

Lesson Adaptation Activity: Analyzing and Interpreting Data

Related MA STE Framework Standard:

3-ESS2-1. Use graphs and tables of local weather data to describe and predict typical weather during a particular season in an area.

Clarification Statements:

- Examples of weather data could include temperature, amount and type of precipitation (e.g., rain, snow), wind direction, and wind speed.
- Graphical displays should focus on pictographs and bar graphs.

Lesson Description

Ms. Davis' 3rd grade class is learning about weather patterns over each season. Ms. Davis has her students work with temperature and precipitation data from the Boston area over the last year. The students organize this local area weather data into a table and/or graph. This activity is part of a larger unit on Earth's systems.

Lesson Adaptation A **Level 4**

Ms. Davis: So yesterday we talked about the weather. Can anyone remind me what weather is?

Alan: Weather is what it is like outside from day to day.

Ms. Davis: Very good! And we also talked about two ways we can measure weather. One way measured how hot it was, and the other measured how much precipitation there was. What were those two ways?

Stacy: We can measure the temperature using a thermometer and we measure the amount of precipitation using a rain gauge.

Ms. Davis: Thank you Stacy. Scientists called meteorologists use these tools to measure weather every day. They do these measurements to keep track of the weather over the year for different places all around the world!

Ms. Davis: Today we are going to learn about Boston's weather over the year. I've passed out a piece of paper that has information about the temperature and precipitation in Boston for last year. It will tell you what the average temperature and amount of precipitation for each month and season was for the last year. On the board is a list of the months from each season. You and your partner can choose to organize this temperature and precipitation data in any way that is helpful to you. Your goal is to use your organized temperature and precipitation data to make sense of what Boston weather is like during each season.

Alan: What if we want to graph the data?

Ms. Davis: Good question. If you choose to make a graph, please follow the checklist taped to the center of your tables to make sure your graphs contain labels on the axes and a title.

Wahid: What kind of graph should we do?

Ms. Davis: You should talk about what type of graph, and the reasons for your choice with your partner. Remember we have talked about bar graphs, line graphs, and combination graphs.

Wahid: Okay.

Ms. Davis: After you are finish your graph I want each of you to write 1-2 sentences that summarize any seasonal pattern(s) in temperature and precipitation you see within the graph. I have written the following sentence starters on the board to help you get going, "My graph shows that during the _____ season the weather is _____" or "From the _____ season to the _____ season, the weather gets _____"

Ms. Davis: Any questions (pauses), if there are no questions, then you can get started with your partner.

Ms. Davis circulates around the room and stops to listens in on one pair of students' as they discuss their graph.

Ralph: So when it is winter it was the coldest temperature.

Malik: And it was also the season with the second most amount of precipitation.

Ms. Davis: Which season had the most precipitation?

Ralph: Spring.

Ms. Davis: So what happened to the weather between winter and spring?

Malik: From winter to spring the weather got warmer and there was more precipitation.

Ralph: Ms. Davis, I looked at Alan's graph and it looks different than mine. Who is right?

Ms. Davis: Well Ralph, we are going to have each group share about why they chose to make their graph the way they did. We will then discuss as a class how the differences in each group's graphs changed how you made sense of the data.

Lesson Adaptation B Level 2

Ms. Davis: So yesterday we talked about the weather. Can anyone remind me what weather is?

Alan: Weather is what it is like outside from day to day.

Ms. Davis: Very good! And we also talked about two ways we can measure weather. One way measured how hot it was and the other measured how much precipitation there was. What were those two ways?

Stacy: We can measure the temperature using a thermometer and we measure the amount of precipitation using a rain gauge.

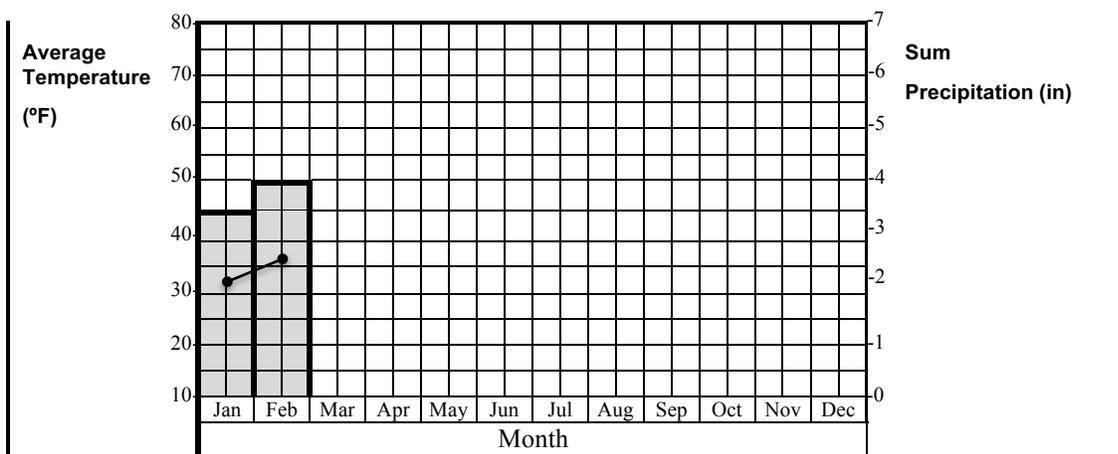
Ms. Davis: Thank you Stacy. Scientists called meteorologists use these tools to measure weather every day. They do these measurements to keep track of the weather over the year for different places all around the world!

Ms. Davis: Today we are going to learn about Boston’s weather over the year. I’ve passed out to two different sheets of a paper to each of you. The first sheet has information about the temperature and precipitation in Boston for last year. It will tell you what the average temperature and amount of precipitation was for each month and season of last year. The other sheet has a data table and a graph on it. Your task today is to work with your partner to organize this weather data into the table and graph from the worksheet:

Monthly Temperature and Precipitation for Boston (2016)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Average Temperature (°F)	32.5	36.0										
Sum Precipitation (In.)	3.5	4.0										

Monthly Temperature and Precipitation for Boston (2016)



Alan: What kind of graph are we going to make?

Ms. Davis: Good question. When you are ready to make your graph please follow the checklist at the center of your tables. There should be one there for each partner group. It will give you step-by-step directions on how to complete the graph. I have also filled in the graph for January and February to show what the graph should look. Any more questions (pauses), if there are no questions, then you can get started with your partner.

Boston Climograph Checklist

- Record the title of the graph and the titles for the x-axis and two y-axes below:
 - o The title of the graph is _____
 - o The x-axis title is _____
 - o The y-axis title on the left side is _____
 - o The y-axis title on the right side is _____
- Record the scales for the x-axis and two y-axes below:
 - o The x-axis for months goes from _____ to _____
 - o The y-axis for temperature goes from _____ °F- _____ °F
 - o The y-axis for sum precipitation goes from _____ in- _____ in
- Use a **line** to fill in the **temperature** data on the graph
- Use **bars** to fill in the **precipitation** data on the graph.
- Follow the example graph below when you make the line and bars in your graph.

Monthly Temperature and Precipitation for Boston (2016)

Month	Average Temperature (°F)	Sum Precipitation (in)
Jan	32	3.5
Feb	35	4.5
Mar		
Apr		
May		
Jun		
Jul		
Aug		
Sep		
Oct		
Nov		
Dec		

Ms. Davis circulates around the room and listens in on one pair of students' discussion.

Jane: So why don't you fill out the temperature data for each month and I will do the precipitation data. After we can switch.

Steve: Sounds good, but how are we going to make the graph? There are two groups of data but only one graph?

Jane: They both go on the one graph. It tells us here (points to sheet in center of table). The left side is for temperature and that will be a line graph. The right side is for the precipitation and that will be a bar graph. And the bottom is where the months go.

Steve: Okay I get it now.

Lesson Adaptation C **Level 1**

Ms. Davis: So yesterday we talked about the weather. Can anyone remind me what weather is?

Alan: Weather is what it is like outside from day to day.

Ms. Davis: Very good! And we also talked about two ways we can measure weather. One way measured how hot it was and the other measured how much precipitation there was. What were those two ways?

Stacy: We can measure the temperature using a thermometer and we measure the amount of precipitation using a rain gauge.

Ms. Davis: Thank you Stacy. Scientists called meteorologists use these tools to measure weather every day. They do these measurements to keep track of the weather over the year for different places all around the world!

Ms. Davis: Today we are going to learn about Boston's weather over the year. You and your partner are going to use one of the laptops at the center of your table to investigate the Boston's weather for one month of the year. You will use the National Weather Service database to completed your investigation. I've passed out to each partner group a worksheet which has the name of the month you will be researching, and directions on how to use the database to find monthly temperature and precipitation data. After each group has found their monthly data, we will come together as a class and each group will give me their data. I will fill it into the data table here (gestures to board).

Month:

March

Directions for National Weather Service Database Activity

Step 1: Website

Go to the following website: <http://w2.weather.gov/climate/xmacis.php?wfo=box>

Step 2: Precipitation Data

The screenshot shows the National Weather Service NOWData interface for Boston, MA. The page is titled "National Weather Service Forecast Office Boston, MA". It features a navigation menu with "Home", "News", and "Organization". Below the menu, there are tabs for "Observed Weather", "Climate Locations", "Climate Prediction", "Climate Resources", "Local Data/Records", "Astronomical", and "NOWData". The "NOWData" tab is active, showing search options for "Location", "Product", "Options", and "View".

Annotations on the screenshot:

- 1. Choose Boston area (points to "Boston Area" in the Location dropdown)
- 2. Choose monthly summarized data (points to "Monthly summarized data" in the Product dropdown)
- 3. Choose year range: 2016-2016 (points to "Year range: 2000 - 2017" dropdown)
- 3a. Choose variable: precipitation (points to "Precipitation" in the Variable dropdown)
- 3b. Choose variable: precipitation (points to "Sum" in the Summary dropdown)
- 3c. Choose summary: sum (points to "Sum" in the Summary dropdown)
- 4. Click go (points to the "Go" button)

Step 3: Record sum precipitation data for your month

- **Sum precipitation for March:** _____ (in)

Lesson Adaptation D Level 3

Ms. Davis: So yesterday we talked about the weather. Can anyone remind me what weather is?

Alan: Weather is what it is like outside from day to day.

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Stacy: We can measure the temperature using a thermometer and we measure the amount of precipitation using a rain gauge.

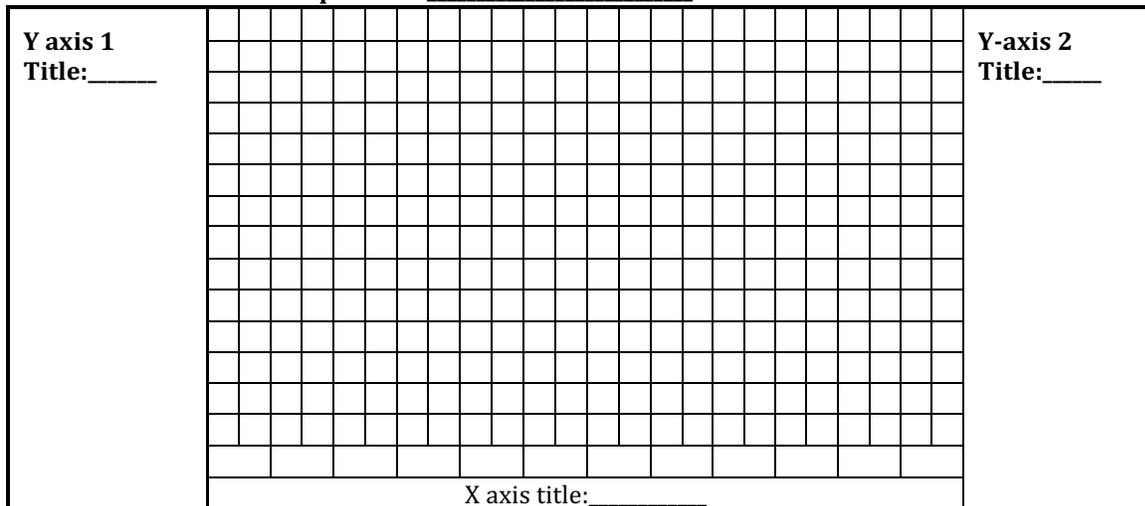
Ms. Davis: Thank you Stacy. Scientists called meteorologists use these tools to measure weather every day. They do these measurements to keep track of the weather over the year for different places all around the world!

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Title: _____

	Winter			Spring				Summer				Fall				Winter
	Jan.	Feb.	Avg.	Mar.	Apr.	May	Avg.	Jun.	Jul.	Aug.	Avg.	Sep.	Oct.	Nov.	Avg.	Dec.
Average Temperature (°F)																
Sum Precipitation (In.)																

Graph Title: _____



Alan: What kind of graph are we going to make?

Ms. Davis: Good question. When you are ready to make your graph please follow the checklist at the center of your tables. There should be one there for each partner group. It will help you to to complete the graph. While you are organizing your data I want you to think about the weather during different seasons in Boston. Use the temperature and precipitation data to make sense of the weather is like during each season. And if you forget what months are part of each season, where could you look?

Boston Climograph Checklist

- Create a title that is descriptive and specifically about the variables
- Label the x-axis with the independent variable (what changes).
- Label the left-hand side y-axis with the first dependent variable from your data table (first recorded weather measurement)
- Label the right-hand side y-axis with the second dependent variable from your data table (second recorded weather measurement)
- Create an appropriate scale for the left and right-hand sides of the y-axis (fits the minimum and maximum measurements)
- Create an appropriate scale for the right-hand side y-axis (fits the minimum and maximum measurements)
 - Make sure the intervals (spaces) on the scale are equal and accurate
- Use a **line** to fill in the **temperature** data on the graph
- Use **bars** to fill in the **precipitation** data on the graph.
- Follow the example line/bars below when you make the line and bars in your graph

Wahid: You can look at the top of the data table or on the board.

Ms. Davis: Good. Now after you finish your graph I want each of you to write 1-2 sentences that summarize any seasonal patterns in temperature and precipitation you see within the graph. I have written the following sentence starters on the board to help you get going, “My graph shows that during the _____ season the weather is _____” or “From the _____ season to the _____ season, the weather gets _____”

Ms. Davis: Any questions (pauses), if there are no questions, then you can get started with your partner.

Ms. Davis circulates around the room and stops to listens in on one pair of students’ as they discuss their graph.

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Malik: And it was also the season with the second most amount of precipitation.

Ms. Davis: Which season had the most precipitation?

Ralph: Spring.

Ms. Davis: So what happened to the weather between winter and spring?

Malik: From winter to spring the weather got warmer and there was more precipitation.

Ordering of Adaptations

Directions: Order the four adaptations (A-D) along the Science Practice Continuum (Levels 1-4) for the Analyzing and Interpreting Data practice.

	Level 1	Level 2	Level 3	Level 4
Adaptations	C	B	D	A