

STATE OF NEW HAMPSHIRE
TICKBORNE DISEASE CURRICULUM KIT
GRADES 4-5



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New Hampshire Department of Health and Human Services

Division of Public Health Services

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Introduction

Lyme disease and other tickborne diseases are an important cause of illness in New Hampshire (NH). Over the last decade reported cases of Lyme disease have increased significantly in NH. In 2013, the Centers for Disease Control and Prevention (CDC) reported that NH had the second highest incidence rate of Lyme disease in the United States. Data also show that the annual incidence of Lyme disease is highest among the 5-14 year age group, but is high for all primary and secondary aged children.

In response to this growing epidemic, the NH Department of Health and Human Services (DHHS), Division of Public Health Services (DPHS) released its first [State of New Hampshire Tickborne Disease Prevention Plan](#) in March of 2015. The plan outlines recommended prevention measures and actions to prevent tickborne disease, including educational outreach, which will be the main method that the NH DHHS will use to address tickborne disease in NH.

In an effort to reach NH's youngest populations, the NH DHHS has developed three Tickborne Disease Prevention Curriculum Kits (grades K-1, 2-3, and 4-5), each with a primary focus on personal protective measures. Efforts have been made to adapt lessons contained within the Curriculum Kits to fit within the Common Core State Standards, the Next Generation Science Standards performance expectations, and the NH Curriculum Frameworks for science and health. Each activity addresses one or more curriculum standards, and may include standards across multiple curriculum areas. These efforts will allow school districts and teachers to utilize the materials provided by the NH DHHS to educate NH children about tickborne disease prevention without requiring significant restructuring of the established curricula.

What You Will Find in Each TBD Curriculum Kit:

- ✓ Activities that have been piloted to the specified grade levels
- ✓ Reproducible activity sheets
- ✓ Teacher's guides containing background information with underlined keywords, additional resources, and a detailed lesson plan specific to each activity

Lesson Summaries

Lesson 1

Tick Research Report

This lesson challenges students to research an assigned tick species, using informational books and reliable internet sites to find out more about their tick's habitat, physical characteristics and diseases it transmits. Students will communicate their findings by developing a visual aid relative to their tick and research, and present their findings to the class.

Lesson 2

Tick Host Pictograph

This lesson helps students further develop their science skills as they learn what a host is, and some common tick hosts. They will also build upon existing math skills and develop new ones including data interpretation using a pictograph.

Lesson 3

Designing a Tick-Safe School

This lesson requires students to work alone or in small groups to conduct an assessment of their school's grounds to identify and record existing landscaping techniques that are beneficial to reducing tick populations, and make suggestions for improvements. Students will then create a map or diagram that shows the existing landscape as well as their suggestions for landscape modifications.

Lesson 1

Tick Research Report

Background

There are many species of ticks in the world, but there are only seven in the United States that bite humans and may make them sick. While some ticks may be difficult to identify, each species has a distinguishing characteristic(s) that entomologists and scientists look for when identifying ticks. These characteristics may include a specific pattern, a single spot, or a specific color or two on the tick's abdomen or scutum, which is a shield that covers a portion of the back surface of the tick. Additionally, these characteristics are helpful for identification of a male verse a female tick, and what life stage the tick may be in.

Ticks can live up to two years and have a four-stage life cycle, including the egg, larva, nymph and adult stages. During the adult stage of a tick's life, the tick is at its biggest, making it easier to identify. Tick larvae and nymphs, however, are quite small, which makes determining a tick's species difficult at these two stages.

A tick's geographic distribution also varies based on species. For example, certain ticks may only be found in the northeast, while another species may be found throughout the entire United States. It is important to be aware of the geographic distribution of the different types of ticks in order to prevent getting bitten by tick, especially if you are traveling to another state in the country and are going to be near tick habitats. Being aware of which ticks are common to certain regions of the country, and what a tick habitat looks like, are just some ways you can reduce your risk of tick bites and tickborne diseases; there are many additional steps that can be taken to lower your risk.

Lesson Plan

Title: Tick Research Report

Subject(s): Science, Health, English (communications), and Social Studies

Grade Level: 4-5

Duration: 5.5-6 hours

Materials Required: Tick Research Report packet; lined paper; writing implement; crayons, colored pencils or markers; computer; reference books; materials for visual aid (shoe boxes, poster boards, construction paper, glue, grass, figurines, rocks, leaves, etc.)

Key Vocabulary: abdomen, anatomy, characteristic, distinguishing, entomologist, geographic distribution, habitat, region, scutum, species, tickborne

Description: This lesson challenges students to research an assigned tick species, using informational books and reliable internet sites to find out more about their tick's habitat, physical characteristics and diseases it transmits. Students will communicate their findings by developing a visual aid relative to their tick, and research and present their findings to the class.

Objectives: Students will demonstrate knowledge of the tick researched by presenting information in a written research report and in an oral presentation to the class.

Procedure:

- 1.) Introduce the lesson with a discussion about ticks and tick species. The teacher may also want to explain to students what a research report is and the various types of resources that can be used to obtain information on ticks. Some suggested discussion points are listed below (20 minutes):
 - *“Has anyone ever seen a tick?”*
 - *“What did it look like?”*
 - *“Has anyone ever had a tick on them?”*
 - *“What did you do when you found the tick on you?”*
 - *“Where do you think you were when the tick got on you?”*
- 2.) Explain to students what a bibliography is, and instruct them to keep a bibliography of all resources used. It may be helpful to show some examples. (10 minutes)
- 3.) Assign each student a specific tick species to research. The following is a list of human biting ticks found in the United States:
 - American dog tick
 - Blacklegged tick

- Brown dog tick
 - Gulf Coast tick
 - Lone star tick
 - Rocky Mountain wood tick
 - Western blacklegged tick
- 4.) Instruct students that they will need to conduct research in order to gather information to complete the six sections of their report. These sections include: the tick's scientific name, anatomy, habitat, and geographic distribution; as well as a disease transmitted by the tick; and additional interesting facts about the tick. (3 hours)
 - 5.) The teacher may choose to provide students with a rough draft template or lined paper to take notes.
 - 6.) Prior to writing the final draft, students will be instructed to have one other student peer-review their rough draft. (25-30 minutes)
 - 7.) Students will then complete the reference page using appropriate citation format. (20 minutes)
 - 8.) Students will be instructed to prepare their oral presentation and visual aid. (90 minutes)
 - 9.) Students will present their findings and visual aid. (3-5 minutes)
 - 10.) Following each presentation, the presenter will answer three questions from the audience (other students) about his/her specific tick. (5 minutes)

Helpful Resources:

<http://www.dhhs.nh.gov/dphs/cdcs/lyme/index.htm>

<http://www.dhhs.nh.gov/dphs/cdcs/lyme/documents/tbdpreventionplan.pdf>

<http://www.cdc.gov/ticks/index.html>

http://www.tickencounter.org/tick_identification

Standards Met:

New Hampshire Curriculum Framework - Science Process Skills

SPS1– Scientific Inquiry and Critical Thinking Skills (INQ)

- S:SPS1:4:1.7 Ask questions about objects, organisms and events in their local environment. – Grades 3 and 4
- S:SPS1:4:5.1 Cite evidence or data to support conclusions. – Grades 3 and 4

SPS3– Personal, Social, and Technological Perspectives

- S:SPS3:4:2.5 Use reliable information to answer questions. – Grades 3 and 4

SPS4– Science Skills for Information, Communication and Media Literacy

- S:SPS4:4:1.1 Access information from a variety of media sources (e.g., Internet, CD-ROM programs, print resources). – Grades 3 and 4

- S:SPS4:4:2.1 Use a variety of tools and formats (oral presentations, journals, and multimedia presentations) to summarize and communicate the results of observations. – Grades 3 and 4

New Hampshire Curriculum Framework - Life Science

LS2– Energy flows and matter recycles through an ecosystem

- S:LS2:4:1.1 Describe how the nature of an organism’s environment, such as the availability of a food source, the quantity and variety of other species present, and the physical characteristics of the environment affect the organism’s patterns of behavior. – Grades 3 and 4
- S:LS2:4:1.2 Describe the interaction of living organisms with nonliving things. – Grades 3 and 4
- S:LS3:4:1.3 Using information (data or scenario), explain how changes in the environment can cause organisms to respond (e.g., survive there and reproduce, move away, die). – Grades 3 and 4
- S:LS2:6:1.1 Identify and describe the factors that influence the number and kinds of organisms an ecosystem can support, including the resources that are available, the differences in temperature, the composition of the soil, any disease, the threat of predators, and competition from other organisms. – Grades 5 and 6

Next Generation Science Standards

Biological Evolution: Unity and Diversity

- 2-L S4-1 Make observations of plants and animals to compare the diversity of life in different habitats – Grade 2
- 3-LS4-3 Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all – Grade 3

From Molecules to Organisms: Structures and Processes

- 3-LS1-1 Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death – Grade 3
- 4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction – Grade 4

New Hampshire Curriculum Framework - Health

Personal and Consumer Health

- 2.4 Strategies to prevent parasitic infections - Elementary

- 2.5 Benefits of wearing insect repellent - Elementary
- 2.6 Benefits of wearing protective clothing - Elementary

Community and Environmental Health

- 1.1 Resources for health information – Elementary

New Hampshire Curriculum Framework - Written and Oral Communication

Reading Connection: W:RC:2: In response to literary or informational text read aloud, students make and support analytical judgments about text by...

- W:RC:5:2.3: Using specific details and references to text or citations to support focus – Grade 5

Informational Writing: W:IW:1: In informational writing (reports or procedures), students organize ideas/concepts by...

- W:IW:3:1.1: Using a given organizational structure for grouping facts and ideas (e.g., template, frame, graphic organizer) – Grade 3
- W:IW:4:1.5: Providing a list of resources (e.g. materials used in a tasks; sources used for reference) – Grades 4 and 5

Informational Writing: W:IW:2: In informational writing (reports or procedures only), students effectively convey purpose by...

- W:IW:3:2.1: Establishing a topic – Grades 3, 4 and 5
- W:IW:4:2.2: Stating and maintaining a focus/controlling idea on a topic – Grades 3, 4 and 5

Informational Writing: W:IW:3: In informational writing(reports or procedures only), students demonstrate use of a range of elaboration strategies by...

- W:IW:3:3.2: Including sufficient details for appropriate depth of information: naming, describing, explaining, comparing, using visual images – Grade 3
- W:IW:4:3.1: Including facts and details relevant to focus/controlling idea – Grade 4
- W:IW:4:3.2: Including sufficient details or facts for appropriate depth of information: naming, describing, explaining, comparing, using visual images – Grades 4 and 5

Writing Conventions: W:C:1: In independent writing, students demonstrate command of appropriate English conventions by...

- W:C:5:1.2: Applying basic capitalization rules – Grade 5
- W:C:5:1.4: Using punctuation to clarify meaning EXAMPLES: commas, apostrophes, quotation marks – Grade 5
- W:C:5:1.5: Correctly spelling grade-appropriate, high-frequency words, including homonyms and homophones and applying syllables and affix spelling patterns/rules EXAMPLES: consonant doubling, consonant patterns, units of meaning – common roots, base words, pre/suffixes – Grade 5

Oral Communication Strategies: W:OC:1: In oral communication, students demonstrate interactive listening by...

- W:OC:5:1.2: Summarizing, paraphrasing, questioning, or contributing to information presented – Grade 5

Oral Communication Strategies: W:OC:2: In oral communication, students make oral presentations by...

- W:OC:3:2.5: Using eye contact and adjusting rate, pace and volume – Grade 3
- W:OC:5:2.3: Telling stories, giving information using details and providing a coherent conclusion EXAMPLE: using books, pictures, displays, graphics, or artifacts – Grade 5

New Hampshire Curriculum Framework - Reading

R:ERS:2: Demonstrates understanding of concepts of print during shared or individual reading by...

- R:ERS:1:2.4: Identifying title, author, illustrator – Grade 1

R:IT:2:1: Demonstrate initial understanding of informational texts (expository and practical texts) by...

- R:IT:2:1.1: Obtaining information, from text features (e.g., simple table of contents, glossary, charts, graphs, diagrams, or illustrations) – Grade 2
- R:IT:2:1.3: Locating and recording information to show understanding, when given an organizational format (e.g., T-chart or Venn diagram) – Grade 2
- R:IT:2:2.4: Identifying facts presented in text – Grade 2

R:V:1: Students identify the meaning of unfamiliar vocabulary by...

- R:V:3:1.1: Using strategies to unlock meaning (e.g., knowledge of word structure, including prefixes/suffixes and base words, such as “uncovered;” or context clues; or other resources, such as dictionaries, glossaries; or prior knowledge) – Grade 3

R:IT:1: Demonstrate initial understanding of informational texts (expository and practical texts) by...

- R:IT:4:1.3: Organizing information to show understanding (e.g., representing main/central ideas or details within text through charting, mapping, paraphrasing, or summarizing) – Grade 4
- R:IT:5:1.1b: Obtaining information from text features (e.g., maps, diagrams, tables, captions, timelines, citations) – Grade 5

R:B:3:3: Research* by reading multiple sources (including print and non-print texts) to report information by...

- R:B:3:3.2: Evaluating information presented in terms of relevance – Grades 3, 4, and 5
- R:B:3:3.3: Gathering information and using a given structure (e.g., chart, diagram, outline, etc.) to organize it – Grades 3 and 4

- R:B:3:3.4: Using evidence to support conclusions – Grades 3, 4, and 5

R:B:5:3: Research* by reading multiple sources (including print and non-print texts) to report information, solve a problem, or to formulate a judgment by...

- R:B:5:3.1: Identifying potential sources of information from those provided – Grade 5

Common Core State Standards for English Language Arts and Literacy

Reading Standards for Informational Text

- RI.5.2 Know and use various text features (e.g., captions, bold print, subheadings, glossaries, indexes, electronic menus, icons) to locate key facts or information in a text efficiently – Grade 2
- RI.5.3 Use text features and search tools (e.g., key words, sidebars, hyperlinks) to locate information relevant to a given topic efficiently – Grade 3
- RI.7.5 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently – Grade 5
- RI.9.5 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably – Grade 5
- RI.10.4 By the end of year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4–5 text complexity band proficiently, with scaffolding as needed at the high end of the range – Grade 4

Writing Standards

- W.2.3 Write informative/explanatory texts to examine a topic and convey ideas and information clearly – Grade 3
- W.2.a.3 Introduce a topic and group related information together; include illustrations when useful to aiding comprehension – Grade 3
- W.2.b.3 Develop the topic with facts, definitions, and details – Grade 3
- W.2.c.3 Use linking words and phrases (e.g., *also, another, and, more, but*) to connect ideas within categories of information – Grade 3
- W.2.d.3 Provide a concluding statement or section – Grade 3
- W.4.4 Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience – Grade 4
- W.5.4 With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing – Grade 4
- W.7.5 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic – Grade 5

- W.8.5 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources – Grade 5
- W.10.4-5 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences – Grades 4 and 5

Speaking and Listening Standards

- SL.1.c.5 Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others – Grade 5
- SL.4.4 Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace – Grade 4
- SL.6.4 Differentiate between contexts that call for formal English (e.g., presenting ideas) and situations where informal discourse is appropriate (e.g., small-group discussion); use formal English when appropriate to task and situation – Grade 4

Language Standards

- L.1.4-5 Demonstrate command of the conventions of standard English grammar and usage when writing or speaking – Grades 4 and 5
- L.2.4-5 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing – Grades 4 and 5
- L.3.4 Use knowledge of language and its conventions when writing, speaking, reading, or listening – Grade 4
- L.4.c.4 Consult reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation and determine or clarify the precise meaning of key words and phrases – Grade 4
- L.6.4 Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases, including those that signal precise actions, emotions, or states of being (e.g., *quizzed*, *whined*, *stammered*) and that are basic to a particular topic (e.g., *wildlife*, *conservation*, and *endangered* when discussing animal preservation) – Grade 4

New Hampshire Curriculum Framework - Social Studies

Geography: SS:GE:1: The World in Spatial - Students will demonstrate the ability to use maps, mental maps, globes, and other graphic tools and technologies to acquire, process, report, and analyze geographic information.

- SS:GE:6:1.3: Utilize maps, globes, graphs, charts, models, and databases to analyze spatial distributions and patterns, e.g., climate zones, natural resources, or population density. (Themes: C: People, Places and Environment) – Grades 5 and 6

Name: _____

Tick Research Report

Tick species: _____

Scientific name: _____

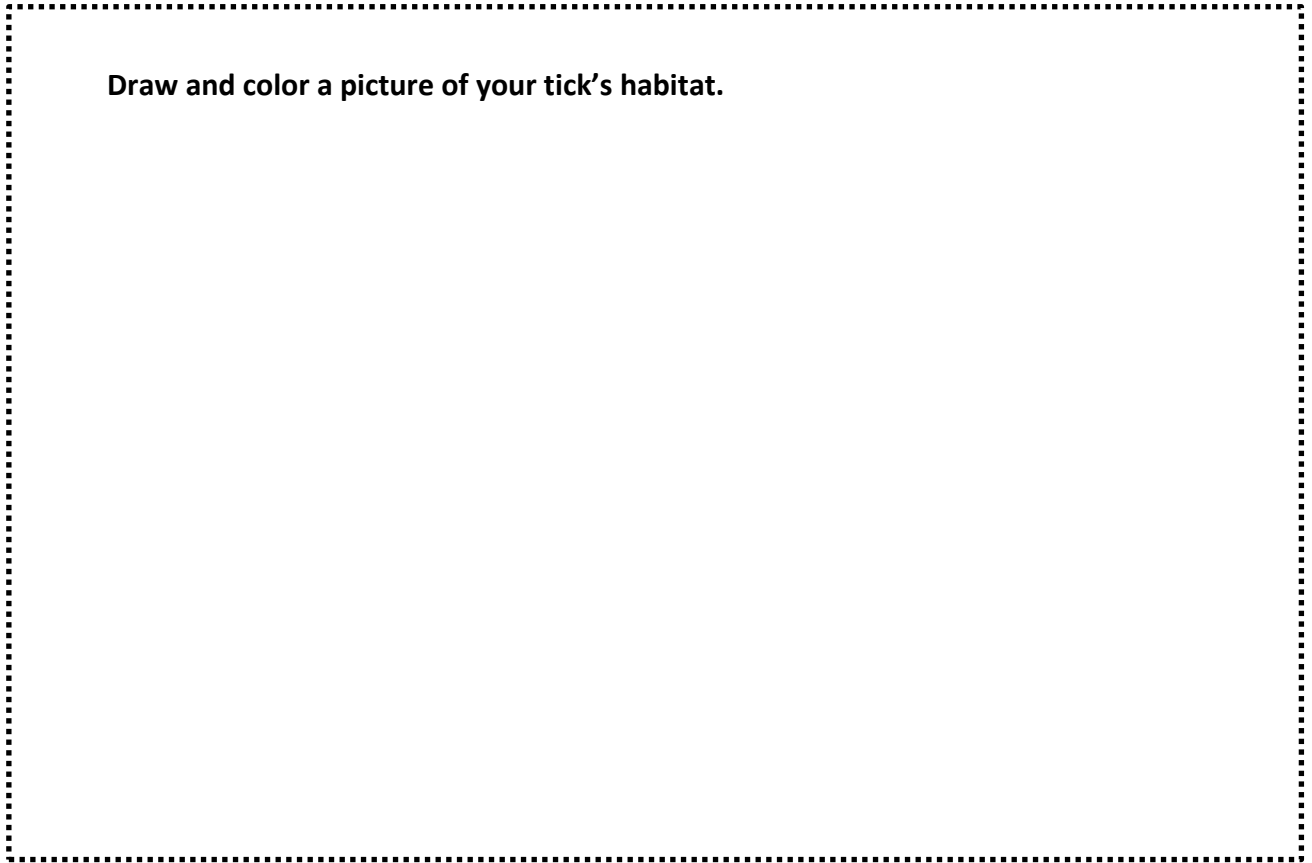


Tick Anatomy

Draw and color a picture of your tick. Label its body parts:

Tick Habitat

Draw and color a picture of your tick's habitat.



Write three sentences describing your tick's habitat.

Geographic Distribution

In which state(s) is your tick most often found?

On the map below, shade in the geographic distribution of your tick.



Interesting Facts

Write three interesting facts about your tick.

1.) _____

2.) _____

3.) _____

Key Words

Identify and define five key words that you used in your tick research report.

1.) _____

2.) _____

3.) _____

4.)

5.)

Bibliography

Please list (in the proper citation format) the five resources that you used. Your resources should be listed in alphabetical order.

***Note:** When you cite a book, be sure to list the author's first and last name as well as the title of the book. When you cite a website, be sure to list the title of the webpage and the URL.*

1.) _____

2.) _____

3.) _____

4.) _____

5.) _____

Presentation

Prepare a three to five minute presentation on your tick. Your presentation should include the following:

- A brief overview of your tick's habitat
- The geographic distribution of your tick
- A brief description of one illness that your tick transmits
- One interesting fact about your tick

You must also have one visual aid related to your research. Examples include: diorama, poster, map, etc.

Lesson 2

Tick Host Pictograph

Background

A host is a living animal or plant on which another living thing feeds; ticks however, only feed on animal (or human) hosts. Most ticks, including the blacklegged tick, follow a three-host life cycle. This means that they feed on a different host during three of their four life stages (larva, nymph, and adult).

In order for a blacklegged tick to become infected with a disease such as Lyme disease, the host that it feeds on needs to have the bacterium or virus in its blood. However, even though the bacterium or virus is in the host's blood, it does not necessarily mean that the host or animal is sick. Certain hosts, such as reservoir hosts, have enough of the bacterium or virus in their body to infect a tick with the disease when the tick bites it, but not enough for the host to get sick.

The main reservoir host for tickborne diseases that have been detected in New Hampshire is the white footed mouse. Other animals that are also considered to be reservoir hosts for tickborne diseases and that you may have heard of include chipmunks, squirrels, birds (robins), and woodchucks.

If the tick has become infected with the disease and then feeds on another host, that host may also become infected with the disease if it does not already have the bacterium or virus in its body. A tick will infect other hosts during the nymph or adult stages of its life, examples of these hosts are small animals, birds, and occasionally humans.

Adult ticks need a larger meal, and will therefore feed on medium to large mammals. This is important for a female tick because in order for her to lay her eggs, a larger meal is necessary. These mammals are considered to be reproductive hosts. The main reproductive host for the blacklegged tick is the white-tailed deer.

Lesson Plan

Title: Tick Host Pictograph

Subject(s): Mathematics and Science

Grade Level: Grade 4

Duration: 60-70 minutes

Materials Required: "Tick Host Pictograph" worksheet, pencil, eraser, scratch paper, and projector

Key Vocabulary: mammal, pictograph, reproductive host, reservoir host

Description: This lesson was developed to teach students about tick hosts that are common in New Hampshire; they will also build upon existing math skills and develop new ones including data interpretation.

Objectives: Students will be able to analyze and interpret data from a pictograph, as well as identify and name various tick hosts.

Procedure:

- 1.) Introduce the lesson by asking students to define mammal and host; if necessary, clarify the definitions for them. (3 minutes)
- 2.) Ask students to provide examples of different mammals and hosts (remind students to raise their hands rather than shouting out answers). Discuss the various examples that students provide. (5 – 10 minutes)
- 3.) Read the background information for this lesson to the students. (5 minutes)
- 4.) Explain to the students what a pictograph is. (3 minutes)
- 5.) Using a projector, show an example of a pictograph to students. When showing an example of a pictograph, it may be helpful to ask questions to the class about the pictograph. (10 minutes)
- 6.) Hand out one Tick Host Pictograph worksheet to each student and review the various types of hosts that are shown on the worksheet. (5 minutes)
- 7.) Read the instructions together as a class. The teacher may decide to answer the first question as a class. (2-5 minutes)
- 8.) Instruct students to complete the worksheet independently. (20 minutes)
- 9.) Review the answers together as a class. (5-10 minutes)

Helpful Resources:

http://www.cdc.gov/ticks/life_cycle_and_hosts.html#find

Standards Met:

New Hampshire Curriculum Framework - Life Science

LS1– All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species)

- S:LS1:4:2.1 Recognize that living organisms have certain structures and systems that perform specific functions, facilitating survival, growth and reproduction. – Grades 3 and 4

Next Generation Science Standards

From Molecules to Organisms: Structures and Processes

- 4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction – Grade 4

New Hampshire Curriculum Framework - Mathematics

Number and Operations

- M:N&O:4:4 Accurately solves problems involving multiple operations on whole numbers or the use of the properties of factors and multiples; and addition or subtraction of decimals and positive proper fractions with like denominators. (Multiplication limited to 2 digits by 2 digits, and division limited to 1 digit divisors.) – Grade 4
- M:N&O:3:6 Mentally adds and subtracts whole number facts through 20 (addends whose sum is at most 20 and related subtraction facts); adds two digit and one-digit whole numbers; adds combinations of two-digit and three-digit whole numbers that are multiples of ten (e.g., $60 + 50$, $300 + 400$, $320 + 90$); subtracts a one-digit whole number from a two-digit whole number (e.g., $37 - 5$); and subtracts two-digit whole numbers that are multiples of ten and three-digit whole numbers that are multiples one hundred (e.g., $50 - 20$, $500 - 200$). – Grade 3
- M:N&O:4:6 Mentally adds and subtracts whole number facts through 20 (addends whose sum is at most 20 and related subtraction facts); multiplies whole number facts to a product of 100, and calculates related division facts; adds two-digit whole numbers, combinations of two-digit and 3- digit whole numbers that are multiples of ten, and 4- digit whole numbers that are multiples of 100 (limited to two addends) (e.g., $67 + 24$; $320 + 430$; $320 + 90$; $1,300 + 1,400$); and subtracts a one-digit whole number from a two-digit whole number (e.g., $67 - 9$); and subtracts combinations of two-digit and

three-digit whole numbers that are multiples of ten (e.g., 50 – 20, 230 – 80, 520 – 200).-
Grade 4

Data, Statistics, and Probability

- M:DSP:4:1 Interprets a given representation (line plots, tables, bar graphs, pictographs, or circle graphs) to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. – Grade 4

Common Core State Standards for Mathematics






Number and Operations in Base Ten

- 4.NBT.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models – Grade 4
- 5.NBT.5 Fluently multiply multi-digit whole numbers using the standard algorithm – Grade 5

Name: _____

Tick Host Pictograph

Instructions: During his hike, Tom saw many different mammals that are common tick hosts. Use the pictograph to answer the questions. Show your work.

Host	Number of Hosts
White-tailed deer	
White-footed mouse	
Squirrel	
Robin	
Rabbit	

Key:



= 5 White-tailed deer
= 8 Ticks



= 3 White-footed mice
= 2 Ticks



= 2 Squirrels
= 3 Ticks



= 6 Robbings
= 1 Tick



= 10 Rabbits
= 4 Ticks

- 1.) How many white-footed mice did Tom see? _____
- 2.) How many squirrels and robins (total) did Tom see? _____
- 3.) How many total host mammals did Tom see? _____
- 4.) How many total ticks were on all rabbits (total) that Tom saw? _____

5.) How many total ticks were on all white-tailed (total) that Tom saw? _____

6.) How many total ticks were on all of the hosts (total) that Tom saw? _____

Lesson 3

Designing a Tick-Safe School

Background

The best way to prevent getting sick with an illness that is spread by ticks is to prevent tick bites from happening. There are many steps that can be taken to reduce your chances of getting bitten by a tick that may have a tickborne disease like Lyme disease. One of those methods is to make some changes to your outdoor environment.

Certain landscape conditions may be attractive to ticks and can result in larger numbers of ticks and even some tick hosts, such as deer and mice. Therefore, when you are planning to make changes to your outdoor environment, one of the first things that should be considered is a tick's habitat, or where a tick lives. Common outdoor areas where ticks are most likely to be living include tall grass or weeds, shrubs, and leaves. Tick habitats may exist in areas such as woods, yards, or parks.

Additionally, it is important to be aware of host habitats and items or structures that tick hosts, are attracted to. Mice may choose to make their home in places like stonewalls, woodpiles, garages, sheds, and occasionally even your home! Furthermore, gardens and bird feeders can serve as the perfect food source for mice and deer.

Once you have identified the tick and tick host habitats as well as food sources for hosts that exist in your outdoor environment, you can take steps to modify your environment to make it tick-safe. Examples of modifications include cutting grass on a regular basis so that it does not become overgrown; moving/storing any outdoor toys and play equipment away from wooded areas and placing them in sunny, drier areas of your yard or property; creating a three-foot boundary (using rocks or wood chips) between your yard or play area and wooded areas; and installing a tall fence around gardens.

Lesson Plan

Title: Designing a Tick-Safe School

Subject(s): Science, health, mathematics, and social studies

Grade Level: 4-5

Duration: 2.5 – 3 hours

Materials Required: Writing implement, lined paper, clip-board (optional), ruler, crayons, colored pencils or markers

Key Vocabulary: attractive, conditions, equivalent, habitat, host, landscape, modification, metric, scale, units

Description: This lesson requires students to work alone or in small groups to conduct an assessment of their school's grounds to identify and record existing landscaping techniques that are beneficial to reducing tick populations, and make suggestions for improvements. Students will then create a map or diagram that shows the existing landscape as well as their suggestions for landscape modifications.

Objectives: Upon completion of the activity, students will be able to identify seven landscaping techniques that are beneficial to reducing tick populations. Through map creation, students will be able to appropriately and consistently use measurement tools and metric units. Students will further their understanding of equivalent standard units of length.

Procedure:

- 1.) The teacher will explain to students what a tick-safe zone is, as well as the various techniques that can be done to help reduce tick populations in an area. (10 minutes)
- 2.) Students will be asked to complete an assessment of their school's grounds; this includes making the list of existing landscaping techniques. The teacher may decide to have students break into small groups and assign groups a different area of the school's grounds to assess. (30 minutes)
- 3.) Students will be instructed to come up with a list of suggestions for modifying the school's grounds to ensure that the grounds are tick-safe. (10 minutes)

- 4.) Students will be instructed to create (draw) a map or diagram of their school's grounds displaying the existing landscape as well as the landscape modification(s) they are suggesting. The students will be required to develop a scale for their map (45-60 minutes).
- 5.) Select one student (or group) at a time to stand up and present/show and explain their map in detail. (1 hour – assuming 20 students with 3 minute presentations each)

Helpful Resources:

- http://www.cdc.gov/lyme/prev/in_the_yard.html
- <http://www.epa.gov/pesp/ticks/tick-safety-in-schools.pdf>

Standards Met:

New Hampshire Curriculum Framework - Science Process Skills

SPS1 Scientific Inquiry and Critical Thinking Skills (INQ)

- S:SPS1:4:1.2 Make and record observations for a given purpose. – Grades 3 and 4
- S:SPS1:4:1.4 Record observations using standard units of measurement. – Grades 3 and 4

SPS 3 Personal, Social, and Technological Perspectives

- S:SPS3:2:1.1 Work with a partner to accomplish a specific task. – Grades 1 and 2
- S:SPS3:4:1.1 Be able to complete an assigned task when given a specific role in a group. – Grades 3 and 4
- S:SPS3:2:2.1 Use observation skills to describe the area around their homes and school. – Grades 1 and 2
- S:SPS3:4:2.7 Identify and investigate issues in their local environments and communities. – Grades 3 and 4

SPS 4 Science Skills for Information, Communication and Media Literacy

- S:SPS4:2:3.1 Make observations and tell ideas about real-life issues. – Grades 1 and 2
- S:SPS4:2:6.1 Plan and carry out simple activities with a group. – Grades 1 and 2

New Hampshire Curriculum Framework -Health

Community and Environmental Health

- 2.1 Strategies to prevent hazardous exposures – Elementary

New Hampshire Curriculum Framework -Mathematics

Geometry and Measurement

- M:G&M:4:5 Demonstrates conceptual understanding of similarity by applying scales on maps, or applying characteristics of similar figures (same shape but not necessarily the

same size) to identify similar figures, or to solve problems involving similar figures. Describes relationships using models or explanations. – Grade 4

- M:G&M:5:5 Demonstrates conceptual understanding of similarity by describing the proportional effect on the linear dimensions of triangles and rectangles when scaling up or down while preserving angle measures, or by solving related problems (including applying scales on maps). Describes effects using models or explanations. – Grade 5
- M:G&M:X:7 Uses units of measures appropriately and consistently, and makes conversions within systems when solving problems across the content strands. Unit (accuracy): Inch (to 1/2 inch); Foot (to whole inch); Centimeter (to whole centimeter); Meter (to whole centimeter) – Grade 3
- M:G&M:X:7 Uses units of measures appropriately and consistently, and makes conversions within systems when solving problems across the content strands. Unit (accuracy): Inch (to 1/4 inch); Foot; Centimeter (to 0.5 centimeter); Meter (to 0.5 centimeter); Yard; Mile (use in scale questions); Kilometer (use in scale questions) – Grade 4

Common Core State Standards for Mathematics

Measurement and Data

- 2.MD.3 Estimate lengths using units of inches, feet, centimeters, and meters – Grade 2
- 5.MD.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems – Grade 5

Number and Operations – Fractions

- 5.NF.5.a Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication – Grade 5

New Hampshire Curriculum Framework - Social Studies

Geography

- SS:GE:4:5.1: Illustrate how people modify the physical environment, e.g., irrigation projects or clearing land for human use. - Grades 3 and 4

Common Core State Standards for English Language Arts and Literacy

Speaking and Listening Standards

- SL.3.2 Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue – Grade 2

- SL.4.4 Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace – Grade 4