

# Good Bugs

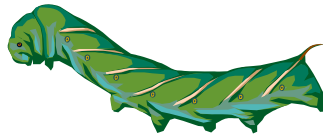


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# Bad Bugs

Student Booklet

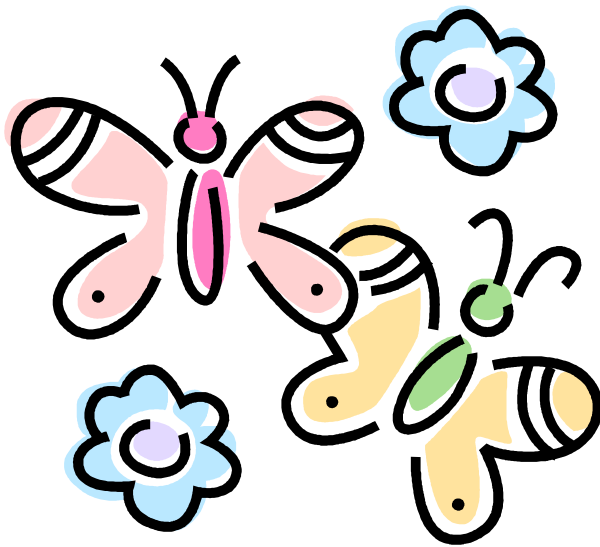


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## Preface

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. You encounter insects or products of insects’ everyday. The objective of this booklet is to help children learn about the benefits of insects and gain an appreciation for what insects do for the world in which we live. However, there are some harmful insects, and this booklet will help students know which insects are good and which ones are bad.



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## Lesson 1 - Entomology

### Reading Exercise

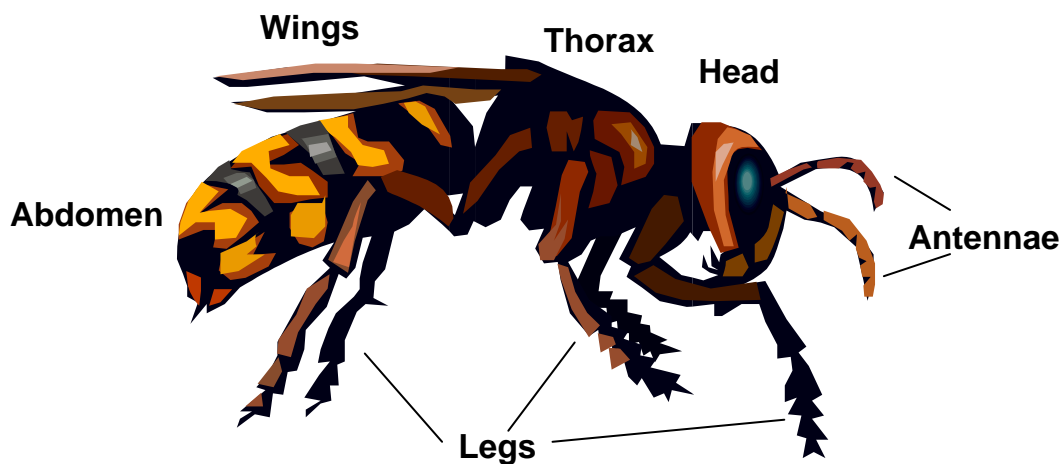
Entomology is the study of insects. An entomologist is a scientist who studies insects. Insects are arthropods. They are related to other arthropods such as spiders, scorpions, shrimp, millipedes and centipedes. Insects are different from other arthropods because they have three body regions, six legs,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

### Glossary Words

Abdomen  
Entomology  
Entomologist  
Exoskeleton  
Thorax

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.

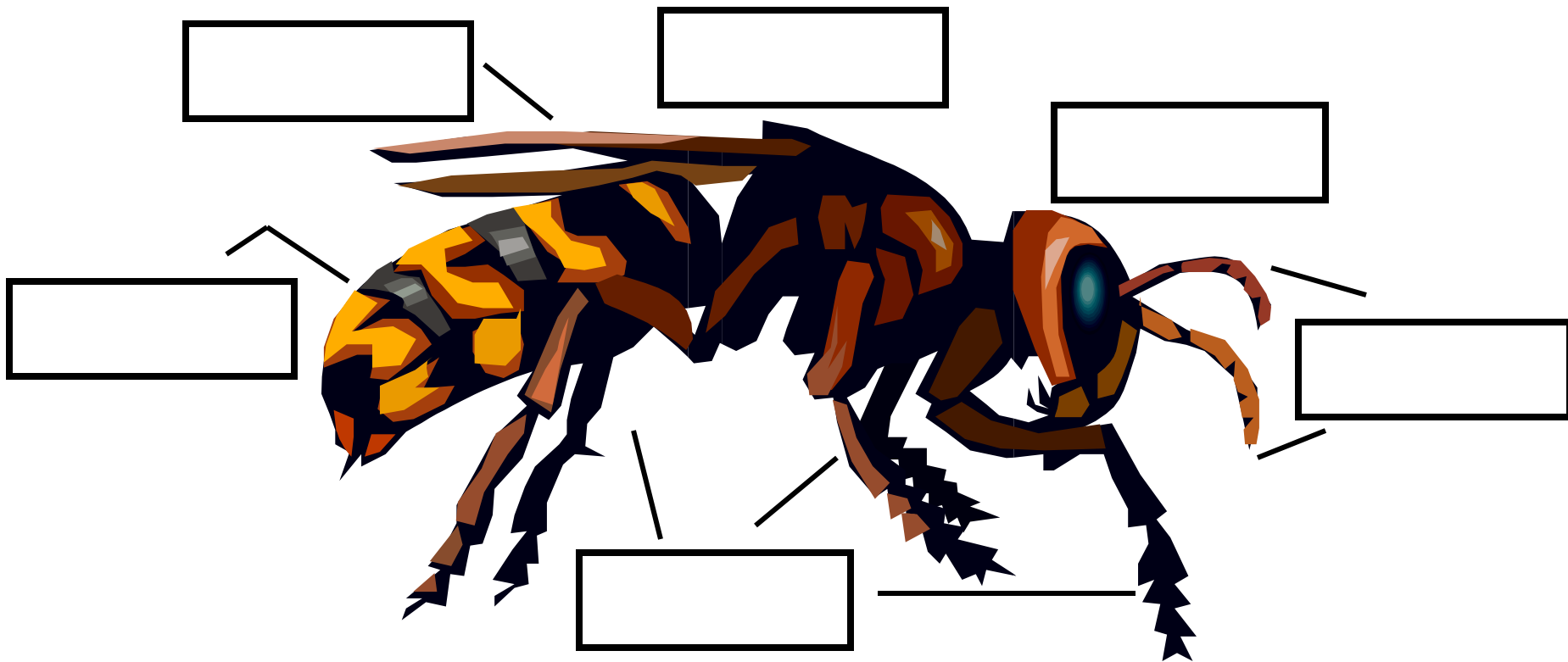


## **Questions**

1. How do you know an insect is an insect and not another animal?
2. What are the body regions of an insect?
3. Why are insect's bodies so hard?
4. What is an entomologist?

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

## Lesson 2-1 – Insect Lifecycles

### 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.

#### Glossary Words

Complete Metamorphosis  
Incomplete Metamorphosis  
Metamorphosis  
Molt

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.

### Questions:

1. Why can't insects grow very large?
2. What are the two types of metamorphosis insects go through?
3. What does metamorphosis mean?
4. What is one way to know if an insect is an adult?
5. Does an insect molt again once it is an adult?



## Lesson 2-2 – Complete Metamorphosis

### 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.

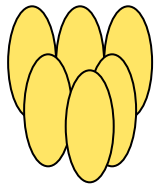
A **larva** is called many different things depending on the insect. Butterfly and moth larvae are called caterpillars; beetle larvae are called grubs; and fly larvae are called maggots. Larvae molt a series of times, growing each time. Because insects are covered by an exoskeleton (even larvae and pupae) 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.

<b>Glossary Words</b> Complete Metamorphosis Larva Molt Pupa
--



**Lady Beetle Egg**



**Lady Beetle Larvae**



**Lady Beetle Pupae**



**Lady Beetle Adult**



## **Questions:**

1. What are the life stages that insects go through if they have complete metamorphosis?
2. Is the pupa really resting?
3. What are some other names for larva?
4. What are some other names for pupa?
5. Name some insects that go through complete metamorphosis?

# Activity 2-1: Complete Lifecycle

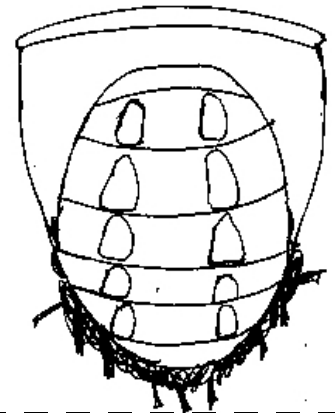
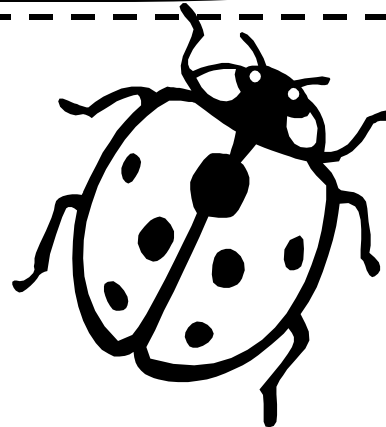
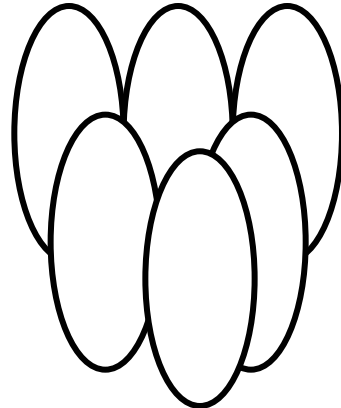
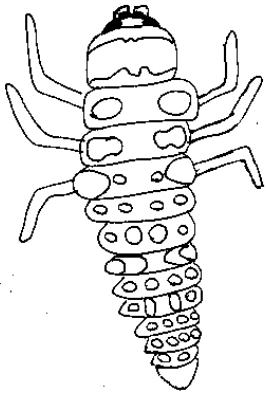
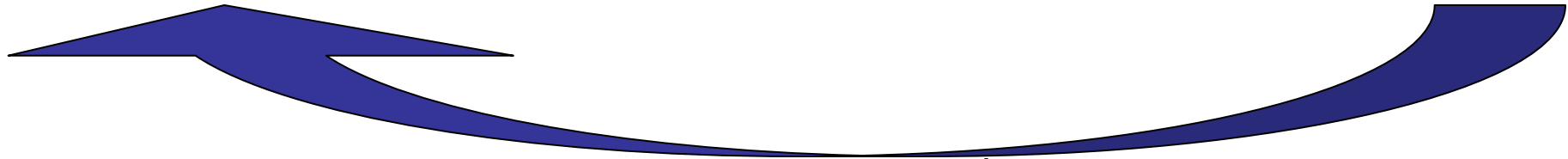
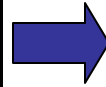
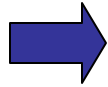
Cut out and color the life cycle images and glue them in the correct boxes

Egg

Larva

Pupa

Adult



## Lesson 2-3 – Incomplete Metamorphosis

**Glossary Words**  
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)



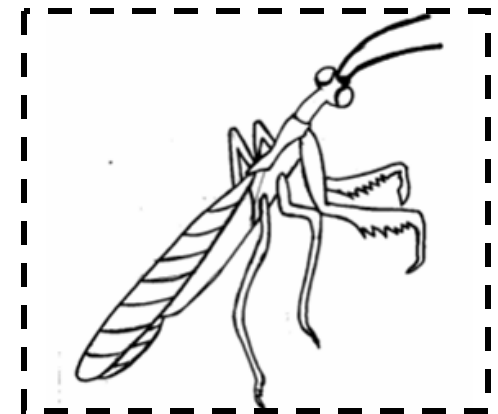
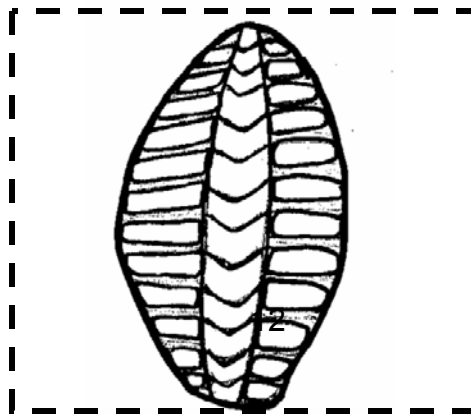
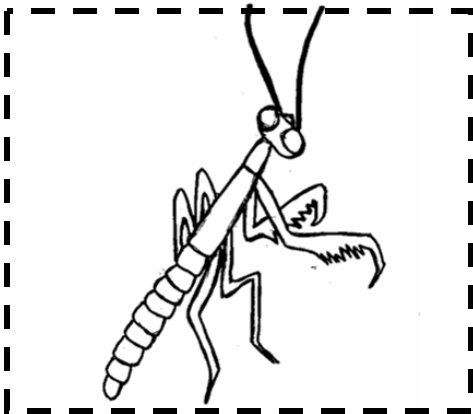
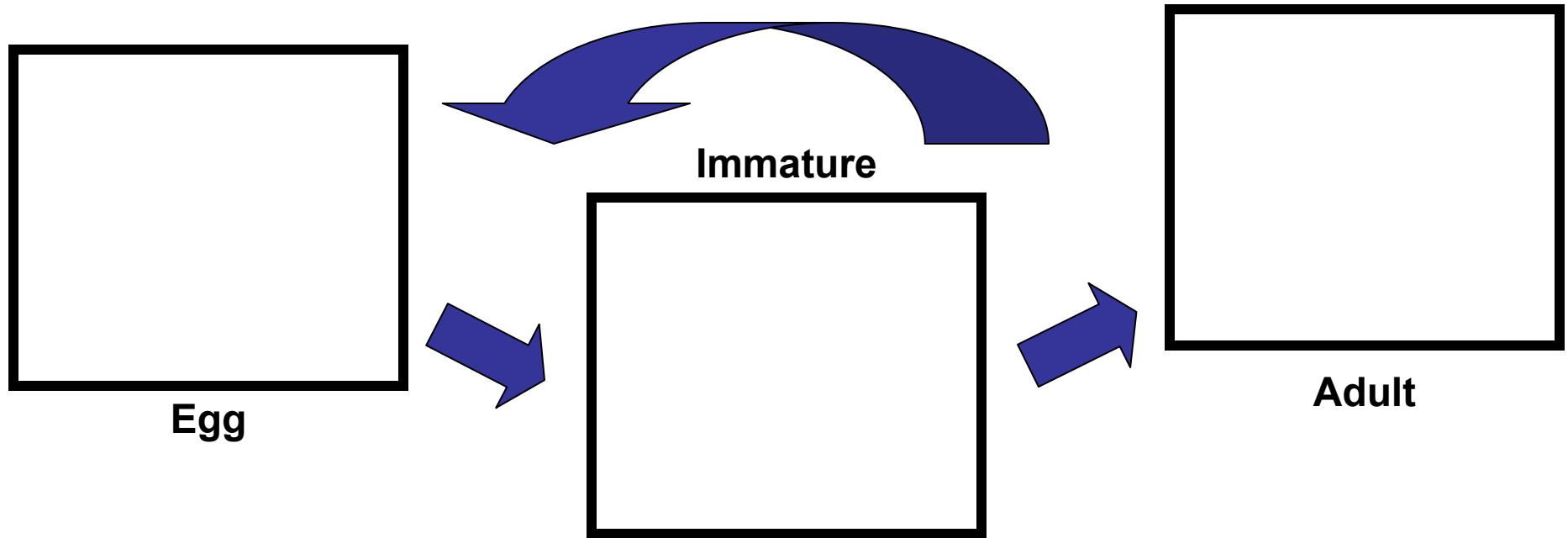
Praying Mantis Adult

### Questions:

1. What are the life stages an insect that has incomplete metamorphosis goes through?
2. What are some other names for the immature stage of an insect that goes through incomplete metamorphosis?
3. Name some insects that go through incomplete metamorphosis.

# Activity 2-2: Incomplete Lifecycle

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



## Lesson 3-1- What is a Beneficial Insect?

### 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.

#### Glossary Words

Pollinate

Predator

Recycle

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!



### Questions:

1. Are all insects harmful or bad?
2. What are the three different groups some beneficial insects can be put into?
3. What is a neutral insect?
4. Is it harmful?

## Lesson 3-2 – Predators

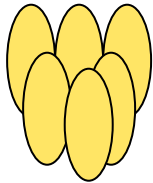
Glossary Words  
Predator

### 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!



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 “preying” 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 praying 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. Praying mantises have wings as adults although they rarely use them. Only adult praying mantises have wings, immatures never have wings.



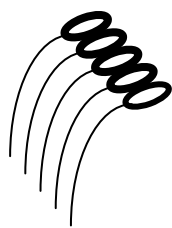
**Praying Mantis Ootheca (egg case)**



**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**

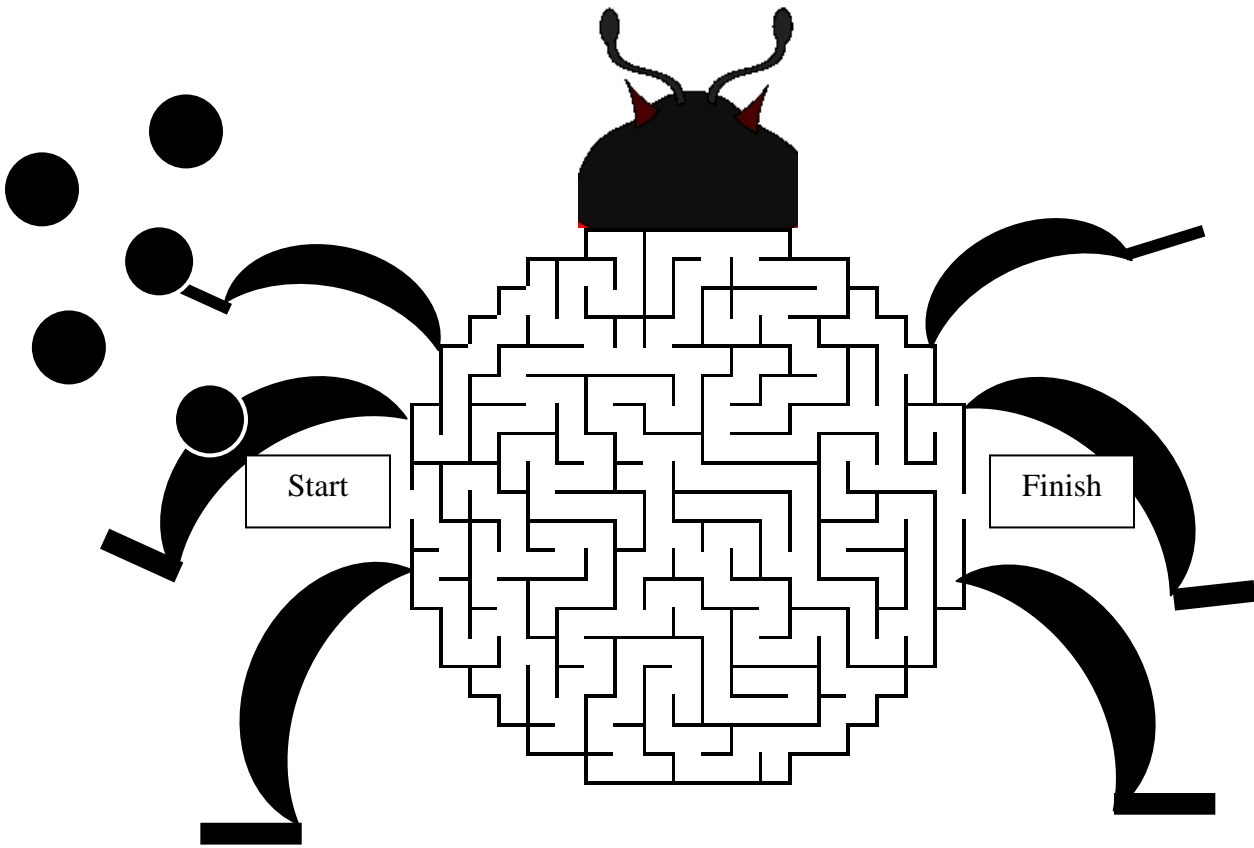
**Questions:**

1. Are all ladybeetles females?
2. Why are ladybeetles so beneficial?
3. Why does a bird only eat one ladybeetle?
4. Why does a lacewing mother lay her eggs on stalks?
5. Where are lacewings found?



**Activity 3-1:**

**Help the Lady Beetle get her spots back!**



## Lesson 3-3 – Pollinators

### 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.

#### Glossary Words

Nectar

Pollinate

Proboscis

**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 one 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 single 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 flowers they transfer pollen from one flower to another. When the pollen of two flowers mixes together, a seed or flower is produced.



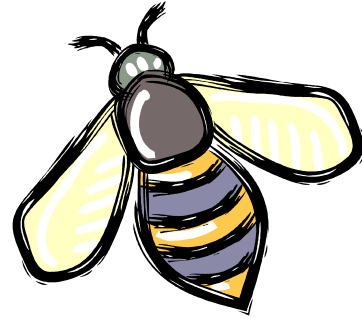
## Questions

1. Why do pollinators do?
2. Why do most pollinators visit flowers?
3. Why do farmers need pollinators?
4. What is a proboscis?
5. Are bees good or bad insects?

### Activity 3-2

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



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\_\_\_\_\_ 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.



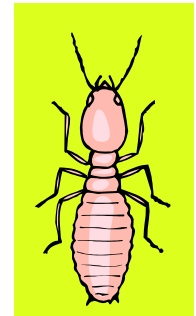
## Lesson 3-4 – Recyclers and Decomposers

<b>Glossary Words</b> Recycle
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### Reading Exercise D:

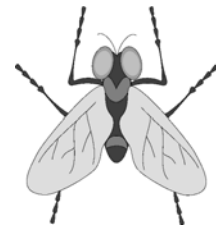
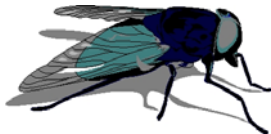
Some insects are beneficial because they help recycle waste. Most people do not think these are beneficial insects because they are usually found in trash and decaying matter, but they are very important to the world. These insects help things decompose and keep the trash from piling up. Decompose means 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!

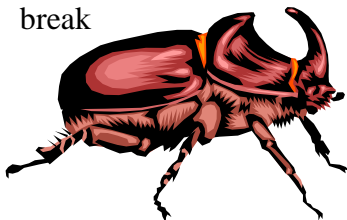
**Flies** can be found in trash, on dung, and near dead animals. Flies have excellent noses and that is why they are the first thing to a trash pile, food, or a dead body. Flies like to eat stinky, decaying things. This is because they help recycle those things and remove them from the area. Some adult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



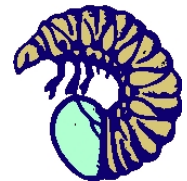
rotten  
good  
their  
their

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!

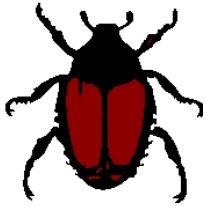


Rhinoceros beetle



Rhinoceros Beetle Grub

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.

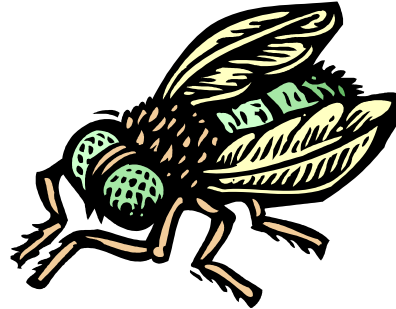
### **Questions:**

1. Why are recyclers beneficial?
2. What would happen if we got rid of all the recycling insects?
3. Name some important recyclers or decomposers.
4. Are termites good or bad?

### Activity 3-3

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



\_\_\_\_\_ 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

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## Pollinators

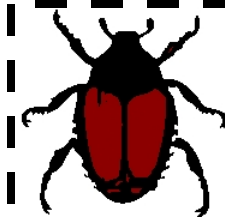
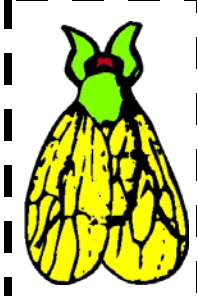
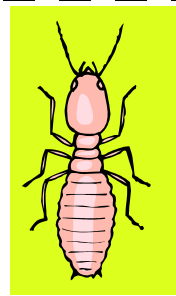
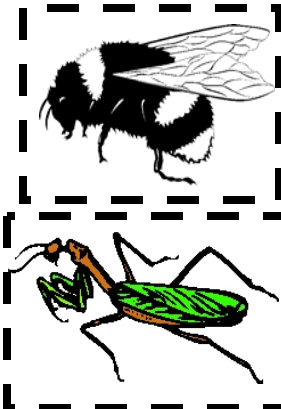
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## Predators

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Butterfly	Lacewing	Bee	Preying Mantis	Lady Beetle
		Fly	Beetle	Termite





## Lesson 4-1 – Harmful Insects

<b>Glossary Words</b> Entomologist Transmit
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### 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.

### Questions:

1. How many insects are harmful?
2. How can insects be harmful?
3. What is an entomologist?

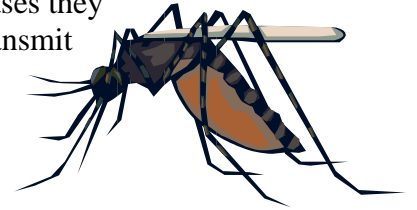
## Lesson 4-2 – Medically Important Insects

Glossary Words  
Transmit

### 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.



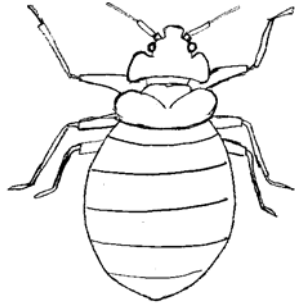
Bee



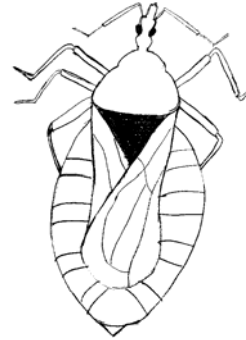
Wasp



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**

### **Questions:**

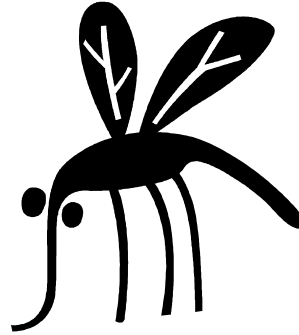
1. What is a medical entomologist?
2. What is the deadliest animal in the world? Mosquitoes
3. Name some stinging insects.
4. Name some blood sucking insects.
5. How do kissing bugs and bed bugs suck blood?



## Activity 4-1

Match the following words related to medically 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



\_\_\_\_\_ 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.

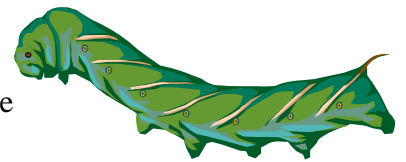


## Lesson 4-3 – Garden and Landscape Pests

### 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 loopers 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.

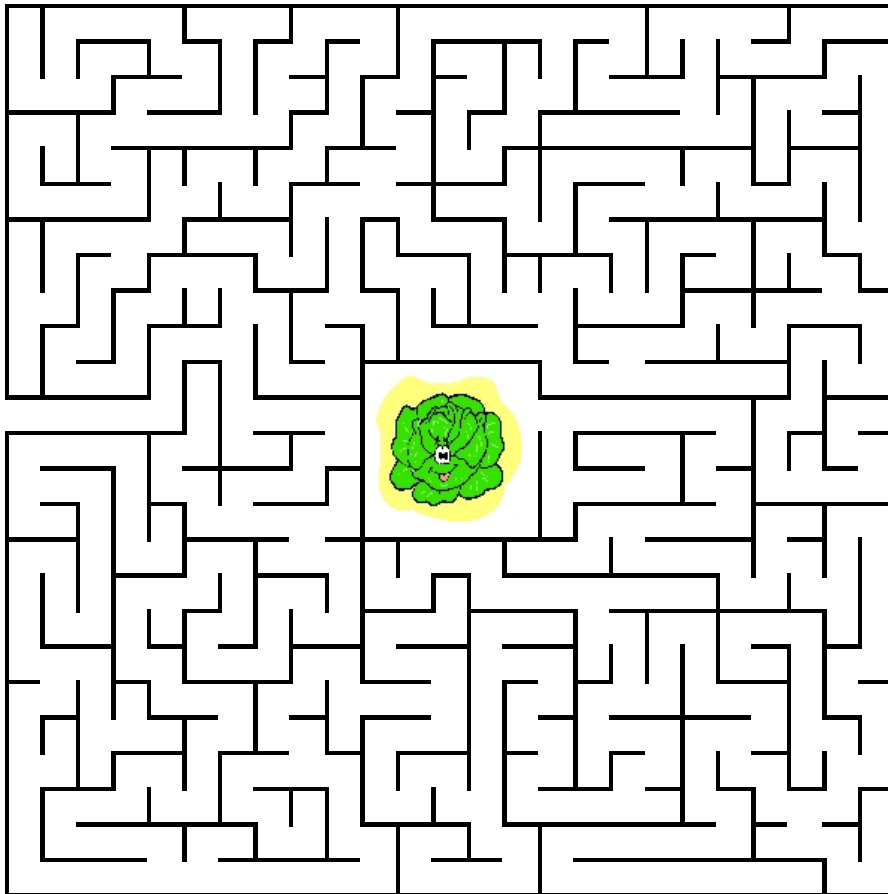


**Questions:**

1. Name some caterpillars that are harmful in the garden.
2. How do caterpillars chew?
3. How do aphids eat?
4. What type of predator insect loves to eat aphids?

**Activity 4-2**

Help the Cabbage Looper find the cabbage!

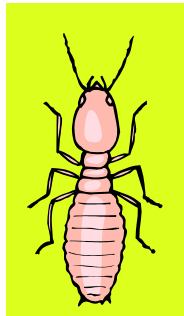


## Lesson 4-4 – Structural Pests

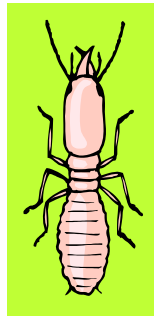
### Reading exercise D:

**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.

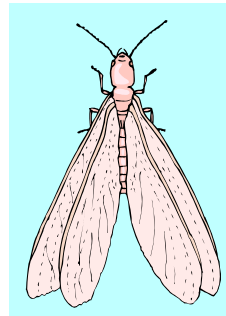
The queen termite lays all the eggs and controls what goes on in the colony. She usually lives deep underground and is rarely seen. The worker's job is to eat wood and feed the rest of the colony. The soldier's job is to protect the colony from enemies and invaders. They have very strong mouthparts and 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

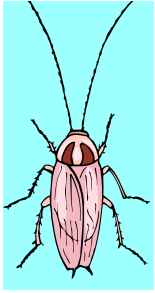
**Carpenter Ants** are a type of ant that likes to live in rotting or moist wood. Carpenter ants don't eat wood like termites, but they chew up the wood to make a home. The tunnels they make in the wood are called galleries. The chewed up wood looks just like sawdust and the carpenter ants will push 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.



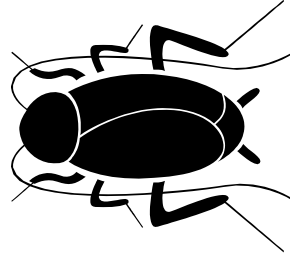
### **Questions:**

1. Name some structural pests.
2. Why are termites harmful?
3. Do Carpenter Ants eat wood?
4. Can people be allergic to cockroaches?

### Activity 4-3

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



\_\_\_\_\_ 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.

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

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

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



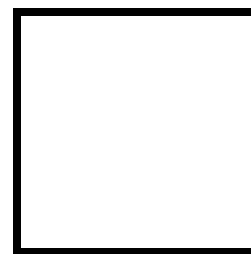
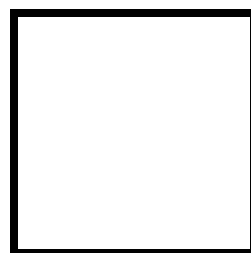
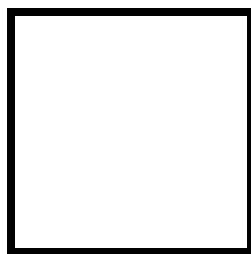
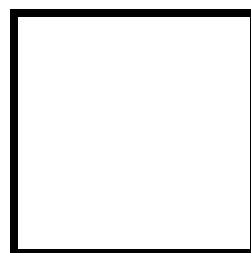
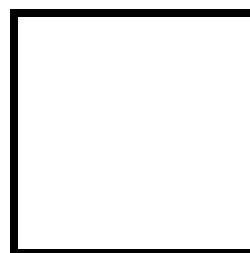
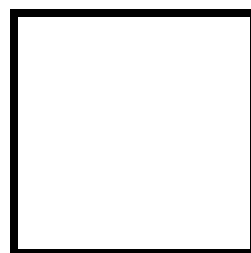
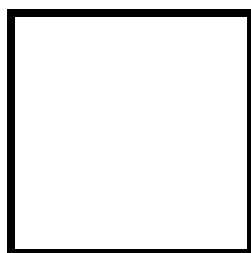
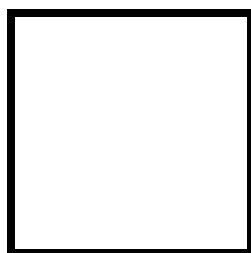
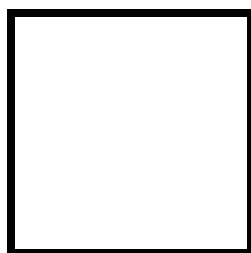
# Activity 4-4 Beneficial Insects Matching Game Activity

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

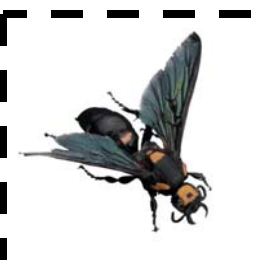
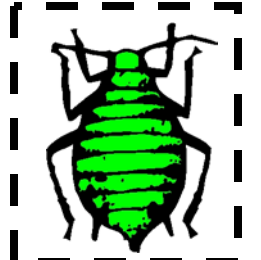
**Medically Important**

**Garden and Landscape**

**Structural**



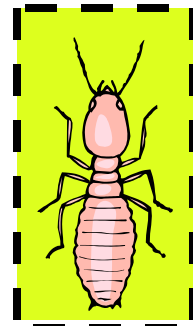
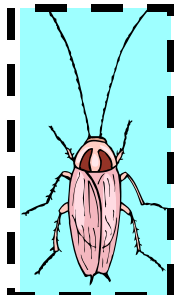
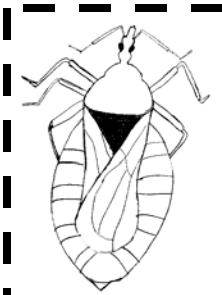
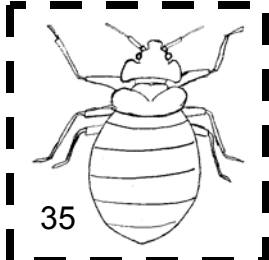
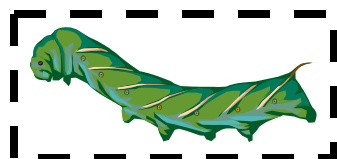
Tomato Hornworm	Kissing Bug	Cockroach	Carpenter Ant	Wasp	Aphid
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Bed Bug

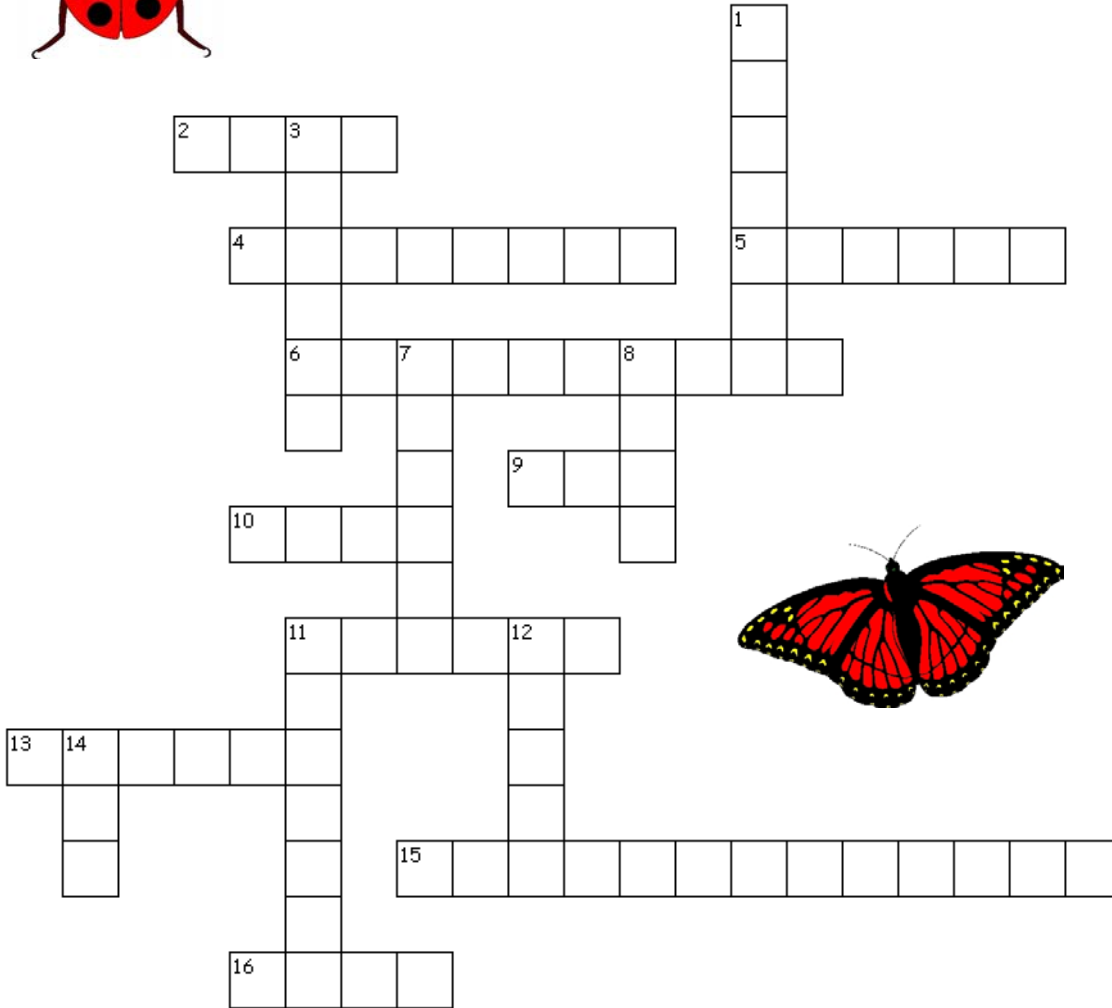
Cabbage Looper

Termite





## Wrap up Activity: Good Bugs and Bad Bugs Crossword



Word Bank	
Adult	
Bad	
Egg	
Entomology	
Head	
Insect	
Lady	
Looper	
Metamorphosis	
Molt	
Mosquito	
Praying	
Pupa	
Termites	
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
14. The very first life stage of an insect

### 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

## 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 stages: 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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