CCPS Science Unit Plan

Grade	4	Subject	Science	Unit #	2
Unit Name	Unit 2: Forecasting the Weather		Timeline	6 WEEKS	
How to use the Framework	This Framework should be used to implement daily science instruction. The resources and instructional strategies reflected in the Framework will provide a foundation for effective implementation and student mastery of standards. Please see the hyperlinked abbreviation document to ensure understanding of all abbreviations used with this framework. CCPS Department of Science Website for access to all unit frameworks				
Unit Overview	*All resources related to this Framework are embedded in this document or can be located via the Science Department website. **Background Information:** In 4th grade, students learn that when solid water, called ice, melts, it becomes liquid water. When liquid water evaporates, it changes into a gas, called water vapor. When the temperature drops and liquid freezes it becomes a solid and when gas gets cooler, it turns into a liquid through the process of condensation. These are called the states or phases of water. Using their understanding of the phases of water, students will learn about the various paths that water can follow as it moves around the Earth in different states. This is called the water cycle. The movement of water around the Earth is part of what makes weather occur. Following their mastery of S4E3 students will explain how weather instruments (thermometer, rain gauge, barometer, wind vane, and anemometer) are used to gather weather data and make forecasts. The students will investigate using weather instruments and what type of data each one can be used to collect. Then students construct explanations for how the instruments and their data can be used to forecast the weather. Clouds are weather occurrences that can be used to predict weather based on their form. Clouds come in different types that look different in the sky. The clouds indicate different things about the atmosphere. Fourth graders should know the form and function of each type: cirrus, stratus, cumulus. Using observations of cloud types and data of weather conditions, students will predict weather events. **Prerequisites:** First Grade - Unit 2 Weather (Standards: S1E1a/b/c/d). Second Grade - Unit 3: What is Matter and How Does it Change? (Standards: S2P1) Fourth Grade - Unit 1: Weather and Moon Phases (Standards: S4E4a&c ; S4E2b) **Throughout this unit, the students will**: ● *illustrate* the multiple pathways water may take during the water cycle and the states that occur as it moves ● *plan and carry out investigations* to construct models that illustrate the energetic flow of water during the water cycle ● *interpret and explain* how tools and observations (of clouds) are used to collect data and predict weather **Throughout this unit, the teacher should:** ● *aid* students in formulating detailed plans and methodologies to conduct investigations ● *support* students in constructing models to represent scientific phenomena				

- *foster an environment* where students feel empowered to ask probing questions, nurturing their curiosity and critical thinking skills.
- *guide* students through the analysis and interpretation of data, helping them to identify key features and patterns

Science-4th-Teacher-Notes.pdf

Standards

GSE	Science and Engineering Practices	Crosscutting Concepts
S4E3. Obtain, evaluate, and communicate information to demonstrate the water cycle. a. Plan and carry out investigations to observe the flow of energy in water as it changes states from solid (ice) to liquid (water) to gas (water vapor) and changes from gas to liquid to solid. b. Develop models to illustrate multiple pathways water may take during the water cycle (evaporation, condensation, and precipitation). (*Clarification statement:* Students should understand that the water cycle does not follow a single pathway.) **S4E4. Obtain, evaluate, and communicate information to predict weather events and infer weather patterns using weather charts/maps and collected weather data.** a. Construct an explanation of how weather instruments (thermometer, rain gauge, barometer, wind vane, and anemometer) are used in gathering weather data and making forecasts. b. Interpret data from weather maps, including fronts (warm, cold, and stationary), temperature, pressure, and precipitation to make an informed prediction about tomorrow's weather. c. Ask questions and use observations of cloud types (cirrus, stratus, and cumulus) and data of weather conditions to predict weather events.	**Ask Questions** A practice of science is to ask and refine questions that lead to descriptions and explanations of how the natural and designed world works and which can be empirically tested. **Plan and Carry Out Investigations** Scientists and engineers plan and carry out investigations in the field or laboratory, working collaboratively as well as individually. Their investigations are systematic and require clarifying what counts as data and identifying variables or parameters. **Construct Explanations** The products of science are explanations and the products of engineering are solutions. **Develop and Use Models** A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations. **Analyzing and Interpreting Data** Scientific investigations produce data that must be analyzed in order to derive meaning. Because data patterns and trends are not always obvious, scientists use a range of tools—including tabulation, graphical interpretation, visualization, and statistical analysis—to identify the significant features and patterns in the data. Scientists identify sources of error in the investigations and calculate the degree of certainty in the results. Modern technology	**Patterns** Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them. **Cause and Effect** Mechanism and explanation. Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts. **Systems and System Models** Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering. **Scale, proportion, and quantity:** In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance. **Energy and matter:** Flows, cycles, and conservation. Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations.

	d. Construct an explanation based on research to communicate the difference between weather and climate	makes the collection of large data sets much easier, providing secondary sources for analysis.	

NGSS Alignment	NGSS Alignment to Disciplinary Core Ideas

The Phenomenon Protocol

Anchoring Phenomena	Learning Targets
S4E3a - Water on a Can	Students will plan and carry out an investigation to explain how energy flows as water changes states.
S4E3b - Hail in the Summer	Students will craft a model that shows the many paths water takes during the water cycle.
S4E4a - Weather Balloon (Video Link)	Students will construct an explanation of how weather instruments are used in gathering weather data and making forecasts
S4E4B - Weather Forecasting	The students will interpret data from weather maps to make informed predictions about the next day's weather.
S4E4c - Clouds	The students will ask questions and use observations of cloud types and data of weather conditions to predict weather events.
S4E4d - Weather vs. Climate	The students will construct an explanation based on research to communicate the difference between weather and climate.

Weekly Lesson Tasks

Navigation: Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Additional Resources

Week 1

Standards | Phenomenon | Weekly Lessons

GSE: S4E3a	**Focused Concept:**Plan and carry out investigations to observe the flow of energy in water as it changes states from solid (ice) to liquid (water) to gas (water vapor) and changes from gas to liquid to solid.
Learning Target	Students will plan and carry out an investigation to explain how energy flows as water changes states

Lab Safety Protocol:
General Safety Practices for the Elementary Science Classroom- TOC.docx

Materials:

2 plastic cups ice water hot plate pot	Gizmo Student Edition The Water Cycle

SEP TEACHER TIP:
To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol: Plan and Carry Out Investigations.pdf

Phenomenon: Water on a Can

DQ: What is happening to the flow of energy as water changes states from liquid to gas and reverses?

Day 1: Opening	Day 2 : Guided Practice/ Transition	Day 3: Independent Practice	Day 4: Independent Practice	Day 5: Assessment / Summary
Phenomena Introduction **(5-7 minutes)** Show students the phenomenon card **Water on a Can** Use the See-Think-Wonder protocol to guide student thinking. Teachers should provide students opportunities to share observations and develop questions. The teacher should record students' observations and questions on chart paper for referencing throughout this week's lesson. **Inquiry Activity** **(15-20 minutes)** Note**: There are two activities for students to complete during this time. **Activity 1** **Savvas uInvestigate Lab** **"Where did that water come from?"** **Objective** : Students will investigate why water forms on the outside of a cup	**Introduce the Driving Question:** **(7 - 10 minutes)** Have students review the driving question: *What is happening to the flow of energy as water changes states from liquid to gas and reverses?* Use the strategy to support students with making connections and understanding the driving question (DQ). Visualizing the Driving Question Click here to access question words reference chart The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer. Be sure to create a reference for students to have throughout the week. ****Teacher Note:** Students should not answer the driving question at this time. Students will need to collect information, data and understanding from the phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format. (3-5 teachers and students should	**Review the Driving Question:** **(1-2 minutes)** *What is happening to the flow of energy as water changes states from liquid to gas and reverses?* **Graphic Organizer** **(2-3 minutes for students to access)** Students will need and use the student lab sheet for "Phases of Water Gizmo" **Materials** Gizmo Student Edition **Investigation Facilitation** **(20 - 25 minutes)** **Gizmo: Phases of Water** **Objective**: Students heat or cool a container of water and observe the phase changes that take place. Students can work independently on this activity but can benefit from having partnered discussions Have students follow the procedure provided in the lab. The teacher should facilitate and actively monitor student	**Text Annotation Strategy** **(30-45 minutes)** Have students read and annotate the following text: The Water Cycle The teacher should facilitate the following process. Have the students follow the text protocol facilitation directions provided in the following strategy: 3-5 Text Annotation Prot… Students should complete the following student handout as they work through the text annotation protocol: 3-5 Information Analysis Student Organizer (editable) 3-5 Information Analysis… During the teacher-led discussion, the teacher should ask the following questions: *1. What are the three phases of water, and how can water change from one phase to another?* *2. Describe a real-life example where you can see water changing from a liquid to a gas.* *3. What happens to water when*	**Review the Phenomenon** **(5-7 minutes)** Allow students to review the initial observations and questions from see, think, wonder strategy on Day 1. Have students review initial ideas. Ask students: *Have any of your ideas about the phenomenon changed? How?* Have students review their initial questions. Ask students: *What questions generated on Day 1 can you answer, now? What are your answers to those questions?* **Claim-Evidence-Reasoning** **(15 -25 minutes)** Students will write a response to the following driving question in the CER format. **What is happening to the flow of energy as water changes states from liquid to gas and reverses?** Review the claim-evidence-reasoning poster with the students

Have students follow the procedure provided in the lab and answer the Analyze and Interpret question.

Students can use the graphic organizer for Where did the water come from?

The lab for this week's lesson can be found by accessing **SAVVAS Grade 5 Unit: Earth's Water, Lesson 1 Water Cycle**

**TEACHER NOTE:

The teacher should prepare warm water for students in advance by heating up water using a hot plate and a pot. The water should be warm to touch and not room temperature.

The teacher should be the only one operating the hot plate. The water should be warmed prior to the investigation so that students are not exposed.

Students are expected to *plan and carry out* their investigation with a partner. The teacher can support students by allowing them to preview the materials before getting started. For students who need scaffolded support, the teacher can tell them step one (pouring ice water into one cup and warm water into another) then allow them to describe what steps to take next to answer the

focus on developing claim, evidence, and reasoning)

Claim-Evidence-Reasoning (CER) (10-12 minutes)

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to review and understand their peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

The teacher should state the following to students:

"Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas."

Review the claim-evidence-reasoning poster with students.

As a class or in student groups, provide students with this week's claim- evidence-reasoning sample.

Student CER Sample

The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol:

Claim-Evidence-Reasoning Record Observations Document (google doc)

Claim-Evidence-Reasoning O… (PDF)

1. Identify the student's claim in the sample and have the teacher or students write their observations or

work and discussions. The teacher should walk around the room to observe and provide guidance questions where necessary.

The lab for this week's lesson can be found by accessing **Gizmo: Phases of Water**

**TEACHER NOTE:
Students will observe water changing states.
The teacher can also demonstrate this phenomenon in class with a hot plate, and lidded pot, and ice.

After allowing students to complete the Gizmo, the teacher can have students observe ice in a pot as it melts on a hot plate until it turns into vapor.

The teacher should ask the following questions:
Certainly! Here are three higher-order thinking questions for 9-year-old 4th graders, focused on heating or cooling a container of water and observing the phase changes:

How does heating the container of water change its state? What observations can you make about the water as it heats up, and how do these changes help us understand the process of phase change? What differences do you notice when cooling the container of water compared to heating it? How do the changes you

it freezes, and what phase does it become?

**TEACHER NOTE: Read and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit time used for transitioning.

Vocabulary Strategy (10-15 minutes)

Vocabulary Words:
phase
solid
liquid
gas
evaporate
condense

Vocabulary Strategy: Vocabulary Connect Two Strategy
Provide students with the graphic organizer (editable) or pdf handout.

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words. Allow students to research the word using reference tools (google, research options, peer discussion, etc.). The teacher should model researching the word and using the information gathered to decide on another term that creates connections between the vocabulary word and another term/word.

**TEACHER NOTE: Provide students with sentence starters by sharing on the board:

3-5 Claim-Evidence-Rea…

Have students write their claim-evidence-reasoning

writing a claim
Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question.

writing evidence
Students should provide observational or numerical data as their evidence from their investigation and write a short caption or brief description of the data they provide to support their claim.

writing the reasoning
Students will use textual evidence from the "text annotation graphic organizer" to generate the reasoning or justification in the CER format.

Have students use the following template to write their claim-evidence-reasoning (CER)

3-5 Student Writing Template (editable)
3-5 Student Writing Template (pdf)

question.

Prepare to discuss the following questions with students: *Why didn't both cups have water? How did water get on the outside of the cup? Where did it come from?*

Materials:
2 plastic cups
ice
water
hot plate
pot

Activity 2

"How does the amount of water change over time?"
The lab for this week's lesson can be found by accessing **SAVVAS Grade 3 Unit: Weather , Lesson 1 Water and Weather**

Objective : Students will predict how long it will take for water to change from a liquid to a gas at room temperature

Have students follow the procedure provided in the lab and answer the Analyze and Interpret question.

Students can use the graphic organizer for How does the amount of water change over time?

Assessment Prep Activity:
Following the task, click the link above. Have students practice applying their

questions.

2. Identify the student's evidence in the sample and have the teacher or students write their observations or questions.

3. Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.

Ask the following questions to students as they analyze the student samples:

Claim-Evidence-Reasoning Q…

Teacher Note: As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn vocabulary on Day 4.

observe when the water cools help explain the transition between different states of matter?
Why do you think water changes from one state to another when heated or cooled? How can understanding these phase changes help us explain natural processes, like the water cycle, in our environment?

Assessment Prep Activity:
Following the task, click the link above. Have students practice applying their knowledge to an assessment question.

Allow students to work in collaborative groups to discuss and research the other provided vocabulary terms and repeat the modeled instructional strategy.

Have students collaborate, in groups, to complete the strategy for the other vocabulary terms.

Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.

**TEACHER NOTE: Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions:

How are your thoughts or understanding similar to another writer on the topic?
How are your thoughts or understanding different to another writer on the topic?
What would you like to learn more about? Why?

Assessment for Learning
(10-15 minutes)

S4E3a Forecasting the Weather Assessment

knowledge to an assessment question.				

Week 2

Standards | Phenomenon | Weekly Lessons

GSE: S4E3b	**Focused Concept:** Develop models to illustrate multiple pathways water may take during the water cycle
Learning Target	Students will design a model that shows the many paths water takes during the water cycle.

Lab Safety Protocol:
General Safety Practices for the Elementary Science Classroom- TOC.docx

Materials:

Cooler (or something to hold cold materials) Blue Food Coloring Clear plastic cups Dixie Cups	Plastic Bottles Red food coloring Thick Paper plates See Think Wonder Graphic Organizer

SEP TEACHER TIP:
To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol: Develop and Use Models.pdf

Phenomenon: Hail in the Summer	**DQ: "Why does it hail in the summer?"**

Day 1: Opening	Day 2 : Guided Practice/ Transition	Day 3: Independent Practice	Day 4: Independent Practice	Day 5: Assessment / Summary
Phenomena Introduction (5-7 minutes) Show students the phenomenon card : **Hail in the Summer** Use the See-Think-Wonder protocol to guide student thinking. Teachers should provide students opportunities to share observations and develop questions. The teacher should record	**Introduce the Driving Question: (7 - 10 minutes)** Have students review the driving question: *Why does it hail in the summer?* Use the strategy to support students with making connections and understanding the driving question (DQ). Visualizing the Driving Question	**Review the Driving Question: (1-2 minutes)** *Why does it hail in the summer?* **Graphic Organizer (2-3 minutes for students to access)** Students will need to use the "Student Worksheet" in the WaterCycleGame_Stude… **Materials** WaterCycleGame_Stude… 12 in. yarn or pipe cleaners 9 different colored beads (30	**Text Annotation Strategy (30-45 minutes)** Have students read and annotate one of the following text: Water, water, everywhere. The teacher should facilitate the following process. Have the students follow the text protocol facilitation directions provided in the following strategy: 3-5 Text Annotation Prot…	**Review the Phenomenon (5-7 minutes)** Allow students to review the initial observations and questions from see, think, wonder strategy on Day 1. Have students review initial ideas. Ask students: *Have any of your ideas about the phenomenon changed? How?* Have students review their initial questions. Ask students: *What questions generated on*

students' observations and questions on chart paper for referencing throughout this week's lesson.

Inquiry Activity
(10-15 minutes)

Creating a Water Cycle in a Bag

Objective: Understand the water cycle process by observing evaporation, condensation, and precipitation within a sealed environment.

Procedures:
1. Preparation:

a. Draw the Scene:
- Take the Ziploc bag and use the permanent markers to draw a sun in the top right corner.
- Draw trees on the bottom right corner next to the sun.
- Draw clouds in the top left and middle sections of the bag.
- Draw an ocean or a large body of water in the bottom left corner.

2. Adding Materials:

a. Add Wet Sand:
- Scoop some wet sand and place it in the bottom right corner of the bag, below the trees. Make sure the amount of sand is higher than the level of water you will add.

b. Add Water:
- Measure out a small amount of water using the

Click here to access question words reference chart

The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer.

Be sure to create a reference for students to have throughout the week.
****Teacher Note:** Students should not answer the driving question at this time. Students will need to collect information, data and understanding from the phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format.

(3-5 teachers and students should focus on developing claim, evidence, and reasoning)

Claim-Evidence-Reasoning (CER)
(10-12 minutes)

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to review and understand their peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

The teacher should state the following to students:

"Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and

each at least)
"Soil Surface" **Brown** Beads
"Plant" **Green** Beads
"River" **Dark Blue** Beads
"Ocean" **Light Blue** Beads
"Lake" **Purple** Beads
"Animal" **Yellow** Beads
"Ground Water" **Black** Beads
"Glacier" **Pink** Beads
"Clouds" **White** Beads

Investigation Facilitation
(25-30 minutes)
The Water Cycle Game and Necklace Build

Objective: Students play a game modeling the path that water takes through Earth: from the soil to rivers and lakes to clouds to the ocean and so on. Students will create a necklace that represents the path that they took

Students will need to work in partner pairs. The teacher should assign partners prior to the beginning of the lesson.

Have students follow the procedure provided in the lab. The teacher should facilitate and actively monitor student work and discussions. The teacher should walk around the room to observe and provide guidance questions where necessary.

**TEACHER NOTE:
The teacher will need to start preparing for class the day before by ensuring that there are 9 station tables for students to rotate to.
The teacher should also separate

Students should complete the following student handout as they work through the text annotation protocol:

3-5 Information Analysis Student Organizer (editable)
3-5 Information Analysis…

During the teacher-led discussion, the teacher should ask the following questions:

1. Where does rain come from? How are clouds formed?
2. Does water travel in a single path around the earth? Why not?
3. How does the sun play a role in the water cycle?

**TEACHER NOTE: Read and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit time used for transitioning.

Vocabulary Strategy
(10-15 minutes)

Vocabulary Words:
precipitation
condensation
evaporation
hail
atmosphere
cycle
vapor

Vocabulary Strategy:
Four Square
Provide students with the graphic organizer (editable) or

Day 1 can you answer, now? What are your answers to those questions?

Claim-Evidence-Reasoning
(15 -25 minutes)

Students will write a response to the following driving question in the CER format.

"Why does it hail in the summer?"

Review the claim-evidence-reasoning poster with the students

**TEACHER NOTE: Provide students with sentence starters by sharing on the board:

3-5 Claim-Evidence-Rea…

Have students write their claim-evidence-reasoning

writing a claim
Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question.

writing evidence
Students should provide observational or numerical data as their evidence from their investigation and write a short caption or brief description of the data they provide to support their claim.

measuring cup (about 1/4 cup) and pour it into the bottom left corner of the bag, below the ocean drawing. Ensure the sand and water do not mix.

3. Seal and Place the Bag:
a. Seal the Bag:
- Carefully zip the bag closed, making sure it is fully sealed to prevent any water from leaking out.

b. Tape the Bag to the Window:
- Use masking tape to secure the bag to a window that receives direct sunlight. Make sure the drawings face inside the room so they can be easily observed.

4. Observation:

a. Daily Observations:
- Over the next several days, observe what happens to the water inside the bag. Write down your observations in a notebook.
- Look for signs of evaporation, condensation, and precipitation within the bag.
- Note changes such as water droplets forming on the sides of the bag (condensation), water level changes, and if water seems to move back to the sand area (precipitation).

The teacher should ask the following questions throughout the activity:
What do you observe happening to the water in the bag over time? Can you see water vapor

explain what they learn in science investigations and science ideas."

Review the claim-evidence-reasoning poster with students.

As a class or in student groups, provide students with this week's claim-evidence-reasoning sample.

Student CER Sample

The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol:

Claim-Evidence-Reasoning Record Observations Document (google doc)

Claim-Evidence-Reasoni… (PDF)

1. Identify the student's claim in the sample and have the teacher or students write their observations or questions.

2. Identify the student's evidence in the sample and have the teacher or students write their observations or questions.

3. Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.

Ask the following questions to students as they analyze the student samples:

the beads into the correct colors.

As students are completing the activity, the teacher should pause to ask the following questions:
When you follow the path of water from one place to another, what patterns or sequences do you notice? How do these patterns help you understand how water moves and changes form in nature?
How can creating a necklace to represent these paths help us better visualize and remember the steps of the water cycle?

What does this bead represent in the water cycle, and why is this stage important for the movement of water through the environment?
Can you explain how water moves from one stage to the next in your model? What causes these changes in the water's path?

Assessment Prep Activity:
(7-10 minutes)
Following the task, click the link above. Have students practice applying their knowledge to an assessment question.

pdf handout, explaining its four sections: word, meaning, picture, and sentence.

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words.

Allow students to work in collaborative groups. Actively monitor and facilitate small group discussions and review various artifacts (pictures, images, primary sources, charts) to build knowledge of the term.

Have students collaborate to complete the four square strategy for the other vocabulary terms.

Monitor student progress, sharing new ideas for class discussion, and help students distinguish essential from non-essential characteristics.

Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.

writing the reasoning
Students will use textual evidence from the "text annotation graphic organizer" to generate the reasoning or justification in the CER format.

Have students use the following template to write their claim-evidence-reasoning (CER)
3-5 Student Writing Template (editable)
3-5 Student Writing Template (pdf)

**TEACHER NOTE: Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions:

How are your thoughts or understanding similar to another writer on the topic?
How are your thoughts or understanding different to another writer on the topic?
What would you like to learn more about? Why?

Assessment for Learning
(10-15 minutes)

S4E3b Forecasting the Weather Assessment

forming? Where does it go? How do the water droplets form on the inside of the bag? What do the droplets do after they form on the bag? How does this experiment demonstrate the water cycle? Extension Activity: - Try placing the bag in different locations (shade, indoors away from windows) and compare the results. What differences do you observe in the water cycle process? **Materials:** - 1 large Ziploc bag - Permanent markers (various colors) - Wet sand - Water - Measuring cup - Masking tape - Notebook and pencil for observations **ADDITIONAL ACTIVITY** **Mystery Science** **"Summer Ice Storm?"** **Copy of Mystery Science…** The lab for this week's lesson can be found by accessing **Mystery Science, Weather & Climate: Stormy Skies Unit, Anchor Phenomenon** **Objective**: Students record and generate questions observations and questions about the phenomenon and create an initial explanation of how it happened. Students will follow the entire	Claim-Evidence-Reasoni… ****Teacher Note:** As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn vocabulary on Day 4.			

activity starting with the "Anchor Phenomenon" where students will notice a weather phenomenon in Guadalajara, Mexico. The teacher should follow the activity slide by slide **TEACHER NOTE: This inquiry activity is the Anchoring phenomenon for the entire Mystery Science Unit, however students will only complete a couple of lessons from the unit. The students will investigate the Summer Hail phenomenon by considering what they know about weather and the observations. Through the rest of the week, the students will investigate the water cycle that causes hail in the summer. **Materials:** See.Think.Wonder. Graphic Organizer **Assessment Prep Activity:** Following the task, click the link above. Have students practice applying their knowledge to an assessment question.				

Week 3 Standards | Phenomenon | Weekly Lessons	
GSE: S4E4a	**Focused Concept:** Construct an explanation of how weather instruments (thermometer, rain gauge, barometer, wind vane, and anemometer) are used in gathering weather data and making forecasts.

Learning Target	I can construct an explanation of how weather instruments are used to make weather forecasts			
Lab Safety Protocol: General Safety Practices for the Elementary Science Classroom- TOC.doc			**Materials:** Measuring Weather and Climate - Weather Instruments Measuring Weather and Climate - Teacher Instructions Gizmo: Observing Weather Student Edition	
SEP TEACHER TIP: To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol: Construct Explanations and Argue from Evidence.pdf				
Phenomenon: Weather Balloon (Video Link)		**DQ: How do weather instruments help us to gather data and make weather forecasts?**		
Day 1: Opening	**Day 2 : Guided Practice/ Transition**	**Day 3: Independent Practice**	**Day 4: Independent Practice**	**Day 5: Assessment / Summary**
Phenomena Introduction **(5-7 minutes)** Show students the phenomenon card : **Weather Balloon** (Video Link) Use the See-Think-Wonder protocol to guide student thinking. Teachers should provide students opportunities to share observations and develop questions. The teacher should record students' observations and questions on chart paper for referencing throughout this week's lesson. **Inquiry Activity** **(10-15 minutes)** **"Weather Instruments"** **Objective**: Students will look at some weather tools and learn what the tools are used for. Students will then begin to	**Introduce the Driving Question:** **(7 - 10 minutes)** Have students review the driving question: *How do weather instruments help us to gather data and make weather forecasts?* Use the strategy to support students with making connections and understanding the driving question (DQ). Visualizing the Driving Question Click here to access question words reference chart The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer. Be sure to create a reference for students to have throughout the week. ****Teacher Note:** Students	**Review the Driving Question:** **(1-2 minutes)** *How do weather instruments help us to gather data and make weather forecasts?* **Graphic Organizer** **(2-3 minutes for students to access)** Students will need and use the student lab sheet for Gizmo: "Observing Weather" Gizmo: Observing Weather Student Edition **Materials** N/A **Investigation Facilitation** **(20-25 minutes)** **NAME: Gizmo - Observing Weather** **Objective**: Students will practice using a thermometer, anemometer, rain gauge, and hygrometer to record weather conditions in a variety of	**Text Annotation Strategy** **(30-45 minutes)** Have students read and annotate the following text: Observing the Weather The teacher should facilitate the following process. Have the students follow the text protocol facilitation directions provided in the following strategy: 3-5 Text Annotation Prot… Students should complete the following student handout as they work through the text annotation protocol: 3-5 Information Analysis Student Organizer (editable) 3-5 Information Analysis… During the teacher-led discussion, the teacher should ask the following questions: What is the difference between weather and climate? Give an example of each to explain.	**Review the Phenomenon** **(5-7 minutes)** Allow students to review the initial observations and questions from see, think, wonder strategy on Day 1. Have students review initial ideas. Ask students: *Have any of your ideas about the phenomenon changed? How?* Have students review their initial questions. Ask students: *What questions generated on Day 1 can you answer, now? What are your answers to those questions?* **Claim-Evidence-Reasoning** **(15 -25 minutes)** Students will write a response to the following driving question in the CER format. **How do weather instruments help us to gather data and make weather forecasts?**

observe the weather daily and record the data on a classroom graph.

Have students follow the procedure provided in the lab and answer the associated questions.
Measuring Weather and Climate - Teacher Instructions

**TEACHER NOTE:
Tools may be found around the school, but if not the teacher may show students images of the instruments below.
Measuring Weather and Climate - Weather Instruments

Allow students to share and discuss their ideas. The teacher can use a variety of ways to collect student thoughts:
- anchor charts and sticky notes
- set the class up in stations
- display the images on the board and record student thoughts alongside each picture.

This activity requires students to use observational skills to make sense of weather tools. The teacher should allow students to build their own ideas. The teacher can guide students thinking with the following questions:

What do these tools measure?
How does each tool measure the weather? How do you know?
Does each tool measure the same thing?
Why do we need these tools?
How do you think weather was measured before the invention

should not answer the driving question at this time. Students will need to collect information, data and understanding from the phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format.

(3-5 teachers and students should focus on developing claim, evidence, and reasoning)

Claim-Evidence-Reasoning (CER)
(15 -25 minutes)

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to review and understand their peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

The teacher should state the following to students:

"Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas."

Review the claim-evidence-reasoning poster with students.

As a class or in student groups, provide students with this week's claim-evidence-reasoning sample.

locations and dates

Students will need to work in partner pairs. The teacher should assign partners prior to the beginning of the lesson.

Have students follow the procedure provided in the graphic organizer. The teacher should facilitate and actively monitor student work and discussions. The teacher should walk around the room to observe and provide guidance questions where necessary.

**TEACHER NOTE:

This Gizmo will have students record measurements from several weather instruments.

Students will NOT actually see how the instruments collect the data. The teacher can show the following video **AFTER** the investigation to support students understanding of how the instruments are collecting data in the gizmo

Wheeler School Talk - W…

Activity A reviews weather instruments while **Activity B** allows students to explore how the tools help to predict weather **Activity C** can be used as an extension for students who finish early. Note that activity C is connected to other relevant concepts in the entire unit and previous unit where the equator and location on the earth determine weather. The students can benefit from the experience

Imagine you are a meteorologist explaining weather and climate to kids younger than you. How would you describe each so they can understand?

**TEACHER NOTE: Read and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit time used for transitioning.

Vocabulary Strategy
(10-15 minutes)

Vocabulary Words:
Provide list of vocabulary words here (4-5 words max, if possible)

Vocabulary Strategy:
Four Square
Provide students with the graphic organizer (editable) or pdf handout, explaining its four sections: word, meaning, picture, and sentence.

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words.

Allow students to work in collaborative groups. Actively monitor and facilitate small group discussions and review various artifacts (pictures, images, primary sources, charts) to build knowledge of the term.

Review the claim-evidence-reasoning poster with the students

**TEACHER NOTE: Provide students with sentence starters by sharing on the board:
3-5 Claim-Evidence-Rea…

Have students write their claim-evidence-reasoning

writing a claim
Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question.

writing evidence
Students should provide observational or numerical data as their evidence from their investigation and write a short caption or brief description of the data they provide to support their claim.

writing the reasoning
Students will use textual evidence from the "text annotation graphic organizer" to generate the reasoning or justification in the CER format.

Have students use the following template to write their claim-evidence-reasoning (CER)

3-5 Student Writing Template (editable)

of this technology? *How can you use these tools to predict the weather tomorrow?* **NOTE: Part 2 of the activity will require students to use the tools through the rest of the week. If you have access to the physical tools, the teacher can continue with the activity. If not, the teacher can support students by referring to their initial thoughts throughout the week This standard is not asking students to interpret or analyze the data. Students will do that in the following weeks. However, the students are required to understand the function of the machines and tools that are used to collect the data. **Materials:** Measuring Weather and Climate - Weather Instruments Measuring Weather and Climate - Teacher Instructions **Assessment Prep Activity:** **(7-10 minutes)** Following the task, click the link above. Have students practice applying their knowledge to an assessment question.	The teacher will pull students samples from earlier in the unit for peer review. Be sure to hide student names. The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol: Claim-Evidence-Reasoning Record Observations Document (google doc) Claim-Evidence-Reasoni… (PDF) *1. Identify the student's claim in the sample and have the teacher or students write their observations or questions.* *2. Identify the student's evidence in the sample and have the teacher or students write their observations or questions.* *3. Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.* Ask the following questions to students as they analyze the student samples: Claim-Evidence-Reasoni… ****Teacher Note:** As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or	and make connections, however, if time does not permit, the students will have gained important information from parts A and B. The teacher should end the exploration in time to discuss student findings. To support students knowledge building, the teacher will ask the following questions: *What is weather? What is climate? How does weather compare from year to year? How would you use the different weather tools to collect data on the weather? If you notice that the wind speed is increasing, the temperature is dropping, and the rain gauge is showing an increasing amount of rain. As a meteorologist, what would you need to do next? Why do meteorologists track weather over long periods of time?* **Assessment Prep Activity:** **(7-10 minutes)** Following the task, click the link above. Have students practice applying their knowledge to an assessment question.	Have students collaborate to complete the four square strategy for the other vocabulary terms. Monitor student progress, sharing new ideas for class discussion, and help students distinguish essential from non-essential characteristics. Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.	3-5 Student Writing Template (pdf) **TEACHER NOTE: Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions: *How are your thoughts or understanding similar to another writer on the topic? How are your thoughts or understanding different to another writer on the topic? What would you like to learn more about? Why?* Assessment for Learning **(10-15 minutes)** *S4E4a Weather Instruments Assessment*

	observations about vocabulary. Students will explicitly learn vocabulary on Day 4.			

Week 4

Standards | Phenomenon | Weekly Lessons

GSE: S4E4B	**Focused Concept:** Interpret data from weather maps, including fronts (warm, cold, and stationary), temperature, pressure, and precipitation to make an informed prediction about tomorrow's weather.
Learning Target	Students will interpret data from weather maps, including fronts (warm, cold, and stationary), temperature, pressure, and precipitation to make an informed prediction about tomorrow's weather.

Lab Safety Protocol:
General Safety Practices for the Elementary Science Classroom- TOC.docx

Materials:

1 Picture Vocabulary (per class) *Can be projected (find in the Explain section) 1 2-liter bottle with cap (per class) 1 Safety goggles (per student) Match (per class)	Map of the Americas Worksheet Map of Asia & Australia Worksheet Map of Europe & Africa Worksheet

SEP TEACHER TIP:
To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol: Analyze and Interpret Data.pdf

Phenomenon: S4E4B - Weather Forecasting

DQ: How can we interpret data to make informed weather decisions?

Day 1: Opening	Day 2 : Guided Practice/ Transition	Day 3: Independent Practice	Day 4: Independent Practice	Day 5: Assessment / Summary
Phenomena Introduction (5-7 minutes) Show students the phenomenon card : **S4E4B - Weather Forecasting** Use the See-Think-Wonder protocol to guide student thinking.	**Introduce the Driving Question: (7 - 10 minutes)** Have students review the driving question: *How can we interpret data to make informed weather decisions?*	**Review the Driving Question: (1-2 minutes)** *How can we interpret data to make informed weather decisions?* **Graphic Organizer (2-3 minutes for students to access)** **Mystery Science**	**Text Annotation Strategy (30-45 minutes)** Have students read and annotate the following text: Global Patterns and Local Weather The teacher should facilitate the following process. Have the students follow the text protocol	**Review the Phenomenon (5-7 minutes)** Allow students to review the initial observations and questions from see, think, wonder strategy on Day 1. Have students review initial ideas. Ask students: *Have any of your ideas about the*

Teachers should provide students opportunities to share observations and develop questions. The teacher should record students' observations and questions on chart paper for referencing throughout this week's lesson.

Inquiry Activity
(10-15 minutes)

"Cloud In a Bottle"

Objective:
Students model changes in weather and make predictions using their observations

**TEACHER NOTE:
Teacher Instructions

This is a whole group demonstration. Students will NOT complete the activity as an investigation but as an observation. The teacher will complete the activity by following the teacher instructions. Students will participate indirectly by passing the used materials around.

It is recommended that the teacher attempt the experiment before this lesson to ensure understanding of how to do it correctly.

The investigation is better performed in low light and with a directed light source shining at the materials in use.

NOTE: The teacher does not

Use the strategy to support students with making connections and understanding the driving question (DQ).

Visualizing the Driving Question

Click here to access question words reference chart

The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer.

Be sure to create a reference for students to have throughout the week.
Teacher Note: Students should not answer the driving question at this time. Students will need to collect information, data and understanding from the phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format.

(3-5 teachers and students should focus on developing claim, evidence, and reasoning)

Claim-Evidence-Reasoning (CER)
(10-12 minutes)

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to review and understand their peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

Why are some places always hot?

Students will use the climate temperatures scientists have collected to determine real life decisions.

The lab for this week's lesson can be found by accessing **Mystery Science, Third Grade, Weather and Climate: Stormy Skies Unit, Lesson 4**

Materials
Map of the Americas Worksheet
Map of Asia & Australia Worksheet
Map of Europe & Africa Worksheet

Investigation Facilitation
(20-25 minutes)

"Why are some places always hot?"

Objective: Students will interpret data from weather maps, including fronts (warm, cold, and stationary), temperature, pressure, and precipitation to make an informed prediction about tomorrow's weather.

Students will need to work in partner pairs. The teacher should assign partners prior to the beginning of the lesson.

Have students follow the procedure provided in the lab. The teacher should facilitate and actively monitor student work and discussions. The teacher

facilitation directions provided in the following strategy:

3-5 Text Annotation Prot…

Students should complete the following student handout as they work through the text annotation protocol:

3-5 Information Analysis Student Organizer (editable)
3-5 Information Analysis…

During the teacher-led discussion, the teacher should ask the following questions:

What does the symbol for a cold front look like on a weather map?
How does it affect the weather in your region?

TEACHER NOTE: Read and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit time used for transitioning.

Vocabulary Strategy
(10-15 minutes)

Vocabulary Words:
wavelength,
amplitude
frequency
trough
crest

Vocabulary Strategy:

Vocabulary Terms Chart

phenomenon changed? How?

Have students review their initial questions. Ask students:
What questions generated on Day 1 can you answer, now?
What are your answers to those questions?

Claim-Evidence-Reasoning
(15 -25 minutes)

Students will write a response to the following driving question in the CER format.

How can we interpret data to make informed weather decisions?

Review the claim-evidence-reasoning poster with the students

TEACHER NOTE: Provide students with sentence starters by sharing on the board:

3-5 Claim-Evidence-Rea…

Have students write their claim-evidence-reasoning

writing a claim
Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question.

writing evidence
Students should provide observational or numerical data

need to teach the vocabulary words at this time; only provide students an opportunity to connect meaning.

Materials:
1 Picture Vocabulary (per class)
*Can be projected (find in the Explain section)

1 2-liter bottle with cap (per class)
1 Safety goggles (per student)

Match (per class)

Teachers will ask students how scientists determine the weather?
While observing students working in their groups, teachers should ask students to explain what type of data is collected from weather maps.

Assessment Prep Activity:
(7-10 minutes)
Following the task, click the link above. Have students practice applying their knowledge to an assessment question.

The teacher should state the following to students:

"Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas."

Review the claim-evidence-reasoning poster with students.

As a class or in student groups, provide students with this week's claim-evidence-reasoning sample.

The teacher will pull students samples from earlier in the unit for peer review. Be sure to hide student names.

The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol:

Claim-Evidence-Reasoning Record Observations Document (google doc)

Claim-Evidence-Reasoni… (PDF)

1. Identify the student's claim in the sample and have the teacher or students write their observations or questions.

2. Identify the student's evidence in the sample and have the teacher or students write their

should walk around the room to observe and provide guidance questions where necessary.

**TEACHER NOTE:
Students will be separated into pairs to map places on earth and their temperatures. Students will be given data on the type of weather in their section of the map.

Once your students are paired up, divide your class into three groups. Decide which group will be in charge of which map (Americas map, Europe & Africa map, and Asia & Australia map). At the end of the activity, groups will combine their maps to make a full world climate map.
Teacher answer key

How do scientists make weather predictions?
How can maps be used to determine data?

Assessment Prep Activity:
(7-10 minutes)
Following the task, click the link above. Have students practice applying their knowledge to an assessment question.

Provide students with the graphic organizer (editable) or pdf handout, explaining its sections: word, *What did it look like in the investigation?*, meaning, image/drawing, connection

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words. The teacher should provide the meaning of the word to the students and ask students to provide examples of how the word was represented during the investigation, phenomenon and/or inquiry activity. In the connection column, students should write how the word connects to concepts or observations they gathered during their classroom tasks. Allow students to work in collaborative groups. Actively monitor and facilitate small group discussions and review various artifacts (pictures, images, primary sources, charts) to build knowledge of the term.

Have students collaborate, in groups, to complete the vocabulary terms chart for the other vocabulary terms.

Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.

as their evidence from their investigation and write a short caption or brief description of the data they provide to support their claim.

writing the reasoning
Students will use textual evidence from the "text annotation graphic organizer" to generate the reasoning or justification in the CER format.

Have students use the following template to write their claim-evidence-reasoning (CER)

3-5 Student Writing Template (editable)
3-5 Student Writing Template (pdf)

**TEACHER NOTE: Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions:

How are your thoughts or understanding similar to another writer on the topic?
How are your thoughts or understanding different to another writer on the topic?
What would you like to learn more about? Why?

Assessment for Learning
(10-15 minutes)

S4E4b Forecasting the Weather Assessment

	observations or questions. *3. Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.* Ask the following questions to students as they analyze the student samples: Claim-Evidence-Reasoni… **Teacher Note:** As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn vocabulary on Day 4.			

Week 5 Standards | Phenomenon | Weekly Lessons	
GSE: S4E4c	**Focused Concept:**. Ask questions and use observations of cloud types (cirrus, stratus, and cumulus) and data of weather conditions to predict weather events.
Learning Target	I can predict weather events by asking questions and making observations of cloud types
Lab Safety Protocol: **General Safety Practices for the Elementary Science Classroom- TOC.docx**	**Materials:** Graphic Organizer for Cloud Observation Scissors Storm Spotter's Guide Will it Storm? Worksheet
SEP TEACHER TIP: To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol: Ask Questions and Define Problems.pdf	
Phenomenon: S4E4c **- Clouds**	**DQ: How can we use the clouds to predict different patterns in weather?**

Day 1: Opening	Day 2 : Guided Practice/ Transition	Day 3: Independent Practice	Day 4: Independent Practice	Day 5: Assessment / Summary
Phenomena Introduction (5-7 minutes) Show students the phenomenon card : **S4E4c - Clouds** Use the See-Think-Wonder protocol to guide student thinking. Teachers should provide students opportunities to share observations and develop questions. The teacher should record students' observations and questions on chart paper for referencing throughout this week's lesson. **Inquiry Activity (10-15 minutes)** **Georgia Inspire** **"What can clouds tell us about the weather?"** The lab for this week's lesson can be found by accessing **Georgia Inspire, Unit 1 Weather and Moon Phases, Lesson Templates: Phenomenon task: clouds** **Link** **Objective**: Students generate questions about various cloud types then attempt to answer their questions with observation. The students will use the graphic organizer to answer	**Introduce the Driving Question:** **(7 - 10 minutes)** Have students review the driving question: *How can we use the clouds to predict different patterns in weather?* Use the strategy to support students with making connections and understanding the driving question (DQ). Visualizing the Driving Question Click here to access question words reference chart The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer. Be sure to create a reference for students to have throughout the week. ****Teacher Note:** Students should not answer the driving question at this time. Students will need to collect information, data and understanding from the phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format. (3-5 teachers and students should focus on developing	**Review the Driving Question:** **(1-2 minutes)** *How can we use the clouds to predict different patterns in weather?* **Graphic Organizer** **(2-3 minutes for students to access)** Students will use the Will it Storm? worksheets to complete this investigation. The Spotter's Guide will need to be printed and folded. **Materials** Scissors **Investigation Facilitation** **(30-35 minutes)** **Mystery Science** **"How can we predict when it is going to storm?"** **Objective**: Students will ask questions and use observations of cloud types (cirrus, stratus, and cumulus) and data of weather conditions to predict weather events. Ex. What type of clouds cause rain? Which clouds are most likely described as fluffy? Teacher will assign students a group or partner.. The teacher should assign partners prior to the beginning of the lesson. Have students follow the procedure provided in the lab. The teacher will offer support to	**Text Annotation Strategy** **(30-45 minutes)** Have students read and annotate the following text: The Big Storm The teacher should facilitate the following process. Have the students follow the text protocol facilitation directions provided in the following strategy: 3-5 Text Annotation Prot… Students should complete the following student handout as they work through the text annotation protocol: 3-5 Information Analysis Student Organizer (editable) 3-5 Information Analysis… During the teacher-led discussion, the teacher should ask the following questions: On a weather chart, you see cirrus clouds in the morning, followed by cumulus clouds in the afternoon. What does this sequence of cloud types suggest about the weather conditions throughout the day? Which cloud type is usually associated with fair weather, and which might bring rain? ****TEACHER NOTE:** Read and review the annotation protocol prior to providing this lesson to students. Students will need to	**Review the Phenomenon** **(5-7 minutes)** Allow students to review the initial observations and questions from see, think, wonder strategy on Day 1. Have students review initial ideas. Ask students: *Have any of your ideas about the phenomenon changed? How?* Have students review their initial questions. Ask students: *What questions generated on Day 1 can you answer, now? What are your answers to those questions?* **Claim-Evidence-Reasoning** **(15 -25 minutes)** Students will write a response to the following driving question in the CER format. **How can we use the clouds to predict different patterns in weather?** Review the claim-evidence-reasoning poster with the students ****TEACHER NOTE:** Provide students with sentence starters by sharing on the board: 3-5 Claim-Evidence-Rea… Have students write their claim-evidence-reasoning

their observations.

**TEACHER NOTE:
Students will watch the "Exploration" video and review the question: what can clouds tell us about the weather?". The activity requires students to consider the worst storm they've ever experienced and how they might know when one is approaching.

While the exploration video is about 3 ½ minutes, the teacher can extend the question activity in the following ways:
Students write a narrative describing the worst storm
Students use descriptive words and drawings to describe it
Students work with group members to act out a terrible storm
-

**NOTE: The teacher does not need to teach the vocabulary words at this time; only provide students an opportunity to connect meaning.

Materials:
Graphic Organizer for Cloud Observation

Assessment Prep Activity:
(7-10 minutes)

Following the task, click the link above. Have students practice applying their knowledge to an assessment question.

claim, evidence, and reasoning)

Claim-Evidence-Reasoning (CER)
(10-12 minutes)

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to review and understand their peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

The teacher should state the following to students:

"Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas."

Review the claim-evidence-reasoning poster with students.

As a class or in student groups, provide students with this week's claim-evidence-reasoning sample.

The teacher will pull students samples from earlier in the unit for peer review. Be sure to hide student names.

The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol:

Claim-Evidence-Reasoning Record Observations Document

groups by asking questions and giving feedback.
The teacher should facilitate and actively monitor student work and discussions. The teacher should walk around the room to observe and provide guidance questions where necessary.

The lab for this week's lesson can be found by accessing **Mystery Science, Weather & Climate: Stormy Skies Unit, Lesson 2**

In this activity students will make a " Storm Spotter's Guide " which is a little booklet with information on how to spot a storm. Students will fill in the blanks concerning cloud types based on the information that discover in the investigation. Students will need to ask questions to understand cloud types that they see and describe them in their booklet.

After assessing cloud types, students will actually go outside to identify clouds and make a prediction on whether it is going to storm.

Before the outside activity, students will practice using the Will it Storm? Worksheet

**TEACHER NOTE:
Once you know which direction you want to look, use a compass, a compass app on a smartphone, or Google maps to figure out the cardinal directions. The teacher can label the classroom walls North, East, South, and West. Find a

be placed in groups or have an understanding of how the groups will change to limit time used for transitioning.

Vocabulary Strategy
(10-15 minutes)

Vocabulary Words:
cumulus
cirrus
stratus

Vocabulary Strategy:
Vocabulary Terms Chart
Provide students with the graphic organizer (editable) or pdf handout, explaining its sections: word, *What did it look like in the investigation?*, meaning, image/drawing, connection

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words. The teacher should provide the meaning of the word to the students and ask students to provide examples of how the word was represented during the investigation, phenomenon and/or inquiry activity. In the connection column, students should write how the word connects to concepts or observations they gathered during their classroom tasks. Allow students to work in collaborative groups. Actively monitor and facilitate small group discussions and review various artifacts (pictures, images, primary sources, charts) to build knowledge of the term.

writing a claim
Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question.

writing evidence
Students should provide observational or numerical data as their evidence from their investigation and write a short caption or brief description of the data they provide to support their claim.

writing the reasoning
Students will use textual evidence from the "text annotation graphic organizer" to generate the reasoning or justification in the CER format.

Have students use the following template to write their claim-evidence-reasoning (CER)

3-5 Student Writing Template (editable)
3-5 Student Writing Template (pdf)

**TEACHER NOTE: Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions:

	(google doc) Claim-Evidence-Reasoni… (PDF) *1. Identify the student's claim in the sample and have the teacher or students write their observations or questions.* *2. Identify the student's evidence in the sample and have the teacher or students write their observations or questions.* *3. Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.* Ask the following questions to students as they analyze the student samples: Claim-Evidence-Reasoni… ****Teacher Note:** As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn vocabulary on Day 4.	landmark that will help your students remember which way to look. **Assessment Prep Activity:** **(7-10 minutes)** Following the task, click the link above. Have students practice applying their knowledge to an assessment question.	Have students collaborate, in groups, to complete the vocabulary terms chart for the other vocabulary terms. Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.	*How are your thoughts or understanding similar to another writer on the topic? How are your thoughts or understanding different to another writer on the topic? What would you like to learn more about? Why?* **Assessment For Learning** **(10-15 minutes)** *S4E4c Forecasting the Weather Assessment*

Week 6 Standards | Phenomenon | Weekly Lessons	
GSE: S4E4d	**Focused Concept:** Construct an explanation based on research to communicate the difference between weather and climate.

Learning Target	I can construct an explanation based on research to communicate the difference between weather and climate.

Lab Safety Protocol: General Safety Practices for the Elementary Science Classroom- TOC.doc

Materials:

Weather in Different Seasons: Digital Graphic Organizer Climbing For Climate: Digital Graphic Organizer Student Chromebooks (1 per group) Weather v. Climate Situation Cards (1 per group)	Rain gauge (set outside) Wind sock/weather vane Thermometer Compass (for wind direction if weather vane doesn't have directions on top or if using a wind sock) Barometer Anemometer

SEP TEACHER TIP:

To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol: Construct Explanations and Argue from Evidence.pdf

Phenomenon: S4E4d - Weather vs. Climate

DQ: "How can we communicate the difference between weather and climate?"

Day 1: Opening	Day 2 : Guided Practice/ Transition	Day 3: Independent Practice	Day 4: Independent Practice	Day 5: Assessment / Summary
Phenomena Introduction **(5-7 minutes)** Show students the phenomenon card : **S4E4d - Weather vs. Climate** Use the See-Think-Wonder protocol to guide student thinking. Teachers should provide students opportunities to share observations and develop questions. The teacher should record students' observations and questions on chart paper for referencing throughout this week's lesson. **Inquiry Activity**	**Introduce the Driving Question:** **(7 - 10 minutes)** Have students review the driving question: *How can we communicate the difference between weather and climate?* Use the strategy to support students with making connections and understanding the driving question (DQ). Visualizing the Driving Question Click here to access question words reference chart The process can be recorded on chart paper with the students or	**Review the Driving Question:** **(1-2 minutes)** *How can we communicate the difference between weather and climate?* **Graphic Organizer** **(2-3 minutes for students to access)** Students will use the graphic organizer for the Weather and Climate investigation lab Graphic Organizer **Materials** Student Chromebooks (1 per group) Rain gauge (set outside) Wind sock/weather vane Thermometer Compass (for wind direction if weather vane doesn't have directions on top or if using a	**Text Annotation Strategy** **(30-45 minutes)** Have students read and annotate the following text: Climate vs. Weather The teacher should facilitate the following process. Have the students follow the text protocol facilitation directions provided in the following strategy: 3-5 Text Annotation Prot… Students should complete the following student handout as they work through the text annotation protocol: 3-5 Information Analysis Student Organizer (editable) 3-5 Information Analysis…	**Review the Phenomenon** **(5-7 minutes)** Allow students to review the initial observations and questions from see, think, wonder strategy on Day 1. Have students review initial ideas. Ask students: *Have any of your ideas about the phenomenon changed? How?* Have students review their initial questions. Ask students: *What questions generated on Day 1 can you answer, now? What are your answers to those questions?* **Claim-Evidence-Reasoning** **(15 -25 minutes)** Students will write a response to

(10-15 minutes)

Savaas: Weather & Climate Interactivity: Weather in Different Seasons
Navigation: SAVAAS Grade 3, Weather Unit, Seasonal Weather Changes Lesson
Digital Graphic Organizer

Savvas: Virtual Lab: Climbing For Climate
Navigation: SAVAAS Grade 3, Weather Unit, Seasonal Weather Changes Lesson
Digital Graphic Organizer

Interactivity: Classifying Weather and Climate

Objective: Students learn how to determine the difference between climate and weather by completing different activities to learn about each.

**TEACHER NOTE:
Students will complete two activities to learn about weather then climate. Students should use the graphic organizers to collect their observations, however, the teacher can also assign the activities in Savvas.

After completing the activity on weather and the activity on climate. The students should then complete the interactivity to compare the two.

Throughout the investigations, the teacher should as the following questions: *How do we determine the weather? What kinds of information helps us to know what the weather is? How* the teacher can complete the graphic organizer.

Be sure to create a reference for students to have throughout the week.
****Teacher Note:** Students should not answer the driving question at this time. Students will need to collect information, data and understanding from the phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format.

(3-5 teachers and students should focus on developing claim, evidence, and reasoning)

Claim-Evidence-Reasoning (CER)
(10-12 minutes)

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to review and understand their peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

The teacher should state the following to students:

"Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas."

Review the claim-evidence-reasoning poster

wind sock)
Barometer
Anemometer
Weather v. Climate Situation Cards (1 per group)

Investigation Facilitation
(35-40 minutes)

Weather and Climate

Objective: Students will observe and record weather, research past weather data, predict future weather as a class, and distinguish between weather and climate.

Students will need to work in groups of 3 to 4. The activity requires at least 6 groups if possible. The teacher should assign groups prior to the beginning of the lesson.

Have students follow the procedure provided in the lab according to the Teacher Instructions linked below
Teacher Instructions

The teacher should facilitate and actively monitor student work and discussions. The teacher should walk around the room to observe and provide guidance questions where necessary.

**TEACHER NOTE:
This investigation requires preparation the day before with the tools used earlier in the unit. The teacher does not have access to the tools, students can still complete the activity using weather websites.

During the teacher-led discussion, the teacher should ask the following questions:

What patterns or differences do you notice between the short-term weather and the long-term climate?
Imagine you're describing today's weather to a friend. What details would you include to help them understand the difference between weather and climate?

**TEACHER NOTE: Read and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit time used for transitioning.

Vocabulary Strategy
(10-15 minutes)

Vocabulary Words:
climate
weather
conditions

Vocabulary Strategy: Four Square
Provide students with the graphic organizer (editable) or pdf handout, explaining its four sections: word, meaning, picture, and sentence.

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words.

the following driving question in the CER format.

"How can we communicate the difference between weather and climate?"

Review the claim-evidence-reasoning poster with the students

**TEACHER NOTE: Provide students with sentence starters by sharing on the board:

3-5 Claim-Evidence-Rea…

Have students write their claim-evidence-reasoning

writing a claim
Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question.

writing evidence
Students should provide observational or numerical data as their evidence from their investigation and write a short caption or brief description of the data they provide to support their claim.

writing the reasoning
Students will use textual evidence from the "text annotation graphic organizer" to generate the reasoning or justification in the CER format.

do we determine climate? What information helps us to know what the climate is? How is this information different from what we use to determine weather? **NOTE: The teacher does not need to teach the vocabulary words at this time; only provide students an opportunity to connect meaning. **Materials:** Weather in Different Seasons: Digital Graphic Organizer Climbing For Climate: Digital Graphic Organizer **Assessment Prep Activity:** **(7-10 minutes)** Following the task, click the link above. Have students practice applying their knowledge to an assessment question.	with students. As a class or in student groups, provide students with this week's claim-evidence-reasoning sample. The teacher will pull students samples from earlier in the unit for peer review. Be sure to hide student names. The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol: Claim-Evidence-Reasoning Record Observations Document (google doc) Claim-Evidence-Reasoni… (PDF) *1. Identify the student's claim in the sample and have the teacher or students write their observations or questions.* *2. Identify the student's evidence in the sample and have the teacher or students write their observations or questions.* *3. Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.* Ask the following questions to students as they analyze the student samples: Claim-Evidence-Reasoni…	Students will look at weather data over a more recent period of time then compare the data to that of longer time periods. Students will take that information and create visual graphs with it. The teacher will need to support students in creating graphical representations of their data. The teacher should facilitate the conversation by asking the following questions: *What should we include on our graph to compare temperatures on our graphs? What temperature will we compare, Celsius or Fahrenheit? If our graphs will show temperatures over time, what should our x- and y- axis be?* Once student groups finish their graphs, the class will work to put a graph together. The teacher should consider creating the graph the day before on chart or butcher paper. Students can use sticky notes or colored markers to make their chart entries. Guide students through finding the averages for the days that they've graphed using the same formula from Day 1. Following the activity the teacher should ask the following questions: *Based on the data, what do you think the temperature might be during this time next year? How do we determine weather?When we observed the conditions outside, we were gathering data about the weather. Climate is a little different. How do we*	Allow students to work in collaborative groups. Actively monitor and facilitate small group discussions and review various artifacts (pictures, images, primary sources, charts) to build knowledge of the term. Have students collaborate to complete the four square strategy for the other vocabulary terms. Monitor student progress, sharing new ideas for class discussion, and help students distinguish essential from non-essential characteristics. Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.	Have students use the following template to write their claim-evidence-reasoning (CER) 3-5 Student Writing Template (editable) 3-5 Student Writing Template (pdf) **TEACHER NOTE: Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions: *How are your thoughts or understanding similar to another writer on the topic? How are your thoughts or understanding different to another writer on the topic? What would you like to learn more about? Why?* **Assessment for Learning** **(10-15 minutes)** *S4E4d Forecasting the Weather Assessment*

	Teacher Note: As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn vocabulary on Day 4.	*determine climate? Why is it useful to determine information about the climate?* The final part of the full investigation requires students to compare what makes climate versus what makes weather by categorizing different situations. Weather v. Climate Situation Cards The teacher should remember Students should identify and circle the keywords in each phrase. Teamwork is important to debate, discuss, and identify the key words. **Assessment Prep Activity:** **(7-10 minutes)** Following the task, click the link above. Have students practice applying their knowledge to an assessment question.		

Assessment Prep (5-7 minutes)

Prepare students for assessment by reviewing the following Assessment Prep Presentation.

Objective: Have students make connections between in class tasks and assessment questions to provide an opportunity for students to analyze and interpret the expectations of test and quiz questions and apply knowledge of experience to answering the assessment questions accurately

Facilitation: The teacher will select an assessment question that relates to the concept of the day. Students should only analyze one question each day the *"Assessment Prep Activity"* is provided in the plan. Students should engage in discussion to argue and develop reasoning for answer choices that are both correct and incorrect.

Goal: The goal is to practice the skills of test taking, such as: process of elimination, reasoned assumption, avoiding premature selection, checking for consistency, time

management, using context clues, reading questions carefully, etc to build confidence in students as they perform on summative assessments throughout the year.

Use the following:

G4U2 Forecasting the Weather

Provide the following guidance:

Place students in groups and display the assessment question. Complete the following assessment prep protocol:

Ask the students the following questions as they work through the assessment prep protocol.

- *What is the question asking you?*
- *What do you know about the vocabulary or concept in the question?*
- *Is this question similar to any investigations or tasks we've completed?*
- *How can what you've done help you answer this question?*
- *Just view the assessment question: What is the question asking you?*

Guide students to think about how their inquiry task and investigation experience connects to the question.
Using the answer choices provided, students should begin asking themselves and their group members:

- Identify a wrong answer: How do I know this answer is incorrect?
- Identify the right answer: How do we know this answer is correct?

Allow the students time to discuss in collaborative groups.

TEACHER NOTE: If students struggle with the question, review the same question on the very next day. Do not feel the need to rush to the next question to review. Assessment prep is not meant to be a lengthy activity when considering time. Provide students with five - seven minutes to analyze the question and check for understanding.

Labs / Investigations

Mandatory Labs	Explore Learning Gizmo	Mystery Science/Phet
What can clouds tell us about the weather? (GDOE) **Weather in Different Seasons (SAVAAS)** **Classifying Weather and Climate (SAVAAS)** **Where did that water come from? (SAVAAS)**	**Phases of Water** **Observing Weather**	**Why are some places alway hot?** **Will it Storm?**

Additional- Resources/Tasks

Supplemental Labs	**Water Cycle Game** **Water Cycle in a Bag** **Summer Ice Storm** **Weather Instruments**

	Cloud in a Bottle
Culminating Performance Task	CER *What is happening to the flow of energy as water changes states from liquid to gas and reverses?* *CER Why does it hail in the summer?* *CER How do weather instruments help us to gather data and make weather forecasts?* *CER How can we interpret data to make informed weather decisions?* *CER How can we use the clouds to predict different patterns in weather?* *CER How can we communicate the difference between weather and climate?*
STEM Activities	
Lesson Plan guidance document and template	Link the following : https://drive.google.com/file/d/1dDFitw1NesctodMZ9XAr7zc0-S5GZKPB/view?usp=drive_link