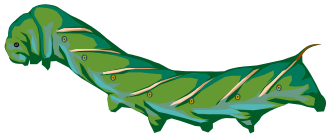
Good Bugs
&
Bad Bugs

Teacher's Booklet



AgriLIFE EXTENSION
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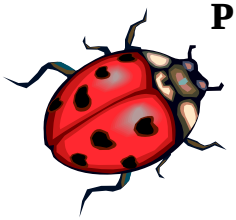
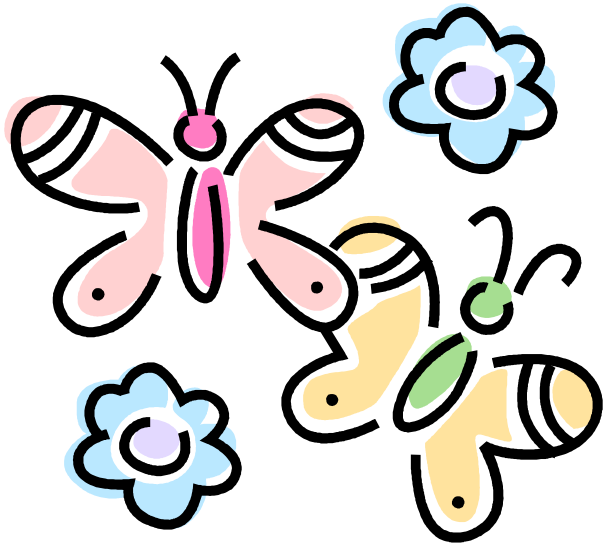


Preface

Insects are a very diverse group of organisms. There are over a million described species of insects and many more undescribed. The first thought a person has when asked about insects is usually “ew!” or that insects are bad. In fact, only 5% of all the described species of insects are actually harmful in some way. All other insects are beneficial or neutral.

Insects are found in every single environment imaginable, from inside structures to under the water, and even in the snow. Children encounter insects or by products of insects everyday. The objective of this booklet is to education children about the benefits of insects to help them understand that not all insects are harmful and gain an appreciation for what insects do for the world in which we live. It is also intended to help children understand which insects are harmful and why.



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Lesson 1 - Entomology

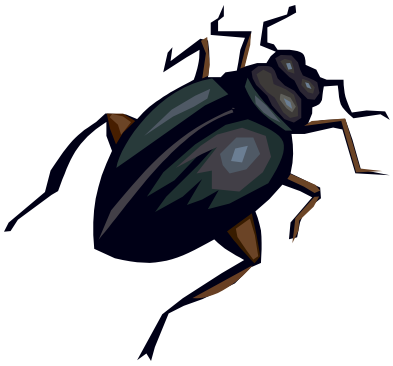
Overview:
Students will read the following passage in the classroom and then answer relevant questions pertaining to the passage. Students will learn the characteristics and external morphology of insects.

Instructions:
Read passage in groups or as a class.

Objective:
Students will be able identify insects and identify the various morphological characteristics that differentiate insects from other arthropods and animals.

TEKS:
Science: 2.2a, 2.2b, 2.2c, 2.2d, 2.2e, 2.2f, 2.3a, 2.3b, 2.3c, 2.9a, 2.10a
Science: 3.2a, 3.2c, 3.2f, 3.3c, 3.3d, 3.10a, 3.10b
Science: 4.2a, 4.2b, 4.2c, 4.2f, 4.3c, 4.3d, 4.10a
Science: 5.2b, 5.2f, 5.2g, 5.10a

Materials:
Handouts of reading exercise
Overhead copy of reading exercise
Wrap up questions for Lesson 1
Activity 1-1



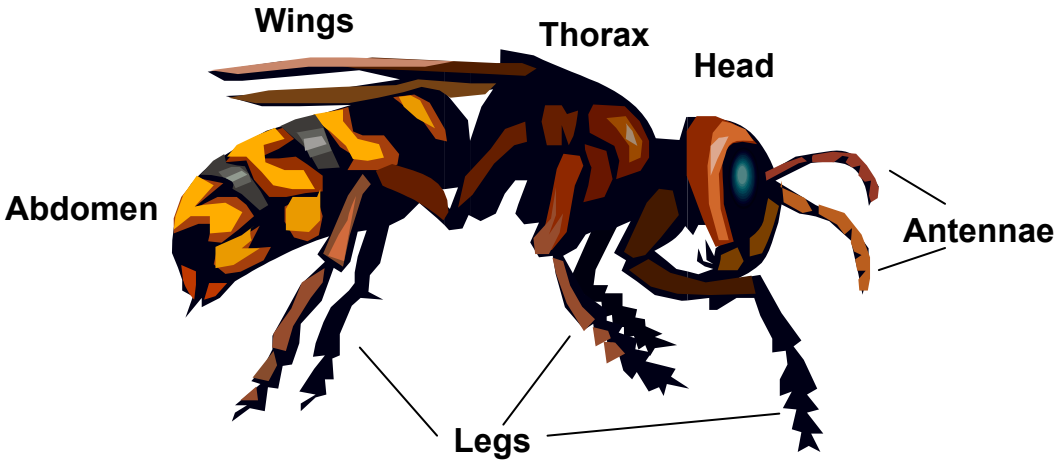
Lesson 1 - Entomology

Questions to ask before reading the passage:
What is an insect?
What are the body parts of an insect?
Are spiders insects?

Reading Exercise
Entomology is the study of insects. An entomologist is a scientist who studies insects. Insects are arthropods. They are related to other arthropods such as spiders, scorpions, shrimp, millipedes and centipedes. Insects are different from other arthropods because they have three body regions, six legs, one pair of antennae, and two pairs of wings.

The three body regions of an insect are the **head, thorax,** and **abdomen**. An insect's head contains eyes, mouthparts and antennae. Insect antennae are feelers that help the insect feel, see, hear, smell, and taste. The thorax is the middle of the insect's body and is the locomotion part of an insect. The legs and wings are attached to the thorax. Not all insects have wings, but they can have up to two pairs (or four) wings. The abdomen is the hind part of the insect. If an insect has a stinger, the stinger is on the abdomen.

Insects and other arthropods have an exoskeleton; their skeleton is on the outside of their body. It acts as armor and protects the insect. This is why beetles are so hard and why insects crunch when you step on them.



For the Teacher: Demonstration Activity:

Chose five students to participate in the activity and have them line up single file with their back to the person behind them. The first person will be the "head," the next three will be the "thorax" and represent each pair of legs, and the last person is the "abdomen." Ask the students place their hands on the shoulders of the person in front of them. Instruct the thorax students to walk like they think the insect should walk. The students will probably fall off balance and will not be able to walk efficiently. Now instruct the first and third legs to step forward with their right leg, and the middle leg to step forward with their left leg.

Insects walk in a tripod or triangle pattern for balance. If all three legs lifted on one side of the insect, it could topple over easily. Insects always keep one foot on the ground when walking for balance. When an insect speeds up, the legs do not stay on the ground as long as they were when walking. When an insect runs it may have all legs off the ground at one point, just like people do when they run.

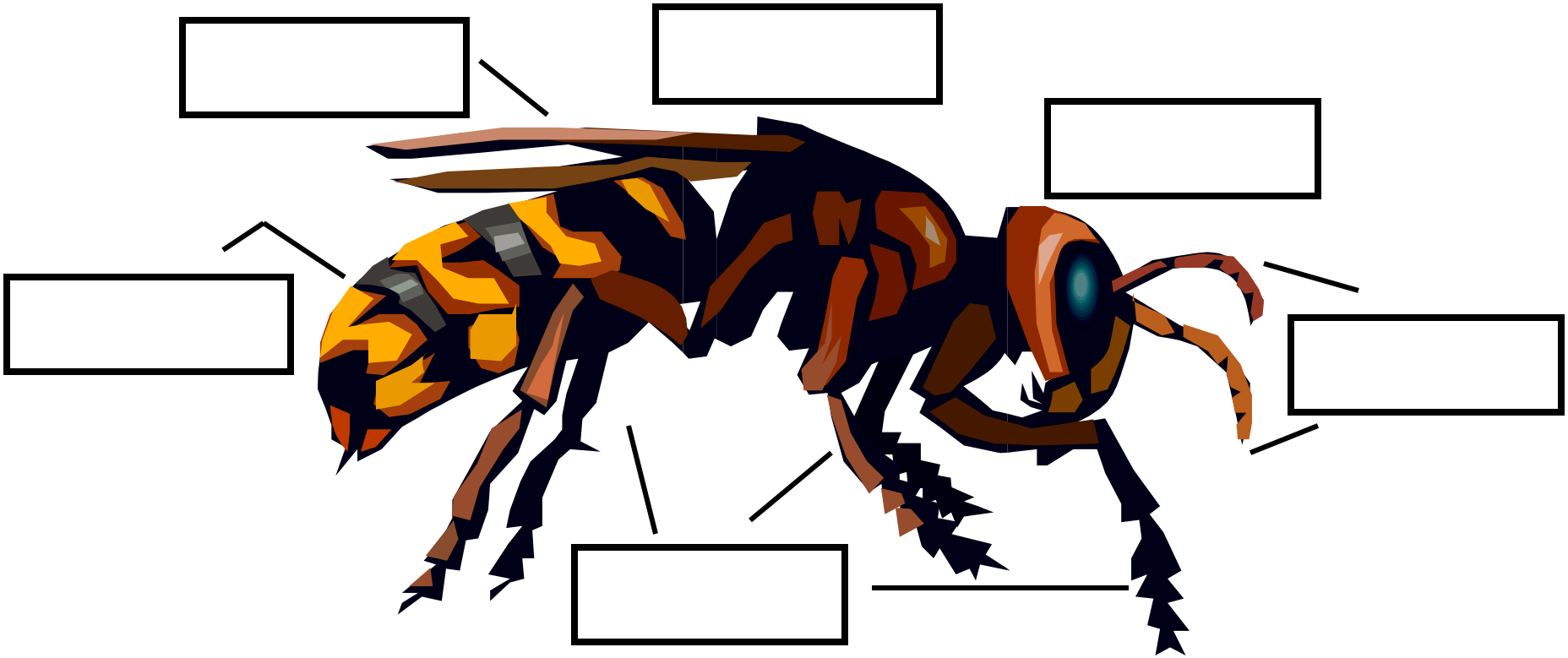
Questions for activity:

What went wrong when the legs tried to move by each other?
Why do insects always keep one foot on the ground instead of moving all three at the same time?
What other animals can you think of that alternate feet when they walk? (ie: dogs, cats, horses, any animal)

Wrap up questions for Lesson 1:

How do you know an insect is an insect and not another animal? Three body parts, six legs, antennae, and some have wings.
What are the body regions of an insect? Head, thorax, and abdomen.
Why are insect's bodies so hard? Their skeleton is on the outside of their body
What is an entomologist? A scientist who studies insects.

Activity 1-1 Cut out the words in the word bank. Match the words to the correct body parts on the insect.



Abdomen	Antennae	Head	Thorax	Legs	Wings

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Pre/Post Test Evaluation: Lesson 1

1. What is entomology?
    a. The study of spiders
    b. The study of insects
    c. The study of creepy crawly things
    d. The study of life

2. How many legs does an insect have?
    a. 2
    b. 4
    c. 5
    d. 6

3. What are the body regions of an insect?
    a. Head and Body
    b. Head, Body, Tail
    c. Head, Thorax, Abdomen
    d. Head and Abdomen

4. Where are the insect's legs and wings found on the body?
    a. Head
    b. Thorax
    c. Abdomen
    d. Tail

5. What do the antennae do for the insect?
    a. Nothing
    b. Fly
    c. See, hear, smell, taste and feel
    d. Walk

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Pre/Post-Test Evaluation: Lesson 1 - KEY

1. What is entomology? B
    a. The study of spiders
    b. The study of insects
    c. The study of creepy crawly things
    d. The study of life

2. How many legs does an insect have? D
    a. 2
    b. 4
    c. 5
    d. 6

3. What are the body regions of an insect? C
    a. Head and Body
    b. Head, Body, Tail
    c. Head, Thorax, Abdomen
    d. Head and Abdomen

4. Where are the insect's legs and wings found on the body? B
    a. Head
    b. Thorax
    c. Abdomen
    d. Tail

5. What do the antennae do for the insect? C
    a. Nothing
    b. Fly
    c. See, hear, smell, taste and feel
    d. Walk

Lesson 2 – Insect Lifecycles

Overview:
Students will read the following passage in the classroom and then answer relevant questions pertaining to the passage. The students will get an overview of the lifecycle of insects.

Instructions:
Read passages in groups or as a class.

Objective:
Students will be able identify the two different types of metamorphosis; complete and incomplete. Students will be able to differentiate the different stages of an insect's lifecycle.

TEKS:
Science: 2.2a, 2.2b, 2.2c, 2.2d, 2.2e, 2.2f, 2.9a, 2.9b, 2.9c, 2.10a, 2.10c
Science: 3.2a, 3.2c, 3.2f, 3.3c, 3.9b, 3.10a, 3.10b, 3.10c
Science: 4.2a, 4.2b, 4.2c, 4.2f, 4.9a, 4.10a, 4.10b, 4.10c
Science: 5.2b, 5.2f, 5.2g, 5.10a, 5.10a, 5.10b, 5.10c

Materials:
Handouts of reading exercises A, B, and C
Overhead copy of reading exercise A, B, and C
Wrap up questions for Lesson 2-1, 2-2, and 2-3
Activity 2-1 and 2-2

Lesson 2-1 – Insect Lifecycles

Questions to ask before reading the passage:
How do you think insects grow?
What are some life stages of insects that you can think of?
Have you ever seen an insect as big as a dog?

Reading Exercise A:
Metamorphosis is a change in form. Insects go through metamorphosis to become adults. Many insects completely change their size, shape and color as they go through their lifecycle. All insects start out as eggs. The egg hatches, and the insects go through a series of molts until they become adults. When an insect molts, it sheds its exoskeleton (or skin) and grows for a short period of time until their new exoskeleton becomes hard again. This is one reason why insects can never become as large as a dog. Another reason is because their exoskeleton is so hard and strong, it would crush them if they became too large.

Only the immature insects can molt. Once an insect becomes an adult it will no longer molt. One way to tell the difference between adult insects and immatures is to see if they have wings. Only adult insects have wings. If you see a small fly it is incorrect to call it a baby fly, because that is as big as it will ever get!

There are two different types of lifecycles that insects can go through. Insects either go through **complete metamorphosis** or **incomplete metamorphosis**. The type of metamorphosis or lifecycle an insect goes through depends on the type of insect.

Wrap up questions for Lesson 2-1:
Why can't insects grow very large? Because they don't have enough time to grow large, and if they did grow large their exoskeleton would crush them.
What are the two types of metamorphosis insects go through? Incomplete and complete metamorphosis.
What does metamorphosis mean? A change in form.
What is one way to know if an insect is an adult? If it has wings.
Does an insect molt again once it is an adult? No, once it has wings it is an adult and will never molt again.

Lesson 2-2 – Complete Metamorphosis

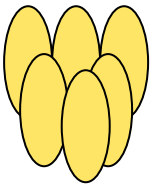
Questions to ask before reading the passage:
What are the life stages of a butterfly?
What is a larva?
What is a pupa?
Can you think of any insects that have a larval or pupal stage?

Reading Exercise B:
Complete Metamorphosis has four different life stages. **Egg, larva, pupa,** and **adult**. An **egg** is laid, and a larva hatches from the egg.

A **larva** is called many different things depending on the insect. Butterfly and moth larvae are called caterpillars; beetle larvae are called grubs; and fly larvae are called maggots. Larvae molt a series of times, growing each time. Because insects are covered by an exoskeleton (even larvae and pupae) they must shed their exoskeleton to grow. Humans have their skeletons in the inside of their bodies and our skin stretches when we grow. Insects cannot do that, so they must shed their skin, or exoskeleton, and then grow.

A larva will molt several times before it is ready to become a **pupa**. The last larvae will make a pupal case to protect the pupae from the environment. Butterfly and moth pupal cases are called cocoons or a chrysalis. The pupa is sometimes called the resting stage of an insect because it usually does not move. But there is a lot of activity going on inside the pupal case. The pupa is preparing to become an adult, forming wings, changing mouthparts, and gaining new organs!

When the **adult** emerges it will look nothing like the larva or pupa. It will not eat the same types of food. In fact, it may have completely different mouthparts! The adults will also probably not live in the same places as the larva.
Some common insects that go through complete metamorphosis are butterflies, moths, beetles, lacewings, flies, bees, ants and wasps.



Lady Beetle Egg

Lady Beetle Larvae

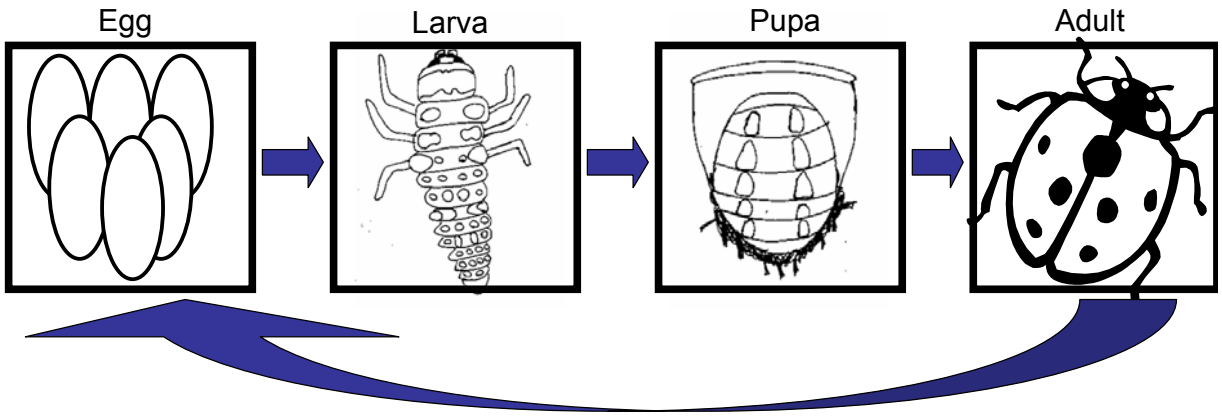
Lady Beetle Pupae

Lady Beetle Adult

Wrap up questions for Lesson 2-2:
What are the life stages that insects go through if they have complete metamorphosis? Egg, larva, pupa, adult.
Is the pupa really resting? No, it is preparing to become an adult and forming wings, changing mouthparts, and gaining new organs.
What are some other names for larva? Grubs, caterpillars, or maggots
What are some other names for pupa? Cacoons or chrysalis.
Name some insects that go through complete metamorphosis? butterflies, moths, beetles, lacewings, flies, bees, ants and wasps.

Activity 2-1:Complete Lifecycle Key

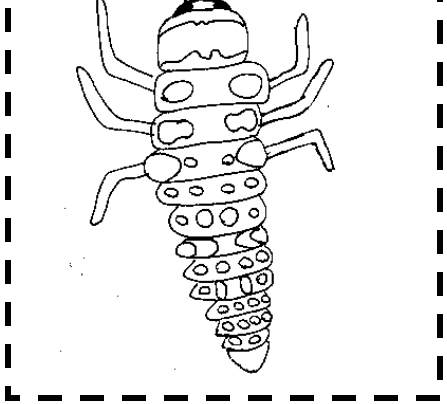
Cut out the life cycle images and glue them in the correct boxes

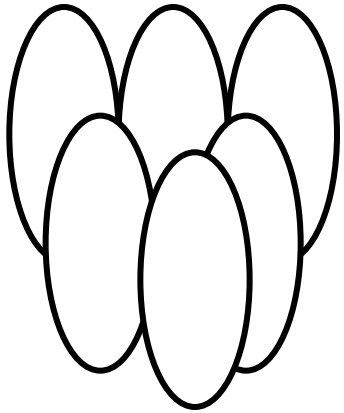


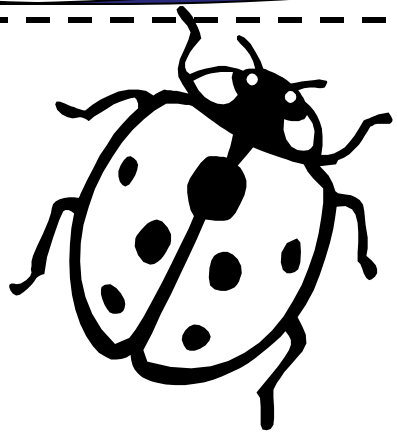
Activity 2-1:Complete Lifecycle

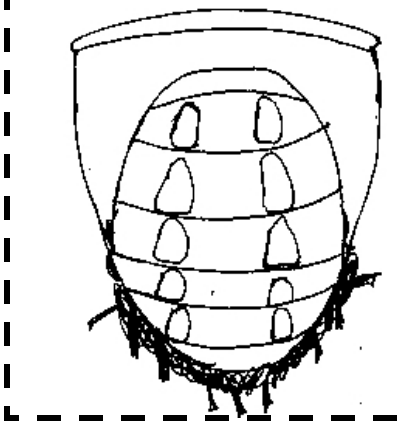
Cut out and color the life cycle images and glue them in the correct boxes

Egg → Larva → Pupa → Adult









Lesson 2-3 – Incomplete Metamorphosis

Reading exercise C:
Incomplete metamorphosis has only three different life states. **Egg, immature,** and **adult.** When an **egg** hatches, an immature emerges. The **immature** is similar to the adult, but is smaller and never has wings. Immatures are called nymphs if they live on land and naiads if they live in or near water. Immatures molt a number of times before they become an adult. Each time the immature molts, its wing pads grow larger and larger. Finally, on the last molt, the **adult** emerges from the shed exoskeleton. The adult has fully developed wings, not wing pads. Both the adult and immatures eat the same types of food. Immatures usually eat more food so that they can get enough nutrients to become a healthy adult.

Some common insects that have incomplete metamorphosis are cockroaches, preying mantises, sting bugs, and other true bugs.

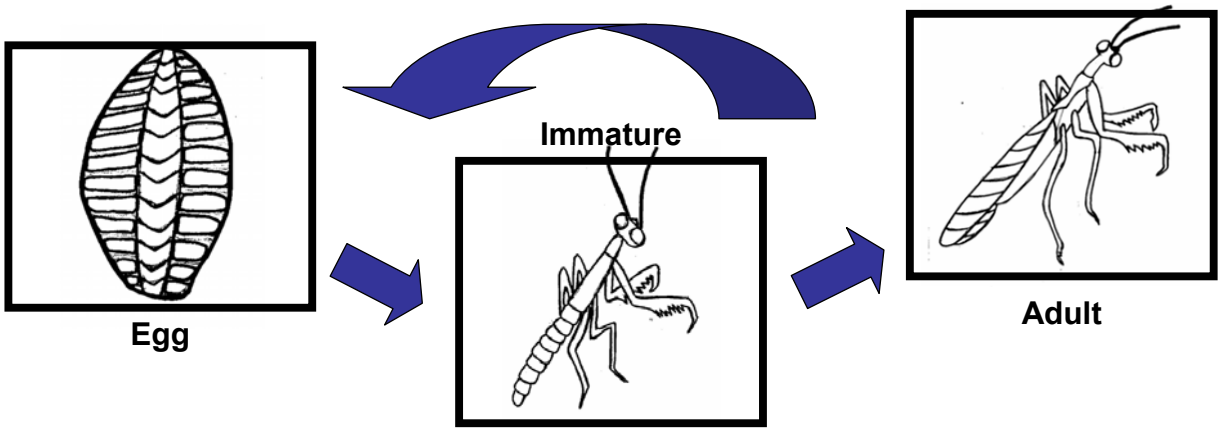
Praying Mantis Ootheca (egg case)

Praying Mantis Adult

Wrap up questions for lesson 2-3:
What are the life stages an insect that has incomplete metamorphosis goes through? Egg, immature, adult
What are some other names for the immature stage of an insect that goes through incomplete metamorphosis? Nymph or naiad.
Name some insects that go through incomplete metamorphosis: cockroaches, praying mantises, stink bugs and other true bugs.

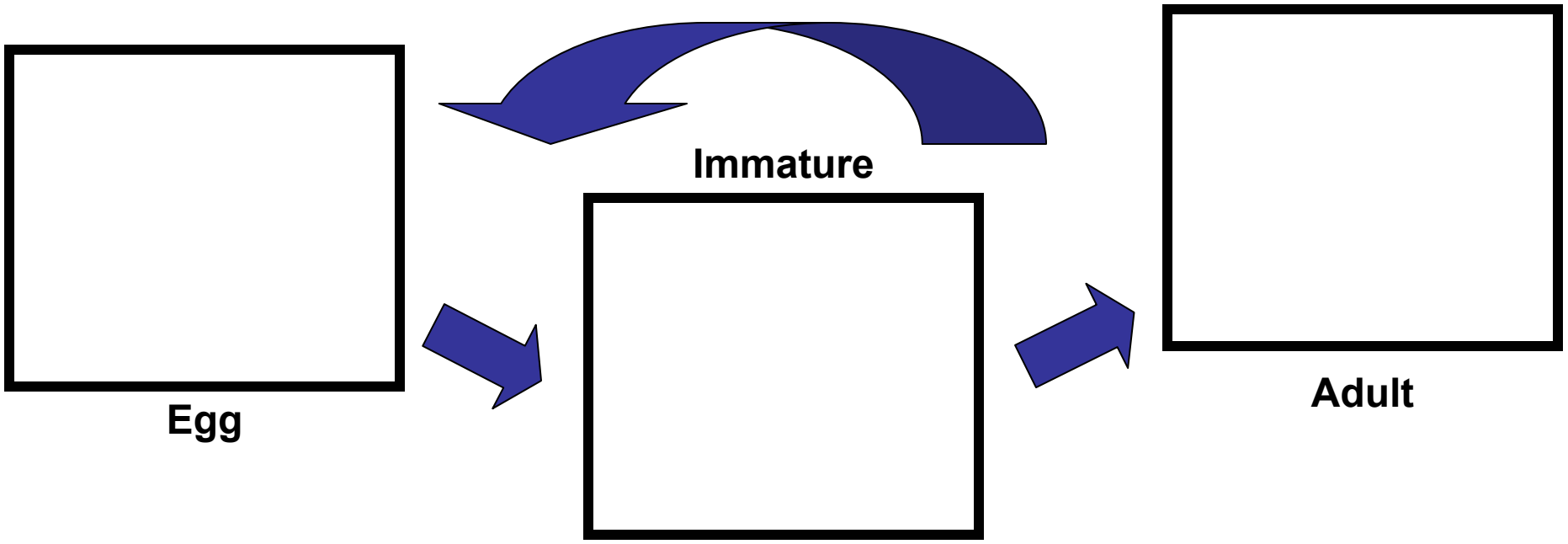
Activity 2-2: Incomplete Lifecycle Key

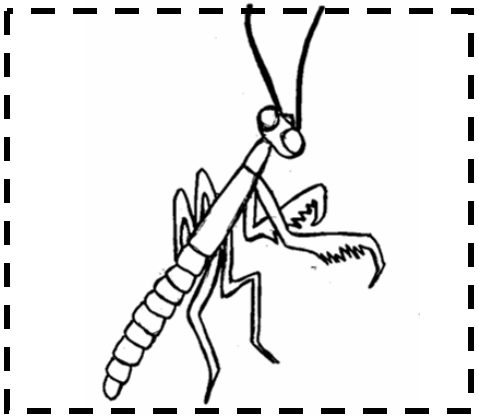
Cut out the life cycle images and glue them in the correct boxes

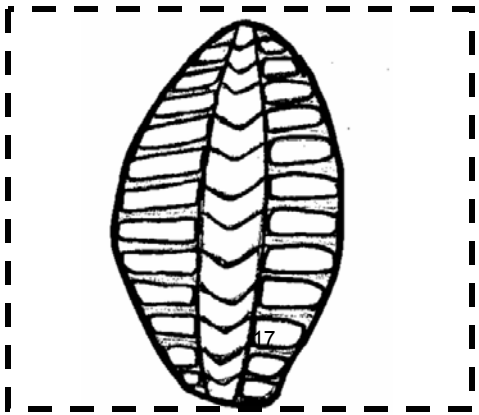


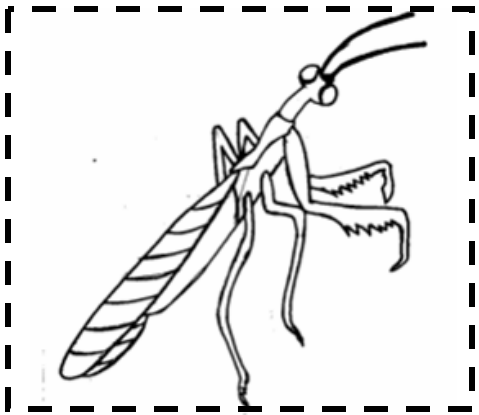
Activity 2-2: Incomplete Lifecycle

Cut out the life cycle images and glue them in the correct boxes









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Pre/Post Test Evaluation: Lesson 2

1. What is metamorphosis?
    a. The study of insects
    b. A type of insect
    c. A change in form
    d. A scientist

2. What are the life stages of an insect with complete metamorphosis, like a butterfly?
    a. Egg, larva, pupa, adult
    b. Egg, immature, adult
    c. Baby, child, adult
    d. Teenager, adult

3. What are the life stages of an insect with incomplete metamorphosis, like a praying mantis?
    a. Egg, larvae, pupa, adult
    b. Egg, immature, adult
    c. Baby, child, adult
    d. Teenager, adult

4. Why does an insect molt?
    a. To get clean
    b. To get shinier
    c. To grow larger
    d. No one knows

5. Only adult insects have wings
    a. True
    b. False

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Pre/Post-Test Evaluation: Lesson 2 Key

1. What is metamorphosis? C
    a. The study of insects
    b. A type of insect
    c. A change in form
    d. A scientist

2. What are the life stages of an insect with complete metamorphosis, like a butterfly? A
    a. Egg, larva, pupa, adult
    b. Egg, immature, adult
    c. Baby, child, adult
    d. Teenager, adult

3. What are the life stages of an insect with incomplete metamorphosis, like a praying mantis? B
    a. Egg, larvae, pupa, adult
    b. Egg, immature, adult
    c. Baby, child, adult
    d. Teenager, adult

4. Why does an insect molt? C
    a. To get clean
    b. To get shinier
    c. To grow larger
    d. No one knows

5. Only adult insects have wings. A
    a. True
    b. False

Lesson 3 – Beneficial Insects

Overview:
Students will read the following passage in the classroom and then answer relevant questions pertaining to the passage. The students will get an overview about beneficial insects and understand how certain insects benefit the earth.

Instructions:
Read passages in groups or as a class.

Objective:
Students will be able identify beneficial insects in the landscape. Students will learn why certain insects are beneficial and the categories into which various beneficial insects fall.

TEKS:
Science: 2.2a, 2.2b, 2.2c, 2.2d, 2.2e, 2.2f, 2.9a, 2.9b, 2.9c, 2.10a, 2.10b, 2.10c
Science: 3.2a, 3.2c, 3.2f, 3.9a, 3.9b, 3.9c, 3.10a, 3.10b, 3.10c
Science: 4.2a, 4.2b, 4.2c, 4.2f, 4.9a, 4.9a, 4.9b, 4.10a, 4.10b, 4.10c
Science: 5.2b, 5.2f, 5.2g, 5.9a, 5.9b, 5.9c, 5.10a, 5.10b, 5.10c

Materials:
Handouts of reading exercises A, B, C, and D
Overhead copy of reading exercise A, B, C, and D
Wrap up questions for Lesson 3-1, 3-2, 3-3, and 3-4
Activity

Lesson 3-1- What is a Beneficial Insect?

Questions to ask before reading the passage:
What is the first thing you think of when you think about insects?
Do you think insects are good or bad?
Why do you think people think insects are bad?
Name some good insects. Why are these good insects?
Name some bad insects. Why are these bad insects?

Reading Exercise A:
There are over one million types of insects in the world. Most people's first thought of insect is "ew, gross!" or that insects are bad. However, only 5% percent of all insects are bad. That means that 95% of all insects are either good or neutral. A neutral insect is one that isn't beneficial, but also doesn't cause any harm.

Good insects can be found in many different places. There are good insects in the garden, in the backyard, in the playground, in parks, and even in your home. Beneficial insects can be grouped into three groups: predators, pollinators, and recyclers. Predators are beneficial because they prey on and eat bad insects. Pollinators help spread pollen and make flowers, fruits, vegetables, and other plants grow and spread. Recyclers are insects that decompose or break down waste and trash. Without these insects our trash, animal poop, and dead things would pile up all around us!

For the Teacher:

Demonstration Activity

Take about 20 blocks, checkers, or other objects. Place one block aside, separate from the others to demonstrate to the class the small amount of insects that are actually bad. Another option: Use the class as the demonstration. Tell the class that most insects are good, and if everyone in the classroom was an insect, only one person would be a harmful insect; all the others would be beneficial or neutral.

Wrap up questions for Lesson 3-1:
Are all insects harmful or bad? No, only 5% of the millions of different kinds of insects are bad.
What are the three different groups some beneficial insects can be put into? Predators, pollinators, and recyclers.
What is a neutral insect? Is it harmful? No, a neutral insect is doesn't do anything good or bad.

Lesson 3-2 – Predators

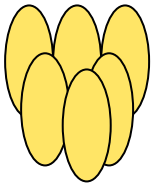
Questions to ask before reading the passage:
What is a predator?
Can you name any predators?
Can you name any insects that are predators?
Why do you think predator insects are good insects?

Reading Exercise B:
There are many different insects that are good because they feed on harmful insects. Gardeners and farmers like these insects because they kill insects that eat their plants. Beneficial predators are very important because they reduce the number of pests, and we do not have to use harmful chemicals and pesticides.

Ladybeetles (ladybugs) are good insects. Not all ladybeetles are females, ladybeetle is just their name! They feed on many bad insects found on vegetables and flowers. Most ladybeetles are red with black dots, but some are black with two red dots. Ladybeetles are colored brightly to warn birds or other animals that they taste bad. If you have ever held a ladybeetle, sometimes they emit a yellow liquid from their body when they feel threatened. When a bird or insect eats a ladybeetle, the ladybeetle makes that same yellow liquid seep out of its body. That yellow liquid tastes bad to other animals and makes them sick. The ladybeetle's bright red color helps remind the animal not to eat another ladybeetle.

Ladybeetles are such good predators that garden stores sell them as a form of pest control! You can release them in the garden and landscape to keep plants pest free!

<u>For the Teacher:</u> Directions for buying store bought ladybeetles:
If you buy ladybugs from the store or from a supplier, make sure you do not release them during the heat of the day or they will all fly off. The best thing to do is keep them in a refrigerator (not freezer!) to slow them down. You can keep them refrigerated for several days and they will be fine. They may almost appear dead, but once you remove them and they warm up, they will begin moving around. They will be thirsty, so spray the plants with water so the ladybeetles stick around.



Lady Beetle Egg

Lady Beetle Larvae

Lady Beetle Pupae

Lady Beetle Adult

Praying Mantises are predators that only eat live insects, never dead ones. Praying mantis can be spelled two ways: praying mantis and preying mantis. The spelling "praying" comes from the way they hold their legs below their heads like they are praying. The spelling "praying" comes from the fact that they are good predators and searching for food can be called preying.

A praying mantis is known as a sit and wait predator. This means that they do not go searching for their food, their food comes to them! Praying mantises are colored to match their environment. They are camouflaged to blend in with the leaves or sticks of plants where they wait for prey to walk in front of them. Praying mantises have very large eyes and they use them to watch for prey. When prey walks in front of them, they reach out quickly and grab the prey with its front legs. Praying mantises do not walk with their front legs; they only use their back four legs to walk. Their front legs have spines on them that help the preying mantis hold prey while they eat.

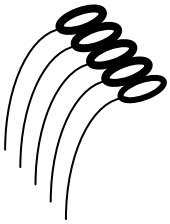
Praying mantises do not lay single eggs. The mother praying mantis lays an egg case that she sticks to a branch or leaf. This egg case contains many eggs. The baby praying mantises hatch and are born knowing to look for food to survive. As a praying mantis grows it will catch larger prey. Preying mantises have wings as adults although they rarely use them. Only adult praying mantises have wings, immatures never have wings.

Praying Mantis Ootheca (egg case)

Praying Mantis

Lacewings are predators of pests on vegetables and flowers. They are very beneficial insects to have in the garden and on farms. The lacewing larvae is the predator stage, the adults would rather feed on pollen and nectar. Lacewing adults are green or brown and have clear wings with many veins. The larvae are very active and look like tiny alligator tails with large pinching mouthparts.

A lacewing larvae hatches from the egg ready to search for food. In fact they are such ferocious predators that the mother lacewing must lay her eggs on stalks. If all of the eggs were laid on a leaf together the first larvae to hatch from the egg would eat all the other eggs. Laying the eggs on stalks protects the lacewing larvae from their brothers and sisters!



Lacewing Eggs

Lacewing Adult

Wrap up questions for Lesson 3-2:

Are all ladybeetles females? No

Why are ladybeetles so beneficial? They are predators of harmful insects in gardens and farms.

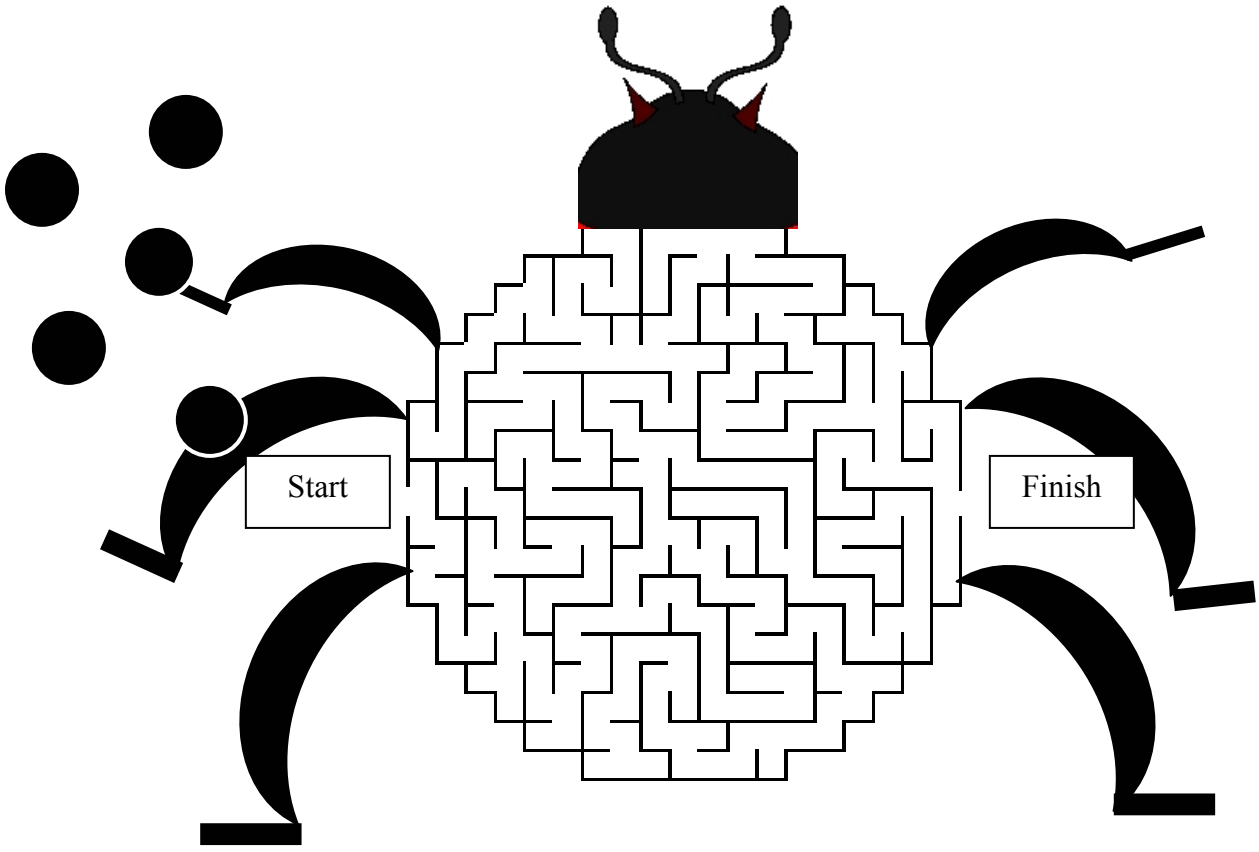
Why does a bird only eat one ladybeetle? Because if a bird eats a ladybeetle it gets sick and it will remember that insects with that bright red and black color are bad to eat.

Why does a lacewing mother lay her eggs on stalks? To protect the eggs from being eaten by the first larvae to emerge.

Where are lacewings found? In flower and vegetable gardens and on farms. Anywhere pests insects are found.

Activity 3-1:

Help the Lady Beetle get her spots back!



Lesson 3-3 – Pollinators

Questions to ask before reading the passage:
What does pollination mean?
Why are pollinators so important?
Can you name any insects that pollinate?

Reading Exercise C
Many insects are responsible for pollinating plants. Have you ever stood next to a flower plant and seen all the different insects visiting the flowers? Some are honey bees, bumble bees, wasps, or butterflies. These insects are important pollinators for plants. Flowers have nectar, which insects eat as food. When an insect visits a flower looking for nectar it will pick up pollen. Then it visits another flower and drops the pollen into that flower. When the pollen of two flowers mixes together a fruit or flower is formed. Plants depend on the wind, other animals, and insects to help them pollinate. Without insects, you would not see wildflowers in the spring or flowers in gardens. Farmers depend on insects to pollinate their crops, and without insects, we would not have fruits and vegetables in the grocery stores.

Bees are very important pollinators. There are many different types of bees: honey bees, bumble bees, carpenter bees, and leafcutting bees. Most bees visit flowers to collect nectar for food. Honey bees take the nectar back to their bee hive to make honey. Bees have very hairy bodies, and when they visit a flower they will pick up pollen on those hairs. When they visit another flower, pollen is transferred from on flower to another and pollination takes place.

Many people think that bees are bad insects because they sting. Bees do sting, but if you ignore a bee, it will ignore you. A single bee visiting a flower or your soda can, will probably not sting you if you leave it alone. Bees only sting to defend themselves, their nest or their queen. Bees that are in their nest and are disturbed are much more dangerous than a singe bee visiting a flower or your soda can. If you disturb a bee nest, the bees will try to protect their home and queen by stinging whatever and whoever is near. If you notice a bee nest, stay away from it, do not annoy them and they won't sting.

Butterflies are also pollinators. Adult butterflies have a special mouthpart called a proboscis that allows them to reach deep in flower to get nectar. A butterfly's mouthparts are like a rolled up straw. When they are ready to drink nectar, they unroll their mouthparts and reach into the flower. When they visit different flower they transfer pollen from one flower to another. When the pollen of two flowers mixes together, a seed or flower is produced.

Wrap up questions for Lesson 3-3:
Why do pollinators do? Move pollen from one plant to another to
Why do most pollinators visit flowers? To feed on nectar.
Why do farmers need pollinators? To help their crops grow.
What is a proboscis? The mouthparts of a butterfly that help it drink nectar.
Are bees good or bad insects? Good, but some people think they are bad because they sting.

Activity 3-2 Key

Match the following words related to pollinating insects to the correct phrases.

A. Pollination
B. Bees
C. Butterflies
D. Nectar
E. Sting
F. Farmers
G. Proboscis

__B__ These insects have hairy bodies that pick up pollen when they visit flowers.

__D__ Bees and butterflies visit flower looking for _____, which is their food.

__A__ This is why bees and butterflies are considered very beneficial insects.

__C__ These colorful insects visit flowers looking for food.

__G__ This is a special type of mouthpart used by butterflies to drink nectar. The butterfly unrolls its _____ and sticks it deep in the flower.

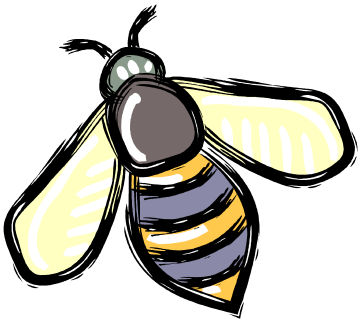
__F__ Bees are very important for ____, to help their crops grow and so we can have fruits and vegetables at the grocery store.

__E__ This is one reason why people might think bees are harmful insects.

Activity 3-2

Match the following words related to pollinating insects to the correct phrases.

H. Pollination
I. Bees
J. Butterflies
K. Nectar
L. Sting
M. Farmers
N. Proboscis



_____ These insects have hairy bodies that pick up pollen when they visit flowers.

_____ Bees and butterflies visit flower looking for _____, which is their food.

_____ This is why bees and butterflies are considered very beneficial insects.

_____ These colorful insects visit flowers looking for food.

_____ This is a special type of mouthpart used by butterflies to drink nectar. The butterfly unrolls its _____ and sticks it deep in the flower.

_____ Bees are very important for ____, to help their crops grow and so we can have fruits and vegetables at the grocery store.

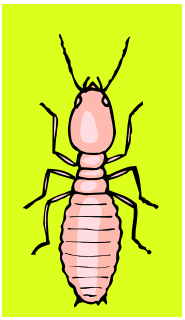
_____ This is one reason why people might think bees are harmful insects.

Lesson 3-4 – Recyclers and Decomposers

Questions to ask before reading the passage:
What does recycle mean?
What does decompose mean?
Can you think of any insects that eat trash?

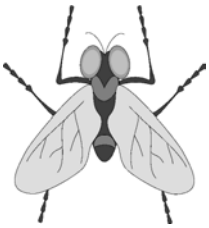
Reading Exercise D:
Some insects are beneficial because they help recycle waste. Most people do not think these are beneficial insects because they are usually found in trash and decaying matter, but they are very important to the world. These insects help things decompose and keep the trash from piling up. Decompose means to break down into smaller pieces. Other words for decompose are to decay or rot.

Termites are insects that eat wood and other wood products such as dead trees and roots. Termites are beneficial if they do not enter the home and eat the wood in our homes and buildings. In almost everyone's backyard, every garden, every park, and every forest termites can be found. They live naturally in the soil and eat the roots and wood of dead trees and plants. Termites help decompose the wood quickly and get rid of dead plants.

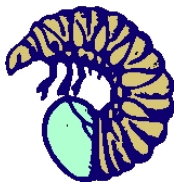


Without termites, fallen trees would stay on the ground forever, roots would fill up the earth, new plants would not have room to grow, and dead plants would take years longer to decompose!

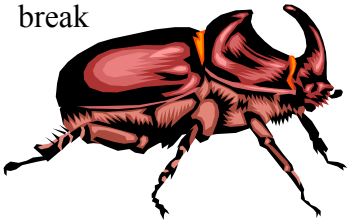
Flies can be found in trash, on dung, and near dead animals. Flies have excellent noses and that is why they are the first thing to a trash pile, rotten food, or a dead body. Flies like to eat stinky, decaying things. This is good because they help recycle those things and remove them from the area. Some adult flies use their saliva to dissolve the food so their sponging mouthparts can slurp up the food. They also lay their eggs in decomposing matter. The larvae that hatch are called maggots. The maggots feed on the dead body, trash, or rotten meat.



Beetles are also recyclers. Giant rhinoceros beetle grubs are often found in compost bins. Compost bins are used by gardeners to make mulch, which has lots of nutrients to help plants grow. Compost bins are made up of scraps from the kitchen, grass clippings and dead plants. Piled together, the material in the compost bin starts to break down and heats up. Rhino grubs like to eat the scraps and nutritious compost. They help the compost break down quicker and keep air flowing so that farmers and gardeners can use it sooner!



Rhinoceros Beetle Grub



Rhinoceros beetle

Other beetles, such as dung beetles, feed on dung. A dung beetle female rolls up a small ball of dung and lays her eggs in it. The eggs hatch and the larvae feed on the dung until they are ready to pupate. The adults also feed on dung. These insects are important because they help recycle manure.

There are also other types of beetles that feed on decaying plant and animal material. Some beetles eat decaying wood. These beetles keep the forest floor clean. Other beetles feed on decaying animals, and come to bodies after flies have already arrived. They help the body decompose further by feeding on the cartilage in the bones and the hair, leaving only bones. Some beetles are used by hunters to clean the off bones of the animals they hunt.

Wrap up questions for Lesson 3-4

Why are recyclers beneficial? Because they help break down trash and rotting materials to keep the world clean.

What would happen if we got rid of all the recycling insects? Trash and rotting things would pile up all around us.

Name some important recyclers or decomposers. Flies, termites, beetles

Are termites good or bad? Both. They are bad because they feed on the wood in buildings and homes, but they are good because they eat fallen trees and branches and get rid of rotting wood in the ground.

For the Teacher: Beneficial Insect Providers

Science Kit and Boreal Laboratories:
http://www.sciencekit.com/category.asp?c=427453&sid=google&cm_mmc=google-_-cpc-_-skit-_-liveinsects

Insect Lore: http://insectlore.stores.yahoo.net/

Carlolina Biological Supply Company: https://www2.carolina.com

Ward's Natural Science: http://wardsci.com

Activity 3-3 Key

Match the following words related to recycling insects to the correct phrases.

A. Termites
B. Grubs
C. Fly
D. Decompose
E. Maggot
F. Dung Beetle
G. Beetle

__B__ These are the larval form of rhinoceros beetles. Gardeners like them because they break down their compost faster to help their garden grow.

__E__ This is larval form of a fly. They help breakdown trash, dung, and dead animals to keep the world from stinking.

__D__ This word means to break down into smaller pieces, or to decay or rot.

__F__ This type of insect rolls dung, lays its eggs in the dung, when the eggs hatch the larva feeds on the dung.

__C__ These flying insects have excellent noses and are always the first ones to a trash pile, rotten food, or dead body. They are beneficial because they help reduce the trash in the world.

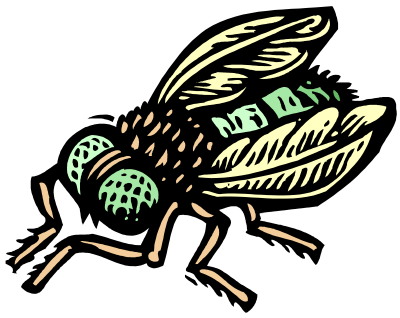
__A__ These insects love to eat wood and help make room for new plants to grow.

__G__ These insects can be used by hunters to clean the bones of the animals they hunt and want to save.

Activity 3-3

Match the following words related to recycling insects to the correct phrases.

H. Termites
I. Grubs
J. Fly
K. Decompose
L. Maggot
M. Dung Beetle
N. Beetle



____ These are the larval form of rhinoceros beetles. Gardeners like them because they break down their compost faster to help their garden grow.

____ This is larval form of a fly. They help breakdown trash, dung, and dead animals to keep the world from stinking.

____ This word means to break down into smaller pieces, or to decay or rot.

____ This type of insect rolls dung, lays its eggs in the dung, when the eggs hatch the larva feeds on the dung.

____ These flying insects have excellent noses and are always the first ones to a trash pile, rotten food, or dead body. They are beneficial because they help reduce the trash in the world.

____ These insects love to eat wood and help make room for new plants to grow.

____ These types of insects can be used by hunters to clean the bones of the animals they hunt and want to save.

Activity 3-4: Beneficial Insects Matching Game Activity

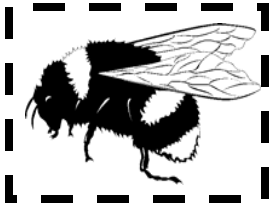
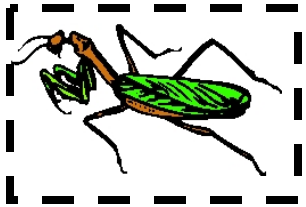
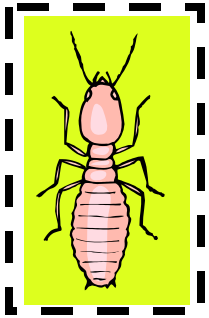
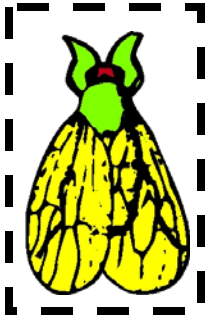
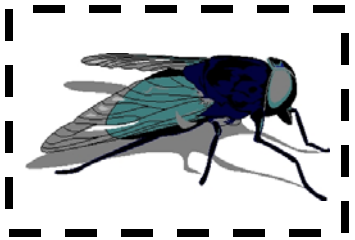
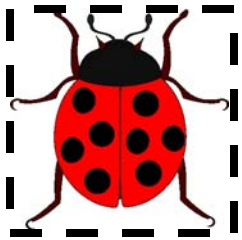
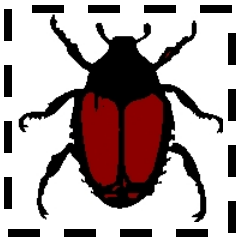
Cut out the pictures and words in the word bank. Match the following beneficial insects to their correct category.

Recyclers/ Decomposers

Pollinators

Predators

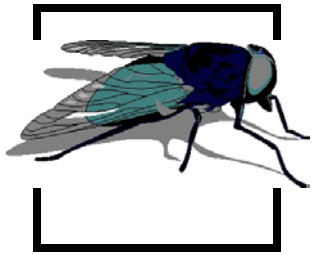
Butterfly	Lacewing	Bee	Preying Mantis	Lady Beetle
Fly	Beetle	Termite		

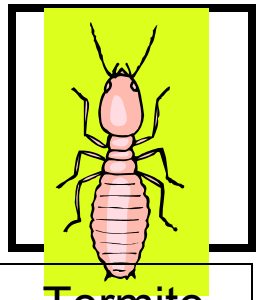

Activity 3-4 Key: Beneficial Insects Matching Game Activity

Cut out the pictures and words in the word bank. Match the following beneficial insects to their correct category.

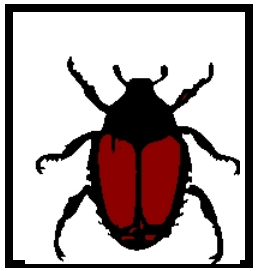
Recyclers/ Decomposers



Fly



Termite



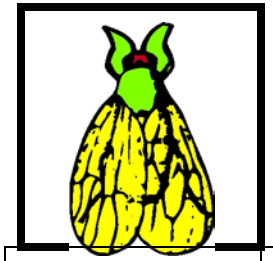
Beetle

Pollinators

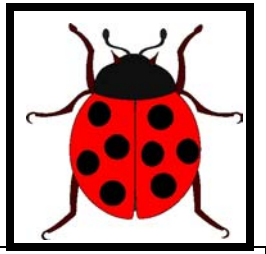
Bee

Butterfly

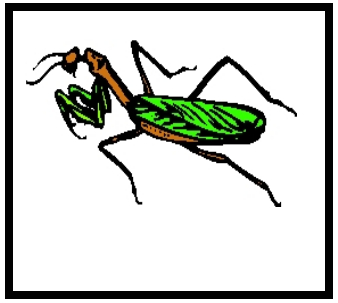
Predators



Lacewing



Lady Beetle



Preying Mantis

AgriLIFE EXTENSION
Texas A&M System

Pre/Post Test Evaluation: Lesson 3

1. All insects are harmful or bad.
    a. True
    b. False

2. What is a neutral insect?
    a. An insect that isn't good or bad
    b. An insect that is good
    c. An insect that is bad

3. Which of the following are ways insect can be beneficial or good? They can be _____:
    a. Predators
    b. Pollinators
    c. Recyclers
    d. All of the above

4. Why are bees and butterflies important insects?
    a. They are pollinators
    b. They are recyclers
    c. They are predators
    d. They are not important

5. Why are preying mantises and lady beetles important insects?
    a. They are pollinators
    b. They are recyclers
    c. They are predators
    d. They are not important

6. Why are termites, flies, and grubs important insects?
    a. They are pollinators
    b. They are recyclers
    c. They are predators
    d. They are not important

AgriLIFE EXTENSION
Texas A&M System

Pre/Post-Test Evaluation: Lesson 3 Key

1. All insects are harmful or bad. B
    a. True
    b. False

2. What is a neutral insect? A
    a. An insect that is neither good or bad
    b. An insect that is good
    c. An insect that is bad

3. Which of the following are ways insect can be beneficial or good? They can be _____: D
    a. Predators
    b. Pollinators
    c. Recyclers
    d. All of the above

4. Why are bees and butterflies important insects? A
    a. They are pollinators
    b. They are recyclers
    c. They are predators
    d. They are not important

5. Why are preying mantises and lady beetles important insects? C
    a. They are pollinators
    b. They are recyclers
    c. They are predators
    d. They are not important

6. Why are termites, flies, and grubs important insects? B
    a. They are pollinators
    b. They are recyclers
    c. They are predators
    d. They are not important

Lesson 4 – Harmful Insects

Overview:
Students will read the following passage in the classroom and then answer relevant questions pertaining to the passage. The students will get an overview of harmful insects.

Instructions:
Read passages in groups or as a class.

Objective:
Students will be able to identify harmful insects. Students will learn why certain insects are harmful and the categories into which various harmful insects fall.

TEKS:
Science: 2.2a, 2.2b, 2.2c, 2.2d, 2.2e, 2.2f, 2.9a, 2.9c, 2.9c, 2.10a, 2.10b, 2.10c
Science: 3.2a, 3.2c, 3.2f, 3.9a, 3.9b, 3.9c, 3.10a, 3.10b, 3.10c
Science: 4.2a, 4.2b, 4.2c, 4.2f, 4.9a, 4.9b, 4.10a, 4.10b, 4.10c
Science: 5.2b, 5.2f, 5.2g, 5.9a, 5.9b, 5.9c, 5.10a, 5.10b, 5.10c

Materials:
Handouts of reading exercises A, B, C, and D
Overhead copy of reading exercise A, B, C, and D
Wrap up questions for Lesson 3-2, 3-3, and 3-4
Activity

Lesson 4-1 – Harmful Insects

Questions to ask before reading the passage:
Name some ways insects can be harmful or bad.
Name some harmful or bad insects.
How or why are those insects bad?

Reading Exercise A
There are millions of insects on the earth right now, but only 5% of them are harmful. Insects that are harmful can cost us lots of money to fix their damage and can be medically important to humans and other animals. Some insects are harmful because they transmit diseases, sting, or cause allergic reactions: these are medically important insects. Some insects are harmful because they damage crops or gardens. Other insects are harmful because they can damage buildings, such as homes and schools. Insects that are found in buildings are usually considered bad even if they aren't doing any damage because people do not like to share the indoors with insects.

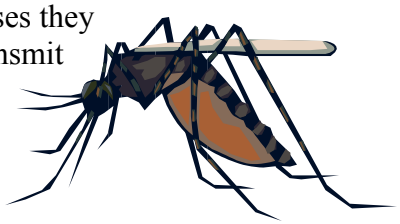
Scientists that study insects are called entomologists. Although there are only a small amount of insects that are harmful, many entomologists study harmful insects. They try to understand how and why the insects cause damage. They also study the harmful insects to learn how to get rid of them.

Wrap up questions for Lesson 4-1:
How many insects are harmful? 5%
How can insects be harmful? They can be medically harmful, harmful to gardens and plants, and they can damage homes and buildings.
What is an entomologist? A scientist who studies insects.

Lesson 4-2 – Medically Important Insects

Questions to ask before reading the passage:
What animal do you think kills more people than any other animal?
Can you name some insects that sting?
Can you name some insects that transmit diseases?

Reading Exercise B:
Insects that transmit diseases, sting, or cause allergic reactions are medically important insects. Although the insects do not actually kill humans or animals, they can carry diseases that can kill. Entomologists who study these types of insects are called medical entomologists.



Mosquitoes are the deadliest animals in the world because of all the diseases they transmit. Only female mosquitoes suck blood, so only the females can transmit diseases. Mosquitoes pick up diseases from humans or animals when they feed on blood and transfer the disease to a new human or animal the next time they suck blood. Mosquitoes transmit diseases such as Malaria, Yellow Fever, and West Nile Virus. West Nile Virus can be found in Texas! Everyday, many people all over the world become sick or die of diseases that mosquitoes transmit. Mosquitoes also transmit diseases to animals such as West Nile Virus, Encephalitis, and Dog Heartworm.

Red Imported Fire Ants are another medically important pest. Fire ants sting anything that stands in their way, including us! When a fire ant stings your skin, it always leaves little pustule or blister. Many people are allergic to fire ants. If they are stung they can swell up around the bite, get a rash, or feel their throat tighten up until it is hard to breath. People who are very allergic to fire ants may even die if they do not get to a doctor in time! Some other insects that sting are **bees** and **wasps**. Many people are allergic to these insects also. Bees and wasps only sting if they feel like their queen, nest, or nest-mates are threatened. If you see a bee hive or a wasp nest, leave it alone! If you do not bother them, they will not bother you. Same thing goes for bees and wasps visiting flowers or flying around.

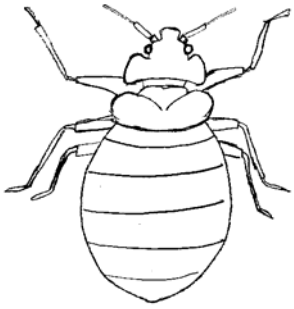
Bee 

Wasp 

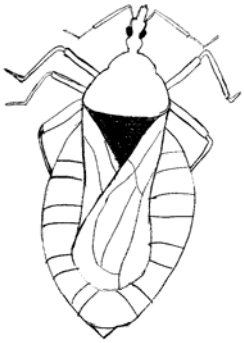
For the teacher: Demonstration Activity

Approximately 5%-10% of the population is allergic to a stinging insect. Ask the class to raise their hand if anyone is allergic to an insect such as wasps, fire ants, or bees. In a class of 20-30 children at least one child should raise their hand.

There are many types of true bugs that are medically important too. True bugs are insects related to stink bugs. Have you ever heard the nursery rhyme, "Good night, sleep tight, and don't let the bed bugs bite?" **Bed bugs** are real insects and they are true bugs. Bed bugs do not transmit diseases, but their bites can cause horrible itching and they are very hard to get rid of. **Kissing bugs** are also medically important true bugs. Bed bugs and kissing bugs have mouthparts made to pierce skin and suck blood. Kissing bugs can transmit Chagas Disease. If you go camping on the beach you might come home with a swollen eye. This is one of the side effects of Chagas Disease. Chagas Disease is a common disease for children in Mexico to get. Kissing bugs are called kissing bugs because one of the areas they feed is around the mouth.



Bed Bug



Assassin Bug

Wrap up questions for Lesson 4-2:

What is a medical entomologist? A scientist that studies medically important insects.
What is the deadliest animal in the world? Mosquitoes
Name some stinging insects. Wasps, bees, red imported fire ants.
Name some blood sucking insects. Mosquitoes, kissing bugs, and bed bugs.
How do kissing bugs and bed bugs suck blood? With mouthparts that pierce into the skin.

Activity 4-1 Key

Match the following words related to medially important insects to the correct phrases.

A. Kissing Bug
B. Chagas Disease
C. Mosquito
D. Red Imported Fire Ant
E. Wasp
F. Bee
G. Allergic
H. Bed Bug
I. Female
J. Diseases
K. Medically

__K__ Insects that sting, cause allergies or transmit diseases are _____ important.

__F__ This type of insect is beneficial because it pollinates, but it is harmful because it stings.

__C__ This is the deadliest animal in the world because of all the diseases it can transmit.

__H__ This type of insect sucks blood from humans while they are in bed sleeping. The bite can be very itchy.

__B__This is the type of disease a kissing bug can transmit.

__D__ The sting from this ant always leaves at least a pustule or blister on your skin.

__J__ Some insects are harmful because they transmit _____, which make people sick all over the world, everyday.

__A__This type of insect gets its name from biting humans around the mouth.

__E__ This is flying insect stings, and many people are allergic to the sting.

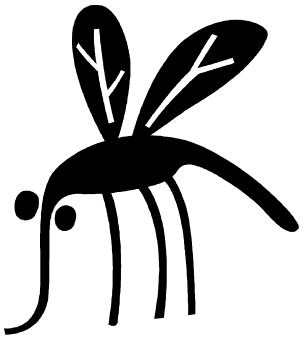
__I__ This is the only type of mosquito that can transmit diseases, because this is the only type that sucks blood.

__G__ Many people are ____ to the sting of wasps, bees, and fire ants.

Activity 4-1

Match the following words related to medically important insects to the correct phrases.

L. Kissing Bug
M. Chagas Disease
N. Mosquito
O. Red Imported Fire Ant
P. Wasp
Q. Bee
R. Allergic
S. Bed Bug
T. Female
U. Diseases
V. Medically



____ Insects that sting, cause allergies or transmit diseases are _____ important.

____ This type of insect is beneficial because it pollinates, but it is harmful because it stings.

____ This is the deadliest animal in the world because of all the diseases it can transmit.

____ This type of insect sucks blood from humans while they are in bed sleeping. The bite can be very itchy.

____This is the type of disease a kissing bug can transmit.

____ The sting from this ant always leaves at least a pustule or blister on your skin.

____ Some insects are harmful because they transmit _____, which make people sick all over the world, everyday.

____This type of insect gets its name from biting humans around the mouth.

____ This is flying insect stings, and many people are allergic to the sting.

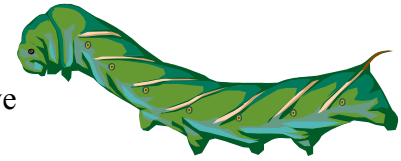
____ This is the only type of mosquito that can transmit diseases, because this is the only type that sucks blood.

____ Many people are ____ to the sting of wasps, bees, and fire ants.

Lesson 4-3 – Garden and Landscape Pests

Questions to ask before reading the passage:
What types of insects have you found on flowers and plants?
Why do you think insects are important to farmers or gardeners?

Reading Passage C:
There are many insects that are found in the garden on plants. Some of them are hunting for other insects to eat, but some are eating the plants. These insects are harmful because they can ruin plants and crops. **Caterpillars** are the larval stage of butterflies. Butterflies are beneficial because they pollinate plants, but caterpillars can be harmful because they feed on plants. Some caterpillars can eat an entire plant overnight! Caterpillars have chewing mouthparts. Instead of chewing up and down like humans do, caterpillars chew side to side. When caterpillars are very young they eat the most food. When they get bigger, they eat less and less. If there are holes in a leaf of a plant, a caterpillar probably did the damage!



Tomato hornworms are common caterpillars in the garden and landscape. They love tomatoes, but will also eat potatoes, eggplant, green peppers and weeds. They are called hornworms because they have a horn on their back! Tomato hornworms are huge caterpillars and will become sphinx moths.

Cabbage loopers are another common caterpillar. Cabbage loppers like to eat cabbage, but you can find them on any type of plant in the garden. Cabbage loopers are called loopers because of the way they move. They stretch their bodies out and then pull their hind end to their front end, making a loop. Then they stretch their front end out to move forward.

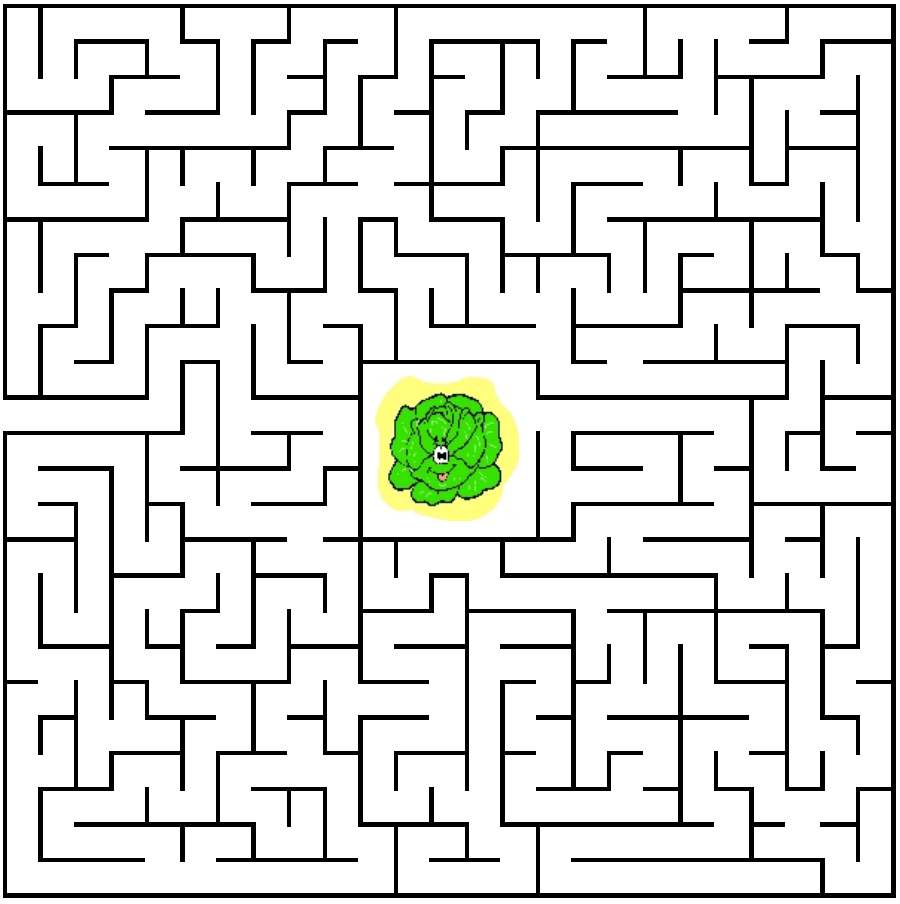
Aphids are a huge pest on roses, other flowers, vegetable gardens, shrubs and trees. If you find aphids in your garden, you probably have lady beetles too! Lady beetles love to eat aphids and can keep the aphids from ruining plants. Aphids are sap suckers. Their mouthparts are like a short tube or straw. They pierce their mouth into the plant and suck up all the juices. Plants have a lot of sugar in them, and aphids emit honeydew to get rid of the extra sugar their body does not need. The honeydew is emitted through two tubes on their abdomen. Too much honeydew attracts ants or can make mold grow on your plants. Aphids can cause plant leaves to turn yellow and wilt. Too many aphids will kill a plant. Aphids are usually found on the underside of leaves and flowers. This is where they are most protected from the weather, sun, and predators.

Wrap up questions for Lesson 4-2:

Name some caterpillars that are harmful in the garden. Cabbage looper and tomato hornworm.
How do caterpillars chew? Side to side
How do aphids eat? With sucking mouthparts that pierce into the plant and suck all the juices.
What type of predator insect loves to eat aphids? Lady beetles

Activity 4-2

Help the Cabbage Looper find the cabbage!

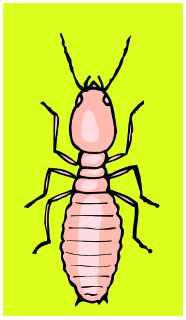


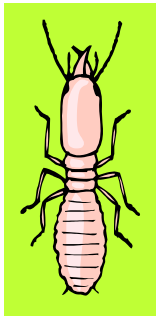
Lesson 4-4 – Structural Pests

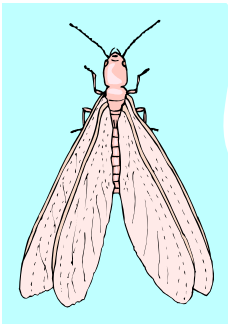
Questions to ask before reading the passage:
What types of insects can you find living indoors?
What is a structure?
Do you usually think insects found in the home are good or bad?

Reading exercise D:
Termites are insects that eat wood. They cause billions of dollars of damage every year. They can invade any type of building, and feed on the wood on the outside and inside of the building. Termites live in colonies and each type of termite has a different job. The main types of termites are workers, soldiers, reproductives, and queens.

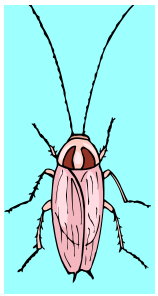
The queen termite lays all the eggs and controls what goes on in the colony. She usually lives deep underground and is rarely seen. The worker's job is to eat wood and feed the rest of the colony. The soldier's job is to protect the colony from enemies and invaders. They have very strong mouthparts and many muscles in their head, but they cannot feed themselves. Workers feed the soldiers, queens, and reproductives. Their job is to eat all day all the time! The workers are the ones that cause the damage to the wood. Reproductives have wings and will use their wings to fly out of the colony to mate and start a new nest.


Termite worker


Termite Soldier


Termite Reproductive

Carpenter Ants are a type of ant that likes to live in rotting or moist wood. Carpenter ants don't eat wood like termites, but they chew up the wood to make a home. The tunnels they make in the wood are called galleries. The chewed up wood looks just like sawdust and the carpenter ants will push it out of the galleries to keep their home clean. Carpenter ants usually live in trees, stumps, or large branches, but sometimes they will move into houses and buildings. If there is leak on the roof or in a wall, you will usually find carpenter ants there. Carpenter ants love wet wood because it is easier to chew up. Carpenter ants are large ants that are either black and red or all black. They might bite if they are scared, but they do not have a stinger.



Cockroaches are ancient insects that have been around for millions of years. Cockroaches can be found inside buildings and homes. Sometimes, people can be allergic to cockroaches if there are many of them in the home. People believe that homes and buildings that have cockroaches are unclean, but cockroaches can enter a building for many reasons. Sometime they enter for food, sometimes for water, and some cockroaches just prefer to be indoors instead of outside. Small crumbs that fall on the floor and aren't swept up right away can be a feast for a small cockroach. To get rid of cockroaches you have to clean up the food and water and also close up holes that let them into the house.

Wrap up questions for Lesson 4-4

Name some structural pests. Termites, carpenter ants, and cockroaches.
Why are termites harmful? Because they eat the wood that keeps our buildings standing.
Do Carpenter Ants eat wood? No, they just live in wood.
Can people be allergic to cockroaches? Yes

Activity 4-3 Key

Match the following words related to structural pest insects to the correct phrases.

A. Termites
B. Wood
C. Carpenter Ant
D. Cockroach
E. Queen
F. Soldier
G. Worker

__B__ This is the favorite food of termites. Carpenter ants also like to live in this.

__D__ This type of insect can be found living indoors. They like to eat the food we leave laying around.

__C__ This type of ant lives inside damp or rotting wood.

__A__ These insects eat wood and can damage homes and other buildings.

__E__ This type of termite controls the colony and lays all the eggs. She usually lives deep in the ground and is rarely seen.

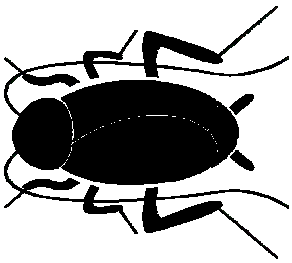
__G__ This type of termite's job is to eat the wood and feed the others.

__F__ This type of termite's job is the protect the colony and all the other termites inside the colony.

Activity 4-3

Match the following words related to structural pest insects to the correct phrases.

H. Termites
I. Wood
J. Carpenter Ant
K. Cockroach
L. Queen
M. Soldier
N. Worker



____ This is the favorite food of termites. Carpenter ants also like to live in this.

____ This type of insect can be found living indoors. They like to eat the food we leave laying around.

____ This type of ant lives inside damp or rotting wood.

____ These insects eat wood and can damage homes and other buildings.

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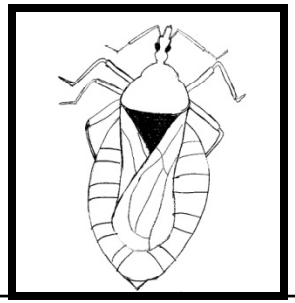
____ This type of termite's job is the protect the colony and all the other termites inside the colony.

Activity 4-4 Harmful Insects Matching Game Activity

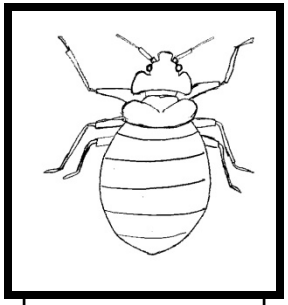
Cut out the pictures and words in the word bank. Match the following beneficial insects to their correct category.

Medically Important



Kissing Bug

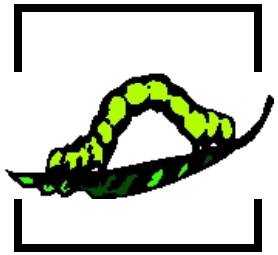
Wasp



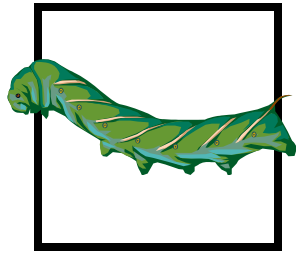
Bed Bug

Garden and Landscape

Aphid

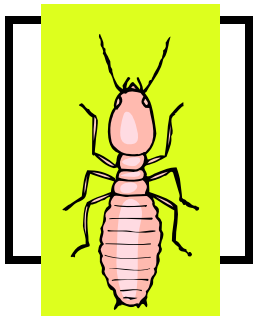


Cabbage Looper

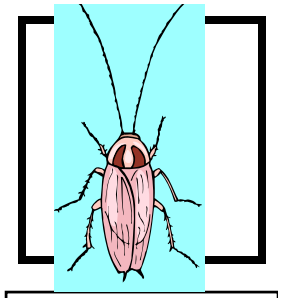


Tomato Hornworm

Structural



Termite



Cockroach

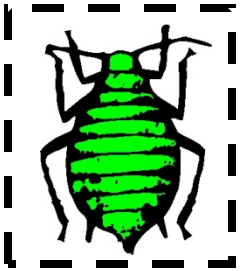
Carpenter Ant

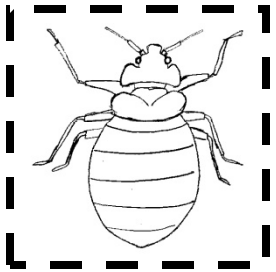
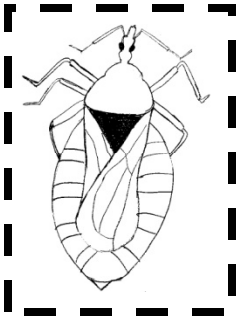
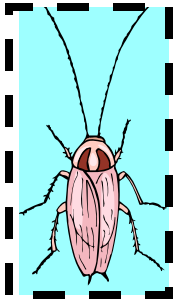
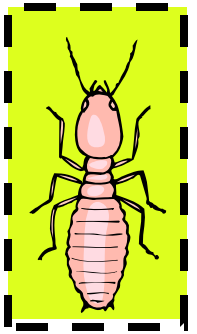
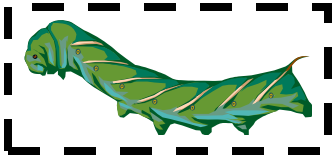
Activity 4-4 Harmful Insects Matching Game Activity

Cut out the pictures and words in the word bank. Match the following beneficial insects to their correct category.

Medically Important **Garden and Landscape** **Structural**

Tomato Hornworm	Kissing Bug	Cockroach	Carpenter Ant	Wasp	Aphid
Bed Bug	Cabbage Looper	Termite			




AgriLIFE EXTENSION
Texas A&M System

Pre/Post Test Evaluation: Lesson 4

1. All insects are harmful or bad.
    a. True
    b. False

2. Which of the following are ways insect can be harmful or bad? They can _____:
    a. Sting
    b. Carry diseases
    c. Eat gardens and farm crops
    d. All of the above

3. Why are bees, wasp, and fire ants harmful insects?
    a. They sting
    b. They carry diseases
    c. They eat gardens and farm crops

4. Why are mosquitoes harmful insects?
    a. They sting
    b. They carry diseases
    c. They eat gardens and farm crops

5. Why are caterpillars harmful insects?
    a. They sting
    b. They carry diseases
    c. They eat gardens and farm crops

6. Is a bed bug a real insect?
    a. Yes
    b. No

AgriLIFE EXTENSION
Texas A&M System

Pre/Post-Test KEY: Lesson 4

1. All insects are harmful or bad. B
    a. True
    b. False

2. Which of the following are ways insect can be harmful or bad? They can _____: D
    a. Sting
    b. Carry diseases
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    d. All of the above

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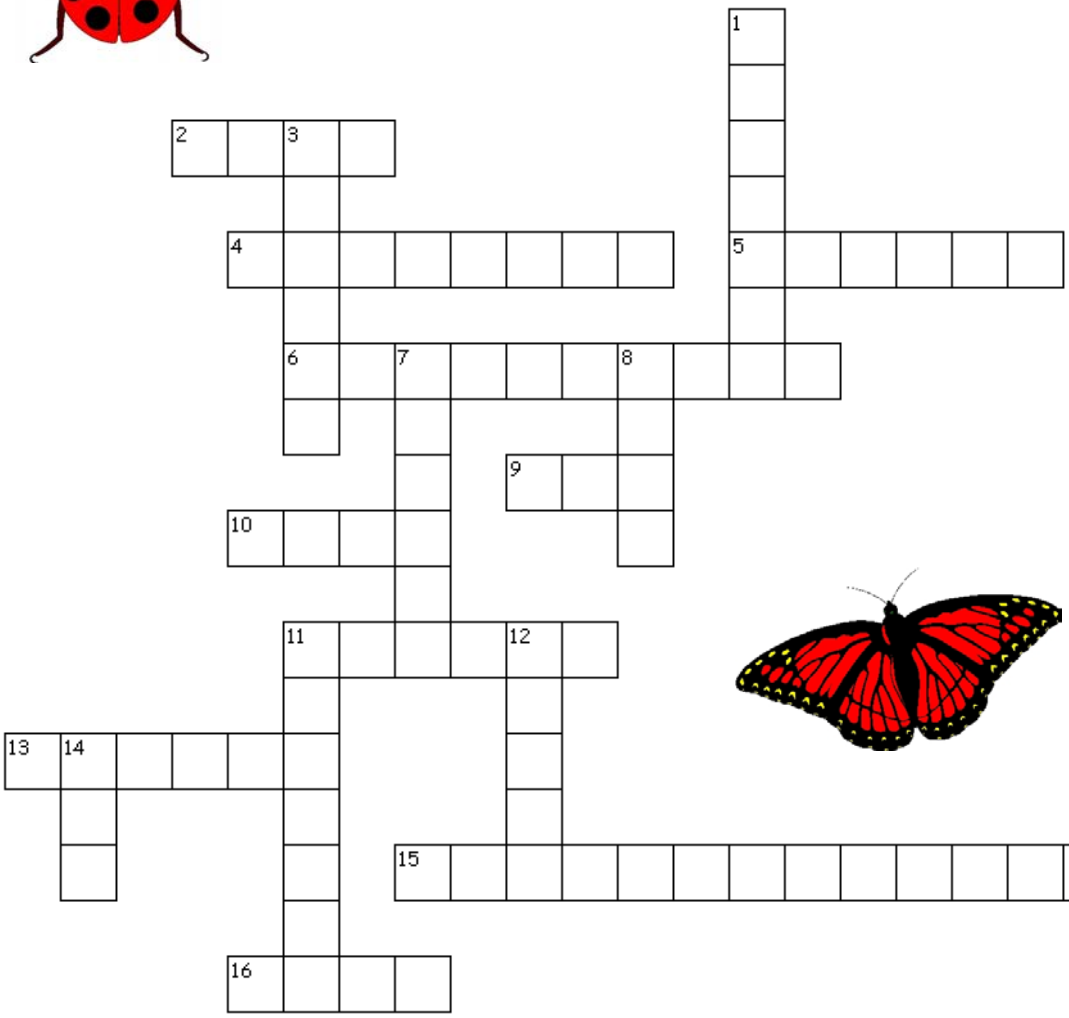
    a. They sting
    b. They carry diseases
    c. They eat gardens and farm crops

5. Why are caterpillars harmful insects? C
    a. They sting
    b. They carry diseases
    c. They eat gardens and farm crops

6. Is a bed bug a real insect? B
    a. Yes
    b. No

Wrap up Activity Key: Good Bugs and Bad Bugs Crossword



Word Bank

Adult
Bad
Egg
Entomology
Head
Insect
Lady
Looper
Metamorphosis
Molt
Mosquito
Praying
Pupa
Termite
Thorax
Tomato

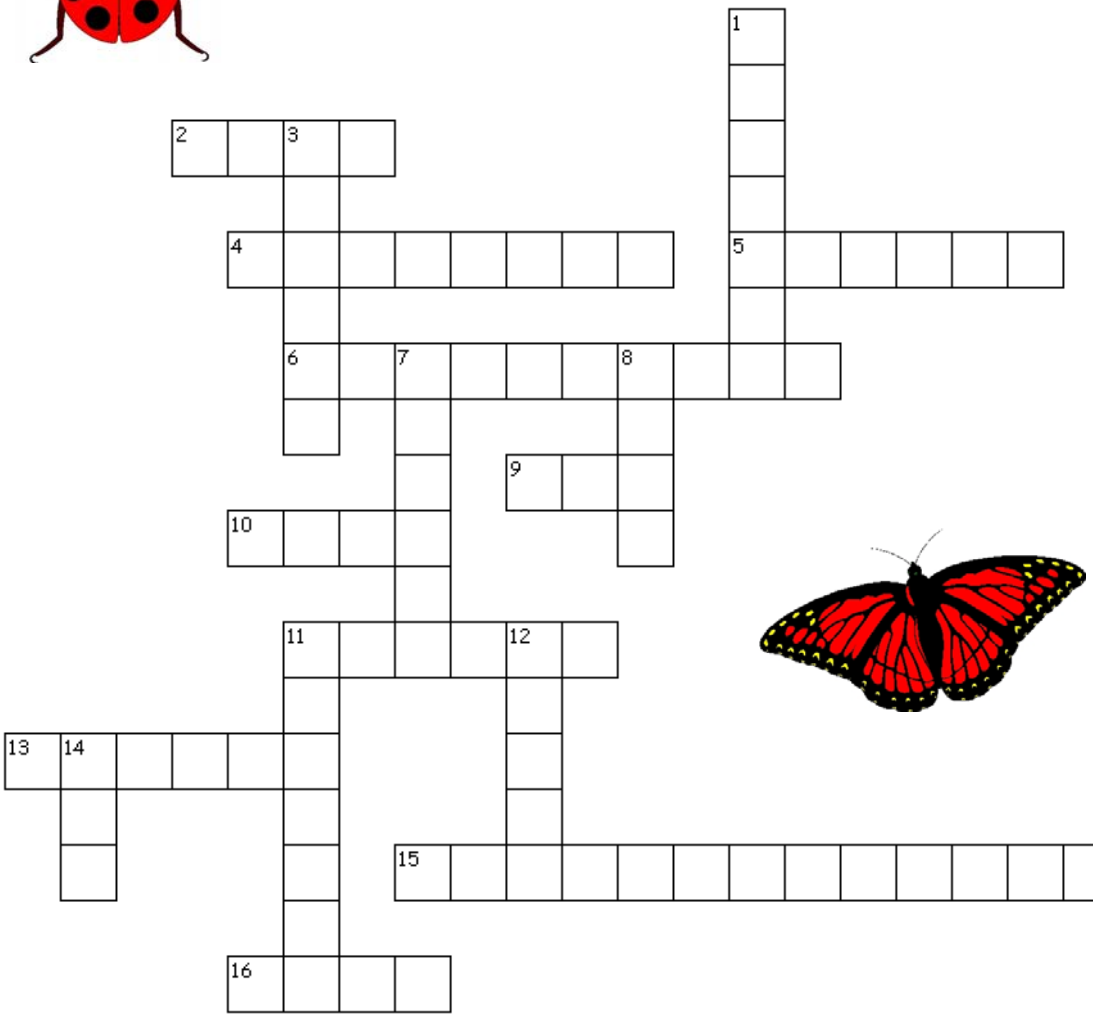
Across

2. What insects do when they shed their skin
4. The deadliest animal in the world
5. An animal with 6 legs, 4 wings, and 2 antennae
6. The study of insects
9. Only 5% of all insects are _____
10. The cocoon stage for butterflies and moths
11. The middle body part of an insect that has the legs and wings
13. What bees and butterflies visit flowers to eat -
15. A change in form
16. The body part of an insect that has the eyes, antennae and mouthparts

Down

1. A _____Mantis is a sit and wait predator
3. A Cabbage ____ is a harmful insect that eat vegetables in gardens
7. A _____ Hornworm is a harmful insect in the garden that has a horn on one side its body
8. ____ Beetles are predators that love to eat aphids
11. A harmful insect that eats woods
12. The only life stage of insects that have wings
14. The very first life stage of an insect

Wrap up Activity Key: Good Bugs and Bad Bugs



Word Bank

Adult
Bad
Egg
Entomology
Head
Insect
Lady
Looper
Metamorphosis
Molt
Mosquito
Praying
Pupa
Termites
Thorax
Tomato

Crossword

Across

2. What insects do when they shed their skin - MOLT
4. The deadliest animal in the world - MOSQUITO
5. An animal with 6 legs, 4 wings, and 2 antennae
6. The study of insects - ENTOMOLOGY
9. Only 5% of all insects are _____ - BAD
10. The cocoon stage for butterflies and moths - PUPA
11. The middle body part of an insect that has the legs and wings - THORAX
13. What bees and butterflies visit flowers to eat - NECTAR
15. A change in form- METAMORPHOSIS
16. The body part of an insect that has the eyes, antennae and mouthparts - HEAD
14. The very first life stage of an insect - EGG

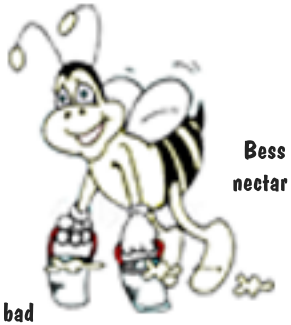
Down

1. A _____Mantis is a sit and wait predator – PRAYING
3. A Cabbage ____ is a harmful insect that eat vegetables in gardens - LOOPER
7. A _____ Hornworm is a harmful insect in the garden that has a horn on one side its body - TOMATO
8. ____ Beetles are predators that love to eat aphids - LADY
11. A harmful insect that eats woods - TERMITE
12. The only life stage of insects that have wings - ADULT

Bugs: Good & Bad

"Aphids are tiny insects that live on roses.

Cockroaches can be found indoors.



Bess make honey out of the nectar they take from flowers.

A lady beetles favorite food is aphids.

Termites in the home are bad because they eat the wood.

Carpenter ants live in wood.

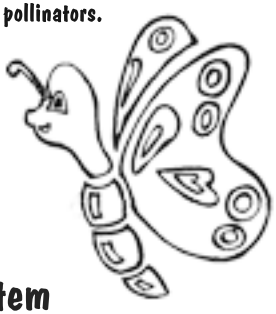
Termites help recycle dead or rotting trees & wood.

Caterpillars can ruin gardens and crops.

Gardeners & Farmers depend on bees and butterflies to pollinate their plants.

A preying mantis is a sit and wait predator.

Bees and butterflies are important pollinators.



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Pre/Post Test Evaluation: Good & Bad Bugs

1. All insects are harmful or bad.
    a. True
    b. False

2. What are the body regions of an insect?
    a. Head and Body
    b. Head, Body, Tail
    c. Head, Thorax, Abdomen
    d. Head and Abdomen

3. What are the life stages of an insect with complete metamorphosis, like a butterfly?
    a. Egg, larva, pupa, adult
    b. Egg, immature, adult
    c. Baby, child, adult
    d. Teenager, adult

4. Which of the following are ways insect can be beneficial or good? They can be _____:
    a. Predators
    b. Pollinators
    c. Recyclers
    d. All of the above

5. Which of the following are ways insect can be harmful or bad? They can _____:
    a. Sting
    b. Carry diseases
    c. Eat gardens and farm crops
    d. All of the above

AgriLIFE EXTENSION
Texas A&M System

Pre/Post-Test Evaluation: Good & Bad Bugs KEY

1. All insects are harmful or bad. B
    a. True
    b. False

2. What are the body regions of an insect? C
    a. Head and Body
    b. Head, Body, Tail
    c. Head, Thorax, Abdomen
    d. Head and Abdomen

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    a. Egg, larva, pupa, adult
    b. Egg, immature, adult
    c. Baby, child, adult
    d. Teenager, adult

4. Which of the following are ways insect can be beneficial or good? They can be _____: D
    a. Predators
    b. Pollinators
    c. Recyclers
    d. All of the above

5. Which of the following are ways insect can be harmful or bad? They can _____: D
    a. Sting
    b. Carry diseases
    c. Eat gardens and farm crops
    d. All of the above

Glossary

Abdomen (Lesson 1) – The last of three body sections on an insect.

Complete Metamorphosis (Lesson 2) – The type of lifecycle an insect goes through with four life stages: egg, larva, pupa, and adult.

Decompose (Lesson 3) – To break down into smaller pieces. Decay or rot.

Entomology (Lesson 1) – The study of insects.

Entomologist (Lesson 1 & 4) – A scientist who studies insects.

Exoskeleton (Lesson 1) – The skeleton or supporting structure on the outside of an insect

Incomplete Metamorphosis (Lesson 2) – The types of lifecycle an insect goes through with three life stagers: egg, immature, and adult.

Larva (Lesson 2) – The second life stage (between egg and pupa) of an insect with complete metamorphosis. Also called caterpillar, maggot, or grub for butterflies and moths, flies, and beetles, respectively.

Metamorphosis (Lesson 2) – A change in form.

Molt (Lesson 2) – Shedding the exoskeleton.

Nectar (Lesson 3) - a sweet liquid given off by plants and especially by the flowers and used by bees in making honey

Pollinate (Lesson 3) – To place pollen from one flower or plant to another flower or plant.

Predator (Lesson 3) – An animal that consumes prey.

Proboscis (Lesson 3) – A long tube like mouthpart on butterflies.

Pupa (Lesson 2) – The third life stage (between larva and adult) of an insect that has complete metamorphosis. Also called a cocoon or chrysalis in butterflies and moths.

Recycle (Lesson 3) – To reuse something for another purpose.

Thorax (Lesson 1) – The middle or second body region of an insect's three body region. Contains the legs and wings.

Transmit (Lesson 4) – to transfer from one person to another. To pass on. To cause or allow spread.

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