What's the Buzz on Bees?

Honey Bee Education Program

Lessons for Grades K-5

Florida Department of Agriculture and Consumer Services

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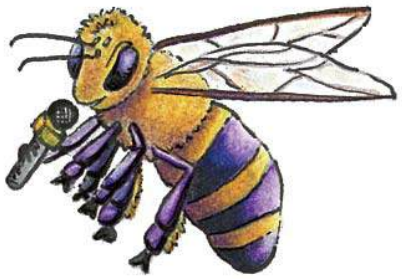

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WHAT'S THE BUZZ ON BEES?

My name is Bissy Bee. Welcome to the first edition of What's the Buzz on Bees, prepared by me and the Florida Department of Agriculture & Consumer Services' Division of Plant Industry.

In this day and age, many adults, let alone children, do not know the source of their food. They think it just appears in the grocery store. They sadly have lost the connection with the plants and animals that provide the food on our tables. The honey bee is a critical link in the chain of how fruits, nuts and vegetables are produced.

Not to brag, but the insect world is fascinating, and children seem to be particularly intrigued by it. These lessons on the honey bee should provide entertaining education to your classes.

The following four lessons are designed to help you teach students in grades K-5 many interesting facts about honey bees including:

LESSON A: WHAT ARE HONEY BEES AND WHY ARE THEY SO IMPORTANT?

Students will learn what a honey bee is, the social structure of honey bees and their role in the hive, and about the behavior of insects that are similar to honey bees.

LESSON B: HOW DO BEES MAKE HONEY? WHAT'S INSIDE A HONEY BEE, A HIVE, AND A FLOWER?

Students will learn what pollination is, how bees behave, how beehives are constructed, what products are found inside the hive, the parts of a honey bee, and the parts of a flower.

LESSON C: WHAT KEEPS A BEEKEEPER BUSY?

Students will learn the difference between feral and managed bee colonies, the basic structure of a beehive, what beekeepers do and the equipment they use, and how beehives are moved around to help pollinate crops.

LESSON D: AFRICANIZED HONEY BEES
BEE AWARE OF YOUR ENVIRONMENT ... LOOK, LISTEN, AND RUN!

Students will learn the importance of managed honey bees, how to describe the differences between Africanized and European honey bees, how to prevent Africanized bees from establishing nests in and around their homes and schools, how to prevent potential stinging incidents, and what to do if they are attacked by bees or other stinging insects.

INTRODUCTION

Each of the four lessons provides the following:

OVERVIEW – Bissy Bee provides detailed information on each lesson's topic. This information should be read by the teacher to the class. A vocabulary list is provided with each lesson and is intended to be given to students prior to the lesson, so they can refer to it while the teacher is reading the overview.

ACTIVITY SHEETS – Exercises are included with each lesson to be performed by the students with direction from the teacher.

SUNSHINE STATE STANDARDS – Outlines how each lesson fulfills the goals of the Sunshine State Standards.

OBJECTIVES – Lists what the students will learn in each of the lessons.

VOCABULARY – Every vocabulary word has been highlighted in the text (first use only) and defined in the glossary.

ARTWORK AND GRAPHIC DESIGN – All the illustrations are original artwork by DPI employee Kathryn Shepard. The layout of the lessons was done by DPI graphic artist Scott Burton. Writing was done by Kathryn Shepard, Denise Feiber and Ellen Dyck. Oh yes, and of course, Bissy Bee had a lot to do with every aspect of the lessons.

ACKNOWLEDGEMENTS – Thanks to others who participated in the development of this curriculum including: the University of Florida's Institute of Food and Agricultural Sciences' Honey Bee Research and Extension Laboratory, Alachua County School Board, and Florida Agriculture in the Classroom, Inc.

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END OF INTRODUCTION

LESSON A:

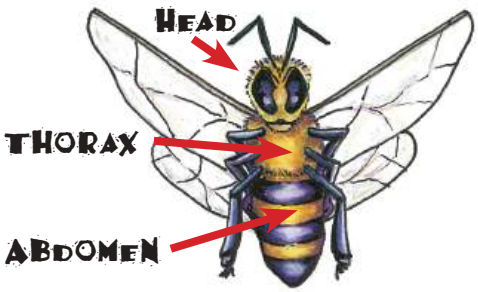
WHAT ARE HONEY BEES AND WHY ARE THEY SO IMPORTANT?

WHAT ARE HONEY BEES AND WHY ARE THEY IMPORTANT?

OVERVIEW:

BISSY BEE

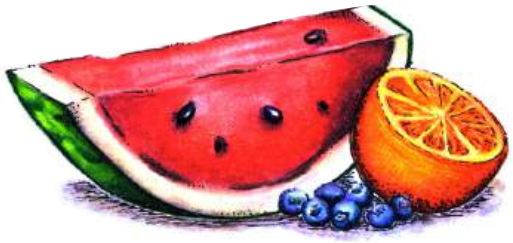
Hi, I'm Bissy Bee. Do you know what a honey bee is? Do you know what one looks like? Well for starters, **honey bees** are small animals that are part of a class called **insects**. Insects have similar characteristics or traits. Many, like the honey bee, have two pairs of wings, three pairs of legs, and a body that is divided into three parts.



They have a head, a **thorax** (which is the middle part of their body) and an **abdomen**. Some other examples of insects are flies, crickets, mosquitoes, beetles, and butterflies. Honey bees also have short hairs on their bodies and their legs, and they are orange-brown to almost black in color. There are approximately 20 to 30 million species of insects in the world and currently scientists have identified around 920,000. And with each passing year about 2,000 new insects are identified.

Insects have been around for many years. In fact, honey bees have been in existence for over 40 million years. However, the honey bees that we know are not native to the United States. They were brought over by European settlers in the early 1600's to produce honey and beeswax which were used in everyday Spanish life. Since then, honey bees have successfully spread throughout the world.

Honey bees are very important. ***Why do you think they are so important?*** Honey bees are the strongest link in the chain between the people who grow the food and the people who eat the food. Without honey bee **pollination**, the food we eat could decrease by 1/3rd. Foods such as watermelons, cucumbers, squash, blueberries and strawberries, as well as many others fruits, vegetables and nuts, are all pollinated by honey bees. In addition to pollinating crops, the honey produced by Florida honey bees is some of the best in the nation. Honey bees contribute millions of dollars to Florida's economy each year.



BISSY'S NEWS:

A single honey bee colony has 40,000 to 60,000 bees

SUNSHINE STATE STANDARDS:

Students will:

- Know that the size of a population is dependent upon the available resources within its community.
- Read the text and determine the main idea or essential message, identify relevant supporting details and facts, and arrange events in chronological order.
- Know the way that plants, animals, and protists interact.

OBJECTIVES:

Students will learn:

- What a honey bee is and characteristics of all insects
- The social structure of honey bees and their roles in the hive
- About the behavior of insects that look similar to bees

VOCABULARY:

Honey bee	*Drone*
Insect	*Pollen baskets*
Thorax	*Nectar*
Abdomen	*Proboscis*
Pollination	*Compound eyes*
Colony	*Fertilized*
Hive	*Larva*
Queen	*Pupa*
Worker	*Solitary*

Honey bees are social insects. ***Do you know what social insects are?*** They are insects that like to live in large groups; these large groups of honey bees are called colonies. A single **colony** will have anywhere from 40,000 to 60,000 bees. With so many bees in each colony, it is important that different jobs are given to different bees, and that each bee knows what it should be doing. Organization is important because the success of the colony depends on how well the bees perform their jobs.

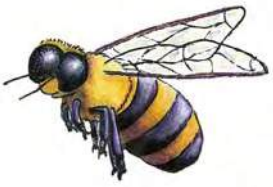
To function well as a group, the entire colony must work as a team for the good of the hive. ***Do you know what a hive is?*** A **hive** is the bee's nest or home where eggs are laid and honey is stored.

QUEEN

Within the hive, there are three types of bees: the **queen**, **workers**, and **drones**. Each has its own particular purpose in the hive. In a hive there is only one queen. The queen, as well as worker bees, have stingers which they will use to defend their territory. The queen is able to sting multiple times; while worker bees can only sting once. Drones do not have stingers. The queen is the largest bee in the hive, with a longer abdomen and a shiny thorax. She keeps the colony going by laying as many eggs as possible. A productive queen will lay as many as 2,000 eggs in a single day.

WORKER

The worker bees make up the largest portion of the hive, although they are the smallest bees in the hive. They are all female and as previously mentioned, worker bees have stingers; however, they can only sting once and then they die. This is because when they sting, some of their internal organs are pulled out along with the stinger. Unlike the other bees in the hive, worker bees have stiff hairs on their hind legs which form what we call **pollen baskets**. The pollen baskets allow the workers to collect pollen from the flowers they visit. Worker bees also have long proboscises. A **proboscis** is a long straw-like tool that bees use to suck nectar from inside flowers. **Nectar** is what bees use to make honey. As you can see, workers are very busy bees. They are responsible for raising and feeding the young, collecting and storing food, making honey and beeswax, and protecting the hive.



DRONE

The final bee that is found in the hive is the drone. Drones are larger than workers and have rounded abdomens, huge **compound eyes**, and powerful wings. Drones are the male honey bees in the hive and they serve one purpose, to mate with the queen bee, but not all drones mate. Drones that do mate, die; drones that do not mate are kicked out of the hive by the worker bees. The worker bees do this in order to conserve the food supply. Unfortunately for drones, they lack the essentials to survive.

Do you know how a bee becomes a bee?
The queen lays thousands of eggs - some fertilized and some not. Fertilized eggs develop into either queens or workers, while unfertilized eggs develop into drones. The process goes something like this: the queen bee lays an egg in the honeycomb of a beehive. In three days, the egg hatches into a **larva**. Worker bees feed the larva, and the larva spins a cocoon around itself. In about ten days, the larva turns into a **pupa**. It now has eyes, wings, and legs. It looks more like a bee. In another couple of weeks, the bee is full grown. Finally, the bee chews its way out of the honeycomb cell and becomes an adult. Time frames for hatching depend on what type of bee is being formed.

There are several insects that look like the honey bee and may be similar in color and size, but their behaviors and characteristics are quite different. Some of these insects include yellow jackets, paper wasps, bumblebees, horse and deer flies, and carpenter bees.

Though named bees, carpenter bees and bumblebees lead different lives from honey bees. The bumblebee lives in a colony that is very small and has only about four hundred bees, while the carpenter bee lives a **solitary** life. They are also both larger and have more hair than the honey bee. Horse flies and deer flies are different because they do not drink nectar, instead they drink blood from farm animals and humans, like mosquitoes do. Hornets and wasps behave differently - some drink nectar like the honey bee, while others eat bugs. Some live in large colonies and some live alone. They can sting multiple times, and are often much more aggressive than the honey bee.

It is important to understand and respect honey bees as well as all insects. It's best to leave insects alone to do their jobs - this way, you can avoid the possibility of getting bitten or stung. But as long as no bees are around, never resist the chance to smell the flowers!

END OF LESSON A

Lesson A:

Vocabulary

ab· do· men: (noun) - the hind portion of the body behind the thorax in an arthropod

col· o· ny: (noun) - a group of plants or animals that belong to one species (as of a colony of bees)

com· pound eye: - one of two large eyes on the sides of a bee's head, which allows the bee to tell the difference between brightness and darkness, movement and color

drone: (noun) - male bee whose sole purpose is to mate with the queen bee

fer· til· ize: (verb) - to make fertile: as **a:** to cause the fertilization of; *also* **:** to unite with in the process of fertilization <a sperm *fertilizes* an egg>

hive: (noun) - a container for housing honey bees **b:** the usually aboveground nest of bees **c:** a colony of bees

hon· ey· bee: (noun) - a bee that produces honey and lives in colonies; especially**:** a European bee widely kept in hives for the honey it produces

in· sect: (noun) - any of a class of arthropods (as butterflies, true bugs, two-winged flies, bees, and grasshoppers) with the body clearly divided into a head, thorax, and abdomen, with three pairs of jointed legs, and usually with one or two pairs of wings

lar· va: (noun) - a young wingless often wormlike form (as a grub or caterpillar) that hatches from the egg of many insects

nec· tar: (noun) - a sweet liquid given off by plants and especially by flowers and used by bees in making honey

pollen basket: (noun) - a flat or hollow area bordered with stiff hairs on the hind leg of a bee in which it carries pollen to the hive or nest

pol· li· na· tion: (noun) - transfer of pollen from the anther to the stigma; important step in the development of seed plants

pro· bos· cis: (noun) - a long tube-shaped body part (as the sucking organ of a butterfly) in the mouth region of an invertebrate

pu· pa: (noun) - a stage of an insect (as a bee, moth, or beetle) having complete metamorphosis that occurs between the larva and the adult, is usually enclosed in a cocoon or case, and goes through changes inside by which structures of the larva are replaced by those of the adult

queen: (noun) - the fertile fully developed female of social bees, ants, and termites whose purpose is to lay eggs

sol· i· tary: (adjective) - growing or living alone**:** not forming part of a group or cluster

tho· rax: (noun) - the middle of the three main divisions of the body of an insect

work· er: (noun) - female member of a colony of honey bees that performs most of the work and protects the colony

LESSON A:

Name:_____ Date:_____

KNOW - WANT - LEARN

Know – Want – Learn (KWL)

KWL is a teaching technique created by Ogle (1986) to develop independent learning.

Please complete the first two columns “K and W” before the lesson and then complete column “L” after the lesson.

K – list what you know about bees
W – list what you want to know about bees
L – list what you learned about bees

K What I know	W What I want to know	L What I learned

LESSON A:

Name:_____ Date:_____

WORD MATCH

Match the vocabulary words with the definitions below.

a.	honey bee	i.	queen bee
b.	insects	j.	worker bee
c.	thorax	k.	drone
d.	abdomen	l.	pollen baskets
e.	pollination	m.	proboscises
f.	colony	n.	compound eye
g.	solitary		
h.	hive		

_____ to transfer pollen from the anther to the stigma of a flower; important step in the development of seed plants

_____ the middle of the three main divisions of the body of an insect

_____ a container for housing honey bees

_____ the female honey bee whose purpose is to lay eggs

_____ a bee that produces honey and lives in colonies

_____ an eye (as of an insect) made up of many separate visual units

_____ a population of plants or animals in a particular place that belong to one species

_____ any of a class of arthropods (as butterflies, true bugs, two-winged flies, bees, and grasshoppers) with the body clearly divided into a head, thorax, and abdomen, with three pairs of jointed legs, and usually with one or two pairs of wings

_____ one of the members of a colony of bees that performs most of the labor and protective duties of the colony

_____ the hind portion of the body behind the thorax in an arthropod

_____ a flat or hollow area bordered with stiff hairs on the hind leg of a bee in which it carries pollen to the hive or nest

_____ a male bee (as of the honey bee) that does not have a stinger and gathers no honey

_____ growing or living alone: not forming part of a group or cluster

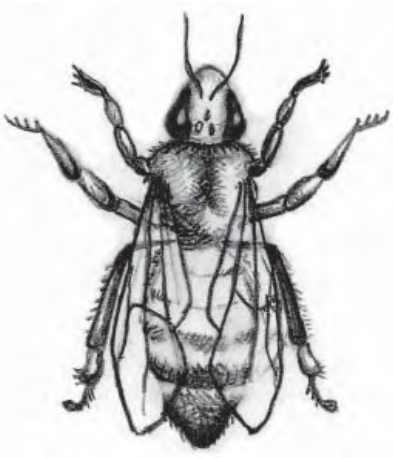
_____ a long tube-shaped body part (as the sucking organ of a butterfly) in the mouth region of an invertebrate

LESSON A:

Name:_____ Date:_____

WHAT DO BEES DO?

The queen, workers and drones look very different and have different jobs in the hive. Identify each bee (queen, worker or drone) in the blank below and then list their jobs.

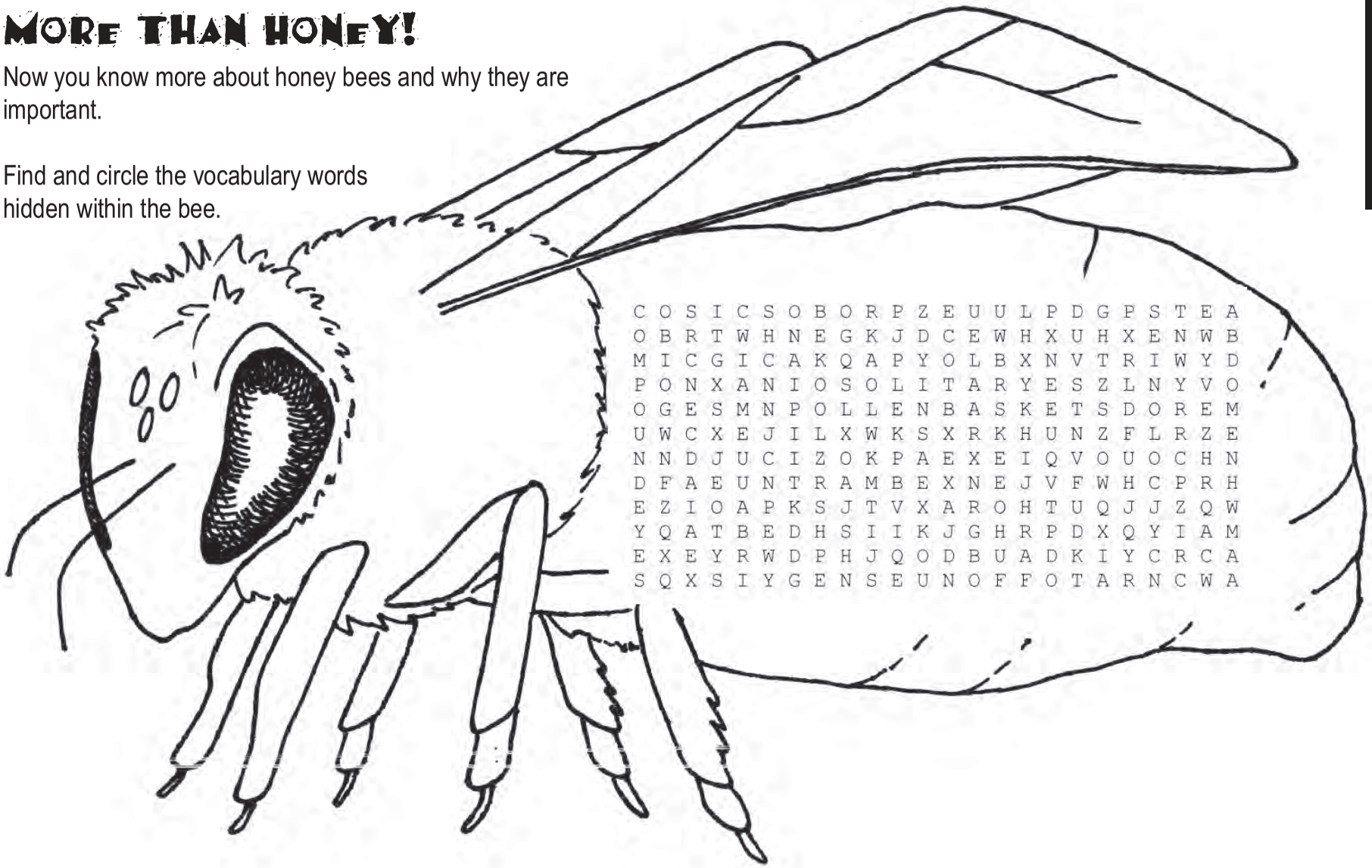


_____	_____	_____

More than honey!

Now you know more about honey bees and why they are important.

Find and circle the vocabulary words hidden within the bee.



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

Abdomen	Drones	Insects	Pollinate	Solitary
Colonies	Hive	Organization	Proboscis	Thorax
Compound Eyes	Honey bee	Pollen baskets	Queen	Workers

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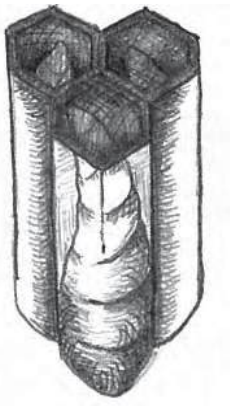
Name: _____ Date: _____

LESSON A:

Name:_____ Date:_____

How Bees Grow

Put the bee life stage illustrations in order using 1-5 and then place that number in the blank by the corresponding description below.



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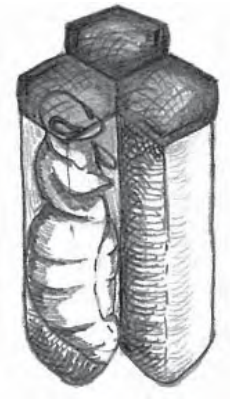

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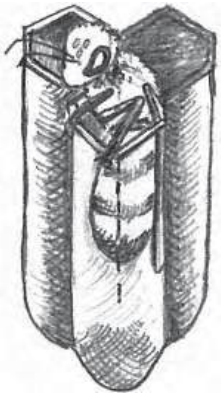

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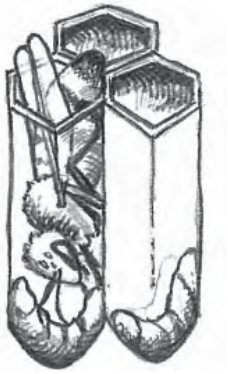

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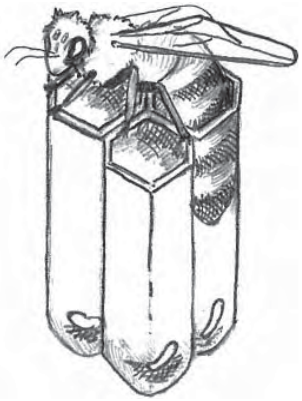


_____

Bee Life Cycle

___ Adult bee emerges from its cell
___ Worker feeds hatched larva
___ Larva becomes pupa
___ Queen lays egg in wax cell
___ Larva reaches full growth and cells are capped over

How do Bees make Honey? What's inside a Honey Bee; a Hive and a Flower?

How do Bees Make Honey? What's Inside a Honey Bee; a Hive and a Flower?

LESSON B:

Bissy Bee

OVERVIEW:

Hi, Bissy Bee here. What do you think about when someone mentions honey bees? A jar of honey, maybe. Well, let's learn just how bees make honey.

Honey has been enjoyed by people around the world for thousands of years. Honey is made when **nectar**, a sweet liquid produced by flowering plants, is collected and later transformed into honey by the bees. Honey bees are the only insects that produce food for people. ***How many of you enjoy honey? How do you use it?***

Also, have you ever heard of the saying "busy as a bee?" Let's learn where the saying comes from. During the spring and summer months a honey bee may visit thousands of flowers searching for nectar. This behavior is called **foraging**. A flower's scent and bright colors are very important. ***Do you know why they are important?*** They are important because this is what initially attracts bees to them. Different kinds of flowers have different scents and will make different kinds of honey in different colors. Most bees have a favorite scent of flower and will continue to search for that kind of flower. The nectar that bees collect from flowers is what gives honey its different colors and flavors. So the nectar from orange blossoms will produce honey that tastes different and is a different color than honey produced from sweet clover.

Do you know how much honey the average worker bee makes in her lifetime? She makes 1/12 of a teaspoon of honey - about the same amount as one or two teardrops. ***How many flowers do you think bees must visit to make a whole pound of honey?*** They would have to visit approximately two million flowers to make that much honey.

A hive or **beehive** is the name of the structure where honey bees live, raise their young, and make honey. Bees are very talented builders. They build their nests by shaping **beeswax** into what are called **honeycombs** - which are comprised of thousands of six-sided, or hexagon shaped cells.

Beeswax is not collected from plants, but is actually made by the honey bees. The wax is produced by the **wax glands**, which are located under the abdomen of the female worker bees.

Bissy's News:

In a bees lifetime, she makes only 1/12 of a teaspoon of honey - about as much as a few teardrops.

Sunshine State Standards:

Students will:

- Know that the size of a population is dependent upon the available resources within its community.
- Read the text and determine the main idea or essential message, identify relevant supporting details and facts, and arrange events in chronological order.
- Know the way that plants, animals, and protists interact.

Objectives:

Students will learn to:

- Fill in a diagram of a bee
- Define pollination
- Explain the jobs of honey bee
- Name the products of the hive
- Identify parts of the honey bee
- Identify the parts of a flower

Vocabulary:

Honey
Nectar
Foraging
Beehive
Beeswax
Honeycomb
Hexagon
Wax glands
Royal jelly
Pollen
Anthers
Pollen sacs
Stigma
Propolis
Antenna
Simple eyes
Compound eyes
Stinger
Calyx
Sepal
Petals
Ovary
Filament
Stamen

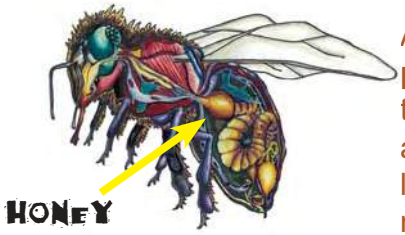
The workers create the wax using the sugars found in the nectar they collect. Beeswax has been used for years in many products people use everyday.

For instance, when your mom or sister uses make-up, such as facial creams, lotions and lipsticks, she is using beeswax because beeswax is an ingredient in many of these products. You also use beeswax when you put ointment on a cut, when you chew gum, or eat a piece of candy. The crayons you use are also made using beeswax, and so is the polish used to clean the furniture in your house. And, beeswax is used by candle makers, and it can even be found in products used by doctors and dentists.

Now that the hive is built, the honey bees can start to fill the honeycombs with honey, baby bees and other products.

So do you want to know exactly how honey is made? As I mentioned, bees collect nectar from flowers with their proboscis and store it in their honey stomachs. Honey bees have two stomachs - their regular stomach and their honey stomach. Bees visit between 100 and 1500 flowers to collect enough nectar to fill their honey stomachs.

When honey bees return to the hive, they pass the nectar, which is 80% water, on to other worker bees who suck the nectar from the honey bee's mouth. The nectar remains in the bee's stomach for about half an hour. The bees then spread the nectar into cells throughout the hive where water evaporates from it and it becomes thicker as the bees fan it with their wings. The bees then seal off the cells of the honeycomb with a plug of wax and it remains stored until it is eaten. A colony of bees eats between 120 and 200 pounds of honey a year.



Do you know what other products are contained in a beehive? **Royal jelly**, produced by the bees, is the first food that queen honey bees eat. Royal jelly is a food containing lots of proteins, vitamins, minerals, and fats. Many cosmetic companies and health food markets around the world use royal jelly to make a variety of products.

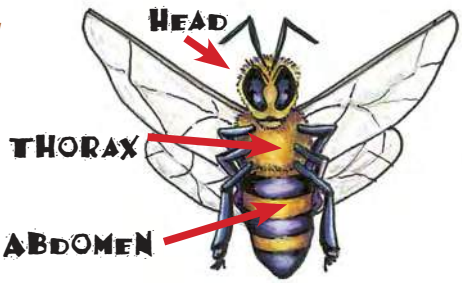
You have all probably seen **pollen** when looking at a flower. It is the yellow powder that can get on your skin when you pick or smell a flower. Pollen is a very important item found in the hive. Pollen comes from the flower's **anthers**, which are the male reproductive cells. Inside these anthers are **pollen sacs** that release pollen onto the outside surface of the anthers. Once the pollen is at the surface, it can be collected in the pollen baskets of the bees or other pollinators that enter the flower. ***Do you know what might be considered a pollinator other than a bee?*** Butterflies and other insects that fly from flower to flower are all pollinators. Once they go to visit another flower, the pollen on their legs from the previous flower gets spread onto the **stigma**, a female part of the flower, and that is how a flower gets pollinated. Pollen supplies a bee with the nutrients it needs to ensure proper health. Just as pollen is important to the health of bees, pollen can also be used as both animal and human food supplements.

Another item the hive produces is called **propolis**. Propolis is a sticky material that is collected by bees from tree buds and other plant parts. Beekeepers believe that the honey bees use propolis to reinforce the hive, reduce vibrations, and make the hive more secure by sealing up extra entrances so it is more difficult for pests to enter. It is also believed that honey bees will use propolis to prevent diseases in the hive. Bees will carry waste such as dead larvae away from the hive. Propolis and its ingredients also have a variety of health properties and have long been used in natural supplements and herbal medicines.

Some beekeepers even think that keeping a piece of propolis in your mouth can help cure a sore throat. It has also been used to treat skin burns.

To better understand how all of these products are made, it helps to know more about the anatomy of honey bees and the parts of a flower.

As you have already learned, there are three main parts that make up the body of a honey bee. ***Can you remember what those are?*** There are the head, thorax, and abdomen. On the honey bee's head there are two antennae; you have probably seen these on many other insects. The **antennae** are what help the bee feel its surroundings, just like your fingers help you feel different things.



Now, let's discuss how honey bees see the world. Honey bees have two different sets of eyes. First they have what are called **simple eyes**; these are located on the front of their head near their antennae, and have only a single lens. Our eyes also have only one lens; this is the part of the eye that allows you to focus on things at different distances. This lens does naturally what glasses or contacts do for people who cannot see clearly.

The other set of eyes that bees have are called compound. **Compound eyes** are the two large eyes on the sides of a bee's head. These eyes work differently from our eyes. Compound eyes have tiny sensors that allow bees to tell the difference between brightness and darkness, movement and color. The honey bee's tube-like tongue called the proboscis is also located on its head.

THE EYES HAVE IT

After the head comes the thorax. Attached to their thorax, honey bees have three sets of legs. The two hind legs are special because they have something attached to them that help them gather pollen. ***Can you remember what they are called?*** They are the pollen baskets. Pollen is stored in these baskets for transport back to the hive where it is kept for later use. They also have two sets of wings on the thorax, the forewings and the hindwings.

The last area on the honey bee is the abdomen. The **stinger** and the wax glands are located on the abdomens of female honey bees. The stinger allows the honey bee to defend itself and the hive. Honey bee wax glands are found under the abdomen near the rear. This is where wax is produced and secreted for the honey bees to use in forming honeycombs. Again, only female honey bees have stingers and wax glands.

FLOWER POWER! The parts of a flower are equally important as the parts of a bee in understanding how pollination works. The stem supports the flower and connects other plant parts such as the leaves together. This is the part you pull when you pick a flower. The **calyx** is the group of leaves under the petals - each leaf of the calyx is called a **sepal**. The purpose is to protect the flower as it develops from a bud. ***Do you know why a flower has petals?*** Flowers have petals, which are often brightly colored, because they surround and protect the reproductive organs.

The large rounded bulb at the top of the flower is the stigma. The stigma pokes out from the center of the flower and is covered in a sticky substance so that when pollen grains are deposited onto the stigma by honey bees, the pollen will stick; this process is called pollination. Located at the bottom of the flower is the female reproductive part called the **ovary**. The ovary is the part of the flower that protects the ovule and once fertilized will ripen into a tasty fruit.

Located right around the stigma are the anthers and the **filaments**; these parts make up the male organs of the flower called the **stamen**. The anthers are the small structures on the tops of the filaments, which are tall stalks that raise the anthers around the stigma. Inside the anthers are pollen sacs, which release the pollen to the outside of the anthers so that insects entering the flower are able to transfer pollen from the anthers to the stigma.

That's a lot of information about bees and flowers. So now, when you pick a bouquet out of your yard, or eat a piece of toast with honey on it, you can appreciate the many talents of the honey bee.

END OF LESSON B

VOCABULARY (PAGE 1 OF 2)

an· ten· na: (noun) - one of a pair of slender movable organs of sensation on the head of an arthropod (as an insect or a crab) that are made up of segments

an· ther: (noun) - the part of the stamen of a flower that produces and contains pollen and is usually borne on a stalk (male section of a flower)

bees· wax: (noun) a yellowish to grayish-brown moldable substance made by bees and used by them to make honeycomb

ca· lyx: (noun) - the group of leaves under the petals, each leaf of the calyx is referred to as a sepal

com· pound eye: - one of two large eyes on the sides of a bee's head, which allows the bee to tell the difference between brightness and darkness, movement and color

fil· a· ment: (noun) - the anther-bearing stalk of a plant stamen (male section of a flower)

forage: (verb) - to make a search especially for food or supplies

hexa· gon: (noun) - a polygon of six angles and six sides

hive: (noun) - a container for housing honeybees **b:** the usually aboveground nest of bees **c:** a colony of bees

hon· ey: (noun) - a thick sugary material prepared by bees from the nectar of flowers and stored by them in a honeycomb for food

hon· ey· comb: (noun) - a mass of six-sided wax cells built by honeybees in their nest to contain young bees and stores of honey

nec· tar: (noun) - a sweet liquid given off by plants and especially by flowers and used by bees in making honey

ova· ry: (noun) - the enlarged rounded lower part of the pistil of a flower in which seeds are formed (female section of a flower)

pet· al: (noun) - one of the often brightly colored modified leaves that make up the corolla of a flower

pol· len: (noun) - a mass of tiny particles in the anthers of a flower that fertilize the seeds and usually appear as fine yellow dust

pollen sac: (noun) - one of the pouches of a seed plant anther in which pollen is formed

prop· o· lis: (noun) - a sticky material that is collected by bees from tree buds and other plant parts.

royal jelly: (noun) - a substance rich in vitamins and proteins that is secreted from glands in the head of honeybees and is fed to all very young larvae and to all maturing queen bees

se· pal: (noun) - one of the specialized leaves that form the calyx of a flower

sim· ple eye: (noun) - one of three eyes on the front of a honey bee's head, have a single lens, which allows the bee to focus on things at different distances

sta· men: (noun) - an organ of a flower that consists of an anther and a filament and produces the pollen (male section of a flower)

stig· ma: (noun) - the upper part of the pistil of a flower which receives the pollen grains and on which they start to grow (female section of a flower)

sting· er: (noun) - a sharp organ of some animals (as bees or scorpions) that is used to wound, paralyze, or kill prey or an enemy by piercing and injecting a poisonous fluid

wax gland: (noun) - group of cells in a honey bee that produces beeswax, located under the abdomen of the worker bee

LESSON B:

Name:_____ Date:_____

KNOW - WANT - LEARN

Know – Want – Learn (KWL)

KWL is a teaching technique created by Ogle (1986) to develop independent learning.

Please complete the first two columns “K and W” before the lesson and then complete column “L” after the lesson.

K – list what you know about bees
W – list what you want to know about bees
L – list what you learned about bees

K What I know	W What I want to know	L What I learned

LESSON B:

Name:_____ Date:_____

WORD MATCH (PAGE 1 OF 2)

a.	pollen basket	m.	gland
b.	beeswax	n.	stinger
c.	nectar	o.	honeycomb
d.	ovary	p.	honey
e.	royal jelly	q.	anther
f.	wax	r.	stigma
g.	antenna	s.	proboscis
h.	simple	t.	pollen
i.	hybrid	u.	sepal
j.	stamen	v.	petal
k.	style	w.	filament
l.	forage		

____ one of a pair of slender movable organs of sensation on the head of an arthropod (as an insect or a crab) that are made up of segments

_____ not compound

____ a long tube-shaped body part (as the sucking organ of a butterfly) in the mouth region of an invertebrate

____ a flat or hollow area bordered with stiff hairs on the hind leg of a bee in which it carries pollen to the hive or nest

____ a cell or group of cells that makes and secretes a product (as saliva, sweat, bile, or shell) for further use in or for elimination from the plant or animal body

____ a sharp organ of some animals (as bees or scorpions) that is used to wound, paralyze, or kill prey or an enemy by piercing and injecting a poisonous fluid

____ the upper part of the pistil of a flower which receives the pollen grains and on which they start to grow

____ the part of the stamen of a flower that produces and contains pollen and is usually borne on a stalk

____ one of the often brightly colored modified leaves that make up the corolla of a flower

____ the filiform usually elongated part of the pistil bearing a stigma at its apex

____ the anther-bearing stalk of a plant stamen

____ the enlarged rounded lower part of the pistil of a flower in which seeds are formed

Name:_____ Date:_____

WORD MATCH (PAGE 2 OF 2)

_____ one of the structures deep inside a flower that together make up the ovary of a flowering plant

_____ a sweet liquid given off by plants and especially by the flowers and used by bees in making honey

_____ an offspring of parents with different genes especially when of different races, breeds, species, or genera

_____ an organ of a flower that consists of an anther and a filament and produces the pollen

_____ a thick sugary material prepared by bees from the nectar of flowers and stored by them in a honeycomb for food

_____ to make a search especially for food or supplies

_____ a yellowish moldable substance produced by bees and used by them for making the honeycomb

_____ a mass of six-sided wax cells built by honeybees in their nest to contain young bees and stores of honey

_____ a substance rich in vitamins and proteins that is secreted from glands in the head of honeybees and is fed to all very young larvae and to all maturing queen bees

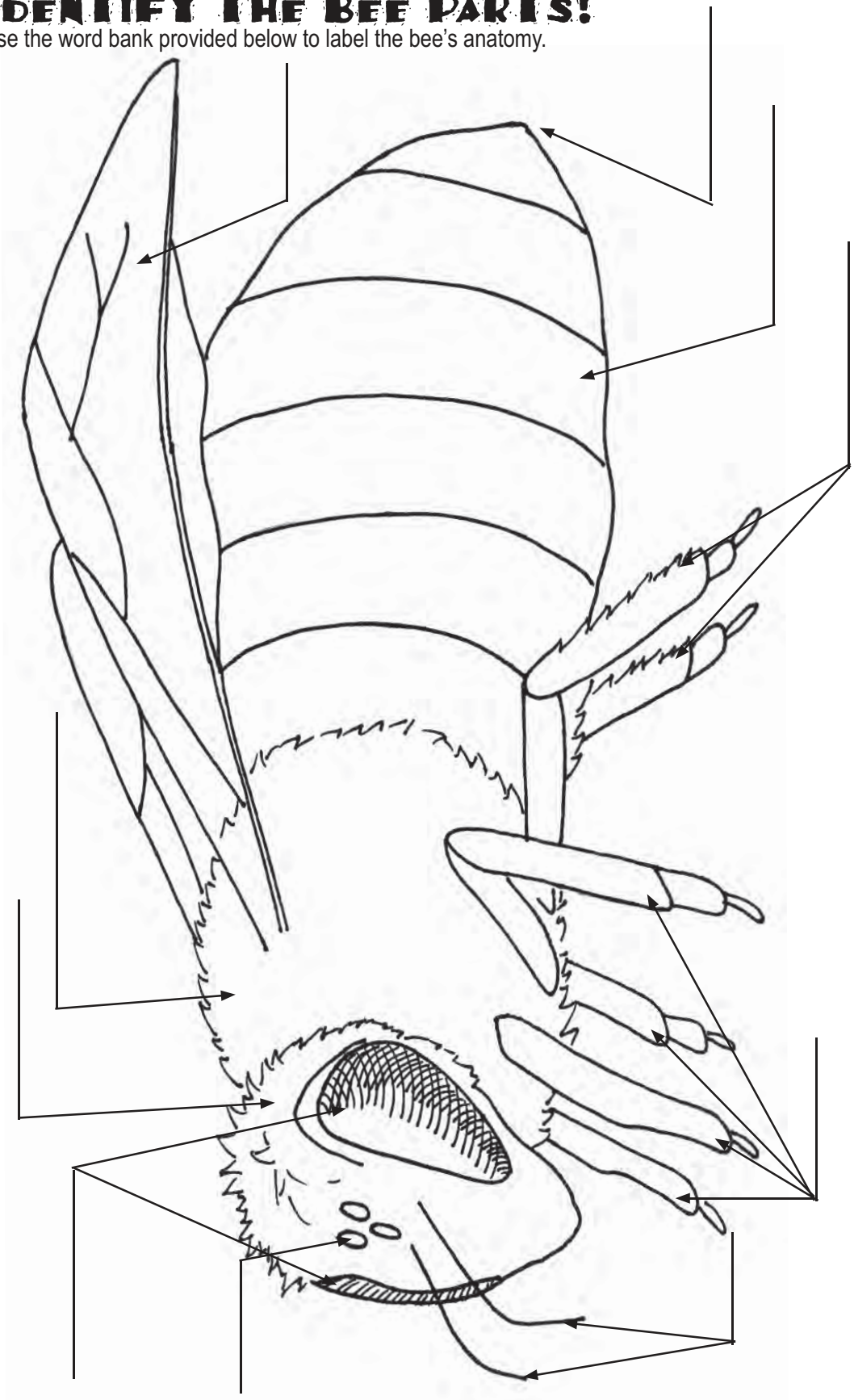
_____ a mass of tiny particles in the anthers of a flower that fertilize the seeds and usually appear as fine yellow dust

_____ a yellowish to grayish-brown moldable substance made by bees and used by them to make honeycomb

Name:_____ Date:_____

IDENTIFY THE BEE PARTS!

Use the word bank provided below to label the bee's anatomy.



Word Box

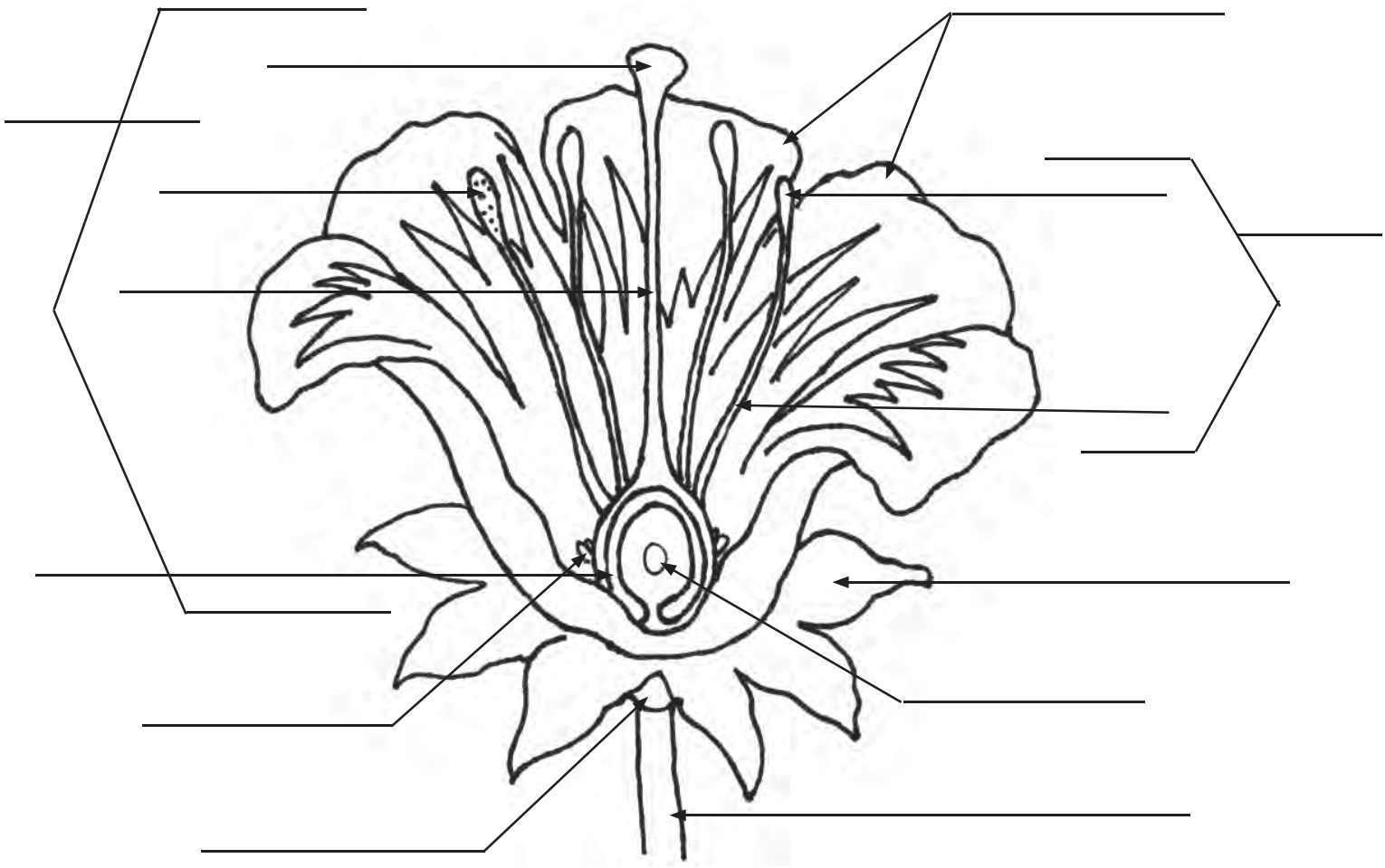
Abdomen
Stinger
Compound eyes
Wings
Head
Simple eyes
Thorax
Antenna
Pollen baskets
Legs

LESSON B:

Name:_____ Date:_____

THE POWER OF A FLOWER!

Not only do they look pretty and smell good; but flowers also serve a very important purpose. Flowers are actually what enable a plant to reproduce. Below is a cross section of a flower. Use the word bank provided below to label the flowers different parts.



Word Box

ovule	petals	stem
anthers	pollen grains	stigma
filament	sepal	style
ovary	receptacle	stamen
nectary	pistil	

LESSON B:

Name:_____ Date:_____

THE POWER OF A FLOWER!

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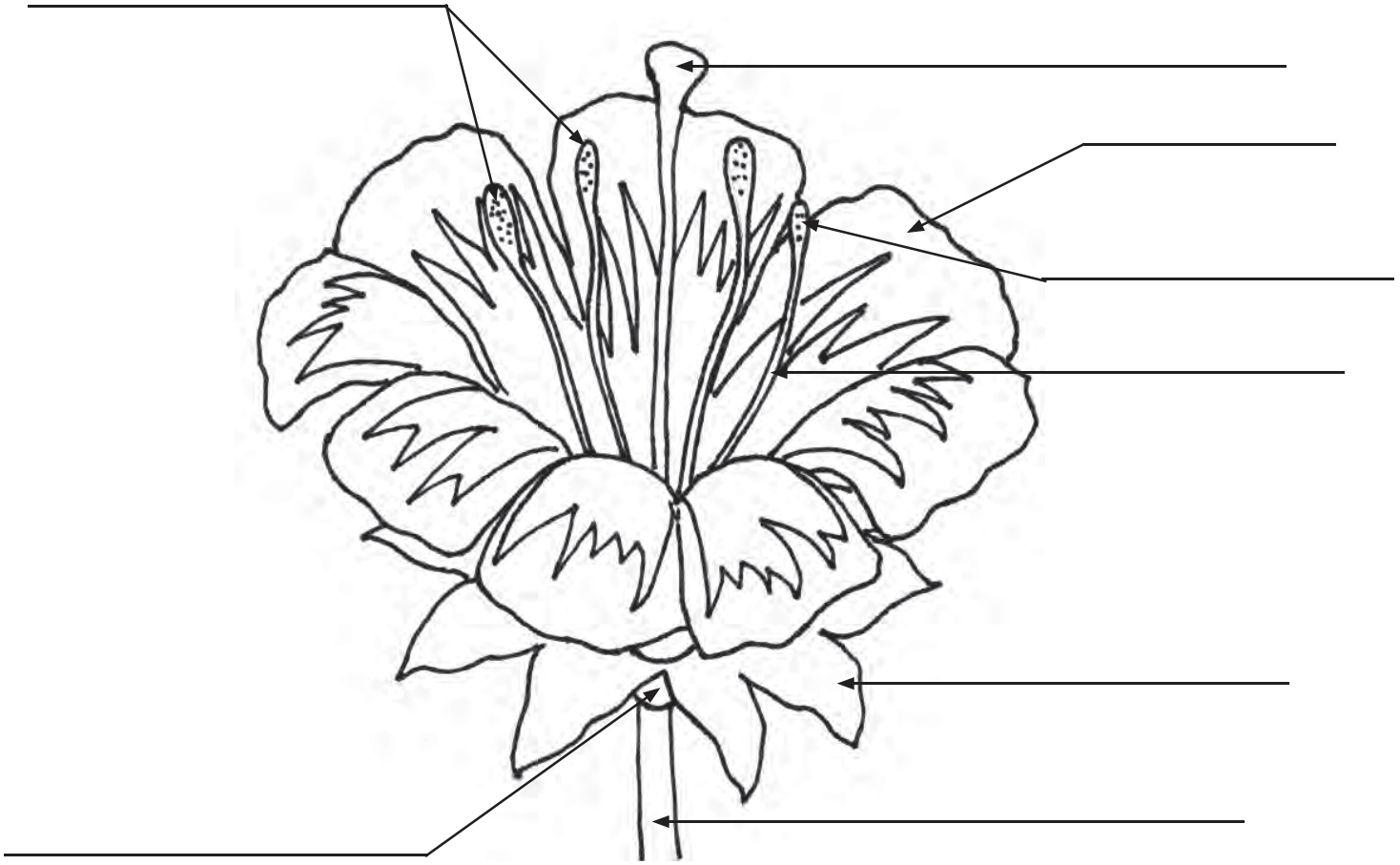


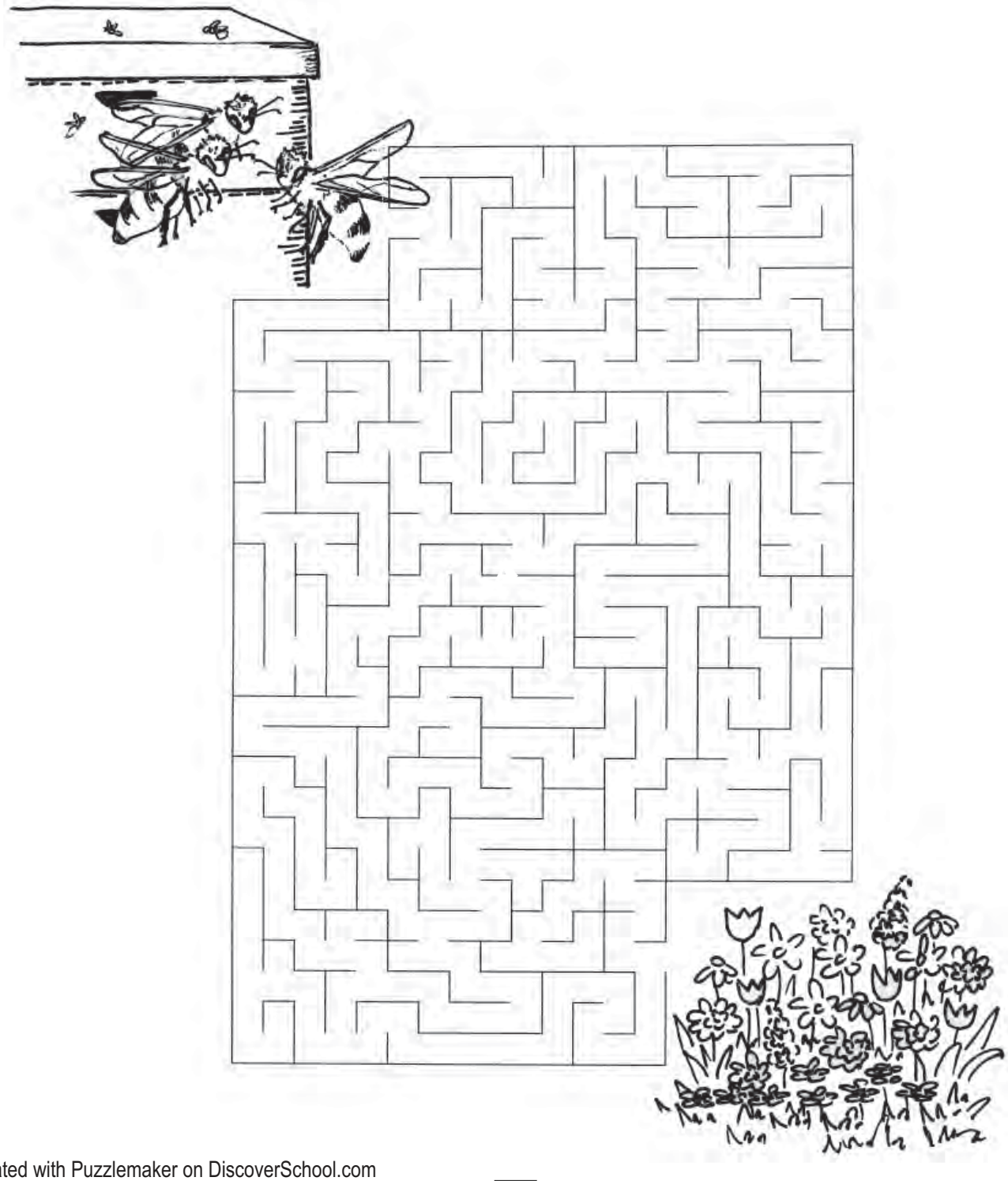
Word Box

Petal
Stem
Pollen grains
Sepal
Filament
Anther
Receptical
Stigma

Name:_____ Date:_____

Bee Maze

Bissy has just returned from a wonderful garden that has many flowers. Help her communicate to the other bees how to navigate their way to the garden by finding your way through the maze to the garden.



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LESSON B:

Name:_____ Date:_____

ACTIVATION POLLINATION!

TEACHER INFORMATION

Honey Bees are very important to plants. This is because bees are pollinators. Pollinators are animals that help plants reproduce, or make more plants, by spreading pollen from one plant to another. The bright colors and scent of flowers are what attract bees. Once a bee lands on a flower, it crawls inside to drink the nectar. Then, the pollen grains that are on the flower's anthers, stick to the bee's body. They then "comb" the pollen from their body and deposit it onto their back legs. This part of their leg is called their pollen basket.

MATERIALS:

- One copy of the honey bee drawing and one of the flower for each student
- Color pencils, crayons, or markers
- Colored chalk
- Scissors
- Q-tips or cotton balls
- Masking tape

To help students better understand how pollination works, students will act out the following activity and take turns acting as the honey bee and then the flower.

1) Have students color the pictures of the honey bee and flower. Remind them what colors honey bees are, and explain to them that when they color the flower, they need to make it pretty and colorful so that it will attract lots of bees.
2) Once they have colored both pictures, have them cut them out.
3) Have each student pick out one color of chalk and color the middle of their flower with it. Explain to them that the chalk will act as pollen.
4) Divide the class in half. Half of the class will act as the honey bees while the other half will be the flowers.
5) Have the students who are the flowers move to different areas of the classroom with their flowers that they have colored and have them stand still like a flower.
6) Use masking tape to tape the picture of the honey bee to the shirts of the students who are the bees and give them each a cotton ball or Q-tip. Explain to the students that the cotton balls or Q-tips are similar to the fine hairs found on the legs and bodies of bees. As they move from flower to flower, have them simulate gathering nectar by dabbing their Q-tip or cotton ball on a colored-flower's center and then move on to another flower and dab on that flower's center and so on. They will pick up the pollen or chalk from one flower and then transfer it to another flower. You may want to demonstrate this for the students before they begin. Have the student 'bees' move from flower to flower, visiting as many as they can in about one minute.
7) Once they are done, have the students look at their cotton balls and see all the different colors, as well as the centers of the flowers.
8) Finally, have the students switch so that those who were the honey bees can now be the flowers and those who were the flowers can now be the honey bees.

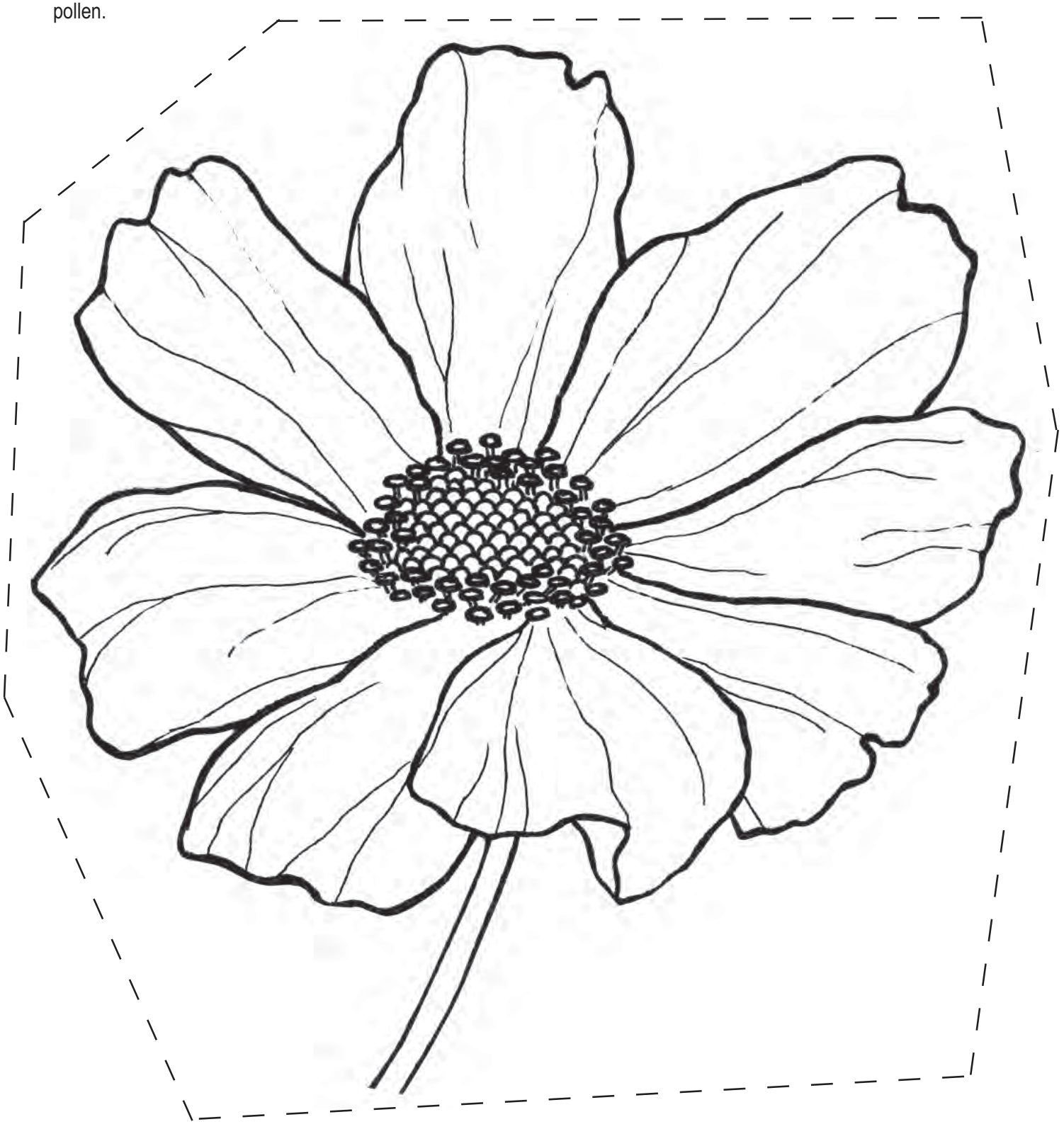
CONCLUSION:
Once the students have completed this activity have them return to their seats for a short discussion. Give students the opportunity to take turns explaining the process of pollination to the teacher or each other. Next ask the class which flower was their favorite and why? Was there one flower that more of the bees decided to go to? If so why? Also, which honey bee was the busiest bee and visited the most flowers?

LESSON B:

Name:_____ Date:_____

ACTIVATION POLLINATION!

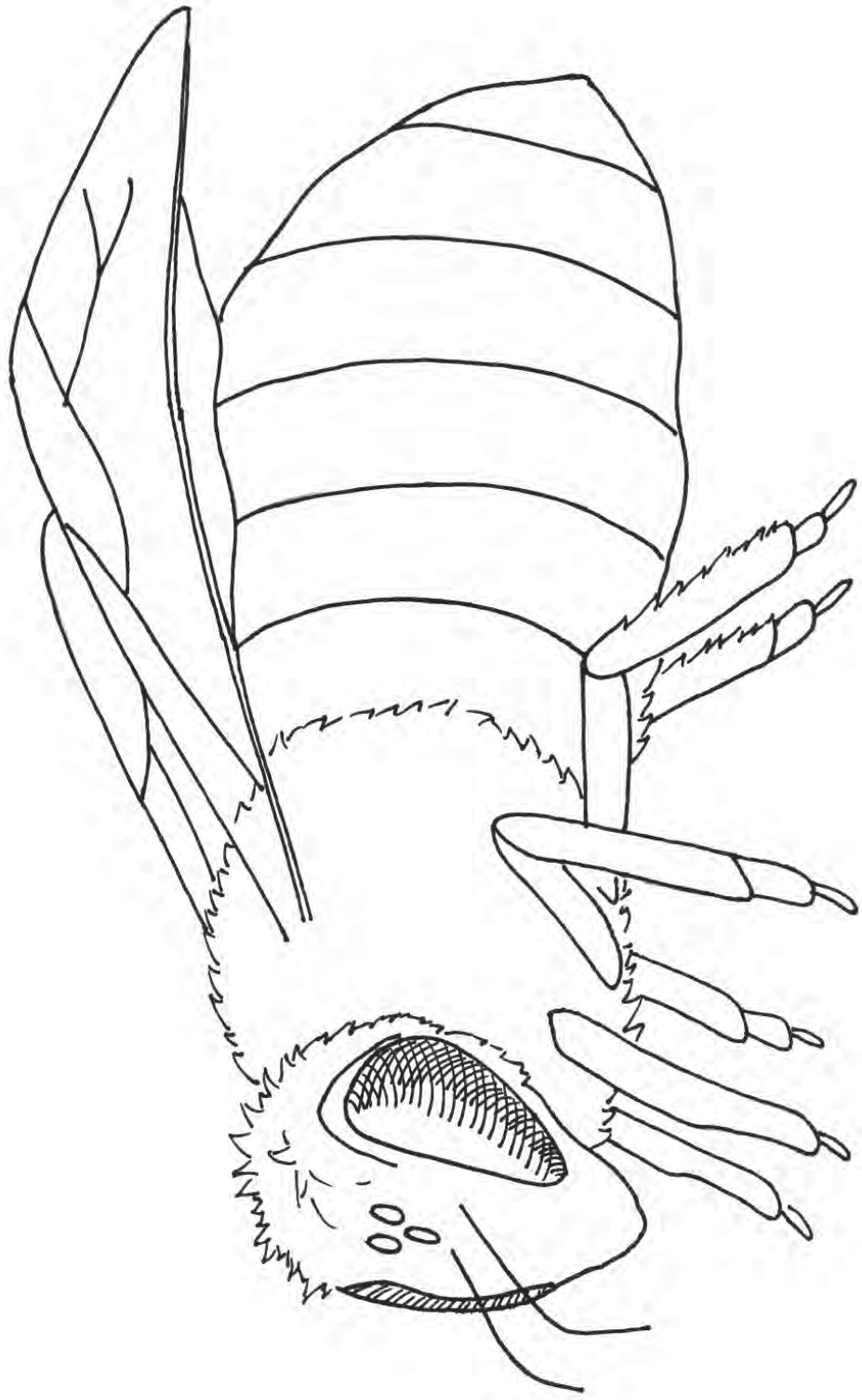
Color the flower pictured below to make it as beautiful as possible. Once you have finished coloring, cut along the dotted lines. Next, pick out one color of chalk and color the center of your flower. The chalk will represent the flower's pollen.



Name:_____ Date:_____

ACTIVATION POLLINATION!

Color the honey bee pictured below. Can you remember what colors make a honey bee? After you have colored your bee, cut along the dotted lines.



WHAT KEEPS A BEEKEEPER BUSY?

WHAT KEEPS A BEEKEEPER BUSY?

OVERVIEW:

BISSY BEE

Hi Kids, Bissy Bee here again. Have you ever wondered where exactly bees live?

Well, so far you have learned that bees live in hives, ***but where do you find these hives?*** In nature, bees like to make their hives in quiet dark places where they will be protected and not be easily disturbed. That is why **feral**, or wild, honey bees often select places in the woods like old hollowed out trees. Sometimes they may even choose to establish a nest in attics or walls of houses. For honey bees, these all seem like excellent safe places to make their home. However, most people don't want bees living in their walls and they don't want to waste all the honey that is produced in these unmanaged wild hives.

That is why people interested in extracting the tasty honey out of the hives had to design equipment and develop methods for 'keeping' bees, or managing them. These are the people we refer to as **beekeepers**.

Hundreds of years ago, beekeepers started making man-made hives, which allowed them to closely observe the bees. Now that we know more about how bees live, we can help protect them, and harvest their honey and other important products.

Honey bees live in large groups or colonies that have anywhere from 40,000 to 60,000 bees. Colonies that are looked after by beekeepers are called **managed hives**. These managed hives are kept in protective wooden boxes and placed near flowering plants and trees that the bees like, and also in locations near plenty of water. Areas like this are called bee yards or **apiaries**. The bee yards act as a safe haven where the bees can fly around and get everything they need close to their hive.

Inside the man-made bee boxes are wooden frames that are sandwiched together. This structure allows worker bees to attach the six-sided cells, that are formed by the wax they produce, onto the surface of the frames, creating a honeycomb. ***Do you know what a six-sided geometric shape is called?***

BISSY'S NEWS:

Beekeeping is considered the oldest form of agriculture. People have been keeping bees for 3000+ years!

SUNSHINE STATE STANDARDS:

Students will:

- Understand that people, alone or in groups, invent new tools to solve problems and do work that affects aspects of life outside of science.
- Know that a successful method to explore the natural world is to observe and record, and then analyze and communicate the results.

OBJECTIVES:

Students will learn:

- The difference between feral and managed bees
- The basic structure of a beehive
- What beekeepers do and the equipment they use
- How beehives are moved around to help pollinate crops

VOCABULARY:

Feral
Beekeeper
Managed hive
Apiary
Hexagon
Pheromone

A six-sided geometric shape is called a **hexagon**; this is the shape of the honeycomb. Bees are very accomplished architects and they make the honeycomb a hexagon because it is the strongest and largest shape. The cells of the honeycomb are designed for storage and each houses something different. Located in the center of the honeycomb is an area reserved for the nursery, where the developing bees are kept. Here, the young bees are protected from dangers and changing weather conditions. Just outside the nursery is where the pollen is stored, so that the young can be easily fed. Meanwhile, honey is kept around the outer area of the honeycomb. The frames can then be carefully lifted out by the beekeepers in order to gain access to the bees without causing them harm.

WORKER BEE FEEDING LARVA (BABY BEE)

For the beekeeper to do a good job, he or she must be prepared and have the correct equipment. The first thing a beekeeper needs is a bee suit. This suit covers his/her body and closes tightly around the wrists and ankles so that bees do not accidentally fly into the beekeeper's clothing. Next. he/she needs gloves and a veil. The gloves help protect the beekeeper's hands as they pull out the frames that contain the honeycomb. The veil is also very important because it covers the beekeeper's entire head so that bees cannot sting the beekeeper's face.

The next piece of important equipment that a beekeeper needs is a smoker. The smoker is a small cone-shaped tool that is often made of copper. Attached to it is what is called a fire box, where items such as pine straw, grass, and burlap are put to burn as fuel and produce smoke. The smoke helps calm the bees. Only a little smoke is needed to cover up the bee's alarm **pheromone**. A pheromone is a chemical odor produced by animals that triggers a response from the same species – think of it like a perfume that a human might wear to attract another human. In bees, this scent signals other bees to come to their aid with their stingers ready because they are in danger. Therefore, instead of becoming panicked, the bees relax and are less likely to sting. Once the bees are calm, the beekeeper is able to easily harvest the honey and other products from the hive.

SMOKER

Beekeepers have many jobs to do to keep their hives healthy. For one, in Florida they register their bees with the Florida Department of Agriculture & Consumer Services who comes out and inspects the hives for harmful pests and diseases. Another important job that beekeepers do is moving the hives around to different areas to help pollinate different crops at different times of the year. Florida beekeepers may place their managed bee colonies in orange groves, melon or blueberry fields throughout the year. And at other times, many Florida beekeepers may move their managed bee colonies temporarily to other states to pollinate crops, such as to California to help pollinate almond trees.

Beekeeping is a not an easy job, but the many benefits of producing healthy hives make the hard work worthwhile.

Next time you taste some honey, think about what you've learned about busy bees and their hardworking beekeepers.

END OF LESSON C

Lesson C:

Vocabulary

api· ary: (noun) - a place where bees are kept; especially**:** a collection of hives of bees kept for their honey

bee· keep· er: (noun) - a person who raises bees

fe· ral: (adjective) - having escaped from domestication and become wild

hexa· gon: (noun) - a polygon of six angles and six sides

man· age: (verb) - to make and keep under one's control**: (handle)**

pher· o· mone: (noun) - a chemical substance (as a scent) that is produced by an animal and serves as a signal to other individuals of the same species to engage in some kind of behavior

LESSON C:

Name:_____ Date:_____

KNOW - WANT - LEARN

Know – Want – Learn (KWL)

KWL is a teaching technique created by Ogle (1986) to develop independent learning.

Please complete the first two columns “K and W” before the lesson and then complete column “L” after the lesson.

K – list what you know about bees
W – list what you want to know about bees
L – list what you learned about bees

K What I know	W What I want to know	L What I learned

LESSON C:

Name:_____ Date:_____

WORD MATCH

a. honey bee
b. manage
c. pollinate
d. pheromone
e. honeycomb
f. larva
g. apiary
h. hexagon
i. hive
j. beekeeper
l. feral
k. colony

_____ a place where beehives are placed near flowers and water

_____ a person who raises bees

_____ a population of plants or animals in a particular place that belong to one species

_____ having escaped from domestication and become wild

_____ a polygon of six angles and six sides

_____a container for housing honey bees

_____a bee that produces honey and lives in colonies

_____ a mass of six-sided wax cells built by honey bees in their nest to contain young bees and stores of honey

_____ a young wingless often wormlike form that hatches from the egg of many insects

_____ to make and keep under one's control

_____ a chemical substance (as a scent) that is produced by an animal and serves as a signal to other individuals of the same species to engage in some kind of behavior (as mating)

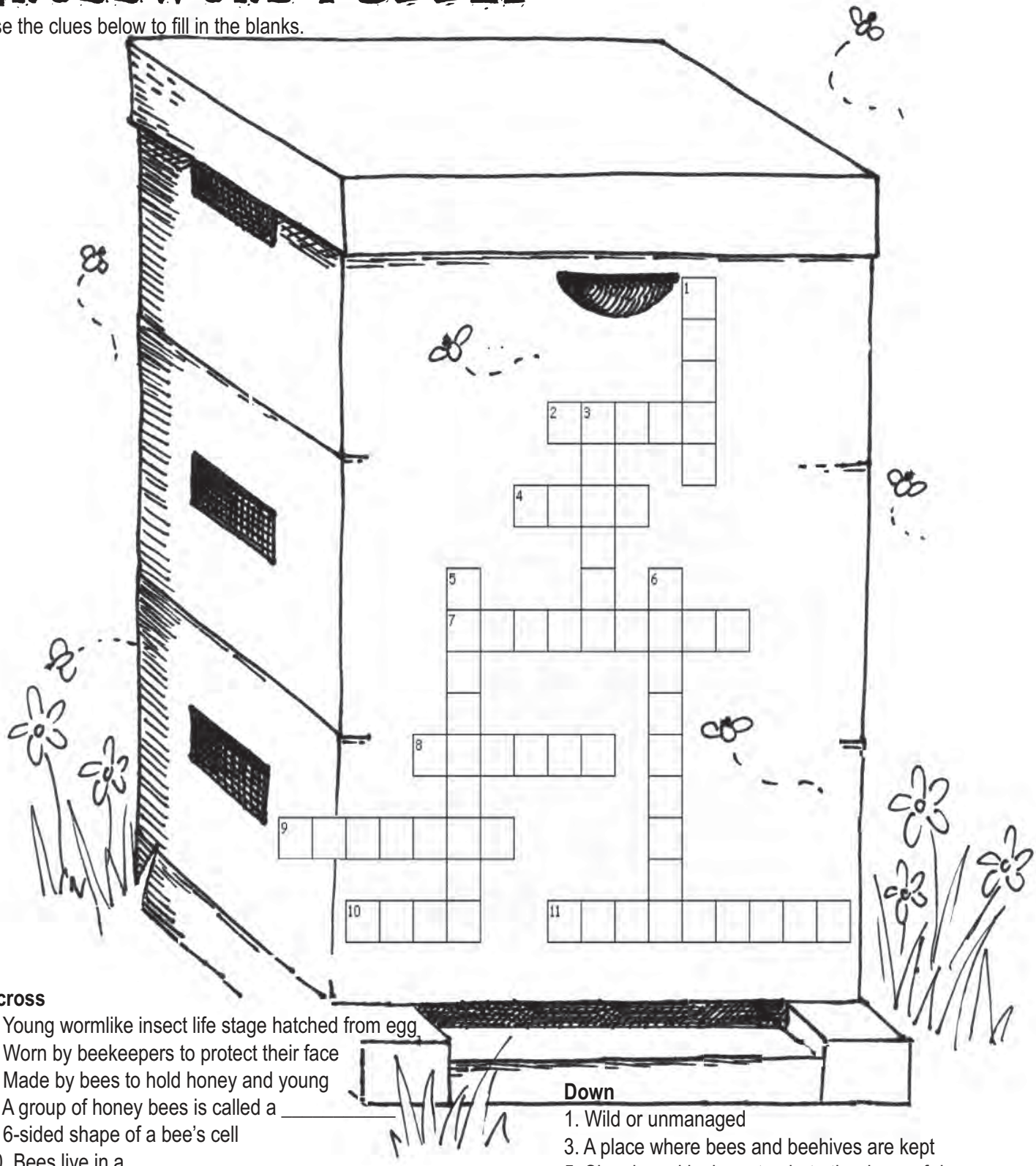
_____ to mark or smudge with pollen

LESSON C:

Name:_____ Date:_____

CROSSWORD PUZZLE

Use the clues below to fill in the blanks.



Across

2. Young wormlike insect life stage hatched from egg
4. Worn by beekeepers to protect their face
7. Made by bees to hold honey and young
8. A group of honey bees is called a _____
9. 6-sided shape of a bee's cell
10. Bees live in a _____
11. Insects that produce honey and pollinate flowers

Down

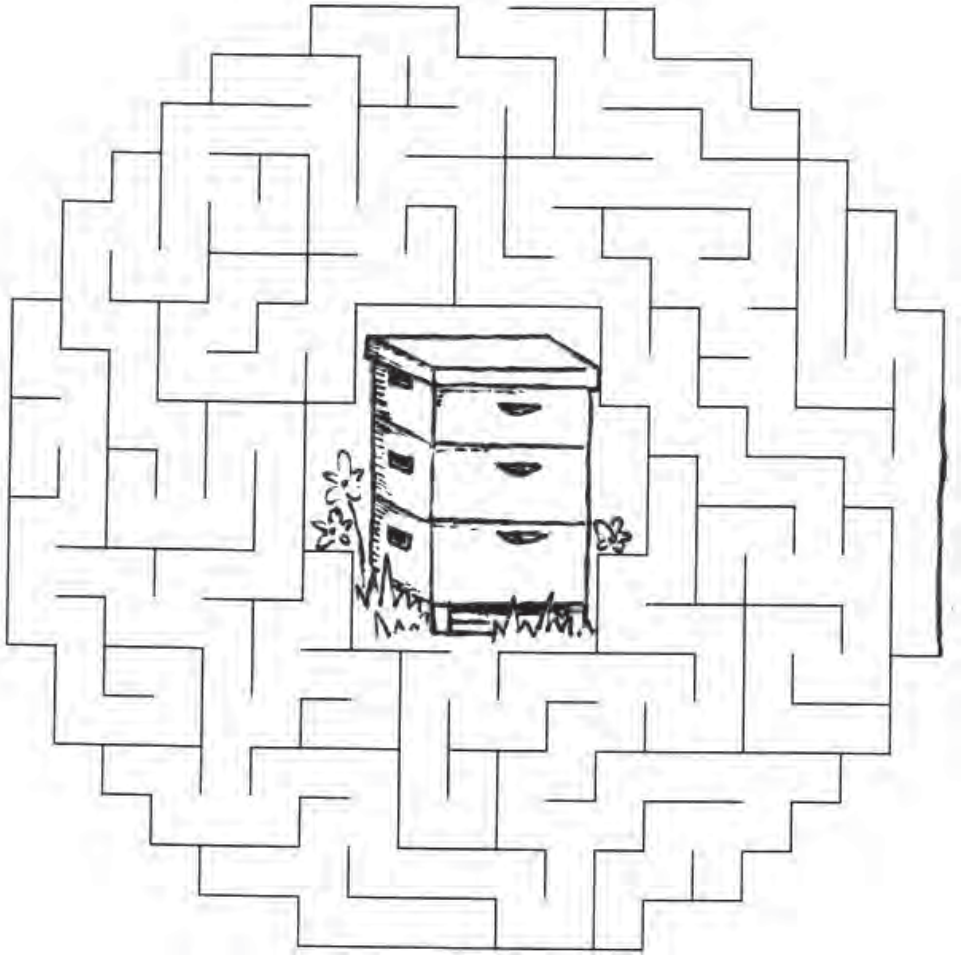
1. Wild or unmanaged
3. A place where bees and beehives are kept
5. Signal used by bees to alert other bees of danger
6. Bees _____ flowers

Created with Puzzlemaker on DiscoverSchool.com

Name:_____ Date:_____

Bee Maze

Help Bissy find her way back to the hive.



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LESSON D:

AFRICANIZED HONEY BEES

BEE AWARE OF YOUR ENVIRONMENT...

LOOK, LISTEN, AND RUN!

Africanized Honey Bees

Bee Aware of Your Environment...:

Look, Listen, and Run!

OVERVIEW:

Bissy Bee

Hi, it's me again, Bissy Bee. I've got some important information about one of my not-so-nice relatives, but don't worry, not all bees are mean.

People are often afraid of bees. Watch your classmates next time a bee accidentally flies into the classroom. ***How do they react?*** Some may get scared and swat at the bee. The best way to act is to leave the bee alone. If you swat at it or try to shoo it away, it might get mad or **defensive**.

Bees use their stingers when they feel threatened or fear that their hive, or their home, is in danger. Protecting the hive is their job.

This is why only beekeepers should try to handle bees, because they know how to work with bees without hurting them and without getting hurt themselves. Beekeepers have special equipment, called bee veils or bee suits that they use to protect themselves.

Bees are **beneficial** insects, because in addition to making honey, which is used in all kinds of food and medicines, they also pollinate plants which help grow the fruit, vegetables and nuts we love to eat. When a bee lands on a flower, its legs brush against the flower's pollen sacs, and when the bee flies away it carries the pollen stuck on its legs. When the bee lands on another flower while looking for nectar (a sugary-liquid inside the flower), the pollen that is stuck on its legs falls out onto the flower, and pollination is underway. Fruits and vegetables like watermelons, cucumbers, squash and most of our blueberries and strawberries, are all plants that are pollinated by honey bees. Pollination provided by honey bees is responsible for 1/3 of the food we eat.

Above, and in previous lessons, you learned how important honey bees are. The honey bee most often used by beekeepers in managed colonies is the European honey bee.

Now it's time to learn about a relative of the gentle European honey bee. The relative, that recently became **established** in Florida, is a very defensive or grumpy cousin of the European honey bee. It is called the African honey bee because it originated in Africa.

Grizelda, The Grumpy Bee

Bissy's News:

Honey bees fly as fast as 15 miles per hour. Track stars run about as fast.

Sunshine State Standards:

Students will:

- *Know that all living things must compete for earth's limited resources - organisms best adapted to compete for the available resources will be successful and pass their adaptations (traits) to their offspring*
- *Understand that changes in the habitat of an organism may be beneficial or harmful*
- *Recognize the use of comparison and contrast in a text*
- *Recognize cause and effect relationships in literary texts*

Objectives:

Students will learn to:

- *Explain the importance of managed honey bees*
- *Describe the differences between Africanized and European honey bees*
- *Discuss why the statement "Bee Aware…Look, Listen and Run" is a good motto for the Africanized honey bee education program*
- *Explain what to do if he or she is attacked by bees*

Vocabulary:

Defensive
Beneficial
Established
Africanized honey bee
Hybrid
Swarm
Pheromone

In the 1600's, soon after our country was founded, subspecies of European honey bees were brought to America from Europe by early settlers. They are the honey bees beekeepers in the U.S. use. Fast forward 350 years to the 1950's when the African honey bee was brought from Africa to Brazil for an experiment to see how it would perform in the sub-tropical Brazilian climate. This subspecies of honey bee can work more efficiently in hotter temperatures than their European cousins can. The scientists who brought the African honey bees to Brazil knew these bees were more defensive than the Euro-pean honey bees, but hoped when they mated with the European bees, they would become less defensive.

What actually happened in that experiment in Brazil was that some of the African bees escaped, mated with European bees and became a **hybrid** bee, part European and part African. Now they are called **Africanized honey bees**. These Africanized honey bees spread through-out South America, into Central America, and in the 1990's they were discovered in the United States in Texas. In 2002, they were found in Florida. Now they are here to stay, and we have to learn how to live with them.

Why should we care if they are Africanized honey bees or the regular European honey bees with which we are familiar? We should care because Africanized honey bees can be dangerous to humans and animals, and we need to learn what to do to avoid being stung. Let's discuss some of the characteristics of these different subspecies of honey bees.

To the average person, Africanized honey bees look identical to the more gentle European honey bee. Only scientists can tell the difference. One difference is the Africanized bees have slightly smaller wings than do the European bees.

Other similarities include: they both produce honey; pollinate plants; **swarm**, or reproduce by moving to another location to start a new hive; and they both have a queen, workers and drones in their hives.

Africanized honey bees swarm, or reproduce, considerably more times per year than do European honey bees. When you see many bees moving together in a swarm, they are usually looking for a new home. They are not dangerous during this time because they have not established a home yet to defend. But no matter what the bees are doing, if you see a large group of bees, always stay away from them - go inside and tell an adult what you have seen.

Unlike the European honey bees which prefer to build nests in larger dry places up off the ground, the Africanized honey bees will build a nest just about anywhere – in small holes around the outside of your house, in old tires, flower pots, bird nests, water meter boxes, barbecue grills, in the ground or in hollowed-out tree trunks.

If they feel threatened, Africanized honey bees will send out multiple scouts from the nest to investigate. If those bees sting a person or animal they perceive as a threat, they will emit a pheromone, or odor, that will signal its hive mates to come and attack.If that scout stings a person or animal they perceive as a threat, they will emit a pheromone, or odor, that will signal its hive mates to come and attack. As many as 60,000 bees live in a nest and many of them could come out to attack. They have been known to chase people or animals for up to a quarter of a mile which is more than the length of three football fields (mile is 5,280 feet; quarter of a mile is 1,320 feet; foot-ball field is 360 feet in length).

Because the Africanized honey bees are so defensive, they will defend their nests if they think someone or something is threatening them.

CALLING ALL BEES!

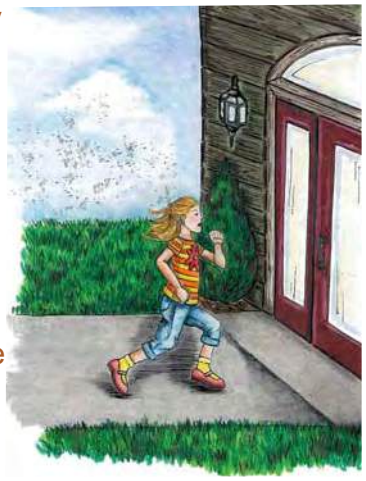
That 'someone' might be you or your family playing in the backyard or in a public park; it may be a landscaper mowing a yard; or it might be a utility worker checking the meter boxes. The Africanized honey bees also don't like loud vibrating noises like lawn mowers, leaf blowers or chain saws. They have excellent senses of sight and sound that they use to detect potential threats.

So what can you do to avoid encounters with Africanized honey bees? The Florida Department of Agriculture & Consumer Services recommends that you follow this advice: **Bee aware of your environment . . . look, listen and run.**

LOOK: Tell your parents, and you can help them too, to look around your house and yard regularly to see if there are any signs of bees establishing a nest. You would see bees coming and going from a hole in your house or from a wood pile or the other items or places we talked about earlier. **LISTEN:** While you're looking, also listen for any buzzing that might help you see where bees or other insects might be nesting.
If you see bees or other insects and it looks like they have established a nest, tell your parents or another adult to contact a licensed pest control company or a registered beekeeper right away to remove the nest. Do not try to remove or disturb a nest yourself – it could be very dangerous. Your parents or teachers should not try to remove nests themselves either because of the danger.

Now, what if you get attacked by bees or other stinging insects, what do you think you should do? That's right, **RUN!** The best thing you can do is run as fast as you can inside your house or a building. If you can, while you're running, cover your nose and mouth, because the bees are attracted by the air that comes out of these areas. Do not jump in a pool to avoid the bees. They will just hang around and wait for you.

The Africanized honey bees will also attack animals. Protect your pets and livestock by asking your parents not to leave animals tied up in the yard. If these animals were to be attacked by bees, they would not be able to run away.



I looked, I listened, and I ran!

Follow the **look, listen and run** advice. Avoid Africanized honey bees just like you do other biting and stinging insects like fire ants, yellow jackets, spiders and snakes. It doesn't mean they are bad, they just defend themselves in ways that could hurt you. Avoid them and they should leave you alone too.

Share this information with your parents and make a plan for regularly checking your house or anywhere you are outdoors for possible Africanized honey bee nesting sites.

Remember that managed honey bee colonies that are cared for by beekeepers contain more gentle bees, and they are providing the important pollination services that produce delicious fruits, vegetables and nuts. Honey bee hives managed by beekeepers can even discourage the establishment of Africanized honey bees in an area, because when an Africanized honey bee comes along and sees an area is already occupied by other bees, it will often just move on to another location.

So when you see those white bee boxes in fields, you'll know that busy bees are hard at work pollinating plants and making honey and other important products in their hives.

End of Lesson D

Lesson D:

Vocabulary

Af· ri· can· ized honey bee: (noun) - a hybrid sub-species of honey bee (African and European) that is more defensive and will defend their hive in large numbers

ben· e· fi· cial: (adjective) - producing results that are good for health and happiness

de· fen· sive: (adjective) - serving to defend or protect

es· tab· lish· ed: (verb) - to be settled in a new area

hy· brid: (noun) - an offspring of parents with different genes especially when of different races, breeds, species, or genera

pher· o· mone: (noun) - a chemical substance (as a scent) that is produced by an animal and serves as a signal to other individuals of the same species to engage in some kind of behavior

swarm: (noun) - a group of honey bees who leave their hive to look for another location to build a new hive

LESSON D:

Name:_____ Date:_____

KNOW - WANT - LEARN

Know – Want – Learn (KWL)

KWL is a teaching technique created by Ogle (1986) to develop independent learning.

Please complete the first two columns “K and W” before the lesson and then complete column “L” after the lesson.

K – list what you know about bees
W – list what you want to know about bees
L – list what you learned about bees

K What I know	W What I want to know	L What I learned

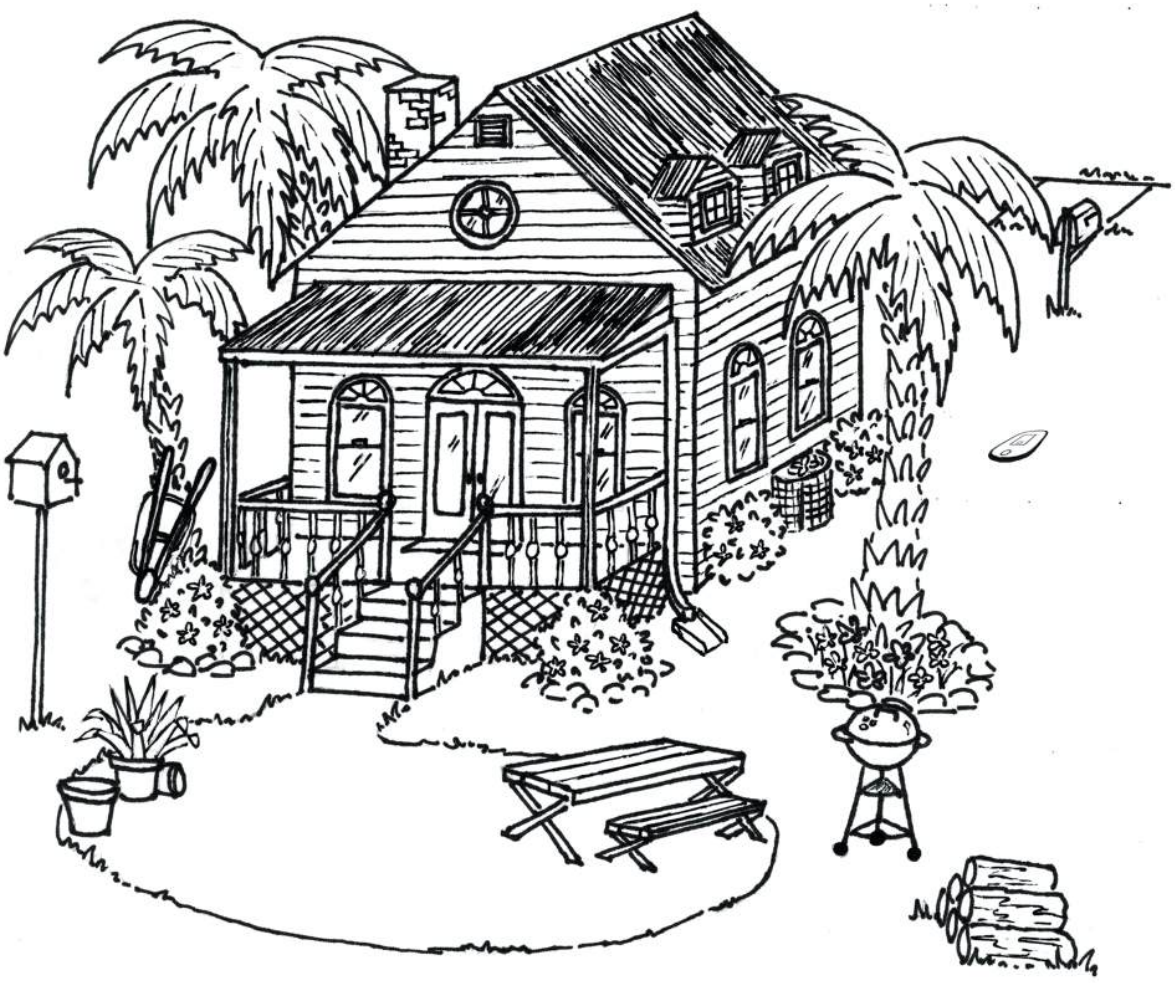
LESSON D:

Name:_____ Date:_____

WHERE BEES MIGHT BE

Africanized honey bees are not very picky when it comes to selecting a nesting site. Below is an illustration that contains some of the places bees might chose to make their home. List as many places as you can find in the picture below where bees may make their homes.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____



LESSON D:

Name:_____ Date:_____

WHAT IS NOT A HONEY BEE?

Cut out the flash cards along the dotted lines. Use cards to memorize each insect's name and description.

LESSON D:

Name:_____ Date:_____

WHAT IS NOT A HONEY BEE?

Cut out the flash cards along the dotted lines. Use cards to memorize each insect's name and description.

yellow jacket - social wasp, black bands on yellow abdomen, build exposed nests or underground nests, will sting to defend their nest, can sting multiple times

bumble bee - found world-wide, large and hairy, usually black with wide yellow bands, build nests in the ground or in abandoned bird nests, live in organized groups with queens, workers and drones

carpenter bee - resemble bumble bees in size and color, but do not have hair on their abdomen and appear shiny, make nests in wooden structures or tree limbs, females rarely bite and male (non-stinging)may fly at anyone who approaches their nest

horse fly - range in size, iridescent eyes, strong fliers, usually found in wooded wet areas, may cary animal diseases, females bite may be painful

deer flies - similar to horse fly, but smaller and different wings

yellow fly - looks like a deer fly, clear wings, bright blue-green eyes, black fore-wings and others are yellow, yellow abdomen, black hair on the sides with a yellow hair stripe down the middle, females bite while males gather pollen and feed on nectar

paper wasp - construct nests out of paper type material, black, brown or red in color with yellow markings, live in a colony, feed on insects

leaf cutter bee - native pollinator, black in color, about the size of a honey bee, females carry pollen on their abdomens, make nests out of cut leaves, solitary bee

baldface hornet - type of yellow jacket, black with white head, make large aerial nest, may sting multiple times, eat insects attracted to sugar - plants or sweet food items

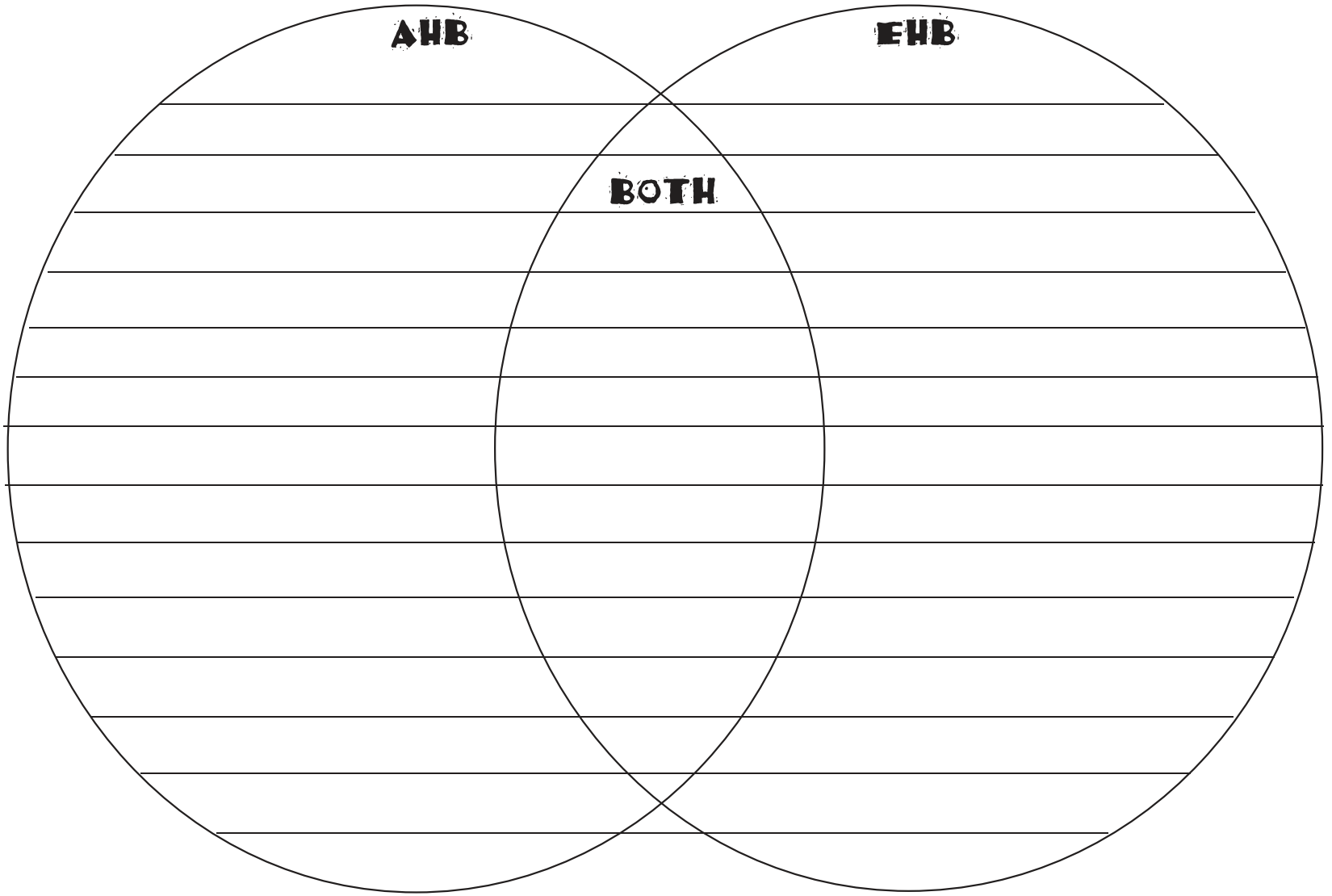
larra wasp - solitary wasp, not aggressive, parasatoid to the mole cricket, black with red abdomen, silver marking on the head, feeds on many types of flowers

LESSON D:

Name:_____ Date:_____

COMPARE AND CONTRAST

Use the Venn diagram below to compare and contrast the similarities and differences between Africanized honey bees and European honey bees. Fill in the section labeled AHB with everything that makes Africanized honey bees different from European honey bees, then do the same for the other side labeled EHB. In the middle section where the circles overlap, fill in the similarities between the two kinds of honey bees.

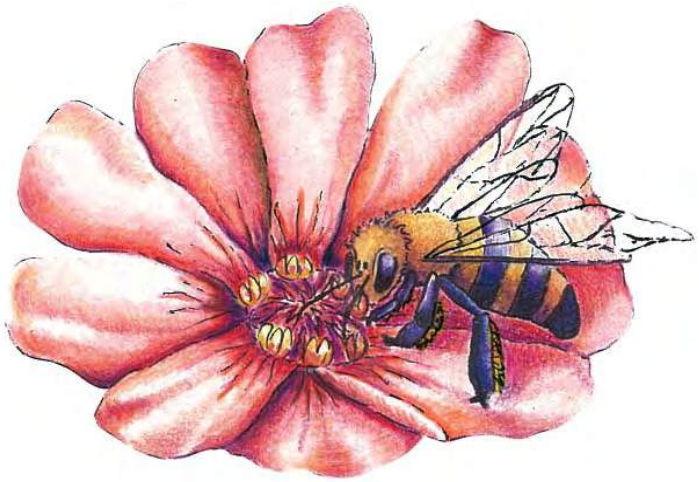


LESSON D:

Name:_____ Date:_____

WORD MATCH

a. honey bee
b. pollen sac
c. pheromone
d. insect
e. beekeeper
f. nectar
g. hive
h. pollinate
i. beneficial
j. hybrid
k. defensive



_____ a person who raises bees

_____ producing results that are good for health and happiness

_____ resisting or preventing attack

_____ a container for housing honeybees

_____ a bee that produces honey and lives in colonies

_____ an offspring of parents with different genes especially when of different races, breeds, species, or genera

_____ any of a class of arthropods with the body clearly divided into a head, thorax, and abdomen, with three pairs of jointed legs, and usually with one or two pairs of wings

_____ a sweet liquid given off by plants and especially by the flowers and used by bees in making honey

_____ one of the pouches of a seed plant anther in which pollen is formed

_____ to mark or smudge with pollen

_____ a chemical substance (as a scent) that is produced by an animal and serves as a signal to other individuals of the same species to engage in some kind of behavior (as mating)

Division of Plant Industry
(352) 395-4700

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Gainesville, Florida 32614-7100

1911 S.W. 34th Street
Gainesville, Florida 32608

Florida Department of Agriculture and Consumer Services

Dear Parent or Guardian:
Your child participated in a Florida Department of Agriculture and Consumer Services' curriculum, "*What's the buzz on bees*." The lessons covered the biology of honey bees and flowers, the history of bees in the US, and the important role bees play in agriculture. One section of the material covers a species of honey bee called Africanized honey bees. These honey bees are more defensive than the average honey bee in Florida. It is important for your family to learn about Africanized honey bees because they are now established in our state. These bees have already caused problems for Florida residents because they can nest in unusual places around your house and yard, and can sting in larger numbers when they feel their hive is threatened.

Africanized honey bee facts

- Look similar to the more common gentle European honey bees
- Defend their homes or hives if they feel threatened
- Despite their defensive nature, they can provide beneficial pollination services
- Can cause harm like many other Florida insects, such as fire ants and yellow jacket wasps

Since it is hard to tell bees apart, the Florida Department of Agriculture and Consumer Services wants you to **Bee Aware of your Environment … Look, Listen and Run.**

Look, Listen

- The most important thing you can do is be aware of your surroundings
- Stay alert when working or playing in your yard or in natural areas
- Look for bees before you or your family use power tools or lawn mowers
- Be careful around possible nesting sites such as wood piles, bird houses, flower pots, and barbecue grills
- Walk away and stay away if you see an insect nest or a swarm of bees

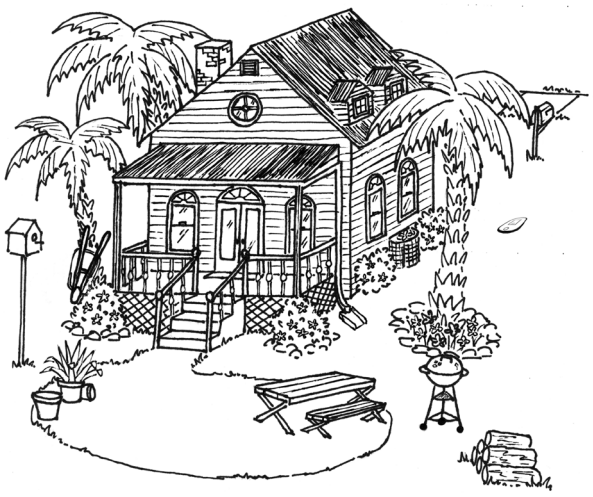
Run

- Run away and get inside a house or building; bees will chase people and animals up to 1/4 mile
- Do not attempt to remove a feral honey bee nest yourself. Call a licensed pest control operator to perform an eradication or a registered beekeeper to perform a live bee removal
- If stung, remove stinger by scraping it out with a fingernail or card
- If you are stung and have a reaction, call for medical help
- Respect all bees and insects

Another important thing to do to protect your family is bee proofing your home. Remove places where bees could build a nest.

Bee proofing your home

- Seal any cracks or holes in your home that are over 1/8 inch
- Put fine gauge screen over open areas
- Remove anything that could be a potential nesting site – empty flower pots, old tires, grills
- Inspect around your home often to make sure no bees have built nests, bees can build nests very quickly and in Florida, they are active most of the year
- If you see a feral honey bee nest, do not attempt to remove it yourself. Contact a licensed pest control operator to perform an eradication or a registered beekeeper to perform a live bee removal



FIND PLACES WHERE BEES COULD NEST.

Please review this information with your family. Remember, Bee Aware of Your Environment … Look, Listen and Run. Visit FDACS.gov or contact our helpline at 1-888-397-1517 for more information.

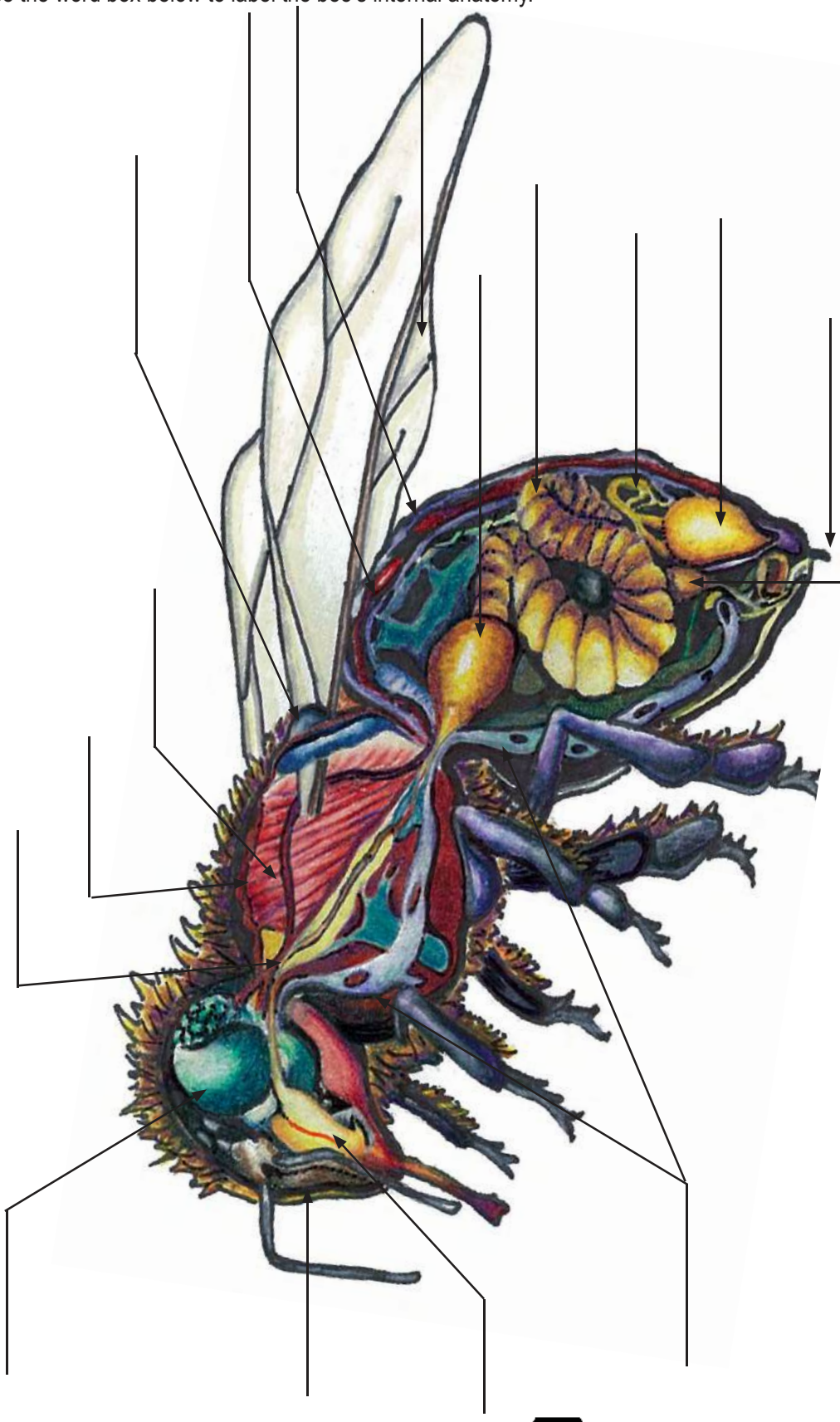
Bonus Activities

BONUS ACTIVITY:

Name:_____ Date:_____

IDENTIFY THE BEE PARTS! (PAGE 1 OF 2)

Use the word box below to label the bee's internal anatomy.



INTERNAL ORGANS

Word Box

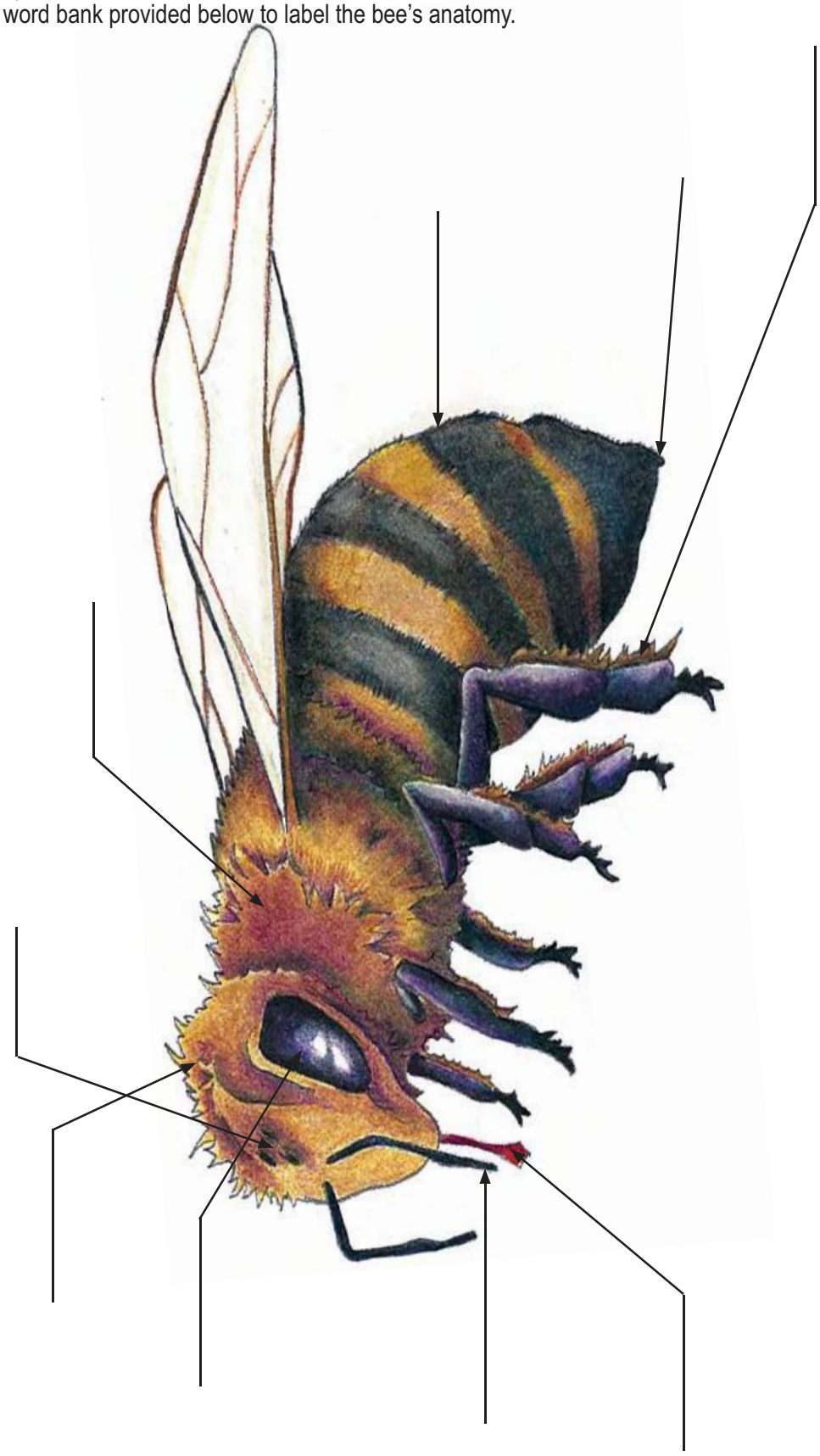
- Brain
- Pharynx
- Glossa
- Nerve ganglia
- Salivary gland
- Poison sac
- Aorta
- Stinger
- Wing muscles
- Rectum
- Air sacs
- Honey stomach
- Chambers of dorsal vessel
- Cell
- Stomach
- Respirator muscle
- Small intestine

BONUS ACTIVITY:

Name:_____ Date:_____

IDENTIFY THE BEE PARTS! (PAGE 2 OF 2)

Use the word bank provided below to label the bee's anatomy.



EXTERNAL

Word Box

Thorax
Abdomen
Antenna
Stinger
Pollen baskets
Proboscis
Head
Compound eyes
Simple eyes

BONUS ACVTIVITY: Name:_____ Date:_____

BISSY BEE TRIVIA

Answer the questions below for extra bee knowledge.

What do baby bees eat?

Where is honey stored by bees?

When a worker bee finds a good source of food, how does she tell the hive?

Why are honey bees called social insects?

How many times can a worker honey bee use its stinger?

What is the male part of the flower called where the pollen is developed and contained?

What foods use honey as an ingredient? Name one.

Where are bees and beehives kept?

What are two important jobs of honey bees?

If you are outside and hear buzzing of bees, what do you do?

How should you remove a stinger?

Name at least three jobs of a worker bee.

How many sides do a cell of a honeycomb have?

What are some products of the hive?

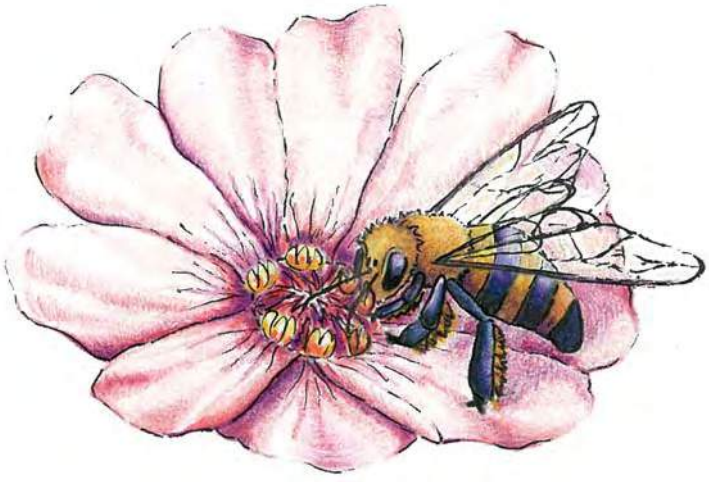
What attracts bees?

What kind of animal is a honey bee?

How many kinds of insects are there?

What insects are usually mistaken for bees?

What is the largest honey bee? Is it the worker, drone or queen?



Bonus Activity:

Make Your own Bissy Bee (page 1 of 3)

Teacher's Instructions:

To help gain a better understanding of the anatomy of a honey bee and to further discussions about the importance of honey bees, have students construct their own Bissy Bee using the homemade clay recipe attached to this activity.

Materials:

- Homemade clay
- Black pipe cleaners
- Scissors
- Wax paper
- Yellow and black acrylic craft paint
- Wire
- Paint brushes
- Drinking straws
- Fishing line or string
- Glue
- Pencils or pens
- Water jars
- Paper plates
- Paper towels
- Hot glue gun and glue sticks (for teacher)
- Clear acrylic sealer spray (optional)

Clay honey bee - approximate size 6" long

Construction Steps:

1. The night before, follow the attached recipe to make the clay for your students' honey bees. Once you have made the clay, store it in a zip lock bag. This will keep for a few days before it starts to dry out. To save time, divide the clay up ahead of time and put an equal amount in each bag.

2. Once the students have received their clay, have them start to make the three different sections of the bee (the head, thorax, and abdomen).

3. Once they have done this, help them insert the drinking straw through the bee. First start with the head and slowly move through the rest of the body. This will help hold the bee together. The straw should not be visible when you are done and may have to be trimmed depending on the size of the bees.

4. After the straw has been inserted, use another straw to poke six holes, three on each side of the thorax, so that pipe cleaners can be inserted later for legs. And for the *piece de resistance*, the stinger, have them poke a hole at the back tip of the bee for the insertion of a small piece of pipe cleaner. Discuss with the class that Bissy is a worker bee, and remind them that worker bees are female who have stingers, while the made drones do not.

BONUS ACVTIVITY:

MAKE YOUR OWN BISSY BEE (PAGE 2 OF 3)

5. A small paperclip can also be inserted into the bee's thorax, leaving just the loop exposed. This will allow students to tie string or fishing line to the loop so that their bees can be suspended for display. Next, two small pieces of wire or pipe cleaners can be inserted into the head to represent the bee's antennae.

6. Now that these first steps are done, leave the clay honey bees out to dry for several days. Depending on the size, it can take a matter of days. To speed up the drying process, flip the figures over after a day so that the bottom can dry. Once the honey bees are completely dry they will be quite hard and students may begin painting.

7. As students begin painting their bees, remind students how honey bees look by showing them pictures. Another good option is to make a model honey bee before the activity so that students can refer to it as an example. Paper plates may be used as palettes - they help keep the two colors separate. Once students have painted the body, they will need to paint the honey bee's two sets of eyes. Remember that they have two large compound eyes and three tiny simple eyes. Once painted, leave the bees out to dry, and then later have the students paint the underside of them since all sides will be visible. Because acrylic craft paint is being used, it should be dry to the touch in a few hours. This process can be sped up by placing a fan in front of the figures.

8. While the paint is drying, give each student a piece of wax paper so that they can make wings. Have the students fold the piece in half and draw a wing on it with pencil. To simplify this, teachers can make a pattern for students to trace. Then once the wing has been drawn, cut the wing out with scissors. Having folded the wax paper in half, students should now have a pair of matching wings. Next use a pencil or pen to draw on the wax paper to create the sections on the wings.

9. Now that their honey bees have wings, pass out pipe cleaners for students to use as legs and the stinger. The pipe cleaners will need to be cut down to the right size or they can be pre-measured.

10. After the bees are completely dry, have the students put a drop of glue in each hole along the side of the bee and back of the bee and insert the pipe cleaner legs and stinger. Next place two drops of glue on the back of the thorax to attach the bee's wings. In case the glue isn't sticking well, teachers can attach these parts quickly using a hot glue gun. Now students have a realistic 3-dimensional model of a honey bee.

CONCLUSION:

Once the students have finished making their honey bees, have them identify the honey bees' body parts. Also, provide a copy of the clay recipe for students to take home so that they can try making more clay at home with an adult. Teachers should also consider displaying the model bees in their classrooms for the students to enjoy as they continue to learn about honey bees.

BONUS ACVTIVITY:

Make Your own Bissy Bee (page 3 of 3)

Homemade Clay Recipe

Ingredients:

- 2 cups salt
- 2/3 cups water
- Saucepan
- 1 cup cornstarch
- ½ cup cold water

Directions:

1. Stir salt and water into a saucepan over heat for 4-5 minutes.
2. Remove from heat and add cornstarch and cold water.
3. Stir mixture until smooth and then return to heat and cook until mixture thickens.
4. Allow the clay to cool. Now the clay is ready to be used.
5. Once the desired shape has been made, leave the clay object out to dry.
6. After the clay shape is completely dry, it may be decorated as desired.
7. Once done, finish it with a clear acrylic spray if desired. This will help protect it so that it may last longer. All unused clay may be stored in a zip lock plastic bag or Tupperware container for a few days.

Yields 3 large honey bees

APPENDICIES

Glossary
Additional Teacher Resources
Information Sources
Activity Answer Sheets

VOCABULARY

GLOSSARY OF TERMS (PAGE 1 OF 3)

ab· do· men: (noun) - the hind portion of the body behind the thorax in an arthropod [1]

Af· ri· can· ized honey bee: (noun) - a hybrid species of honey bee (African and European) that is more defensive and will defend their hive in large numbers

an· ten· na: (noun) - one of a pair of slender movable organs of sensation on the head of an arthropod (as an insect or a crab) that are made up of segments [1]

an· ther: (noun) - the part of the stamen of a flower that produces and contains pollen and is usually borne on a stalk [1] (male section of a flower)

api· ary: (noun) - a place where bees are kept; especially**:** a collection of hives of bees kept for their honey [2]

bee· keep· er: (noun) - a person who raises bees [2]

bees· wax: (noun) a yellowish to grayish-brown moldable substance made by bees and used by them to make honeycomb [3]

ben· e· fi· cial: (adjective) - producing results that are good for health and happiness [1]

ca· lyx: (noun) - the group of leaves under the petals, each leaf of the calyx is referred to as a sepal [3]

col· o· ny: (noun) - a group of plant or animals that belong to one species (as of a colony of bees) [3]

com· pound eye: - one of two large eyes on the sides of a bee's head, which allows the bee to tell the difference between brightness and darkness, movement and color [3]

de· fen· sive: (adjective) - serving to defend or protect [2]

drone: (noun) - male bee whose sole purpose is to mate with the queen bee [3]

es· tab· lish· ed: (verb) - to be settled in a new area [3]

fe· ral: (adjective) - having escaped from domestication and become wild [1]

fer· til· ize: (verb) - to make fertile: as **a :** to cause the fertilization of; *also* **:** to unite with in the process of fertilization <a sperm *fertilizes* an egg> [1]

fil· a· ment: (noun) - the anther-bearing stalk of a plant stamen [1] (male section of a flower)

forage: (verb) - to make a search especially for food or supplies [1]

hexa· gon: (noun) - a polygon of six angles and six sides [2]

VOCABULARY

(PAGE 2 OF 3)

hive: (noun) - a container for housing honeybees **b:** the usually aboveground nest of bees **c:** a colony of bees [2]

hon· ey: (noun) - a thick sugary material prepared by bees from the nectar of flowers and stored by them in a honeycomb for food [1]

hon· ey· bee: (noun) - a bee that produces honey and lives in colonies; especially **:** a European bee widely kept in hives for the honey it produces [1]

hon· ey· comb: (noun) - a mass of six-sided wax cells built by honeybees in their nest to contain young bees and stores of honey [1]

hy· brid: (noun) - an offspring of parents with different genes especially when of different races, breeds, species, or genera [1]

in· sect: (noun) - any of a class of arthropods (as butterflies, true bugs, two-winged flies, bees, and grasshoppers) with the body clearly divided into a head, thorax, and abdomen, with three pairs of jointed legs, and usually with one or two pairs of wings [1]

lar· va: (noun) - a young wingless often wormlike form (as a grub or caterpillar) that hatches from the egg of many insects [1]

man· age: (verb) - to make and keep under one's control**: (handle)** [1]

nec· tar: (noun) - a sweet liquid given off by plants and especially by flowers and used by bees in making honey [1]

ova· ry: (noun) - the enlarged rounded lower part of the pistil of a flower in which seeds are formed [1] (female section of a flower)

pet· al: (noun) - one of the often brightly colored modified leaves that make up the corolla of a flower [1]

pher· o· mone: (noun) - a chemical substance (as a scent) that is produced by an animal and serves as a signal to other individuals of the same species to engage in some kind of behavior [1]

pol· len: (noun) - a mass of tiny particles in the anthers of a flower that fertilize the seeds and usually appear as fine yellow dust [1]

pollen basket: (noun) - a flat or hollow area bordered with stiff hairs on the hind leg of a bee in which it carries pollen to the hive or nest [1]

pollen sac: (noun) - one of the pouches of a seed plant anther in which pollen is formed [2]

pol· li· nate: (verb) – to mark or smudge with pollen [2]

pol· li· na· tion: (noun) - transfer of pollen from the anther to the stigma; important step in the development of seed plants[3]

VOCABULARY

(PAGE 3 OF 3)

pro· bos· cis: (noun) - a long tube-shaped bodily part (as the sucking organ of a butterfly) in the mouth region of an invertebrate [1]

prop· o· lis: (noun) - a sticky material that is collected by bees from tree buds and other plant parts. [3]

pu· pa: (noun) - a stage of an insect (as a bee, moth, or beetle) having complete metamorphosis that occurs between the larva and the adult, is usually enclosed in a cocoon or case, and goes through changes inside by which structures of the larva are replaced by those of the adult [1]

queen: (noun) - the fertile fully developed female of social bees, ants, and termites whose purpose is to lay eggs [1]

royal jelly: (noun) - a substance rich in vitamins and proteins that is secreted from glands in the head of honeybees and is fed to all very young larvae and to all maturing queen bees [1]

se· pal: (noun) - one of the specialized leaves that form the calyx of a flower [1]

sim· ple eye: (noun) - one of three eyes on the front of a honey bee's head, have a single lens, which allows the bee to focus on things at different distances [3]

sol· i· tary: (adjective) - growing or living alone**:** not forming part of a group or cluster [1]

sta· men: (noun) - an organ of a flower that consists of an anther and a filament and produces the pollen [1] (male section of a flower)

stig· ma: (noun) - the upper part of the pistil of a flower which receives the pollen grains and on which they start to grow [1] (female section of a flower)

sting· er: (noun) - a sharp organ of some animals (as bees or scorpions) that is used to wound, paralyze, or kill prey or an enemy by piercing and injecting a poisonous fluid [1]

style: (noun) - the extended part of the pistil with a stigma at its top [3]

swarm: (noun) - a group of honey bees who leave their hive to look for another location to build a new hive[3]

tho· rax: (noun) - the middle of the three main divisions of the body of an insect [1]

wax gland: (noun) - group of cells in a honey bee that produces beeswax, located under the abdomen of the worker bee [3]

work· er: (noun) - female member of a colony of honey bees that performs most of the work and protects the colony [3]

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(3) - Florida Department of Agriculture and Consumer Services Division of Plant Industry

WANT MORE INFORMATION?

Additional Resources

Florida Department of Agriculture and Consumer Services Division of Plant Industry
FDACS.gov/pi
1-888-397-1517

Africanized Honey Bee Information
Web site: www.fdacs.gov/Consumer-Resources/Health-and-Safety/Africanized-Honey-Bees
Brochures - Africanized Honey Bee (Spanish and English)
Bookmark - What is not a bee / Bee Aware of Your Environment
DVD - Africanized Honey Bees in Florida

Other Plant and Pest Information
Information on a plant and pest diseases, native plants, and exotic and invasive species.
Subject matter experts in plant pathology, entomology, and plant and apiary inspection and botany.
Home to the Florida State Collection of Arthropods, and collection of over 8.5 million pinned insects, is one of the largest in the country. The collection is open for school tours.

Coloring Book Downloads
www.fdacs.gov/Divisions-Offices/Plant-Industry/Plant-Industry-Publications

FDACS Kids' Corner Web page
www.fdacs.gov/About-Us/Publications/Marketing-Videos/For-Kids-Students-Teachers

University of Florida
www.ufl.edu

African Honey Bee Extension and Education Program (AFBEE)
htpp://afbee.ifas.ufl.edu

Florida Agriculture in the Classroom
http://flagintheclassroom.org/

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“Propolis.” Wikipedia. 29 May 2006 <http://en.wikipedia.org/wiki/Propolis>

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“Honey Bees.” Beebook. 2006. USDA Agricultural Research Service. 7 June 2006 <http://gears.tucson.ars.ag.gov/beebook/sec1/sec1.html>

“Africanized Honey Bees on the Move: Lesson Plans.” Gibson, Roberta and Janet Mitchell. The University of Arizona Research Project. U of Arizona. 2 May 2006 <http://ag.arizona.edu/pubs/insects.ahb/act25a.gif>

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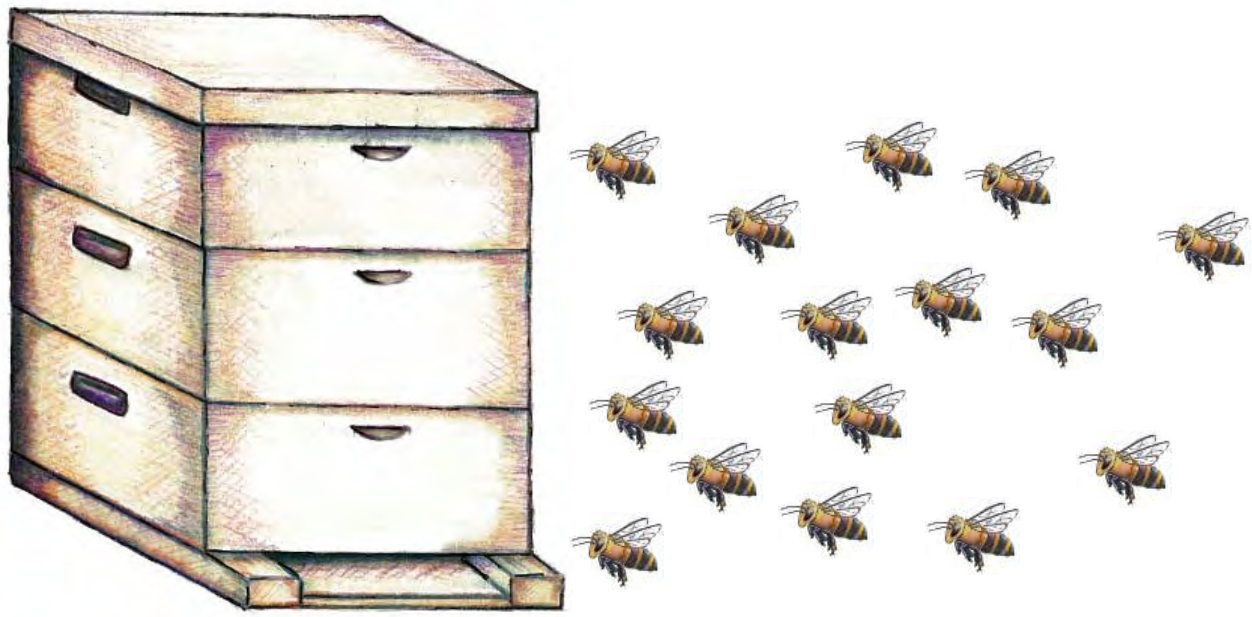
Puzzlemaker. <www.DiscoverSchool.com>

Activity Sheet 12 Africanized Honey Bees on the Move Lesson Plan. University of Arizona Africanized Honey Bee Education Project. <http://cals.arizona.edu/pubs/insects/ahb/act12.html>



LESSON A:

Name:_____ Date:_____

WORD MATCH

Match the vocabulary words with the definitions below.

a.	honey bee	i.	queen bee
b.	insects	j.	worker bee
c.	thorax	k.	drone
d.	abdomen	l.	pollen baskets
e.	pollination	m.	proboscises
f.	colony	n.	compound eye
g.	solitary		
h.	hive		

__e__ to transfer pollen from the anther to the stigma of a flower; important step in the development of seed plants

__c__ the middle of the three main divisions of the body of an insect

__h__ a container for housing honey bees

__i__ the female honey bee whose purpose is to lay eggs

__a__ a bee that produces honey and lives in colonies

__n__ an eye (as of an insect) made up of many separate visual units

__f__ a population of plants or animals in a particular place that belong to one species

__b__ any of a class of arthropods (as butterflies, true bugs, two-winged flies, bees, and grasshoppers) with the body clearly divided into a head, thorax, and abdomen, with three pairs of jointed legs, and usually with one or two pairs of wings

__j__ one of the members of a colony of bees that performs most of the labor and protective duties of the colony

__d__ the hind portion of the body behind the thorax in an arthropod

__l__ a flat or hollow area bordered with stiff hairs on the hind leg of a bee in which it carries pollen to the hive or nest

__k__ a male bee (as of the honey bee) that does not have a stinger and gathers no honey

__g__ growing or living alone : not forming part of a group or cluster

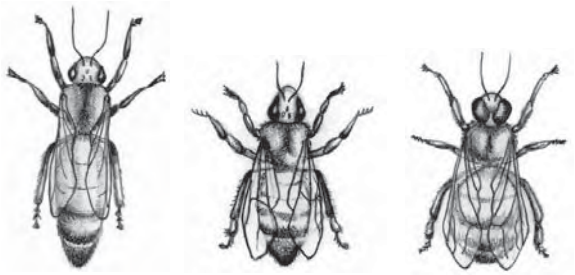
__m__ a long tube-shaped body part (as the sucking organ of a butterfly) in the mouth region of an invertebrate

LESSON A:

Name:_____ Date:_____

WHAT DO BEES DO?

The queen, workers and drones look very different and have different jobs in the hive. Identify each bee (queen, worker or drone) in the blank below and then list their jobs.



Queen	Worker	Drone
lays eggs	female	male
fed with a diet of royal honey	gathers pollen and nectar	mates with the queen to produce fertilized eggs
largest bee	cleans the hive	does not have a stinger
can use stinger multiple times	tends to the baby bees (larvae)	cannot survive without the colony
only one per hive	builds the hive	cannot feed himself
shiny thorax	cleans the hive	large compound eyes
can produce over 2,000 eggs per day	can use stinger only once	
	makes up the largest part of the hive	
	simple and compund eyes	

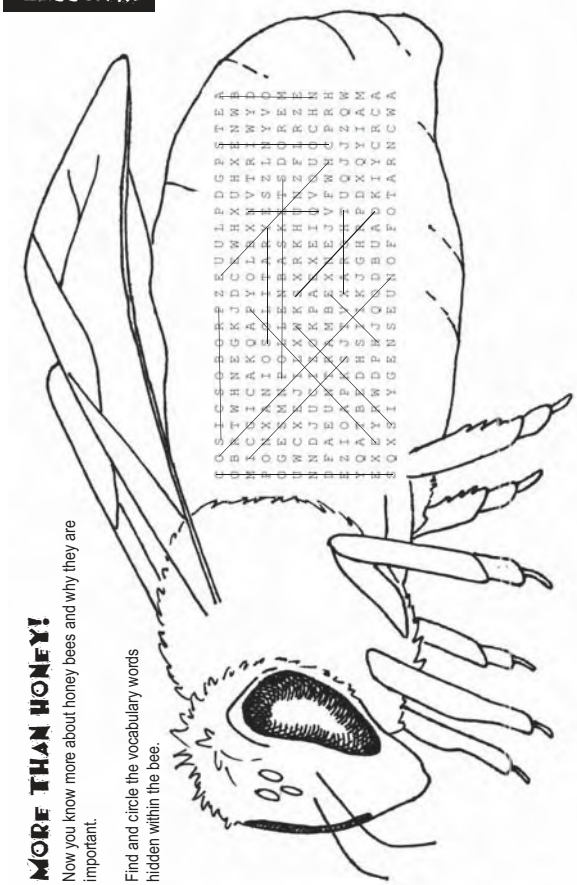
LESSON A:

Name:_____ Date:_____

MORE THAN HONEY!

Now you know more about honey bees and why they are important.

Find and circle the vocabulary words hidden within the bee.



Abdomen
Colonies
Compound Eyes
Drones
Hive
Honey bee
Insects
Organization
Pollen baskets
Pollinate
Proboscis
Queen
Solitary
Thorax
Workers

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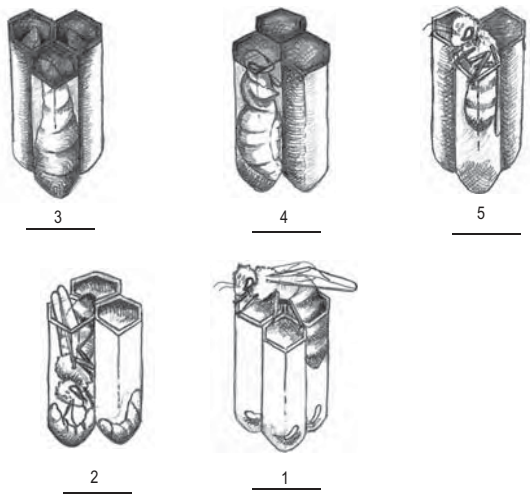
LESSON A:

Name:_____ Date:_____

HOW BEES GROW

Put the bee life stage illustrations in order using 1-5 and then place that number in the blank by the corresponding description below.



3 4 5

2 1

Bee Life Cycle

__5__ Adult bee emerges from its cell
__2__ Worker feeds hatched larva
__4__ Larva becomes pupa
__1__ Queen lays egg in wax cell
__3__ Larva reaches full growth and cells are capped over

LESSON B: Name:_____ Date:_____

WORD MATCH

a.	pollen basket	m.	gland
b.	beeswax	n.	stinger
c.	nectar	o.	honeycomb
d.	ovary	p.	honey
e.	royal jelly	q.	anther
f.	wax	r.	stigma
g.	antenna	s.	proboscis
h.	simple	t.	pollen
i.	hybrid	u.	sepal
j.	stamen	v.	petal
k.	style	w.	filament
l.	forage		

_g_ one of a pair of slender movable organs of sensation on the head of an arthropod (as an insect or a crab) that are made up of segments

_h_ not compound

_s_ a long tube-shaped body part (as the sucking organ of a butterfly) in the mouth region of an invertebrate

_a_ a flat or hollow area bordered with stiff hairs on the hind leg of a bee in which it carries pollen to the hive or nest

_m_ a cell or group of cells that makes and secretes a product (as saliva, sweat, bile, or shell) for further use in or for elimination from the plant or animal body

_n_ a sharp organ of some animals (as bees or scorpions) that is used to wound, paralyze, or kill prey or an enemy by piercing and injecting a poisonous fluid

_r_ the upper part of the pistil of a flower which receives the pollen grains and on which they start to grow

_q_ the part of the stamen of a flower that produces and contains pollen and is usually borne on a stalk

_v_ one of the often brightly colored modified leaves that make up the corolla of a flower

_k_ the filiform usually elongated part of the pistil bearing a stigma at its apex

_w_ the anther-bearing stalk of a plant stamen

_d_ the enlarged rounded lower part of the pistil of a flower in which seeds are formed

LESSON B: Name:_____ Date:_____

WORD MATCH

_q_ one of the structures deep inside a flower that together make up the ovary of a flowering plant

_c_ a sweet liquid given off by plants and especially by the flowers and used by bees in making honey

_i_ an offspring of parents with different genes especially when of different races, breeds, species, or genera

_j_ an organ of a flower that consists of an anther and a filament and produces the pollen

_p_ a thick sugary material prepared by bees from the nectar of flowers and stored by them in a honeycomb for food

_l_ to make a search especially for food or supplies

_f_ a yellowish moldable substance produced by bees and used by them for making the honeycomb

_o_ a mass of six-sided wax cells built by honeybees in their nest to contain young bees and stores of honey

_e_ a substance rich in vitamins and proteins that is secreted from glands in the head of honeybees and is fed to all very young larvae and to all maturing queen bees

_t_ a mass of tiny particles in the anthers of a flower that fertilize the seeds and usually appear as fine yellow dust

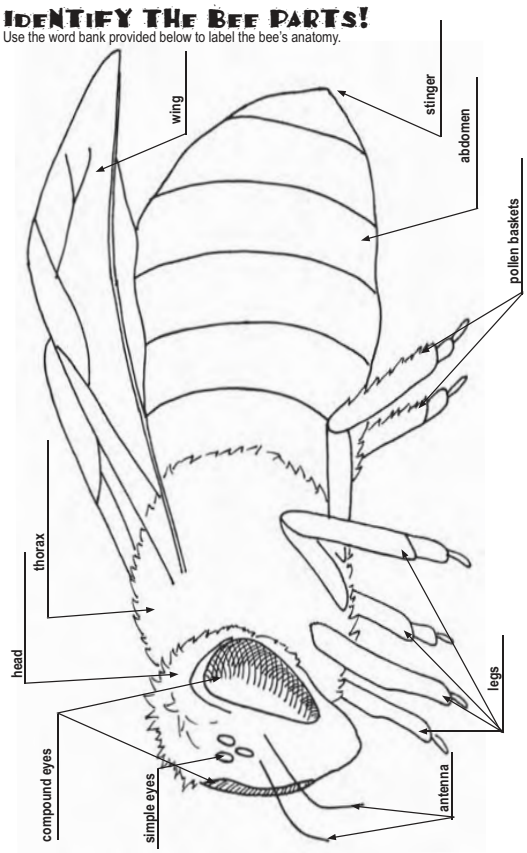
_b_ a yellowish to grayish-brown moldable substance made by bees and used by them to make honeycomb

WHAT'S THE BUZZ ON BEES B FDACS - DIVISION OF PLANT INDUSTRY

LESSON B: Name:_____ Date:_____

IDENTIFY THE BEE PARTS!

Use the word bank provided below to label the bee's anatomy.



Word Box

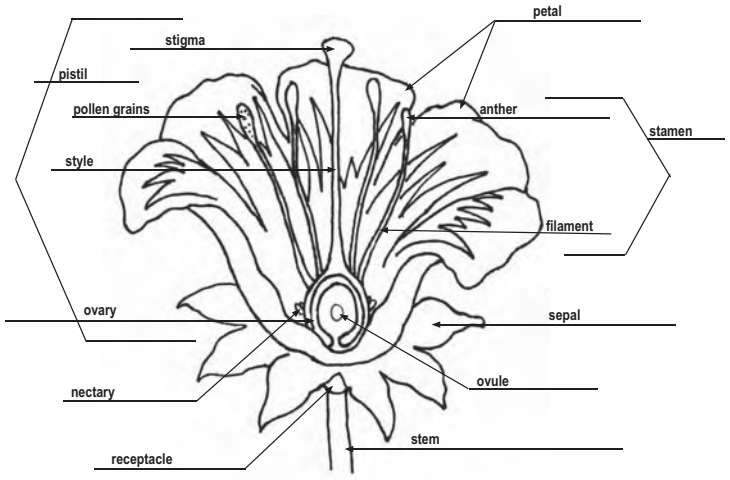
Abdomen
Stinger
Compound eyes
Wings
Head
Simple eyes
Thorax
Antenna
Pollen baskets
Legs

WHAT'S THE BUZZ ON BEES B FDACS - DIVISION OF PLANT INDUSTRY

LESSON B: Name:_____ Date:_____

THE POWER OF A FLOWER!

Not only do they look pretty and smell good; but flowers also serve a very important purpose. Flowers are actually what enable a plant to reproduce. Below is a cross section of a flower. Use the word bank provided below to label the flowers different parts.



Word Box

ovule	petals	stem
anthers	pollen grains	stigma
filament	sepal	style
ovary	receptacle	stamen
nectary	pistil	

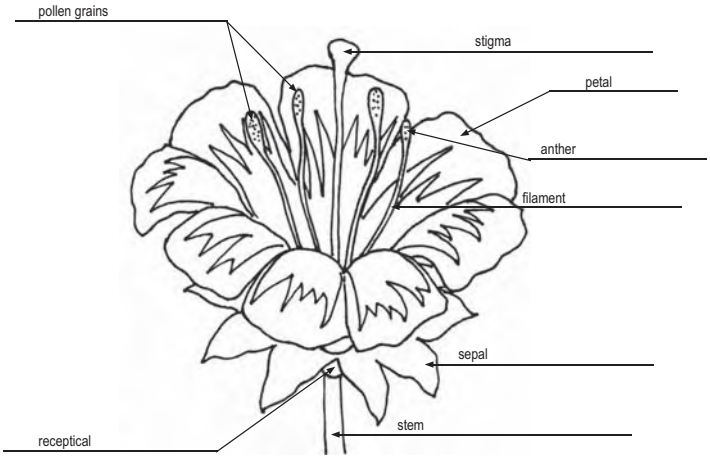
WHAT'S THE BUZZ ON BEES B FDACS - DIVISION OF PLANT INDUSTRY

LESSON B:

Name:_____ Date:_____

The Power of a Flower!

Not only do they look pretty and smell good; but flowers also serve a very important purpose. Flowers are actually what enable a plant to reproduce. Below is a cross section of a flower. Use the word bank provided below to label the flowers different parts.



Word Box

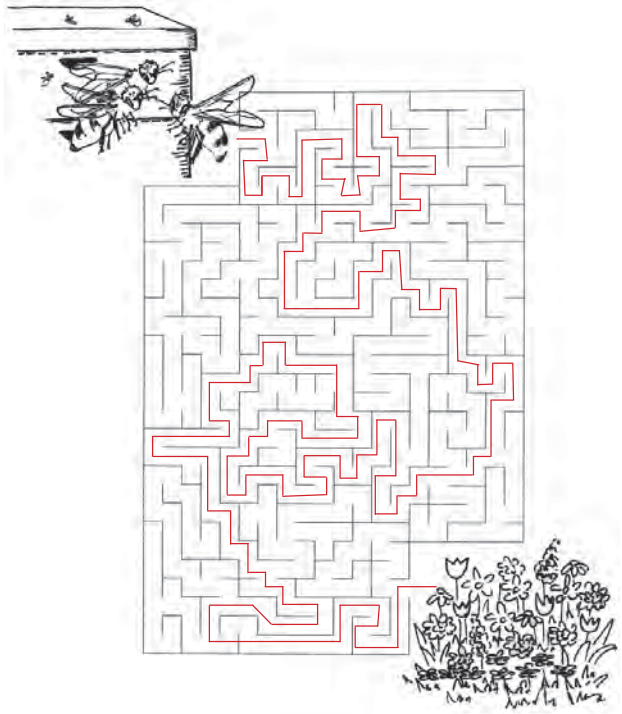
Petal
Stem
Pollen grains
Sepal
Filament
Anther
Receptical
Stigma

LESSON B:

Name:_____ Date:_____

Bee Maze

Bissy has just returned from a wonderful garden that has many flowers. Help her communicate to the other bees how to navigate their way to the garden by finding your way through the maze.



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LESSON C:

Name:_____ Date:_____

WORD MATCH

a. honey bee
b. manage
c. pollinate
d. pheromone
e. honeycomb
f. larva
g. apiary
h. hexagon
i. hive
j. beekeeper
k. feral
l. colony

__g__ a place where beehives are placed near flowers and water

__j__ a person who raises bees

__l__ a population of plants or animals in a particular place that belong to one species

__k__ having escaped from domestication and become wild

__h__ a polygon of six angles and six sides

__i__ a container for housing honey bees

__a__ a bee that produces honey and lives in colonies

__e__ a mass of six-sided wax cells built by honey bees in their nest to contain young bees and stores of honey

__f__ a young wingless often wormlike form that hatches from the egg of many insects

__b__ to make and keep under one's control

__d__ a chemical substance (as a scent) that is produced by an animal and serves as a signal to other individuals of the same species to engage in some kind of behavior (as mating)

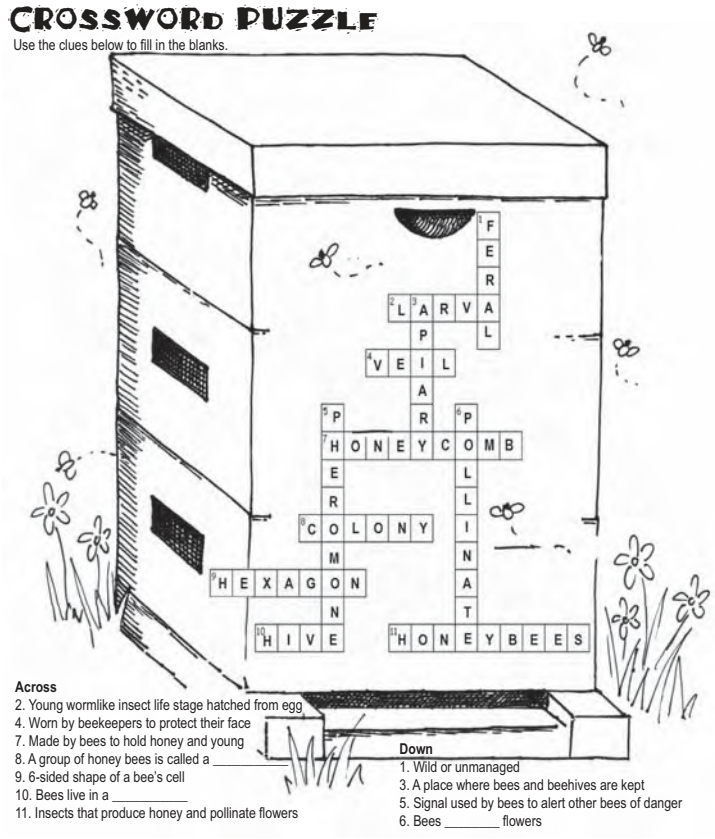
__c__ to place pollen on the stigma of

LESSON C:

Name:_____ Date:_____

CROSSWORD PUZZLE

Use the clues below to fill in the blanks.



Across
2. Young wormlike insect life stage hatched from egg
4. Worn by beekeepers to protect their face
7. Made by bees to hold honey and young
8. A group of honey bees is called a _____
9. 6-sided shape of a bee's cell
10. Bees live in a _____
11. Insects that produce honey and pollinate flowers

Down
1. Wild or unmanaged
3. A place where bees and beehives are kept
5. Signal used by bees to alert other bees of danger
6. Bees _____ flowers

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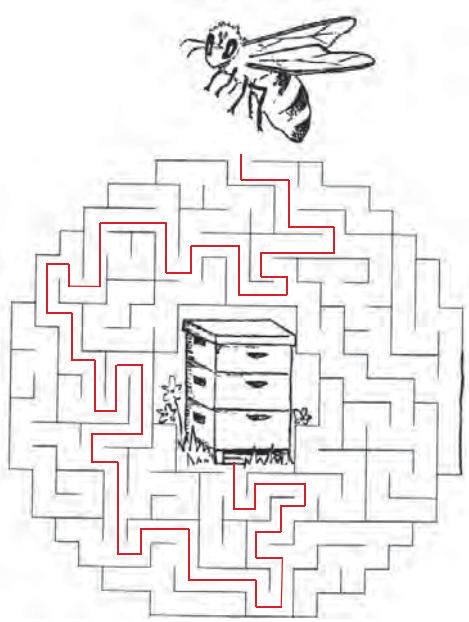
LESSON C:

Name:_____ Date:_____

BEE MAZE

Help Bissy find her way back to the hive.



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Name:_____ Date:_____

WHERE BEES MIGHT BE

Africanized honey bees are not very picky when it comes to selecting a nesting site. Below is an illustration that contains some of the places bees might chose to make their home. List as many places as you can find in the picture below where bees may make their homes.

1. wood piles
2. rain gutters
3. attics
4. chimneys
5. trees
6. air conditioners
7. flower pots
8. under porches
9. grills
10. under picnic tables/benches
11. bird houses
12. wheel barrows
13. mail boxes
14. water meters

Name:_____ Date:_____

WORD MATCH

a. honey bee
b. pollen sac
c. pheromone
d. insect
e. beekeeper
f. nectar
g. hive
h. pollinate
i. beneficial
j. hybrid
k. defensive

_e___ a person who raises bees

_i___ producing results that are good for health and happiness

_k___ serving to defend or protect

_g___ a container for housing honeybees

_a___ a bee that produces honey and lives in colonies

_j___ an offspring of parents with different genes especially when of different races, breeds, species, or genera

_d___ any of a class of arthropods with the body clearly divided into a head, thorax, and abdomen, with three pairs of jointed legs, and usually with one or two pairs of wings

_f___ a sweet liquid given off by plants and especially by the flowers and used by bees in making honey

_b___ one of the pouches of a seed plant anther in which pollen is formed

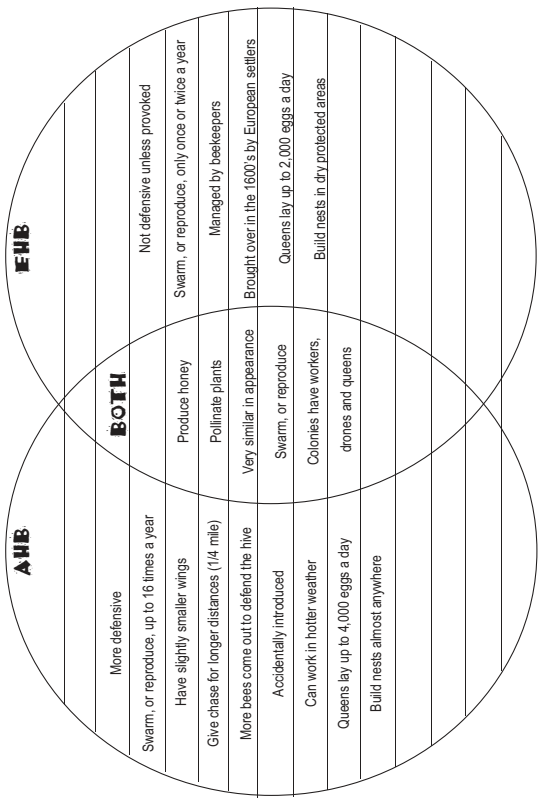
_h___ to mark or smudge with pollen

_c___ a chemical substance (as a scent) that is produced by an animal and serves as a signal to other individuals of the same species to engage in some kind of behavior (as mating)

Name:_____ Date:_____

COMPARE AND CONTRAST

Use the Venn diagram below to compare and contrast the similarities and differences between Africanized honey bees and European honey bees. Fill in the section labeled AHB with everything that makes Africanized honey bees different from European honey bees, then do the same for the other side labeled EHB. In the middle section where the circles overlap, fill in the similarities between the two kinds of honey bees.



BONUS ACVTIVITY: Name:_____ Date:_____

BISSY BEE TRIVIA

Answer the questions below for extra bee knowledge.

What do baby bees eat?
Royal jelly

Where is honey stored by bees?
Honeycomb

When a worker bee finds a good source of food, how does she tell the hive?
She does a dance or releases pheromones that signal other bees

Why are honey bees called social insects?
They share the same dwelling and practice division of labor

How many times can a worker honey bee use its stinger?
Once

What is the male part of the flower called where the pollen is developed and contained?
Anther

What foods use honey as an ingredient? Name one.
Cookies, cereal, candy

Where are bees and beehives kept?
Apiary

What are two important jobs of honey bees?
Honey production and pollination

If you are outside and hear buzzing of bees, what do you do?
Run inside and tell an adult

How should you remove a stinger?
Scrap it, never squeeze it

Name at least three jobs of a worker bee.
Foraging, tending to the hive, caring for the queen, gathering pollen, feeding baby bees, bulding the honey comb

How many sides do a cell of a honeycomb have?
Six

What are some products of the hive?
Wax, royal jelly, honey, propolis

What attracts bees?
Sweet scents, color, noise and movement

What kind of animal is a honey bee?
Insect

How many kinds of insects are there?
20 -30 million

What insects are usually mistaken for bees?
Leaf-cutting bee, Bumble bee, horse and deer fly, hornet, wasp, yellow jacket, carpenter bee

What is the largest honey bee? Is it the worker, drone or queen?
Queen

BONUS ACVTIVITY: Name:_____ Date:_____

HELP BISSY AND GRIZELDA
FIGURE OUT THEIR DIFFERENCES (PAGE 1 OF 2)

Use the following information about European honey bees and Africanized honey bees to answer these math questions.

INFORMATION

Maximum number of eggs laid daily by the queen:
European Bees 2,000 eggs
Africanized Bees 4,000 eggs

Average number of days a worker bee needs to complete all developmental stages from egg to adult:
European Bees 20 days
Africanized Bees 19 days

Average length of time worker bees live during the spring and summer:
European Bees 42 days
Africanized Bees 24 days

Average length of time worker bees live during the winter:
European Bees 135 days
Africanized Bees 90 days

QUESTIONS:

How long would it take for a colony of Africanized honey bees to lay 10,000 eggs?

How long would it take for a colony of European honey bees to lay 10,000 eggs?

What is the maximum number of eggs that one European honey bee queen can produce in a year?

What is the maximum number of eggs that one Africanized honey bee queen can produce in a year?

BONUS ACVTIVITY: Name:_____ Date:_____

HELP BISSY AND GRIZELDA
FIGURE OUT THEIR DIFFERENCES (PAGE 2 OF 2)

How much longer does a European woker honey bee live compared to an Africanized worker honey bee worker during the spring and summer?

How much longer does a European woker honey bee live compared to an Africanized worker honey bee worker during the winter?

How many days does an Africanized honey bee live from egg hatching to the end of adulthood in the summer? In the winter?

The maximum number of worker bees in a well-managed hive is about 60,000. How many days would it take for a European honey bee queen to lay that many eggs?

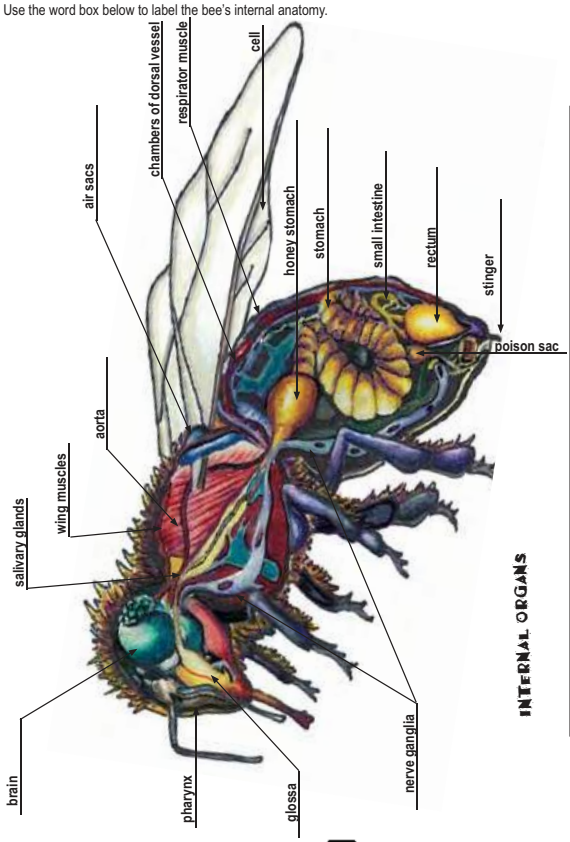
If Africanized honey bees migrate 200 miles northward in an average year, how long will it take the AHB to migrate: a. 2,750 miles? b. 3,020 miles? c. 5,114 miles?

Question Source: Africanized Honey Bees on the Move Lesson Plans The University of Arizona Africanized Honey Bee Education Project - http://cals.arizona.edu/pubs/insects/ahb/act12.html

BONUS ACTIVITY: Name:_____ Date:_____

IDENTIFY THE BEE PARTS (PAGE 1 OF 2)

Use the word box below to label the bee's internal anatomy.



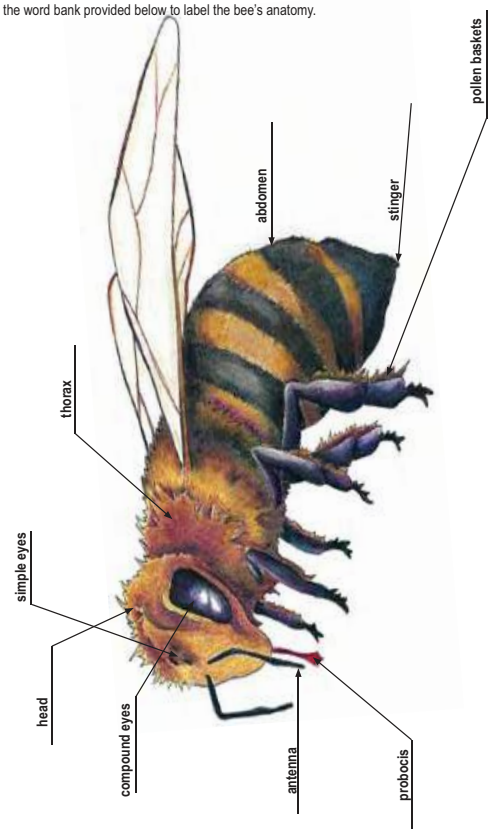
Word Box

- Brain
- Pharynx
- Glossa
- Nerve ganglia
- Salivary gland
- Poison sac
- Aorta
- Stinger
- Wing muscles
- Rectum
- Air sacs
- Honey stomach
- Chambers of dorsal vessel
- Cell
- Stomach
- Respirator muscle
- Small intestine

BONUS ACTIVITY:

IDENTIFY THE BEE PARTS (PAGE 2 OF 2)

Use the word bank provided below to label the bee's anatomy.



EXTERNAL

Word Box

Thorax	Pollen baskets	Simple eyes
Abdomen	Proboscis	
Antenna	Head	
Stinger	Compound eyes	