



California Department of Public Health Vector-Borne Disease Section

This lesson complements the [California State Board of Education](#) Science Content standards pertaining to life cycles and ecosystems appropriate for Grade 3. It also complements Health Education Content Standards for Grade 3 pertaining to health-enhancing behaviors, health promotion, decision making, and injury prevention.

Overview

This guide provides an overview and suggested use of *Don't Let the Ticks Bite!* – a lesson for young students (suggested ages 7-10 years) about ticks in California and tick-bite prevention. This guide also contains background information and resources about ticks for the instructor's benefit. The content in this guide is not intended for direct delivery to students but should instead be used as a supplement to the lesson content; instructors should exercise their discretion when presenting supplementary content to students according to the ages, background, interests, and capabilities of their own students.

Suggested Use

- Review the [Learning Objectives](#), [Background Information](#), and [Vocabulary](#) in this guide to become acquainted with key topics presented in the lesson.
- Engage students prior to the lesson presentation using the [Discussion Questions](#).
- Share [Lesson Presentation](#) with students.
- Complete in-class [Activities](#) or provide as take-home activities.
- Administer [Post-presentation Quiz](#) to assess the students' understanding of key learning objectives.

Time Required

The presentation of the *Don't Let the Ticks Bite!* lesson will take approximately 45 minutes. Other activities may add 25 – 30 minutes.

Learning Objectives

- Ticks are arthropods that have different life stages.
- Ticks feed on the blood of animals and humans.
- Ticks can transmit diseases when they bite and feed on blood.
- Ticks are common in California, especially in cooler, grassy or brushy areas with rocks, logs, fallen leaves, and in forested areas.
- Using tick repellent and checking for ticks can help prevent tick bites.

After completing this lesson, students will be able to:

- Identify a tick and its different body parts.

- Explain how ticks can transmit diseases to people and animals.
- Identify tick habitat in California.
- Explain how to prevent tick bites.
- Explain how a tick should be properly removed if attached to themselves or a pet.

Lesson Presentation

[Don't Let the Ticks Bite! PowerPoint Slides](#) (available for download)

The lesson presentation contains slide animations that can be viewed in “Slide Show” mode. Notes are also included for some slides to provide additional explanation and/or questions to engage students.

Background Information for Instructors

The following content corresponds with slides in the *Don't Let the Ticks Bite!* presentation as noted.

Tick Biology (slides 4-7, 18-20)

Ticks are small **arthropods** that resemble spiders and need to feed on blood to survive. Technically, ticks are not insects, they are arachnids. Insects and arachnids are the most common types of arthropods that a person will encounter in nature.

- Arachnids: Type of arthropod with 8 legs, no antennae, and a body with 2 main regions or sections.
 - Examples: spiders, ticks
- Insects: Type of arthropod with 6 legs, antennae, and a body with 3 sections.
 - Examples: mosquitoes, butterflies, beetles

There are 2 types of ticks – hard ticks and soft ticks. Each type of tick has differences in appearance, feeding behavior, and habitat type. While both types of ticks can transmit pathogens to humans, people are more likely to encounter hard ticks in the environment due to the behavior of hard ticks. Hard ticks are found out in the environment questing for meals during the day, while soft ticks are often found inside rodent nests and are active at night. This lesson will focus on hard ticks specifically.

Ticks generally have 2 main body regions or sections: the **cephalothorax** (head) and **abdomen** (body). Within the cephalothorax region is the **capitulum**, which includes the **chelicerae** and **hypostome**, collectively called the tick’s “mouthparts”. The tick uses its mouthparts to slice through a host’s skin to attach and feed. The shape of the capitulum can also help with identifying the species of tick.

The abdomen contains all the tick’s other organs, such as its stomach and reproductive organs. A noticeable part on the abdomen is the scutum.

The **scutum** (sounds like “skyoo-tm”) is a dorsal “shield” that is on the top of the tick’s abdomen. The size of the scutum can help identify whether a tick is male or female. For female ticks, the scutum covers approximately 1/3 of the body, whereas for male ticks, it

covers the entire back. The scutum is hard and rigid and doesn't change size or shape, even when the tick eats. The female's scutum is smaller so that her abdomen can fill with blood and expand while she eats and develops eggs. In general, ticks have thin, flat abdomens when unfed. While feeding, the tick's abdomen (especially in a female) swells as it fills with blood.

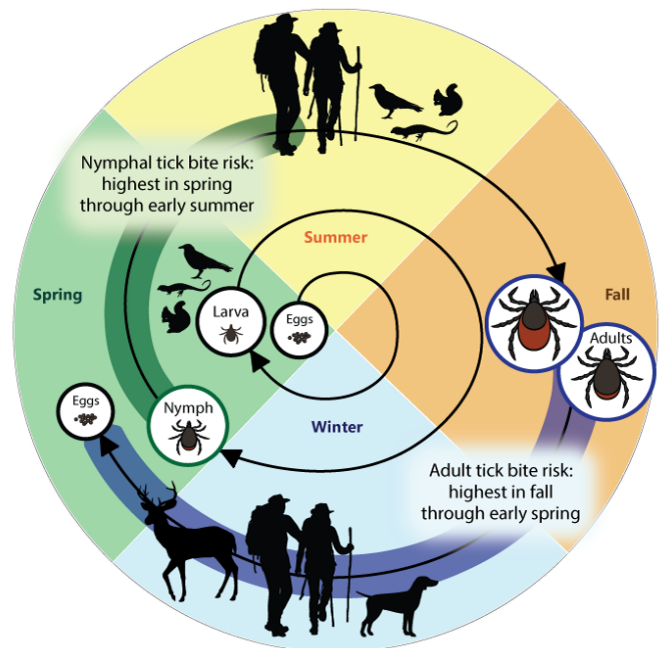
Tick Size and Life Cycle (slides 8-13)

Ticks are very tiny. The size of a tick depends on its life stage and species. The four life stages of a tick are egg, larva, nymph, and adult. An adult tick is generally the size of an apple seed or sesame seed, while nymphs are the size of a poppy seed. Larvae are even smaller and very hard to see. A blood-fed adult female tick is about the size of a raisin.

While ticks can be active year-round in some parts of California, the tick life cycle can generally be broken down seasonally, as different tick life stages are present during different times of the year in California. In general, adult ticks begin to come out in October, and peak in the winter and early spring. Nymphs, the smaller intermediate life stage begin to appear in the spring and peak in May or June. Larvae generally hatch in the spring and do not often feed on humans.

The entire life cycle for the most common tick in California, the western blacklegged tick (*Ixodes pacificus*), takes approximately two and a half years to complete.

- **Eggs:** Eggs are laid in the spring and summer. About 6 weeks after the eggs are laid, the eggs hatch into larvae.
- **Larvae:** Tick larvae have 6 legs, unlike nymphs and adults. After hatching, the larvae enter behavioral diapause, a kind of hibernation where they do not search for bloodmeals, until late winter when they feed on lizards, small rodents, and birds. After feeding, the larvae drop off their hosts and molt in the summer, becoming nymphs.
- **Nymphs:** Nymphal ticks have 8 legs and look like an adult tick only much smaller. After their summer emergence, they enter behavioral diapause for a second time. In the spring, they actively begin to search for hosts, such as lizards and small mammals. Once they have fed, they molt for a second time, emerging as adults in the late summer.
- **Adults:** Adult ticks begin to search for bloodmeals in the late fall and early winter. They are generally looking for large mammal hosts such as deer during this life stage. Female ticks need the protein in blood to develop their eggs, however male ticks can bite as well but will not feed for



very long. Following their feeding, females drop off their host and lay their eggs, dying after they are done.

How Ticks Feed (slides 14-17)

Ticks feed on the blood of mammals (including humans), birds, reptiles, and amphibians. After hatching from the eggs, ticks must eat blood at every life stage to survive. Most ticks prefer to have a different host animal at each stage of their life.

A tick uses its mouthparts (specifically the **hypostome**) to slice through a host's skin to attach and feed on blood. While feeding, a tick can transmit bacteria or other pathogens that can cause disease.

- Depending on the tick species and its stage of life, preparing to feed can take from 10 minutes to 2 hours. When the tick finds a feeding spot, it grasps the skin and cuts into the surface.
- The tick then inserts its feeding tube. Many species also secrete a cement-like substance that keeps them firmly attached during the meal. The feeding tube can have barbs which help keep the tick in place.
- Ticks also can secrete small amounts of saliva with anesthetic properties so that the animal or person can't feel that the tick has attached itself. If the tick is in a sheltered spot, it can go unnoticed.
- A tick will suck the blood slowly for several days. If the host animal has a bloodborne infection, the tick will ingest the pathogens with the blood.
- Small amounts of saliva from the tick may also enter the skin of the host animal during the feeding process. If the tick contains a pathogen, the organism may be transmitted to the host animal in this way.
- After feeding, most ticks will drop off and prepare for the next life stage. At its next feeding, it can then transmit an acquired disease to the new host.

Examples of tick-borne diseases reported in California include:

- Lyme disease
- Tick-borne relapsing fever
- Anaplasmosis
- Pacific Coast tick fever
- Rocky Mountain spotted fever

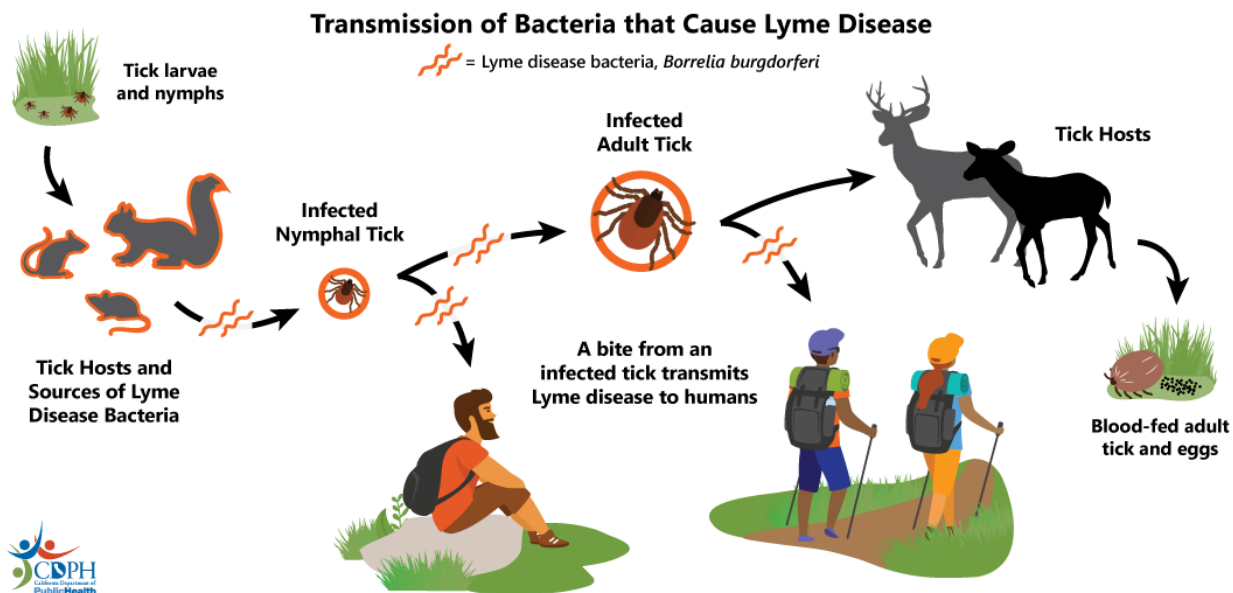
Many tickborne diseases can have similar signs and symptoms. Signs and symptoms may not develop right away – they can take days to weeks to develop. If a person has symptoms after being bitten by a tick, they should see a healthcare provider or doctor.

The most common symptoms of tick-related illnesses include:

- Fever/chills
- Aches and pains
- Rash

Lyme Disease Transmission (supplemental slide 46)

Lyme disease is caused by certain bacteria (called *Borrelia burgdorferi*; sounds like “bor-rel-lee-uh berg-dor-fer-eye”) that can spread from the bite of an infected western blacklegged tick. Ticks become infected at the larval and nymphal stages when feeding on host animals that are infected with *Borrelia burgdorferi* (including mice and squirrels). Infected ticks can then transmit the bacteria to humans when they bite and feed on humans. An infected western blacklegged tick must be attached to a person and feed for at least 24 hours before it can transmit the bacteria that cause Lyme disease.



Ticks in California (slide 21)

There are over 40 species of ticks in California, but less than 10 species are known to bite humans.

Human-biting ticks in California include:

Western blacklegged tick

- Scientific name: *Ixodes pacificus*
- Appearance:
 - Female: Reddish brown abdomen, black/dark brown scutum
 - Male: dark brown/black
- Can transmit Lyme disease and anaplasmosis

Pacific Coast tick

- Scientific name: *Dermacentor occidentalis*
- Appearance:
 - Female: brown abdomen, grayish scutum
 - Male: grayish patterned scutum
- Can transmit Pacific Coast tick fever and tularemia

American dog tick

- Scientific name: *Dermacentor variabilis*
- Appearance:
 - Female: reddish brown abdomen, whitish scutum
 - Male: white and brown patterned scutum
- Can transmit Rocky Mountain spotted fever and tularemia

Tick Habitat (slides 23-25, 27-28)

Ticks are common in shaded, outdoor areas with grass, shrubs, rocks, logs, and fallen leaves. Tick habitat includes grassy/brushy areas and oak, pine, or redwood forests. This includes coastal chaparral, oak savannah, and mixed woodland areas in California. The different life stages of ticks are found in different areas outdoors. Nymphs are found in leaf litter and on rocks, logs, tree trunks, or fallen branches under trees, in shaded natural areas. Adult ticks are found on the tips of grasses and shrubs, often along trails. Ticks lurk in these areas waiting to bite and feed on an animal or person passing by.

California is comprised of diverse natural landscapes. People who live in California most often find ticks when hiking or exploring outdoors. But some people live in regions where they may find ticks in their own backyard, especially in northern coastal counties and the Sierra Nevada foothills. This is especially true for people who live next to natural forests and grasslands. Children may even encounter ticks in fields at school or other outside play areas if situated within or near areas where ticks are common.

Ticks are not found in very hot or very cold climates, such as in the direct sun on sandy beaches, in the snow, or even up in the tops of trees. Ticks remain inactive if the temperature is too cold or too hot. Ticks need a certain amount of humidity or moisture in the air and environment so that they do not dry out.

How Ticks Find Their Hosts (slide 26)

Ticks find their hosts by detecting animals' breath and body odors, or by sensing body heat, moisture, and vibrations. Some species can even recognize a shadow. Ticks pick a place to wait by identifying well-used paths. Then they wait for a host, resting on the tips of grasses and shrubs. Ticks can't fly or jump, but instead wait in a position known as "questing".

While questing, ticks hold onto leaves and grass by their third and fourth pair of legs. They hold the first pair of legs outstretched, waiting to climb on to the host. When a host brushes the spot where a tick is waiting, it quickly climbs aboard. Some ticks will bite and attach quickly, while others will wander, looking for places like the ear or other areas where the skin is thinner.

Tick Bite/Disease Prevention (slides 29-44)

The best way to reduce the risk of getting a tick-borne disease is to prevent tick bites. People can help protect themselves from tick bites by doing the following:

Before you go outdoors:

- **Know where to expect ticks.** Ticks live in grassy, brushy, or wooded areas, or even on animals. Spending time outside walking your dog, camping, gardening, or hunting could bring you in close contact with ticks. Many people get ticks in their own yard or neighborhood.
- **Treat clothing and gear** with products containing 0.5% permethrin. Permethrin can be used to treat boots, clothing and camping gear and remain protective through several washings. Alternatively, you can buy permethrin-treated clothing and gear.
- **Use [Environmental Protection Agency \(EPA\)-registered insect repellents](#)** containing DEET, picaridin, IR3535, Oil of Lemon Eucalyptus (OLE), para-menthane-diol (PMD), or 2-undecanone. Always follow product instructions. Products containing OLE or PMD should not be used on children under 3 years old.

While in areas where ticks live:

- Walk in the middle of trails and avoid brushing against tall grasses and shrubs on the sides of trails.
- Check yourself carefully for ticks after sitting on wooden picnic tables, rocks, and logs.
- Check yourself often for ticks. If you find a tick crawling on you, remove it as soon as possible.

After you come indoors:

- **Check your clothing for ticks.** Ticks may be carried into the house on clothing. Any ticks that are found should be removed. Tumble dry clothes in a dryer on high heat for 10 minutes to kill ticks on dry clothing after you come indoors. If the clothes are damp, additional time may be needed. If the clothes require washing first, hot water is recommended. Cold and medium temperature water will not kill ticks.
- **Examine gear and pets.** Ticks can ride into the home on clothing and pets, then attach to a person later, so carefully examine pets, coats, and daypacks.
- **Shower soon after being outdoors.** Showering within two hours of coming indoors has been shown to reduce your risk of getting Lyme disease and may be effective in reducing the risk of other tickborne diseases. Showering may help wash off unattached ticks and it is a good opportunity to do a tick check.
- **Check your body for ticks after being outdoors.** Conduct a full body check upon return from potentially tick-infested areas, including your own backyard. Use a hand-held or full-length mirror to view all parts of your body. Check these parts of your body and your child's body for ticks:
 - Under the arms
 - In and around the ears
 - Inside belly button
 - Back of the knees
 - In and around the hair
 - Between the legs
 - Around the waist

Dogs are very susceptible to tick bites and tickborne diseases, and dogs can bring ticks into the home. For these reasons, it's important to keep ticks off pets/dogs as well.

- Check pets for ticks daily, especially after they spend time outdoors.
- If you find a tick on your pet, [remove it](#) right away.
- Reduce tick habitat [in your yard](#).

Ask a veterinarian about tick prevention products that are right for your family's dog.

Tick Removal

If you find a tick attached to your skin, remove the tick as soon as possible.

1. Use clean, fine-tipped tweezers to grasp the tick as close to the skin's surface as possible.
2. Pull upward with steady, even pressure. Don't twist or jerk the tick because this can cause the mouthparts to break off and remain in the skin. If this happens, remove the mouthparts with tweezers. If you cannot remove the mouth easily with tweezers, leave it alone and let the skin heal.
3. After removing the tick, thoroughly clean the bite area and your hands with rubbing alcohol or soap and water.
4. Never crush a tick with your fingers. Dispose of a live tick by:
 - Putting it in alcohol
 - Placing it in a sealed bag/container
 - Wrapping it tightly in tape
 - Flushing it down the toilet

Vocabulary

The following words are included in the lesson presentation and may be unfamiliar to some students. Simplified definitions for these vocabulary words are also provided in the Notes section on corresponding slides.

- Abdomen: Body region or section furthest from the head that holds most of the internal organs.
- Adult: The mature life stage of a tick. Adult ticks have 8 legs.
- Antennae: Long, thin sensory appendages on the heads of insects.
- Arachnids: Type of arthropod with 8 legs, no antennae, and a body with 2 main regions.
- Arthropods: Invertebrate animals with a hard exoskeleton, segmented bodies, and paired jointed appendages.
- Bacteria: Single-celled microbes that can be pathogenic.
- Capitulum: The mouthparts of a tick.
- Habitat: The natural environment of an organism; the type of place in which it is natural to live and grow.

- Host: A plant or animal that supports the growth of another organism.
- Hypostome: Toothed mouthparts that a tick uses to pierce the skin.
- Insects: Type of arthropod with 6 legs, antennae, and a body with 3 regions.
- Larva: The immature life stage of a tick that comes after the egg stage, but before the nymphal stage. Larval ticks have only 6 legs.
- Nymph: The immature life stage of a tick that comes after the larval stage, but before the mature adult stage. Nymphal ticks have 8 legs.
- Questing: Host-seeking behavior of ticks.
- Repellent: A substance used to keep bugs, insects, or pests away.
- Scutum: The hard covering or shield on the back of the abdomen; dorsal shield.
- Source: The place or organism from which something comes.
- Thorax: Middle body region of an insect that is behind the head and before the abdomen.

Resources

- [California Department of Public Health \(CDPH\) Tick-Borne Diseases webpage](https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Tick-Borne-Diseases.aspx) (https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Tick-Borne-Diseases.aspx)
- [CDPH Lyme Disease webpage](https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/LymeDisease.aspx) (https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/LymeDisease.aspx)
- [U.S. Centers for Disease Control and Prevention \(CDC\) Ticks webpage](https://www.cdc.gov/ticks/index.html) (https://www.cdc.gov/ticks/index.html)
 - [CDC How Ticks Spread Disease](https://www.cdc.gov/ticks/life_cycle_and_hosts.html) (https://www.cdc.gov/ticks/life_cycle_and_hosts.html)
 - [CDC Symptoms of Tickborne Illness](https://www.cdc.gov/ticks/symptoms.html) (https://www.cdc.gov/ticks/symptoms.html)
 - [CDC Preventing Tick Bites](https://www.cdc.gov/ticks/avoid/on_people.html) (https://www.cdc.gov/ticks/avoid/on_people.html)
 - [CDC Tick Removal](https://www.cdc.gov/ticks/removing_a_tick.html) (https://www.cdc.gov/ticks/removing_a_tick.html)
- [Pacific Southwest Center of Excellence in Vector-Borne Diseases, Ticks of the Pacific Southwest webpage](https://pacvec.us/ticks/) (https://pacvec.us/ticks/)
- [Maine Division of Disease Surveillance – Vectorborne School Curricula](https://www.maine.gov/dhhs/mecdc/infectious-disease/epi/school-curriculum/index.shtml) (https://www.maine.gov/dhhs/mecdc/infectious-disease/epi/school-curriculum/index.shtml)
- [Massachusetts Tick Talk! Lyme Disease Educational Materials for Elementary Schools \(Grades 3, 4, and 5\)](https://www.mass.gov/doc/teachers-guide-to-lyme-disease-0/download) (https://www.mass.gov/doc/teachers-guide-to-lyme-disease-0/download)

Discussion Questions

1. How many of you know what a tick is? Do you think it's a type of insect?
2. Where have you seen a tick before? On you? On a pet? Outside somewhere?
3. Have you ever been bitten by a tick before? What do you think a tick eats?

Activities

(printable versions linked below)

Tick Checks

- Students can practice checking for ticks during a physical education activity, such as a stretching exercise.
 - “Reach down, touch your toes, and hold for 15 seconds. While you’re touching your toes, practice checking for ticks! Look around your legs, ankles, and shoes for any ticks.”
- Students can practice checking for ticks after returning to class from recess.
 - “When you line up to return to class, we’re going to practice checking for ticks. Look behind your knees, under your arms, and around your ankles. Also feel behind your ears. Ask a friend or classmate to check your back for you.”

Drawing Activity

- Students draw their backyard or favorite outdoor space. Then students trade their drawings with a classmate and identify places in the drawing where ticks might be found. (Recall that ticks are common in shaded, outdoor areas with grass, shrubs, rocks, logs, and fallen leaves.)
 - Notify students prior to the activity that other students may review or mark their drawings. This activity can be modified if sharing or exchanging drawings is not possible or desired.

Word Search

- Students look for and circle key vocabulary words from the lesson in the jumble of letters.

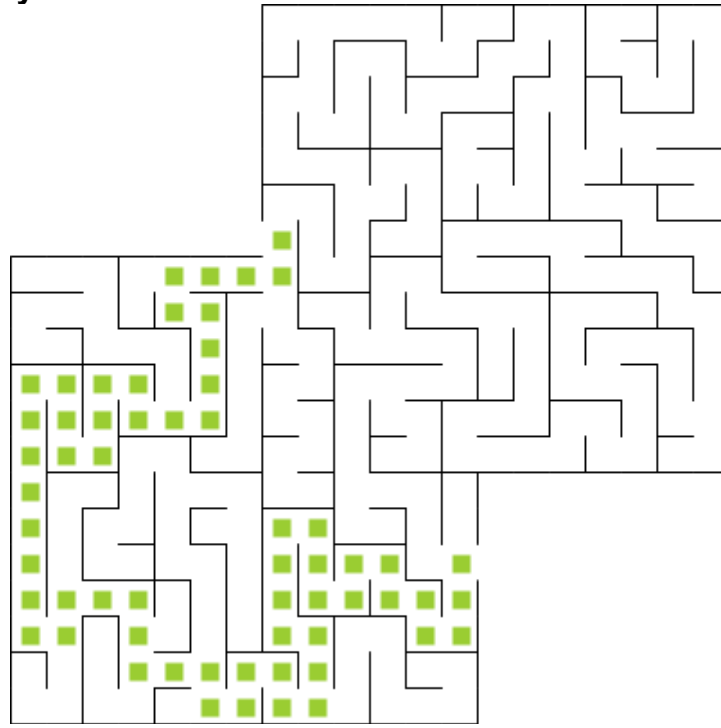
Answer Key:

Q E T I B P D H K A H Q A Z Z
S C U T U M A R V P P U D A E
P S H M R B R R U J M E G M L
C K J O I J A T E A Y S T U S
O A J T R L E M V V N T R X X
A C A K X E O Q O Z K I A T C
K T H N S T P L F H P N I Q U
A B V E S U U E V V J G L Y Q
F R F O C B G D L U V D S Q F
F O P Z L K G A G L H G U D Q
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A D U L T I I K M O R U T B X
Q A U A M Q I F O T S E Z Q O
Z D J V C O P D K O M B G Q F

Maze

- Students help Timothy Tickfinder and Bullseye navigate the tricky maze to get back home (while avoiding ticks along the way!).

Answer Key:



Creative Writing

- [Prompt #1](#): Students write about what it would be like to be a tick – where they live, what they eat, and where they go.
- [Prompt #2](#): Students write about a secret power that would keep ticks from biting them.

Post-presentation Quiz

([printable quiz](#))

1. How do you keep ticks from biting you?
 - a) Use tick repellent
 - b) Avoid brushing against tall grass, leaves, or shrubs
 - c) Check for ticks on yourself, pets, and people with you when you leave the forest or grassy areas
 - d) All of the above
2. Ticks are found naturally:
 - a) On a sandy beach
 - b) On grasses alongside trails

- c) On a basketball court
 - d) On top of the snow
3. If you find a tick attached to your skin, you should:
- a) Squash it like a bug
 - b) Grasp it with your fingers and yank it off
 - c) Have an adult use tweezers to grab the tick as close to your skin as possible and slowly pull it up and off
 - d) Forget about it and leave it there
4. It's important to remove a tick that you find on yourself or your pet because:
- a) The tick could live on you or your pet forever
 - b) Ticks can bite and may give you germs that can make you or your pets sick
 - c) The tick may jump from you or your pet onto someone else
 - d) You don't want them to have a free ride
5. Circle the picture of a tick.



Quiz Answer Key:

- 1. D
- 2. B
- 3. C
- 4. B
- 5. A