

# PREVENT & PROTECT

## Elementary School Curriculum

UNIT GUIDE FOR TEACHERS



# MOSQUITOES - ELEMENTARY LESSON PLAN

<b>Instructional Plan</b>		<b>Instructor:</b>		
<b>Course:</b>	S.C.4.L.16.2 - Explain that although characteristics of plants and animals are inherited, some characteristics can be affected by the environment. S.C.4.L.16.3 - Recognize that animal behaviors may be shaped by heredity and learning.			
<b>Unit:</b>				
<b>Competency:</b>				
<b>Lesson Title:</b>				Mosquito Biology and Importance
<b>Estimated Time:</b>				50 minutes
<b>Objectives</b>				By the end of the lecture, students will be able to: <ol style="list-style-type: none"> <li>1) List the characteristics of insects.</li> <li>2) Construct the life cycle of container mosquitoes.</li> <li>3) Compare two different types of insect life cycles.</li> <li>4) Identify the mosquitoes responsible for Zika virus transmission.</li> </ol>
<b>Equipment, Supplies, References, and Other Resources:</b>				
Candy (variety) (Snickers, M&M's, Skittles, lollipops, Smarties, Twix, gummy worms) Pretzels Nuts (variety) Beads and other alternative items for students with allergies Elementary PowerPoint Presentation Napkins Paper plates Paper towels Soap/water and/or hand sanitizer Whiteboard				

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Projector

Mosquito life cycle worksheet: Print out a blank life cycle and make two copies of it. Students can take notes and sketch out the life cycle on the first while listening to the PowerPoint presentation in class. After the PowerPoint slide presentation, students will use these worksheets to help guide them while creating their candy life cycle using the materials listed above.

**Situation:**

4<sup>th</sup> and 5<sup>th</sup> grade science/biology

25 students

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## Student Preparation (including overview, link, and interest approach)

### Overview:

- Students are expected to complete guided notes while going through the PowerPoint.
- After the PowerPoint lecture is completed, students will design the life cycle of a mosquito using assorted candy/snacks.
- Once the students have completed the life cycle, give them printer paper to draw a map of their house to locate where container mosquitos can be found. Have students write 3-5 sentences on what they can do to help eliminate the mosquitoes around their home and how this can prevent Zika virus transmission. This can be given after the life cycle assignment or as homework.

### Interest Approach: (3-5 min.)

Project slide 1 of the PowerPoint Presentation.



Tell the students to write down the things they observe.

Call on three students to share what they have observed.

Once students have had time to write down observations, click to the next slide to reveal the full mosquito picture.



Ask two students if they have seen a mosquito before, and if so, where.

Ask students if they know why the mosquito is so important.

**Motivation:** Hot humid climates are ideal for many insects and creepy crawly critters. Some of these organisms are good for the environment. However, some can be harmful not only to the environment, but to humans as

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well. Today, we will take a further look at the organisms responsible for spreading a virus known as Zika.

There is a set of guided notes that you will fill out as we go through in today’s class. The guided notes are fill in the blank and also have a few multiple-choice questions. There is also a life cycle worksheet that you will need to fill out once we get to the designated slide. It does not have to be a work of art; stick figures/circles that are recognizable are fine!

We will discuss where these organisms live, as well as their feeding habits, and what we can do to help stop the spread of Zika virus.

After going through the slides, you will all be responsible for designing the life cycle of the organism that causes Zika virus.

Teacher Directions / Methods	Content Outline / Key Points
<p><b>Slide 2:</b> Introduce topic.</p>	<ul style="list-style-type: none"> <li>• “Today we are going to be talking about mosquitoes and why they are so important.”</li> </ul>
<p><b>Slide 3:</b> <b>Question-Answer-Discussion (QAD)</b> <b>Objective 1</b></p>	<ul style="list-style-type: none"> <li>• Ask two students to name any insects they have seen with six legs.</li> <li>• “Are spiders insects?”</li> <li>• All insects have six legs.</li> <li>• Arachnids (spiders) have eight and belong to a different group.</li> </ul>
<p><b>Slide 4:</b> <b>QAD</b> <b>Objective 1</b></p>	<ul style="list-style-type: none"> <li>• Break down the word “exoskeleton”</li> <li>• Ask students, “What do you think exoskeletons are used for?”</li> <li>• Human skeletons are on the inside of our body (click to hide human skeleton picture and reveal cicada picture).</li> <li>• Once the picture of the cicada is revealed, ask, “Does anyone know what is being shown in this picture?”</li> <li>• Insects have their skeletons on the outside of their body. When insects want to grow or transform, they shed their old exoskeleton and make a new one.</li> <li>• Picture of the cicada shows the newly emerged cicada standing on its old exoskeleton.</li> <li>• Exoskeletons are used to provide a source of protection.</li> <li>• Exoskeleton is formed from a material known as chitin. /'kɪtɪn/</li> <li>• Chitin is a hard material (polysaccharide) that serves a protective role to the insect and prevents them from desiccating (drying out).</li> </ul>

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Teacher Directions / Methods	Content Outline / Key Points
<p><b>Slide 5-6:</b></p> <p><b>QAD</b></p> <p><b>Objective 1</b></p>	<ul style="list-style-type: none"> <li>• “How many body parts does an insect have?”</li> <li>• Insects have three major body parts.               <ul style="list-style-type: none"> <li>○ Head                   <ul style="list-style-type: none"> <li>▪ This is where the eyes, mouth, and antennae of the insect are located.</li> </ul> </li> <li>○ Thorax                   <ul style="list-style-type: none"> <li>▪ This is where the appendages (legs and wings if they have them) of the insect are located.</li> </ul> </li> <li>○ Abdomen                   <ul style="list-style-type: none"> <li>▪ The abdomen of the insect is where most of their gut/ digestive tract is located.</li> </ul> </li> </ul> </li> </ul>
<p><b>Slide 7:</b></p> <p><b>QAD</b></p>	<ul style="list-style-type: none"> <li>• “Have any of you seen an insect with more than two wings?”</li> <li>• Mosquitoes have two wings that are used for moving (flying).</li> <li>• Some insects have more than two wings. Examples are butterflies and moths, wasps, bees, and grasshoppers.</li> </ul>
<p><b>Slide 8:</b></p>	<ul style="list-style-type: none"> <li>• Mosquitoes have a mouthpart that is similar to a needle. This needle-like mouthpart is called a proboscis. \prə-ˈbā-skəs\</li> </ul>
<p><b>Slide 9:</b></p>	<ul style="list-style-type: none"> <li>• Mosquitoes can live in a variety of habitats, but they need water to complete their life cycle.</li> <li>• This is because the immature mosquitoes have to develop in the water.</li> <li>• Mosquitoes can be found in swamps, lakes, containers, or drainage ditches on the side of the road.</li> </ul>
<p><b>Slide 10:</b></p> <p><b>QAD</b></p>	<ul style="list-style-type: none"> <li>• “Why do you think only the female mosquitoes need to feed on blood?”</li> <li>• Only female mosquitoes feed on blood.</li> <li>• Female mosquitoes feed on blood because they need the nutrients from the blood to develop their eggs.</li> <li>• Both male and female mosquitoes need to feed on sugar sources.</li> </ul>
<p><b>Slide 11:</b></p> <p><b>QAD</b></p>	<ul style="list-style-type: none"> <li>• “Where can mosquitoes get sugar out in the environment?”</li> <li>• Mosquitoes can get sugar resources from flowers.</li> </ul>
<p><b>Slide 12:</b></p> <p><b>This is an important take-home message for the students.</b></p>	<ul style="list-style-type: none"> <li>• Immature mosquitoes feed, live, and develop in the water.</li> </ul>

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<p><b>Slide 13:</b></p> <p><b>QAD</b></p>	<ul style="list-style-type: none"> <li>• “Now we will begin going through two of the major insect life cycles.”</li> <li>• “Does the immature insect always look like the adult insect?”</li> <li>• We are discussing two different types of lifecycles for insects.</li> <li>• Each life cycle differs from one another.</li> </ul>
<p><b>Slide 14:</b></p> <p><b>QAD</b></p> <p><b>Objective 3</b></p>	<ul style="list-style-type: none"> <li>• “This is a hemimetabolous \he-mi-mə-'ta-bə-ləs\ or incomplete life cycle.”</li> <li>• “What kind of insect can you think of that has an incomplete life cycle?” <ul style="list-style-type: none"> <li>○ Examples can include insects like cockroaches, grasshoppers, bed bugs, and stick insects.</li> </ul> </li> <li>• The hemimetabolous life cycle is also called the incomplete life cycle.</li> <li>• Prefix hemi- means half, which is incomplete.</li> <li>• There are three major parts to the incomplete life cycle: egg, nymph, and adult.</li> <li>• The nymphal stage in this life cycle may look similar to the adult.</li> </ul>
<p><b>Slide 15:</b></p> <p><b>QAD</b></p> <p><b>Objective 3</b></p>	<ul style="list-style-type: none"> <li>• “This is the holometabolous \hō-lō-mə-'ta-bə-ləs\ or complete life cycle of a mosquito.”</li> <li>• “What kind of insect can you think of that has a complete life cycle?” The holometabolous life cycle is also called the complete life cycle. <ul style="list-style-type: none"> <li>○ Examples can include insects like butterflies, mosquitoes, beetles, bees and wasps, and flies.</li> </ul> </li> <li>• This life cycle is also what we would call complete metamorphosis.</li> <li>• Prefix holo- means whole or complete.</li> <li>• There are four major parts to the complete life cycle: egg, larva \'lär-və\, pupa \'pyü-pə\, and adult.</li> <li>• The goal of the larvae is to eat and grow.</li> <li>• The pupal stage is the transformation/ metamorphosis stage.</li> </ul>
<p><b>Slide 16:</b></p> <p><b>Teacher Led Discussion</b> <b>(describe what happens during life cycle stages.)</b></p>	<ul style="list-style-type: none"> <li>• Mosquitoes have the same type of life cycle as a butterfly.</li> <li>• Eggs are laid on or near the water.</li> <li>• They hatch into larvae. This is similar to the caterpillar for butterflies.</li> <li>• Larvae develop into pupae. This is like the chrysalis for a butterfly.</li> <li>• Pupae develop into adult mosquitoes.</li> </ul>

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<p><b>Slide 17-18:</b></p> <p><b>Objective 3</b></p>	<ul style="list-style-type: none"> <li>• Review of major characteristics of each life cycle.</li> <li>• Hemimetabolous = incomplete               <ul style="list-style-type: none"> <li>○ 3 stages → egg, nymph, adult</li> </ul> </li> <li>• Holometabolous = complete               <ul style="list-style-type: none"> <li>○ 4 stages → egg, larvae, pupae, adult</li> </ul> </li> </ul>
<p><b>Slide 19:</b></p>	<ul style="list-style-type: none"> <li>• Mosquitoes lay their eggs on or near the water.</li> <li>• This is because the immature mosquitoes <b>MUST</b> develop in the water.</li> <li>• Eggs can be laid in a raft (pictured) that can have 150 or more eggs.</li> <li>• Eggs can also be laid one at a time.</li> </ul>
<p><b>Slide 20:</b></p> <p><b>QAD</b></p>	<ul style="list-style-type: none"> <li>• “What do you think mosquito larvae eat?”               <ul style="list-style-type: none"> <li>○ Mosquitoes eat organic matter in the water.</li> </ul> </li> <li>• “What is one way that a human can breathe while underwater? Siphons are similar to a snorkel.”</li> <li>• Mosquito eggs hatch into larvae.</li> <li>• The goal of the larvae is to eat and grow.</li> <li>• “Mosquito larvae live in water. This includes ponds and lakes, even water that left sitting outside in a wheelbarrow.”</li> <li>• This is the major growing stage.</li> <li>• They breathe using a siphon which is like a snorkel.</li> <li>• The siphon is not near the larvae’s face! It is on the opposite end of the larvae.</li> <li>• The larval stage can take as little as four days, but this may be slower if there is not enough food, if the temperature is too low, or if there are too many competing larvae in the container.</li> </ul>



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<p><b>Slide 21:</b></p> <p><b>Teacher Led Discussion</b> (describe what happens during life cycle stages.)</p>	<ul style="list-style-type: none"> <li>• “Mosquito pupae live in the water and breathe using what is called a trumpet.”</li> <li>• “This is the transformation stage where the adult mosquito is being formed.”</li> <li>• The pupal stage is the transformation stage. This is like the cocoon of a butterfly.</li> <li>• Pupae breathe using something called a trumpet. Similar to a siphon, it allows the pupae to breathe while under water.</li> <li>• Trumpet is located on the “head” of the pupae.</li> <li>• Pupae live IN the water.</li> <li>• Inside of the pupae picture, you can see some of the parts of the mosquito developing. Dark spot on the head is what will be the adult mosquito’s eye.</li> <li>• The pupal stage usually lasts about 1-2 days before the adult mosquito emerges.</li> </ul>
<p><b>Slide 22:</b></p> <p><b>QAD</b></p>	<ul style="list-style-type: none"> <li>• “This is the final stage of the mosquito lifecycle.”</li> <li>• “Mature mosquitos use a proboscis to feed.”</li> <li>• “Adult mosquitoes live and fly on land.”</li> <li>• “Does anyone remember which mosquito feeds on blood and why?”</li> <li>• This is the adult mosquito and it is the final stage in the mosquito life cycle.</li> <li>• Proboscis is used to feed either on sugar (both male and female) or on blood (females only).</li> <li>• Mosquitoes can live anywhere from a couple weeks to a few months. Some mosquitoes overwinter and they can live six months or more.</li> </ul>
<p><b>Slide 23:</b></p> <p><b>QAD</b></p>	<ul style="list-style-type: none"> <li>• “Did you know that there are many different types of mosquitoes? In Florida, we have about 80 different species of mosquitoes. In the world, there are about 3,500 species.”</li> <li>• “Why do you think these mosquitos are called ‘container mosquitoes’?”</li> <li>• “The water that these mosquitos live in includes water in birdbaths, wheelbarrows, and even waterers for livestock.”</li> <li>• Some species of mosquitoes can be called “container mosquitoes.”</li> <li>• They are called container mosquitoes because they lay their eggs in containers that hold water.</li> <li>• This can include anything that holds even a small amount of water.</li> <li>• Examples of water-holding containers are bird baths, flower pots, water bowls or troughs for animals, and even natural containers like treeholes.</li> </ul>

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Teacher Directions / Methods	Content Outline / Key Points
<p><b>Slide 24:</b></p>	<ul style="list-style-type: none"> <li>• “These mosquitos LOVE to feed on people.”</li> <li>• “Just like we all have a favorite food, some mosquitoes do too. The female container mosquito’s favorite food is human blood.</li> <li>• Container mosquitoes feed on human blood.</li> </ul>
<p><b>Slide 25:</b></p>	<ul style="list-style-type: none"> <li>• “Container mosquitoes feed primarily during the day when people are the most active.”</li> <li>• Container mosquitoes are also searching for a human to feed on when we are the most active: during the day.</li> </ul>
<p><b>Slide 26:</b></p> <p><b>QAD</b></p>	<ul style="list-style-type: none"> <li>• “If we know that these mosquitoes are living in containers around our home and that they are trying to feed on us, what do you think we can do to get rid of them and prevent them from biting us?”</li> <li>• “How do you think we can get rid of and keep away these types of mosquitoes?”</li> <li>• “What containers around your house can you think of that might be holding water?”</li> <li>• To get rid of container mosquitoes, we need to get rid of the containers where they live or at least dump out the water they are developing in once a week.</li> </ul>
<p><b>Slide 27:</b></p> <p><b>QAD</b></p> <p><b>Objective 4</b></p>	<ul style="list-style-type: none"> <li>• “Are these mosquitoes harmful?”</li> <li>• “Are these mosquitoes harmful to only humans?”</li> <li>• “Container mosquitoes can also be harmful to our pets and transmit parasites that cause heartworm in dogs. Parasites are organisms that depend on other animals for their survival.”</li> <li>• Container mosquitoes can transmit disease to both humans and animals.</li> <li>• Some of these are dengue \ 'deŋ-gē\, Zika \ 'zē-kə-\, and chikungunya \ 'chi-kən-'gün-yə\ viruses.</li> <li>• These are diseases that are transmitted by mosquitoes. The symptoms are similar to the flu and include things like red eyes, headache, fever, rash, joint pain, and muscle pain. While these symptoms may not seem that bad, there are worse symptoms that can develop as a result if infection and could be fatal.</li> <li>• Container mosquitos can be harmful to pets causing heartworm disease.</li> <li>• Container mosquitoes can make both humans and our pets sick.</li> <li>• Mosquitoes can transmit, or pass-along, these viruses when they are feeding on our blood so we have to stop them from feeding on us.</li> </ul>

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Teacher Directions / Methods	Content Outline / Key Points
<p><b>Slide 28:</b></p> <p><b>Objective 2</b></p>	<ul style="list-style-type: none"> <li>• “Now that we have learned all this information about mosquitoes, I want you to draw the mosquito life cycle and list two facts about mosquitoes under the life cycle.”</li> <li>• Ask students to recreate the mosquito life cycle.</li> </ul>
<p><b>Application:</b></p> <p><b>Teacher Led Discussion/ask for questions.</b></p> <p><b>Provide students with the homework assignment (already made)</b></p>	<ul style="list-style-type: none"> <li>• “When you go home tonight, I also want you to look around the outside of your house to find any containers where mosquitoes might be developing.”</li> <li>• “Draw a map of your house to show where these containers were. Once you have done this, you can make sure that mosquitoes don’t develop there by dumping out the water once a week.”</li> <li>• Students will draw a map of their house, and identify areas that mosquitos can live in. Students will place an “X” over the areas identified.</li> <li>• Students will also write three to five sentences explaining what they could do around their home to help prevent the spread of Zika virus.</li> </ul>
<p><b>Closure/Summary:</b></p> <p><b>Teacher Led Discussion</b></p>	<ul style="list-style-type: none"> <li>• Today we learned lots of information about the mosquito. While mosquitoes may be small, they have a major impact on human and animal health and on the environment.</li> <li>• We learned about the organism responsible for Zika virus transmission, more specifically the type of mosquito responsible.</li> <li>• We discussed the two different types of life cycles for insects.</li> <li>• We also recreated the life cycle of a mosquito.</li> <li>• Also, we learned about the environments mosquitoes live in, and what we can do to help prevent the Zika virus.</li> </ul>
<p><b>Evaluation:</b></p>	<p>Formative Assessment:</p> <ul style="list-style-type: none"> <li>• Question and discussion.</li> <li>• Construction of mosquito life cycle.</li> </ul> <p>Summative Assessment:</p> <ul style="list-style-type: none"> <li>• House map that identifies where mosquitos live/can live.</li> </ul>

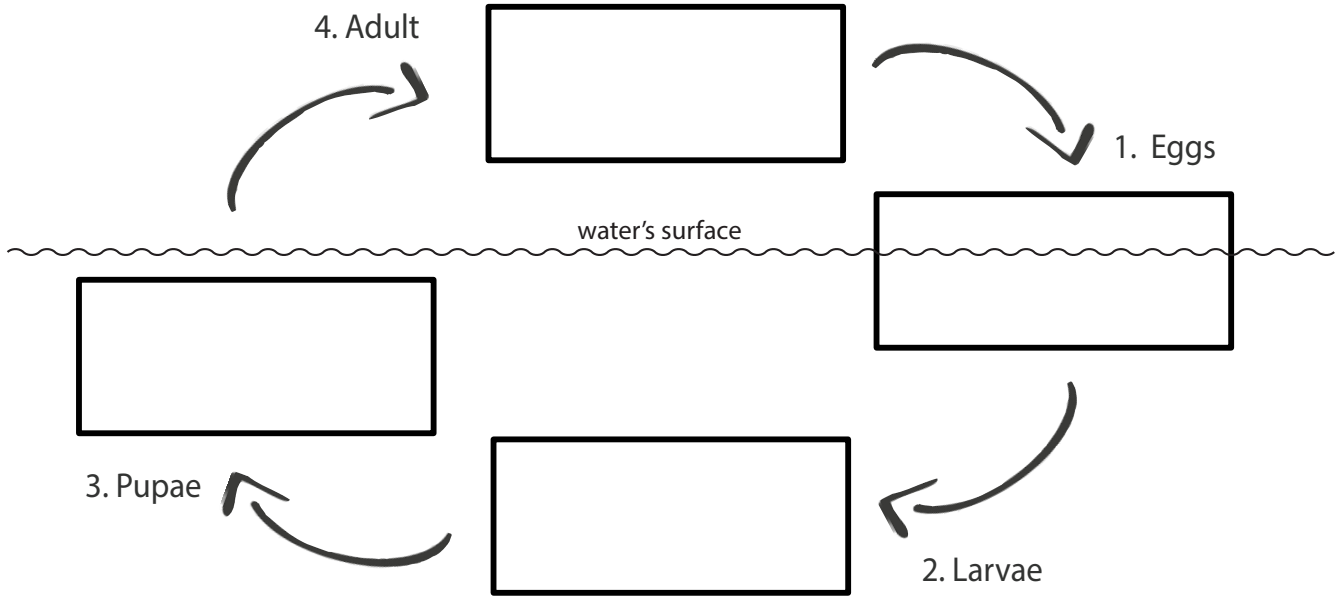


NAME \_\_\_\_\_

DATE \_\_\_\_\_

## LIFE CYCLE OF A MOSQUITO

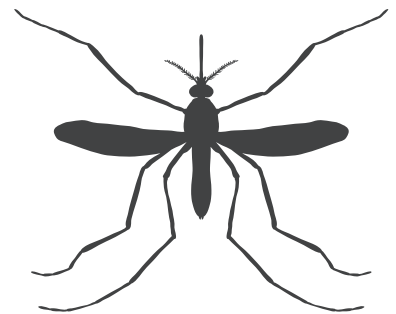
Draw each stage of the mosquito life cycle in the boxes below.



## TEST YOUR KNOWLEDGE

Answer the following questions using your knowledge on mosquitoes.

- Only \_\_\_\_\_ mosquitoes drink blood.
- Mosquitoes have \_\_\_\_\_ legs.
- Mosquitoes have 3 main body parts: \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
- Female mosquitoes lay their eggs in \_\_\_\_\_.
- Container mosquitoes carry what virus?
  - Flu
  - Zika
  - Measles



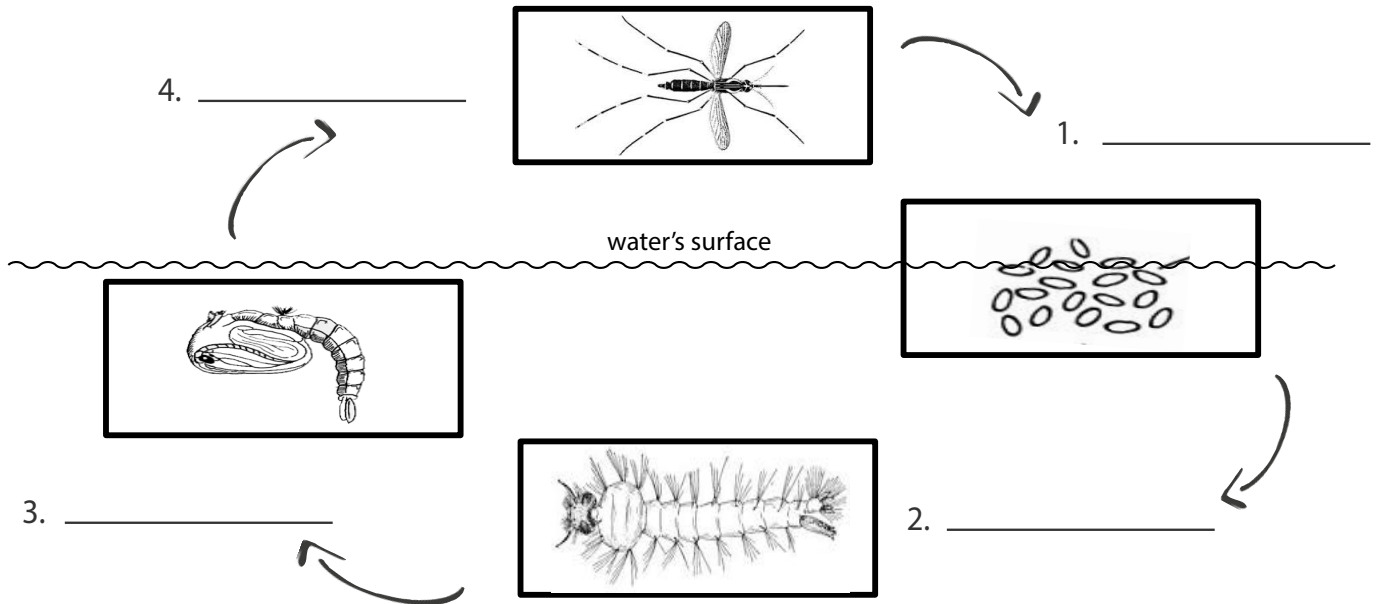


NAME \_\_\_\_\_

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## LIFE CYCLE OF A MOSQUITO

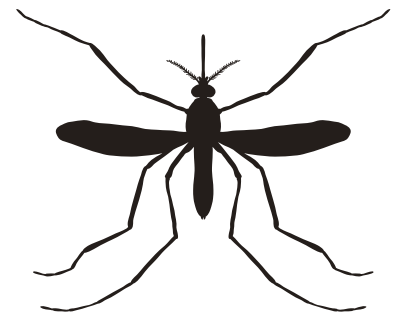
Label the diagram below with the stages of the mosquito life cycle.



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- Female mosquitoes lay their eggs in \_\_\_\_\_.
- Container mosquitoes carry what virus?
  - Flu
  - Zika
  - Measles





# PREVENT & PROTECT

# HOMework

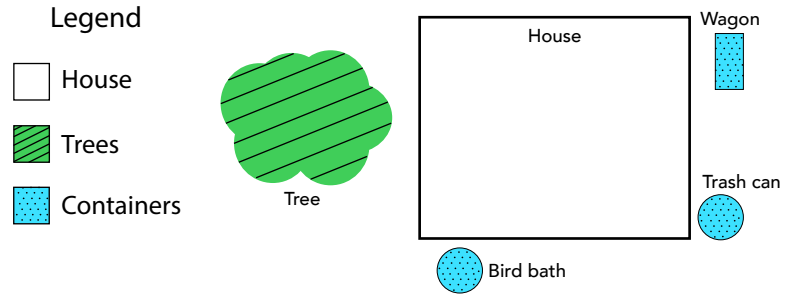
NAME \_\_\_\_\_

DATE \_\_\_\_\_

## DIRECTIONS

- Draw your house and yard in the box below as it would look from the sky.
- Add any containers\* around your home that are holding water (ex. buckets, wagons). Color them blue.
- Label each container.
- Make a legend (key) for the map (see example).

## EXAMPLE



## MY HOUSE

**\*REMINDER:** Be careful when dumping out containers of water you find outside. You may startle a snake or harmful insect!

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