

Think Like
A Scientist

Investigating Weather and Climate



NSA
eBooks⁺Kids



TEACHER'S
GUIDE

Overview

This teacher's guide supports teachers using the *Investigating Weather and Climate* e-book in their classrooms. It lays out learning goals for each chapter, shares student misconceptions and how to address them, and highlights where students explicitly practice science and use crosscutting concepts to support their learning. It also provides end of chapter investigations that connect readings and interactives in the e-book with students' world.



Teachers who follow the guide while addressing the specific needs of their classroom will be able to:

- engage students in grade-level appropriate, three-dimensional learning;
- use the e-book as a tool in class-wide, small group, or independent explorations of its content;
- facilitate investigations that utilize the e-book content and connect it with their own classroom and community; and
- assess students on the NGSS Performance Expectations to which this e-book is aligned and additional *Common Core State Standards*, in English language arts and mathematics suggested throughout the e-book.



Grade 3
Lexile® Measure: 820L

OVERVIEW

This e-book does not use all of the grade-level elements for the practices and crosscutting concepts, but that does not mean that you should not be aware of the other practices and concepts your students need to know. For a full list of all the grade-level elements for the science and engineering practices and crosscutting concepts, refer to [Appendix A](#).

Disciplinary Core Ideas (DCIs)

This e-book examines a disciplinary core idea while using crosscutting concepts and practices to create a three-dimensional understanding of weather and, to a greater extent, climate.

The disciplinary core idea addressed includes:



ESS2.D: Weather and Climate Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.

Science and Engineering Practices

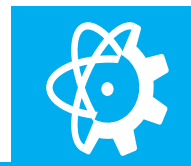
"Engaging in the practices of science helps students understand how scientific knowledge develops; such direct involvement gives them an appreciation of the wide range of approaches that are used to investigate, model, and explain the world. The actual doing of science or engineering can also pique students' curiosity, capture their interest, and motivate their continued study."

(NRC Framework to K-12 Science Education, 2012)

The practices most commonly used throughout this e-book are:

- [Analyzing and Interpreting Data](#)
- [Using Mathematics and Computational Thinking](#)
- [Constructing Explanations and Designing Solutions](#)

The science and engineering practices addressed include:



Analyzing and Interpreting Data

- Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or computation.
- Compare and contrast data collected by different groups in order to discuss similarities and differences in their findings.

Using Mathematics and Computational Thinking

- Describe, measure, estimate, and/or graph quantities such as area, volume, weight, and time to address scientific and engineering questions and problems.

Constructing Explanations and Designing Solutions

- Communicate scientific and/or technical information orally and/or in written formats, including various forms of media and may include tables, diagrams, and charts.

Developing and Using Models

- Develop and/or use models to describe and/or predict phenomena.
- Collaboratively develop and/or revise a model based on evidence that shows the relationships among variables for frequent and regular occurring events.

Planning and Carrying Out Investigations

- Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.
- Make predictions about what would happen if a variable changes.
- Test two different models of the same proposed object, tool, or process to determine which better meets criteria for success.

Engaging in Argumentation From Evidence

- Compare and refine arguments based on an evaluation of the evidence presented.
 - Construct and/or support an argument with evidence, data, and/or a model.
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Chapter 2

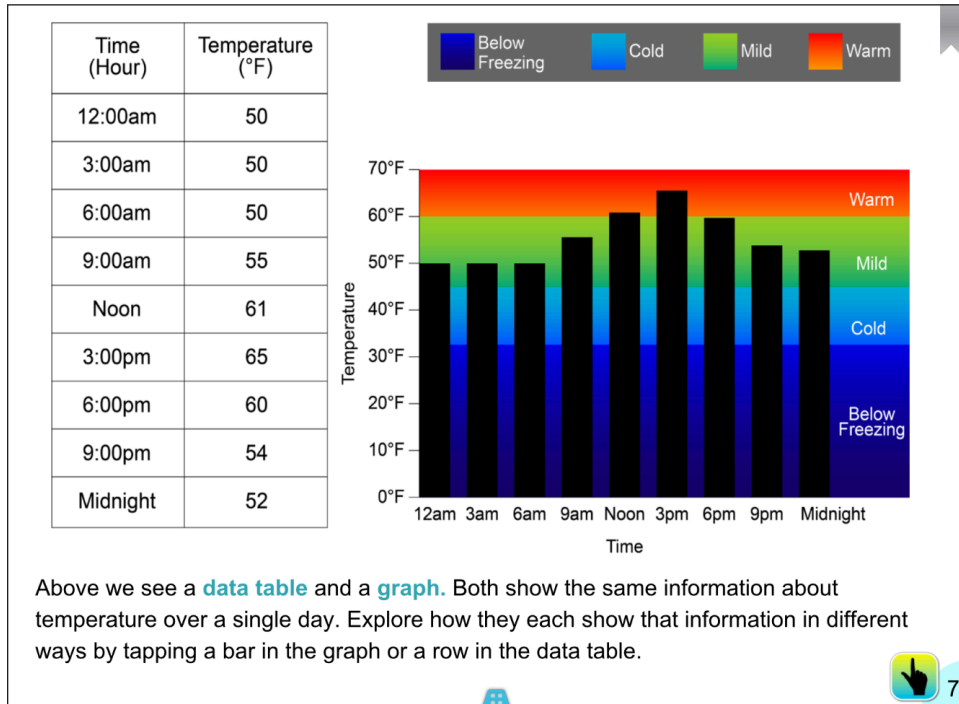
Searching for Patterns in Weather Data

This chapter introduces students to a variety of different kinds of grade-appropriate charts including **bar graphs, line plots, and pictographs**. Students will have the opportunity to **explore** each type of chart and become familiar with how each one illustrates different **quantities** of a measured weather condition. Students are then asked a series of questions where they identify and describe **patterns of change over time**.

By reading and exploring the interactives in this chapter, students will be able to:

- **explain** the **relationship** between the same **weather data represented in a table and in a graph**,
- **interpret patterns** in **weather data represented in bar charts, pictographs, and line plots**, and
- **use charts to communicate** the **relationship** between **temperature and which kind of precipitation we experience on Earth's surface**.

Page 7



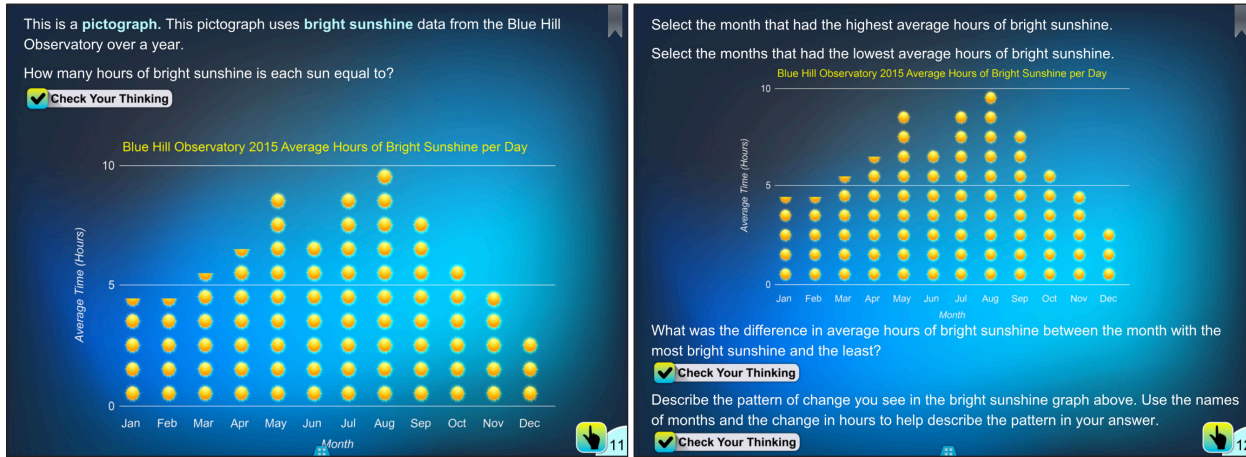
This interactive demonstrates the **relationship between data in a data table and data visualized in a graph**. By tapping on one of the rows or bars in the graph, the highlighted area on both the table and the graph will change to reflect the connection between the two.

The colored bands in the backdrop of the bar graph give students a concrete connection between **quantitative** temperature data and qualitative descriptions we often use to express **weather conditions**.

Teachers can explicitly address the **patterns** crosscutting concept by asking questions where students draw connections between the tallest bar and **the highest numbers in the data table or the shortest bar and the lowest numbers in the data table**.

In the interactive in the previous chapter, students used words to describe the weather conditions outside the window. This interactive begins to illustrate an important difference between data that uses such descriptions and empirical data like those taken from thermometers and other weather instruments.

Page 11 & 12



This pair of pages provides students the opportunity to practice **their pictograph analysis** capabilities to determine **which months have the most and least bright sunshine** and then identify the **pattern of rise and fall over the seasons and calendar year**.

Half suns are presented in this data set to stretch student thinking about what a fraction of a picture might mean in a pictograph. This sort of understanding is beyond the expectation for third grade students so therefore there are no half-image pictographs in the summative assessment. Teachers may decide how deeply to discuss this feature depending on their students' current understanding of fractions and/or graphs.

In 2015, the bright sunshine average for June strayed significantly from the **pattern** evident when looking at the other months. Teachers are encouraged to ask students to consider possibilities for why this might be. Student **predictions** may lead to gathering additional data from the Blue Hill website or other historical weather data warehouse website. This is also a good opportunity to reinforce how the term *average* does not mean that all days in June only experienced seven hours of sunlight.



Appendix B

Worksheets and Graphs

Worksheets

My Weather Data Table					
Date & Time	Temperature (°Fahrenheit)	Wind Speed (mph)	Wind Direction	Precipitation Type and Amount (inches)	Sky Conditions (sunny, cloudy, partly cloudy)