A.5. CURRICULUM SAMPLE – Fourth Grade Science

Grade Level	Content Area	Course Title	Unit Title
4th	**Science**	**N/A**	**Measuring the Weather**

Length of Unit	Time of Year Taught	Expected Prior Knowledge
7 Lessons *17 days	1st Quarter	Every student should understand and use all concepts and skills from the previous grade levels with regard to Science, according to Arizona State Standards.

Unit Description

In this unit students will further their understanding of the water cycle and weather as they conduct investigations using thermometers, barometers, compasses, and student-created rain gauges. They will collect, interpret, and summarize data as well as research the average yearly rain fall in foreign countries in order to compare it to their findings at home.

Common Core Standards	**S1.C2.PO4.** Inquiry process, Scientific testing (investigation and modeling), Measure using appropriate tools (e.g., ruler, scale, balance) and units of measure (i.e., metric, US customary). **S6.C3.PO4-5.** Measure changes in weather (e.g., precipitation, wind speed, barometric pressure) **S1.C4.PO1.** Communicate verbally or in writing the results of an inquiry. **S1.C4.PO2.** Choose an appropriate graphic representation for collected data: **S1.C3.PO1-4.** Analyze data obtained in a scientific investigation to identify trends, formulate conclusions based upon identified trends in data, determine that data collected is consistent with the formulated question, determine whether the data supports the prediction for an investigation.
Summative Assessment	Students will collect data for 10 days. After those 10 days they will have two class periods to organize their data into a table and then write a paragraph summarizing their findings. Their data should include appropriate measurements for temperature, barometric pressure, rainfall (in cm.), and wind direction. For an extension, students can create a graph using the data as well. The summary should be at least five sentences long and include a topic sentence, 3 supporting sentences, and a concluding sentence. The summary should analyze and draw a conclusion about the data collected and determine whether the data predicts the prediction for the investigation.
Assessment Scoring	The data table and summary paragraph will be graded using a four-point rubric. There will be six different criteria related to the data collection and summary writing. The total score will be out of 24 points. *Mastery is considered an average grade of 80% or higher.*
Materials/Resources Needed	Science journal, pencil, whiteboard, marker (all lessons), Video: DE Streaming, *The Water Cycle* (17 min) and *Weather Smart* (15 min), computer with internet connection, pictures of historical rain gauges, rain gauge building worksheet, scissors, ruler (cm), 2-liter soda bottle, transparent tape or double back tape, 1-cup aquarium gravel, tap water (enough of each per small group), "What's the Reading?" worksheet (teacher will draw in measurements), thermometers, barometers, compasses (one of each per small group)

	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Lesson Instruction	1. Begin by telling the student they will be meteorologists for this unit. Allow a few students to tell who or what they think a meteorologist is. If the correct answer is not given tell the class and write the definition on the board. 2. Pass out student science journals and have them copy down the definition. 3. Lead the class in a discussion about what it means to observe. 4. Tell them you are going outside to observe the weather. Give definition of weather. Determine how many observations students should write down. As a group, discuss the kinds of things they can observe (wind speed/direction, temperature, clouds, humidity, etc). 5. Take students outside for 10 min. to	1. Tell the students you need to find out what they already know about weather so you need them to complete a pre-test. 2. Pass out the video pre-test. Allow students enough time to finish. 3. Tell students they will be learning how to measure things like air temperature, air pressure (high and low), and wind direction. Give students the definition of each term. 4. Pass a thermometer around the room and ask what it measures. Do the same with a compass and a	1. Write the following on sentence starters on the board: 1) To measure air temperature I use a ____. 2) To measure air pressure I use a ____. 3) To determine wind direction I use a ____. Have students copy them in their journals and fill in the blanks. Discuss answers as a class. 2. Ask students what unit of measure is appropriate for each tool (degrees, millibars or inches of mercury, direction wind is coming from). Have students add this information to their journals. 3. Tell the students they are going to practice reading these 3 tools because they will be conducting an	1. Begin by asking the students to share with small groups what they know about the water cycle. 2. Have each group share a few things they discussed and create a KWL chart (students should copy this in their journals). 3. Tell students they will be watching a video about the water cycle and that they should take notes in their journal. Pause the video as needed to allow for this. 4. After the video have student create an illustration in their journals of the water cycle and label it. Allow them to work in small groups. 5. Provide the students with the	1. Begin by reviewing the definition of precipitation. Tell the students they will be working in small groups to build rain gauges. Give students the definition of a rain gauge and a brief history. Emphasize that they are used for historic information not to predict. Show students a few pictures of different rain gauges from throughout history. 2. Have students share with their groups their answers to the questions from the previous lesson. Then have a few students share their answers with the class. 3. Pass out directions for building the rain gauge (if you feel your students need to	*Takes place at end of unit. Two class periods (45 min each). First five lessons should be done consecutively. Then allow 2 school weeks for data collection (15 min per day) 1. Tell students that they will be organizing all of their data into a table (you may want to show an example), analyzing it, and writing a summary of their investigations. 2. As a class review the rubric and answer any questions. 3. Allow students to get into their small groups and begin working. 4. Circulate the classroom and offer support as needed. You may want to call each group back, one at a time, to check in

	complete observations. 6. Once back inside group students and have them share their observations. Each group should write one sentence describing the weather using their observations and report it to the class. 7. Tell the students they will be investigating rainfall, temperature, wind direction, and barometric pressure over the next few weeks.	barometer. 5. Tell the students they will be watching a video about weather, what causes changes in it, and how we measure different aspects of it. Tell the students to update their pre-test with the correct answers as they watch. 6. Play Weather Smart video (15 min.) 7. Allow students to work with partners to check answers when video is finished.	investigation where they will be keeping daily records of these 3 measurements for the next 10 days. 4. Pass out worksheet "What's the Reading?" (Be sure you have made marks on the tools prior to copying). Teach students how to read/use each tool appropriately. 5. Allow students to work in small groups to complete the worksheet. 6. Go over the worksheet with the whole class to make sure all students are successfully reading all tools. 7. Pass out actual tools to each group. As a class, determine where the students will be placing thermometers and barometers (you may want to keep compasses in a safe place). As a class write a question to guide your investigation for	following definitions for their journals. precipitation, molecule, condensation, evaporation 6. Review the water cycle as a class to ensure all students understand and have it properly labeled in their journals. Update the KWL chart as a class. 7. Tell the students they will be starting an investigation in the next lesson where they will study and measure rain fall. 8. Write these questions on the board: Why do we study rainfall and keep track of the average rainfall? Who do you think would need to keep track of this sort of information and why?	see an example you can do one for them or have one to show them already completed). Read through the directions and ask if there are any questions. 4. Pass out materials or have one student from each group go get them. 5. Provide time for students to work. Circulate the room to assist as needed. 6. Lead a discussion about where the gauges should be placed, how often they should be checked, and how students will record data (require a table). Then review how to read a ruler, remind them they are using cm. 7. Allow groups to place their gauges. 8. Tell the students they need to write a question to guide their investigation and a hypothesis like they did in the	with them and make sure they are on track. 5. On the last day have each group of students will share the information they researched about a foreign country's avg. yearly rainfall. ***Extension*** Have students graph their data as well and interpret the graphs.

			each tool. Then have each group write a hypothesis for what they think the overall data will show at the end of the 10 collection period. Allow students to place their tools and record their first readings. *If a student is absent he/she should get data from a group member.		previous lesson. 9. Assign each group a foreign country. Have them research the average annual rainfall and report back to the class in a future lesson. (Have a group of students create a bar graph to display this data then discuss why some places have more/less rainfall than others.	

	Lesson 1	**Lesson 2**	**Lesson 3**	**Lesson 4**	**Lesson 5**	**Lesson 6**
Student Activities	1. Students will participate in a class discussion determining who/what a meteorologist is. Then they will write down the definition in their science journals. 2. Students will participate in a class discussion about what it means to observe and determine what types of things they will be observing about weather when they go outside. Student will write the definition of weather in their	1. Students will attempt pre-test. 2. Students will write definitions in journal. 3. Students will pass weather tools and discuss uses. 4. Students will watch Weather Smart video and update pre-test. 5. Students will check pre-test with partners.	1. Students will copy sentences from the board and fill in the blanks with the correct tool. 2. Students will participate in a discussion determining the correct unit of measure for each tool and write it in their journals. 3. Students will complete the worksheet "What's the Reading?" in small groups. 4. Students will	1. Students will discuss in small groups what they already know about the water cycle. 2. Student will participate in creating the class KWL chart. 3. Students will watch the Water Cycle video and take notes. 4. Students will work in small groups to illustrate and label a diagram of the water cycle in their Science	1. Students will write the definition, rain gauge in their journals. 2. Students will view and discuss pictures of various historical rain gauges. 3. Students will share with their groups their answers to the questions from the previous lesson. Then a few students will share their answers with the class. 4. Students will review the directions	1. Students will review rubric with the teacher and ask any necessary questions. 2. Students will work in small groups to create final data tables and write summary paragraphs. 3. Students will present the information they researched about a foreign country's avg. yearly rainfall.

	journals. 3. Students will go outside for 10 min. and write down their observations of the weather in their journals. 4. Students will return to the classroom and get into small groups to discuss their observations and write a sentence describing the weather using their observations. 5. Each group will share the sentence they wrote.		check their work as the teacher reviews the correct answers. 5. Students will participate in writing the question and hypothesis for the investigation. 6. Students will work in small groups to place their tools in appropriate places. 7. Student will record their first readings in their science journals.	journals. 5. Students will copy definitions into their journals and check their diagrams. 6. Students will participate in helping the teacher update the KWL chart and update the one in their journals. 7. Students will answer the questions from the board in their journals.	for building the rain gauge with the teacher. 5. Students will work in small groups to build a rain gauge and write a question and hypothesis. 6. When all are finished students will participate in a class discussion to determine where each gauge should be placed, how often they plan to check them, and how they plan to organize the data they collect.	

Activity: The Rain Gauge
MATERIALS:
Scissors, Ruler (cm), 2-liter soda bottle, Transparent tape or double back tape, 1-cup aquarium gravel, Tap water

OBJECTIVE:
The student will make and use a rain gauge, an instrument that is used to collect and measure falling water (precipitation). It measures the depth of water that would cover the ground if the rain did not drain away or evaporate.

Vocabulary: Precipitation: vapor that condenses into clouds and falls on the land and water in the form of rain, snow, hail or sleet. Eighty-five percent of all precipitation falls into the ocean.

PROCEDURE:

1. Cut (and discard) the top off the soda bottles so the bottle is 8” tall.

2. Pour the gravel into the bottle. (Ask why you need the gravel – to use as a weight and to fill in some of the space need to make a level starting point).

3. Tape the ruler vertically to the inside of the bottle, with the zero end just resting at the top of the bottle line above the gravel.

4. Pour water into the bottle until it touches the zero end of the ruler.

5. Set the bottle outdoors and document the amount of daily rainfall. During periods of no rainfall, add water as necessary to keep the starting water level even with the top of the gravel. (Evaporation)

Video Pre-Test
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Directions: Answer each question either true or false.

1. _____ When air is moving, we call it wind.

2. _____ Air pressure tells you how heavy the air is.

3. _____ Warm air sinks to the ground.

4. _____ The Earth gets its heat from the sun.

5. _____ A barometer tells you the wind direction.

6. _____ The jet stream moves weather around the Earth.

7. _____ Cold air is heavier than warm air.

8. _____ Thermometers tell you how warm the air is.

9. _____ Somewhere on Earth, air is always moving.

10. _____ We could live without air.

Video: Weather Smart: Heat, Wind and Pressure
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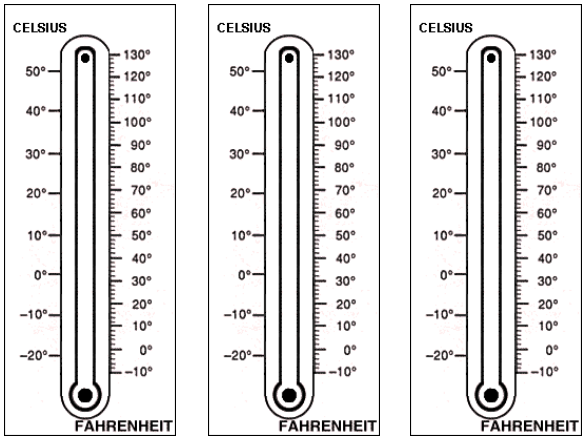
Discussion Questions Directions: Answer the following questions as directed by your teacher.

1. How does wind start? 2. What parts of Earth are always cold? 3. What keeps the temperature from getting too high in hot places? 4. What time of the day is usually the windiest? 5. How would Earth be different if we didn't have air? 6. What kind of weather do you find around low pressure? 7. Why does a strong wind make you feel colder in winter? 8. Where on Earth do we usually find the warmest temperatures? 9. What makes weather move around the world? 10. What does pressure have to do with air?

"What's the Reading?" Learning to use weather related measurement tools

Write the correct temperature below each thermometer.



Write the correct barometric pressure below each barometer.

Write the correct wind direction below each compass. (The direction the wind is coming from)

Rubric: Measuring the Weather Unit

	4	3	2	1
Rain gauge data	10 days	7-9 days	4-6 days	Less than 4 days
Thermometer data	10 days	7-9 days	4-6 days	Less than 4 days
Barometer data	10 days	7-9 days	4-6 days	Less than 4 days
Compass data	10 days	7-9 days	4-6 days	Less than 4 days
Data table	All data is neatly organized, measurement units are labeled correctly, data makes sense	Most data is neatly organized, measurement units are mostly labeled correctly, data makes sense	Data is organized but could be neater, measurement units are missing or incorrect, data doesn't make sense	Data is unorganized, incomplete, or missing, measurement units are missing or incorrect, data doesn't make sense.
Summary paragraph *Can be used as a writing assessment as well	Paragraph includes a topic sentence, at least three supporting sentences, and a concluding sentence. Data is accurately analyzed and a reasonable conclusion is made. No grammar or spelling errors were made.	Paragraph includes a topic sentence, at least three supporting sentences, and a concluding sentence. Data is analyzed and a conclusion is made. Few grammar or spelling errors were made.	Paragraph includes a topic sentence at least two supporting sentences and a concluding sentence. Analysis and/or conclusion is missing. Many grammar or spelling errors were made.	Paragraph is missing a topic sentence, less than two details were included, and no concluding sentence was written. Analysis and/or conclusion is missing. Many grammar or spelling errors were made.