|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **3D-Student Science Performance**  *Author(s): Holly Thomas-Hilburn* | | | | | |
| **Grade: 2nd grade** | | | | **Lesson Title**  **Snow melts from Mountains** | |
| **Lesson Topic: Water exists in different states and places on the earth.** | | | |
| **Performance Expectations (Standard) from State Standards or NGSS:**  **2.E1U1.4:** Develop and use models to represent that water can exist in different states and is found in oceans, glaciers, lakes, rivers, ponds, and the atmosphere. | | | | | |
| **Lesson Performance Expectations:**   * **Students plan and carry out an investigation to observe how ice melting from a mountaintop can move through the water cycle.** * **Students communicate arguments from evidence using models about how wind and water changes Earth’s surface.** | | | | | |
| ***Use the column to describe the phase(s) of the 5E Instructional*** | **Student Science Performance**  ***Phenomenon:* Sometimes we see snow on the mountains, then we don’t.**  ***Gather***  *Begin with photos of local mountains covered with snow.*   1. Students observe photographs and ***develop questions*** about where the snow goes.   Then zoom in on snow. Ask what is snow made of? Snow is composed of crystals with regular shapes. Show photos of ice. What is ice made of? Ice is a solid all the flakes are joined together in a bigger solid chunk and it’s clearer. Explore the relationships between snow and ice. Snow and ice are made of water. They are both in a solid form.   1. Class discussion: What happens when snow melts?   *(Teaching suggestions: Students often will note that snow melts into water. Some clarifying questions to help the probe deeper into their understanding might be “Snow isn’t water?” or “But where does the liquid water go?) These questions would be meant to build the intrigue about the phenomena.*   1. Students ***construct*** ***their own models*** ofmountains/landscapes and explore ice melting on them. Note: the model should have a nonporous, impermeable base, Use overturned cups or other items, covered with aluminum foil to build the landforms inside a roasting pan for each group. 2. What happens when water melts on a mountain? 3. Where does water flow?   ***Reason***   1. Students discuss the outcomes of their models and how the ***structure*** impacts the ***function*** of different models.   *Questions to initiate class discussion:*  *Q: When water is in the solid form. What did it look like? What did it do?*  *Q: When water is in liquid form. What did it look like? What did it do?*  *Q: Which points with the water flow from and to?*  *Q: Did all of your water end up in the same place?*  *Q: What made water flow in different directions?*  *Q: What kinds of structures did it form?*  *Q: What functions do the different land structures have?*  *Q: Can you divide up your model into different sections that flowed to different low points?*  ***Communicate Reasoning***   1. Students ***draw a map of their model to share with others.***  * Include mountains and high points and label the High * Include low points and label them Low. * Include watershed boundaries-the areas that flow all to one low point. * Include arrows that show how water got from the top of the mountain to the bottom (rivers)  1. Have students cover their models with plastic wrap and place them in the sun or under a lamp after they share their maps. This creates an atmosphere around their models to launch the next set of investigations. 2. Students ***develop and use their model to explore*** how water droplets got onto the top of their models. They develop a list of questions from the observations and exploration.   Additional questions to explore:  Q: Where were models left and for how long?  Q: Do all models have the same amount of water?  Q: Where did the water come from?  Q: How can you generate more evidence for where the water comes from?  Q: What do you think these water droplets represent?  Q: What does this space between the plastic and land area represent? Did water move through there? What form was it in?   1. Students ***plan and carry out investigations*** about how water droplets form on the top of the models.   *(Teaching Suggestions: Students might plan investigations such as putting water in a cup with and without a cover, recreating the conditions of their model with and without heat sources, or putting water in a low container and observing it throughout the day at different temperatures. These may take more than one day to complete. They should also design a way to record data: observations and/or measurements Students could conduct experiments in plastic cups with gradation lines already drawn on (or beakers, graduated cylinders, or measuring cups, if this equipment is available) to help measure the amount of water lost over time, or mark the level on a cup and observe each day*  ***Reason***   1. Students record data from their observations of their models. 2. Students present their data to their peers sticking to the evidence, that is exactly what they were able to observe and/or measure. 3. Students ***analyze and interpret*** data to ***construct explanations*** of how water drops move from liquid water on the land surface to the atmosphere. 4. Teacher makes a list of student questions on the board.   Additional questions to explore:  Q: Where could liquid water possibly have gone?Q: It could go down right? Did it? Let’s make sure.  Q: Where did the snow and ice come from on the mountain again?  Q: Is the snow and ice always on the mountain? Why or why not?  Q: What does heat, the Sun, have to do with the form that water is in?  Q Can water be in the air? If it is what does it look like?  ***Communicate***   1. Students use their maps and evidence from their water vapor investigations to communicate and explanation based on evidence of what happens to snow when it melts and what happens to liquid water when it sits on the land surface in the sun | | | | |
| **Formative Assessment for Student Learning** | | | | | |
| **Elicit Evidence of Learning:** *Studenst* ***develop a model*** *for how water moves through the earth system and constructs an explanation of how water moves in the atmosphere.* | | | | | |
| **Evidence of Student Proficiency**  *Student can trace the flow of water on a map and point out structures where water flows. Student can share examples of evidence that demonstrate that water moves through the atmosphere.* | | **Range of Typical Student Responses**  ***Full Understanding:*** *The student can trace the path of snow from mountain tops as it melts melts and becomes liquid water a part of rivers, lakes and ponds. The student can guess what structure will be formed based on the shape of the land (river or pond). They can expand the path of the water to follow the path when liquid water warms up, it changes form again and becomes a gas, moving through the air until it condenses and becomes precipitation again.*  ***Partial Understanding:*** *Student can explain that when water melts from snow it becomes liquid and can name structures that hold liquid water.*  ***Limited understanding****: Student understands that snow is solid water and melts into liquid water.* | | | **Acting on Evidence of Learning**  *Students with partial or limited understanding should complete a “water cycle in a bag” experiement to further observe water moving from land surface to atmosphere.* |
|  | | | | | |
| *SEP, CCC, DCI Featured in Lesson* | | | **Science Essentials** *(Student Performance Expectations From Appendix C, D, E)* | | |
| **Science Practices** | | | Developing questions about how water moves over the land.  Develop and using a model to construct an explanation  Communicating information | | |
| Develop Questions  Develop and use models  Plan and carry out investigation  Analyze and interpret data  Construct Explanations  Engaging in argument from evidence  Communicating information | | |
| **Crosscutting Concepts** | | | The structure of the land determines how it will function when water is added. | | |
| System and System Models  Energy and Matter  Structure and Function  Cause and Effect | | |
| **Disciplinary Core Ideas** | | | The composition of the Earth and its atmosphere and the natural and human processes occurring within them shape the Earth’s surface and its climate. | | |
| Earth and Space: Earth’s systems | | |