

# Analyzing Temperature Data

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- Strand:** Probability and Statistics
- Topic:** Collecting, organizing, representing, interpreting, and comparing data using line graphs
- Primary SOL:** 4.14 The student will
- Collect, organize, represent data in bar and line graphs.
  - Interpret data represented in bar graphs and line graph; and
  - Compare two different representations of the same data (e.g. a set of data displayed on a chart and a bar graph, a chart and a line graph, or a pictograph and a bar graph).

## Materials

- Outdoor thermometer
- Temperature Record activity sheet (attached)
- Poster-size Temperature Record chart
- Graph Template activity sheet (attached)

## Vocabulary

*analyze, bar graph, chart, data, interpret, inference, line graph, line segment, point, predict*

## Student/Teacher Actions: What should students be doing? What should teachers be doing?

1. Review reading a thermometer and recording temperatures in degrees Fahrenheit and degrees Celsius. Then, distribute the Temperature Record activity sheet and model recording a temperature on the handout. Remind students to keep this sheet in their notebooks because they will use it daily for the next 10 days.
2. Each day for 10 days send two students out to read, verify, and then report the outside temperature to the class. Try to do this at the same time each day when the thermometer is in the shade. As the two students report the temperature each day, have them record it on a poster-size Temperature Record chart similar to the handout, and direct all students to record the reported temperature on their own Temperature Record Sheets. Each day facilitate some conversation about what students notice about temperatures: do they see any trends; because the temperature was measured at the same time, what reasons might there be for differences in temperatures, etc.
3. At the end of the 10 days of data collection, let students know that they will be constructing a *line graph* of the data, which will provide a visual story of what happened over the 10-day period of time. The line graph helps to identify trends over time, such as the temperature changes over the 10-day period as well as within a given day. Interpreting the story and studying the trend can help *predict* what the temperature might have been at other times during the day, because the temperature was recorded every 24 hours. Distribute the Graph Template and instruct students in how to use the data from the table and to plot a point on the grid as a line graph. Teachers will need a

large model of the grid on the board or one displayed using a demonstration tool (e.g., document camera, digital display).

- a. The title of the graph should include the time the temperature is taken.
  - b. Direct students to label the vertical axis with appropriate increments. Ask students to tell you what they know about points between the increments. Ask students to identify the value of some points between the increments.
  - c. The date/day should label the horizontal axis. The time should be the same each day so that from tick mark to tick mark 24 hours have passed.
  - d. Work with the class to graph data for the first two days, and discuss how the points are located. Then pose the following questions and facilitate some discussion: “*Did time stop between the two times when the temperature was taken each day? How do you know?*” “*Do you think the temperature stayed the same during the 24 hours in between the time the temperature was taken? How do you know?*” Conclude the discussion by instructing students to draw a line segment between the two points so they can more easily follow the trend of what is happening. Then pose some questions that have students *predict* where the temperature might go.
  - e. At the end of the discussion, ask students to write in their notebooks how to use the data in the table to plot a point on the grid. Circulate around the room to determine whether students are ready to work in pairs to plot the remainder of the points.
  - f. Direct students to work in pairs to finish their graphs and to check each other’s work. If their graphs are not the same, work together to determine how to make the necessary corrections. Circulate around the room to prompt students who are having trouble and to note which students to call on during the whole-class sharing.
  - g. Invite students to come to the class graph to locate points to complete the graph. Ask students to compare their graph with the class graph and make any revisions they think are necessary.
4. Once all students have graphed their data, ask the following questions:
    - a. Which day was the temperature the warmest? Which day was the coolest?
    - b. What is the difference between the temperature on the first Monday and the temperature on the second Monday?
    - c. Which two days have a difference of (seven) degrees?
    - d. Based on the graph, what would you predict the temperature might have been 12 hours after the temperature was recorded on Wednesday?
    - e. If we measured the temperature on the 11th day, do you think it would be the same, more, or less than on the 10th day? Why?
  5. Next, use the data gathered to have students create a *bar graph* in order to compare and determine which graph presents the information better and allows for more inferences. The activity and discussion should support that line graphs are best for something that occurs over time. For example, even though the temperature was taken at the same time each day, there was a temperature at all the other times in the 24-hour period. Bar graphs are best for displaying grouped or categorical data. To facilitate

a comparison, display a bar graph of the data and then pose the same questions that were posed in step 4. In conclusion, ask students to discuss with their shoulder partner what graph was more helpful in answering the questions and why. Invite students to share and highlight responses that capture the attributes of a line graph that are not as clear in a bar graph.

6. For homework, ask students to list 2–3 types of data that would be best displayed in a bar graph and 2–3 items that would be best displayed in a line graph, and explain why. Let them know they can interview adults or look in magazines and newspapers. The following day, create a space on the board for a two-column chart, with one column labeled Bar Graph Data and the other Line Graph Data. As students come into class, ask them to record what they found during their homework assignment; if theirs is already on the list put a check mark by it. Use the information in the list to address any key ideas that need to be discussed further. One question to pose is how students decided whether the data belonged in the bar graph or line graph column.

### Assessment

- **Questions**
  - Could this data be displayed on a different type of graph, such as a bar graph, picture graph, circle or pie graph, or line plot? Why, or why not?
  - What is the trend the temperatures took over these two weeks: getting warmer, cooler, or no change? Was there a distinct trend? Was this typical for this time of year?
  - How might the graph look differently if the temperature were recorded at 9 p.m.?
  - How might the results be different if we were to collect data during a different season of the year?
- **Journal/writing prompts**
  - Write about the data collected. Explain what you notice and what you wonder about the trend over the 10-day period.
  - Write a weather report for the first five days of recording the temperatures.

### Extensions and Connections (for all students)

- Have students also collect other weather-related information at the same time as collecting the temperature. Have them decide whether there are any correlations between the temperature and other factors, such as being sunny, rainy, mostly cloudy, mostly sunny, etc. Have students determine an appropriate way to display the data.
- Have students watch the weather forecasts for the same days and then discuss whether the forecasters' predictions were accurate and what may have been the reasons for the differences.

### Strategies for Differentiation

- Use a large thermometer for ease of reading.
- Use large-sized graph paper.

- Provide a Graph Template handout with the axis lines already labeled.

**Note: The following pages are intended for classroom use for students as a visual aid to learning.**

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## Temperature Record Daily Temperature Data

Day and Date	°F	°C	Other Weather-related Data
Monday, ____			
Tuesday, ____			
Wednesday, ____			
Thursday, ____			
Friday, ____			
Monday, ____			
Tuesday, ____			
Wednesday, ____			
Thursday, ____			
Friday, ____			

Additional Notes:

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# Graph Template

Graph Title

