

Overview

In this lesson, students begin their exploration of Lyme disease in Maine. Students use multiple data representations to ask and answer questions about what's happening with the spread of Lyme disease, and share their personal connections to the disease and interaction with ticks. Time permitting, students will learn more about Lyme disease, how it is transmitted, its signs and symptoms, and how to protect themselves and others from tick bites.

Estimated Time

45 minutes (1 class period)

Target Student Learning Outcomes

Climate and Changing Ecosystems

- Changes in Maine's ecosystems are local instances of global patterns of change.

Data and Scientific Inquiry (This is the work that scientists do!)

- Using data to understand a phenomenon involves being able to read and make sense of data representations (tables, graphs, maps, etc) and models.

Standards

NGSS

- Science & Engineering Practices
 - 4. Analyzing and Interpreting Data
- Crosscutting Concepts
 - 7. Stability and Change

Common Core

- Grade 6 » Summarize and describe distributions.
 - Reporting the number of observations.

Vocabulary

blacklegged tick, case, Erythema migrans, Lyme disease, repellent

Preparation

- Read this entire guide to familiarize yourself with the flow of the lesson.
- Do the online activities as a student so you will be prepared to help students if they get stuck.
- Prepare to share the [Glossary](#) and Student Sheet: Lesson 1 ([Google Doc](#) or [Print](#)) with students.
 - The Google Doc link will prompt you to make a copy to your own Google Drive. This will allow you to edit the document and/or share editable copies with your students. Note that in the Google Doc version of the Student Sheet, response boxes are formatted as table cells that will automatically expand to fit entered text.
 - If you use Google Classroom, you can create an assignment and Make a copy for each student so that students receive an individual copy of the file that they can complete online.

Possible Misconceptions and Barriers to Learning

- **Interpreting graphs:** Help students practice good habits by encouraging them to begin graph interpretation by carefully reading the title, scale, and axis labels, then asking what the graph could be showing.
- **Time series graphs:** Students may not have much prior experience with time series graphs. Consider using something more familiar, like a timeline, as an analogy. The x-coordinate shows when something happened in time; the y-coordinate shows the measured value at that time.
- **Trends:** When discussing trends and trend lines, be sure students understand that this is not the same as connecting the dots between data points, nor is it picking points at either end of the data set and drawing a straight line between them. For the purposes of these lessons, a trend describes the overall direction of change of a time series graph. As you go forward in time, do the data values get bigger, smaller, or stay about the same?
- **Incidence (Rate) of Lyme Disease:** The use of incidence, or rate of Lyme disease as it is referred to in these lessons, may be challenging for students. Emphasize the importance of considering population size when making comparisons between counties. For example, a high population county may have a greater number of total cases of Lyme disease, but a lower population county could have a higher rate of Lyme per 100,000 people.

Facilitating the Lesson

Introduce the lesson.

Provide students with a brief (~ 5 minute) introduction to the lesson and the goals for the day. Here is a sample script you might follow:

“Lyme disease, a common tick-borne illness, has been capturing headlines across the country.

Maybe you once found a tick on your clothes after playing outside. Maybe you know someone who has had Lyme disease. Whatever your story, share it with a classmate. Turn to your neighbor and take turns sharing your personal experiences with ticks or Lyme disease. Give students time to share their stories with each other.

What did your stories have in common? What was different? Allow groups to share what they discussed. Encourage a wide range of voices to be heard.

You're going to work online [with a partner or in a small group]. Your goals for today are to:

- Understand how the number of cases of Lyme disease is changing in the Northeastern United States and in Maine.
- Use data visualizations including maps and graphs produced by others to answer questions about the change in the number of cases of Lyme disease.
- Understand the signs and symptoms of Lyme disease, how the disease is transferred from tick to human, and simple safety tips people can take to protect themselves from tick bites.

When you get to your computers, go to the LabVenture website and open [Ticks & Lyme Disease Lesson 1: Lyme Disease in Maine](#).

Make sure you read all the instructions carefully before you start clicking around. There will be some questions on the screen for you to answer. Some are just questions to think about or discuss with your partner [or group] and others require you to provide an answer. There will also be new vocabulary words. Words that are red are defined in the Glossary for this lesson.

I'll be walking around the room to help you if you get stuck. When you get to the page that says 'Stop,' wait for instructions from me before moving on."

Have students complete the online activities.

- It is recommended that students work in pairs or small groups to complete the online activities. Because this lesson is the first in the unit, you may also wish to do some portions as a whole class.
- While students are working, walk around the room to troubleshoot and answer questions. Below is an outline of the work students will be doing in each of the online activities. Big ideas are listed for each activity. Suggestions for stopping points and discussion prompts for key moments of reflection and synthesis of learning are also provided.

1. Lyme Disease in the Northeast

Students look at the images of Lyme disease in the Northeast U.S. for 2001 and 2017 produced by the Center of Disease Control and Prevention.

Big Ideas:

- More cases of Lyme disease are being reported in the Northeast from 2001 to 2017.
- Lyme disease is being reported in new areas in 2017 compared to 2001.

Facilitation Suggestions

- Point out the "Check answer" feature of multiple choice questions. By clicking this button, students can check their answer and receive feedback about their choice.
- Remind students that blue colored regions are actually made up of many tiny blue dots, each representing one case of Lyme disease.

2. What's happening in Maine?

Students take a closer look at Lyme disease in Maine, investigating a graph from an article published in the Portland Press Herald.

Big Ideas:

- The number of reported cases of Lyme disease is increasing in Maine.
- Data can be represented in many different ways to tell a story or communicate ideas.

Facilitation Suggestions

- The graph provided is different from the one students have been exposed to in previous online lessons, so they may need assistance in decoding the graph. Remind students that this graph is from an actual article published in a local Maine newspaper and is similar to one they would encounter online or see on the news.
- Consider having students share their catchy headlines.
- Have all students stop and await instructions before moving on to page 3.

3. How do we get Lyme disease?

Students watch a short video about how Lyme disease is transmitted to humans.

Big Ideas:

- The transmission of Lyme disease to humans is a complex process that involves many actors.

Facilitation Suggestions:

- You might want to project this video and the remaining online student pages at the front of the room for the whole class to go through together. Especially if sound is an issue for this video.

4. What are the symptoms of Lyme disease?

Lyme disease has many different symptoms, and everybody experiences it differently. Students learn to recognize common early symptoms.

Big Ideas:

- Lyme disease has many different symptoms. Everybody experiences Lyme differently. It's important to know the common symptoms for the health and safety of ourselves and others.

Facilitation Suggestions:

- Connect these symptoms back to the stories students may have shared at the beginning of the lesson if similarities emerge.

5. Protect yourself from ticks

Students learn simple steps to protect themselves and others from tick bites to reduce their risk of Lyme disease..

Big Ideas:

- Simple steps can be taken to reduce your risk for tick bites and getting Lyme disease.
- Public health campaigns can have a big impact in increasing awareness of risk and prevention methods for illnesses like Lyme disease.

Facilitation Suggestions:

- Connect these tick safety steps back to the stories students may have shared at the beginning of the lesson if similarities emerge. Ask students if they have used any of these safety steps before.

6. End of Lesson

Students Print or Share their work. Responses to the questions embedded in the online lesson will be useful for students to keep as notes for the lesson and to refer back to when completing Student Sheets. Collecting this work for assessment is optional.

Facilitation Suggestions:

- When students reach the page titled End of Lesson, have them click the Show All Answers button:



Show All Answers

- Have students Print or Share their responses.



Print

Clicking Print will open the Print dialog box and allow students to print a hard copy of their responses. They may also be able to print to PDF if your settings are configured to allow this.



Share

Clicking Share will open a dialog box with a link that students can copy and paste into an email or document. This link can be used to re-open their answer sheet in a browser any time.

- Once their work has been printed or their link has been safely emailed or saved in a document, students can click Close to exit the lesson.
- Have students complete Student Sheet: Lesson 1 ([Google Doc](#) or [Print](#)).
- As a class or in small groups, have students share and discuss their answers to the questions on the Student Sheet, if time permits, otherwise responses can be collected as an exit card for the lesson.

Questions you might ask:

- What surprised you in today's lesson?
- What do you want to learn more about?

Wrap-up the lesson.

Close out the lesson by reminding students of where they started the day and previewing what's next. Here is a sample script you might follow:

"Today we learned about Lyme disease, how it's transmitted, and what the symptoms look like, as well as some ways to protect yourself. We also looked at some data that showed Lyme disease is on the rise in Maine. In the next lesson, we'll look closer at Lyme disease in Maine to see what's happening in different counties, including here where we live."