on a map. If asked, you should easily be able to point out Mt. Spokane on a map.

Assessment (how you will know students met the objectives - include rubrics)
The student will have pointed out Mt. Spokane to me.

Name: Kristin Wanner	
Subject: Math	Measuring

The big idea(s) or essential question(s): Measuring things is important for many things. You can measure distances between places on a map.

Core standards addressed:
CCSS: 2.MD.1

Objectives (what the students will be able to do as a result of the lesson)

TSWBAT	Provided an atlas or map, the student will be able to measure the distance between two points, by converting inches to miles, using a ruler and the map scale.

Materials and/or technology
The Spokane Valley-Rathdrum Aquifer Atlas p. 3, 19
Ruler, pencil, paper.

Activities/procedures (include anticipated time for each)

Introduction/activator: In the last lesson, we learned about where Mt. Spokane is on the map. We also found some features, such as rivers and lakes. Today, we are going to read a story and then find how far the character in the story traveled by doing some measurements using a map in the *Atlas Aquifer.* It is important to become familiar with measurements since you will definitely use them outside the classroom. Providing *Aquifer Atlases* and reading the story should take about 10 minutes. Allow the students 20 minutes to make their measurements and distance conversions.

Class activities (what you/students will do)	Class activities (why you will do them)
Each student is provided with a map, a ruler, and a pencil. I will read the story on *Aquifer Atlas* page 3. Find the southern point of Lake Pend Oreille on the map. Then, find where the Spokane River crosses the Idaho/ Washington state line on the map. Measure the distance on the map between these two points. Place your ruler next to the scale on the map. Each inch on the map represents a certain number of miles on the ground; this is what the scale is telling you. In other words, each inch on the map means about (xx) miles on the ground. Determine how many miles it is between the southern end of Lake Pend Oreille and the river where it crosses the state line. Determine how many miles it is from Mt. Spokane to your school, or to another familiar location.	The point of the activity is to have the students become familiarized with measurements, and how to convert them from inches to miles (or kilometers) using a ruler and the map scale. The students should complete an activity that relates the legend to real locations on the map, and to see the different lakes on the map that are near where they live. I will model to the students how to measure distances on the map. I will then explain how to convert a distance measured on the map to a distance on the ground using the map's scale. Walk around the classroom, assisting students with doing a number of measurements of distance.

Closure/reminders: After reading the legend and completing our assignment, you should not only be able to locate Mt. Spokane, and other familiar features such as lakes and rivers, but you should be able to convert inches to miles using the ruler and the scale, and then to determine the distance between two objects.

Assessment (how you will know students met the objectives - include rubrics)
Students will have handed in a paper with four correct measurements. I will be able to see their work and be able to tell if they are correctly converting inches to miles.

Accommodations/differentiation
This is potentially a challenging assignment for 2nd graders. Allow students who are struggling extra time, or to take it home and work with parents/guardians to complete.