Science Distance Learning Lesson Sample

6th Grade Science- Weather, Climate and Water Cycling Unit Lesson 1 [Remote Learning]

The following sample lesson was adapted from OpenScieEd 6.3 unit: Why does a lot of hail, rain, or snow fall at some times and not others? and follows the storyline instruction routines. This lesson focuses on the anchoring phenomena routine. The anchoring phenomena will take up to 3 instructional days of 50 minute classes of both asynchronous and synchronous learning. Be aware that instruction does seem to take longer in the virtual setting than in a face to face setting.

Important information:

- The lesson plan is designed to guide teachers in developing high quality science learning opportunities for a remote environment.
- Tasks are designed to occur in both synchronous and asynchronous settings, with adaptations made to fit your unique classroom environment and students.
- Synchronous learning means the instructor(s) is in a virtual classroom setting, such as Zoom or Google Meets, interacting with the students in real time.
- OpenSciEd is an Open Educational Resource (OER) and is free to use. It has received the digital badge from Achieve, the highest rating an NGSS unit can receive.
- A few differences you might notice in the lesson plan is how the objective is constructed. As students are making sense of a phenomenon, having an objective co-constructed with them and in the form of a question allows students to think deeply about what they need to know or figure out today. STEM Teaching Tool 46 "How to define meaningful daily objectives for science investigations" has additional information.
- You will notice the lack of a vocabulary box as students will develop terms and phrases as they interpret and explain phenomena. STEM Teaching Tool #66 "Why you should stop pre-teaching science vocabulary and focus on students developing conceptual meaning first" is an additional resource on this topic.
- Lesson plan is constructed with the NextGen Storylines 5 Questions and Classroom Routines in mind.

Other considerations:

- Have remote learning NORMS and practice them as you would in your classroom. OpenSciEd has developed a resource, Fostering Productive Norms in Remote Teaching, as a suggestion for developing and maintaining a safe, student-driven learning environment.
- Remind students about virtual conference protocols (Zoom/Google Meets) - muting while listening, video on/off depending on the situation or small group, etc.
- Keep students' SEL in mind as you are planning and interacting with students; think about daily/weekly check-ins and how to manage student personal needs with privacy.
- Inform students and parents of the planned schedule and any changes weekly.
- Be clear and concise about directions for tasks, activities completed asynchronously or outside of class time. Have directions available orally and in writing.
- If you are looking for online tools to use with storyline instruction, the Remote Learning Online Tool Organizer has a wide variety of both free and paid tools, along with suggestions for which routines the tool could be utilized. One such tool is Jamboard that is referred to in the lesson plan.

- Keep student safety in mind for any video, demo or at home experiment. In all platforms, all safety guidelines should be followed with the correct safety equipment.

Grade/ Grade Band: 6.3	**Topic:** Weather, Climate and Water Cycling	**Lesson # _1 in a series of _22_ lessons** **Duration: 3 class periods**
Unit: Why does a lot of hail, rain, or snow fall at some times and not others?		
Performance Expectation(s): Building Towards MS-PS1-4, MS-ESS2-4, MS-ESS2-5, MS-ESS2-6 **Online Learning Standards: C: Community Building, D: Learner Engagement F: Diverse Instruction**		
Specific Learning Outcomes: Develop an initial model to describe changes and mechanisms at both the observable and the particle level that cause hail to fall during a brief time period. Ask questions that arise from careful observation of phenomena and gaps in our current models to clarify and seek additional information about how changes to the flow of matter and energy in the air above and around a location on Earth's surface could cause short-duration precipitation events and longer-duration precipitation events (scale).		
Prior Student Knowledge:		
NGSS standards spiral and build upon the previous grade band. The following PEs are from the 3-5 grade band. 3-ESS-2-1, 3-ESS2-2, 4-ESS2-1, 4-ESS2-2.5-PS1-4, 5-ESS2-1. 5-ESS2-2		
Science & Engineering Practices: Develop an initial model Asking questions and defining problems	**Disciplinary Core Ideas:** ESS2:A Eath'sMaterials and Systems ESS2.C: The Roles of Water in Earth's Surface Processes	**Crosscutting Concepts:** Cause and Effect Scale
Objectives: Co-construct the daily objective with students at the beginning of class to post on the board, as an answer to a question: Today we are trying to figure out: What causes this kind of precipitation event to occur? We figure out these things: ● Rain and wind accompany some hail events. ● Some of the water that reaches the ground reached a low enough temperature to freeze, at some point, before it fell. ● Clouds can be seen moving into and out of the area where it hailed. ● Cloud movement in the sky, moving air (wind) at Earth's surface, and temperature may be related to why,		

where, and when different forms of precipitation fall.

Accommodations and modifications:
All accommodations and modifications indicated in student IEPs will be followed and implemented. Please use your districts required documentation guidance. A resource is page 7 of OpenSciEd's Resources for Remote Teaching

Lab Safety: None

DAY1

Explore Anchoring Phenomenon : **Asynchronous/ at home (22 minutes)**

Giving students the opportunity to explore the phenomenon on their own allows students to begin to make sense of the mechanisms that causes different kinds of precipitation events.
Google slides for lesson one may be placed in Canvas or another learning platform.

Explore a Perplexing Phenomenon
Directions to students: The following videos that show a kind of perplexing phenomenon occurring outdoors. Some of you may have experienced this before. Go to your think deeper document and record your notices and wonders for the videos.

- Video clip 1:
  - https://youtu.be/9PeACgaLC4A
- Video clip 2:
  - https://youtu.be/Lx4TUg3TD-s
- Video clip 3:
  - https://youtu.be/wwPnb-1qRtQ

Attempt to Make Sense: Synchronous/Virtual Class (30 minutes)
Students will create Initial Models and connect to previous ideas:

- Discuss notice/wonder charts form the think deeper document using a Jamboard for students to put their noticing and wonders on.
- If students completed Unit 6.1 Thermal Energy built upon the thermal energy models students: Brainstorm how to represent particles in solids, liquids, and gases and how we show energy transferred into and out of the system. If the Thermal Energy unit was not taught, make connections to 5-PS1-1.
  - **Ask:** How did or would we represent the particles that make up different states of matter in a gas, a liquid, and a solid?
  - How did we or would we represent the different ways that energy can be transferred into and out of a system like a cup with a liquid in it?
  - How might this apply to the videos?
- Have students create initial models of what happened in the sky before, during, and after hailstorms on

the deeper thinking document. Students will take a picture and upload to a shared document by breakout group number. This can be used as a formative assessment.

- Have students go into breakout groups of 3-5 to share their models for 8 minutes. Have each group select who the spokesperson will be. This can be done by birthdays, color of shirt, etc. Place in chat or on a shared document for students to see when in a breakout room: What is the same? What is different? What did you struggle with explaining?
- Come back to the whole group (each group's spokesperson will have pressed the hand raised icon). Share models with the whole group (students share the screen of a model from their group).

Asynchronous learning: (post work)

Look back at your model for explaining **"What causes this kind of precipitation event to occur?"**

- Create a large-scale model showing what you think is happening in the phenomenon videos on the think deeper document. Use a different color to mark the places where you think energy was getting transferred into, through, or out of the system. You may choose to draw in 3D paint, or any program you have available and insert it into your document. (If you don't have a computer program to draw, you can draw on paper and take a picture or simply share during our next virtual class.)

Identify and record related experiences. Record related phenomena on your Thinking Deeper Document.

- Times when a lot of precipitation fell **in one place in a relatively short time** (minutes)
- Times when a lot of precipitation fell **continuously in one place over a much longer time**

***Be prepared to share your related experiences during our next virtual class.**

DAY 2 Attempt to Make Sense continuing and Identify Related Phenomena: Synchronous/Virtual Class (45-55 minutes)

- Do Now or as students join the meeting: Target a norm to focus on. Page 3-5 list norms for synchronous and asynchronous learning. Consider selecting a norm and focus on both a synchronous and asynchronous learning bullet. Students share in chat their norm as they enter. Class will discuss and select a norm.
- To bring students back to learning, begin by opening up a drawing program or having chart paper to develop a class record of what we agree upon and where we have competing ideas or areas of uncertainty across our models. This is the class consensus model.

Identify Related Phenomena:

- In the related phenomena section on the thinking deeper document record the following: Describe some times when you have seen a lot of precipitation fall in one place in a relatively short time (minutes). Describe some times when you have seen a lot of precipitation fall continuously in one place over a much longer time.
- Individually you will write 1 question on your thinking deeper document. Question criteria: can't be answered with yes or no and needs to be shared with the class on a platform such as Jamboard. Tools to use to write questions are to look back at notice and wonders from the video, your initial model, our consensus model and related phenomena you came up with.

Asynchronous work: (post work)

- Build our Driving Question Board (DBQ)
  - Record your new question or questions on the DBQ page and submit. Please include your initials.

- Ideas for Future Investigations and Data we Need: What kids of investigations should we do and or what additional sources of data might we need to help figure out the answers to our questions?
    - Write your ideas on your think deeper document.
    - Be prepared to discuss in our next virtual class.

The next several days, several lessons focus on the Navigation Routine. The Navigation Routine starts with looking back or where did you leave off? In this case, students would make sense of hail by observing a hailstone to create a notice and wonder chart. Students then would engage in a lesson by analyzing hail frequency map data. Students would create a Claim, Evidence, and Reasoning (C-E-R) statement and engage in weather balloon data. Students will begin to look forward by making predictions. In Lesson 4 students engage in the Investigation Routine and begin to figure out pieces of the DCI, CCCs and SEPs. Lesson 5 focuses on problematizing by connecting to the anchoring phenomenon of what we have figured out so far and what investigations could we do to figure out the next set of questions or wonders. Finally in lesson 6 students are Putting the Pieces Together routine by constructing a scientific explanation. In lesson 7-22 students continue to engage in the Navigation, Investigation, Problematizing, Putting the Pieces Together routines.