



Bee Society

# Busy As a Bee



More BEE facts:

The queen can lay 2000 eggs a day.

Royal jelly is made from predigested pollen from a nurse bee's pharyngeal glands.

The fertilized egg is set vertically in the cell; 3 days later it goes horizontally to become a larva.

Nurse bees contract their thoracic muscles to keep the brood at 95 degrees.

Propolis is a sticky gum that has a strong odor. It is on the bee's back legs and is used to sanitize the wax comb.

During nectar exchanges, transforming nectar to honey, the honey is enriched by secretions from the salivary gland.

Female bees have 4500 facets per eyes, and pinched waists; males have 7500 facets and round waists.

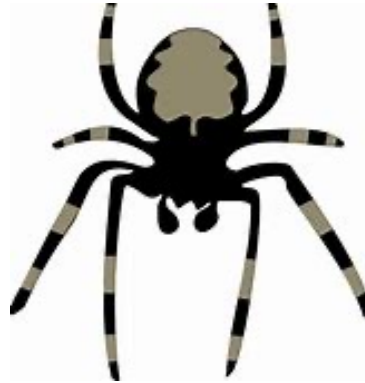
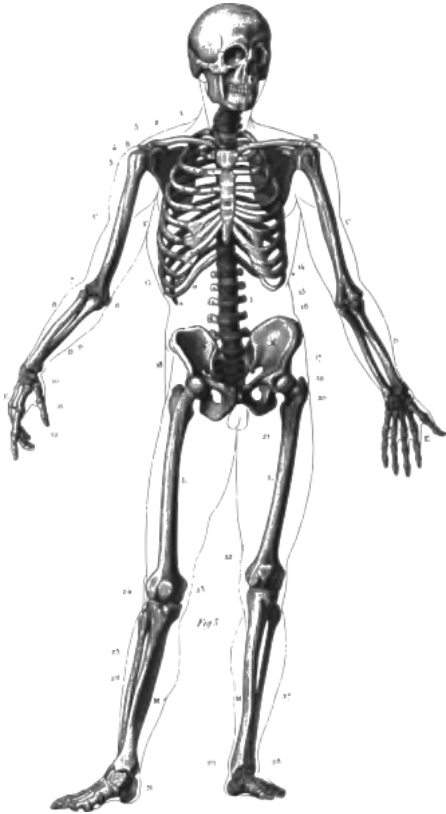
A hive will have 40,000-80,000 bees.

Summer bees live 4-5 weeks; winter bees live 6-8 months.



## Propolis on a bee.

Propolis (bee glue) is a resinous mixture that honeybees produce. They mix saliva and beeswax, with exudate from tree buds, sap flows, or other botanical sources. It is used to seal gaps.

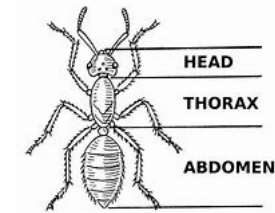


Bees are insects  
and insects are  
arthropods.

- Arthropods include insects like ants and bees, arachnids like spiders, myriapods like centipedes, and crustaceans like pill bugs.
- Tap your forehead, elbow, knee. Can you feel the hard bone under your soft skin? Those bones are part of our skeletons that give structure to our bodies. Our skeletons are inside our skin.



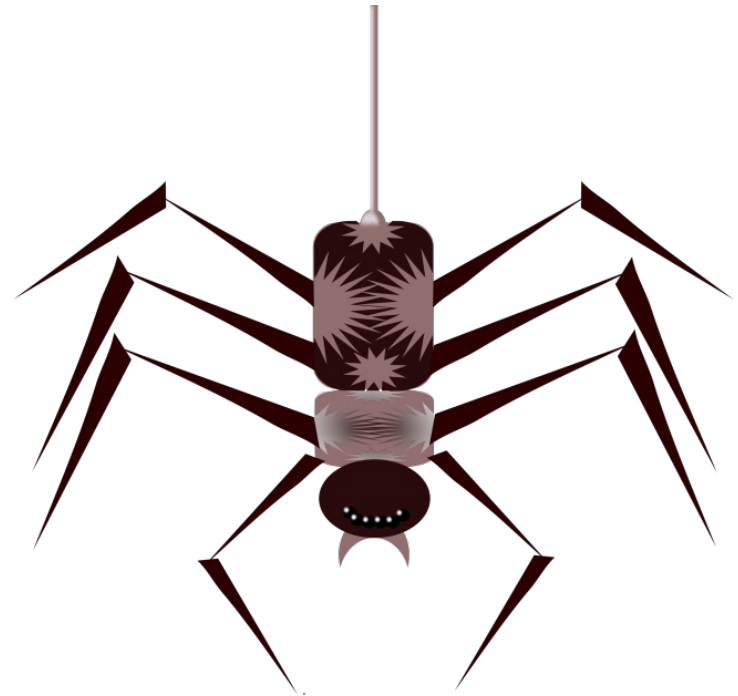
Arthropods have (big word alert!) exoskeletons; that means that their skeletons (hard structures) are outside their bodies like a suit of armor. Their exoskeletons are made of a cellulose like material, chitin, and minerals.



They also have bodies in segments (parts) and jointed (like our knee or shoulder) legs. There are appendages (like our legs and arms) or body parts, attached to the segments.

# Arthropods

- Exoskeleton=skeleton outside so they moult to grow,
- no backbone,
- jointed legs,
- segments=body divided,
- appendages=parts attached,
- cuticle made from chitin.



# Bee anatomy

Bees are insects.

They have three body parts—head (touching head), thorax (touching chest, and abdomen (touching tummy).

The wings (flapping hands) and 6 (3 fingers each hand) legs are attached to the thorax where the muscles are.



Bees have two big eyes (2 fists) called compound eyes made up of lots of little eyes called ommatidia, and 3 small simple eyes (three fingertips) called ocelli.

Bees have 2 antennae (2 fingers by forehead).





Bees have an exoskeleton—a skeleton on the outside (tapping forehead elbow, knee).





- 2 antenna

- 1 head

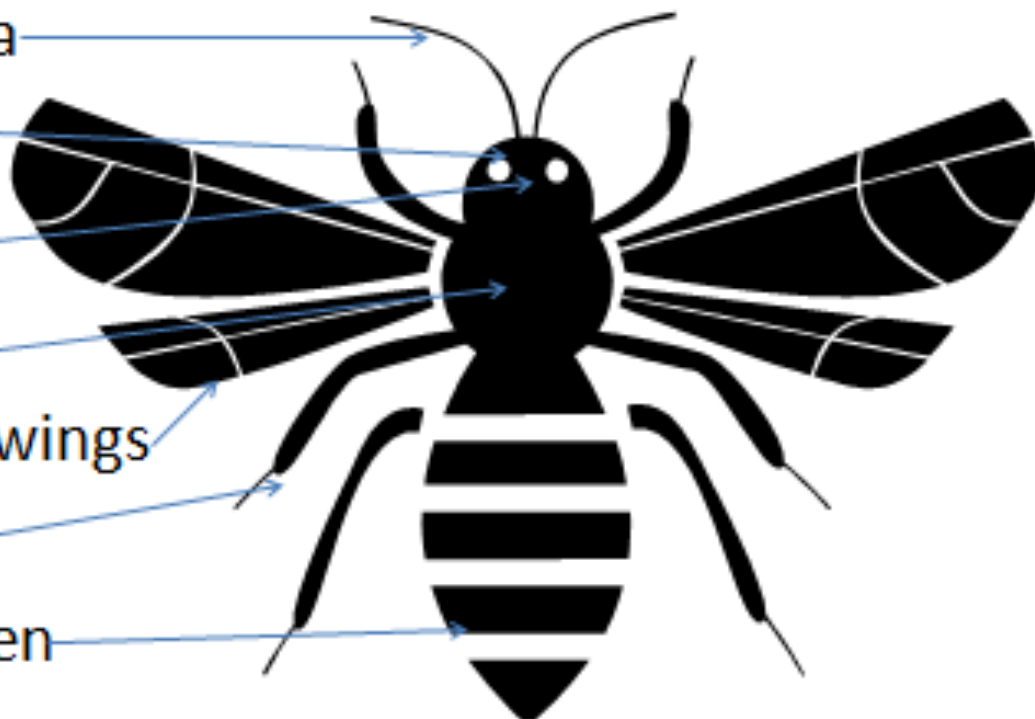
- 2 eyes

- 1 thorax

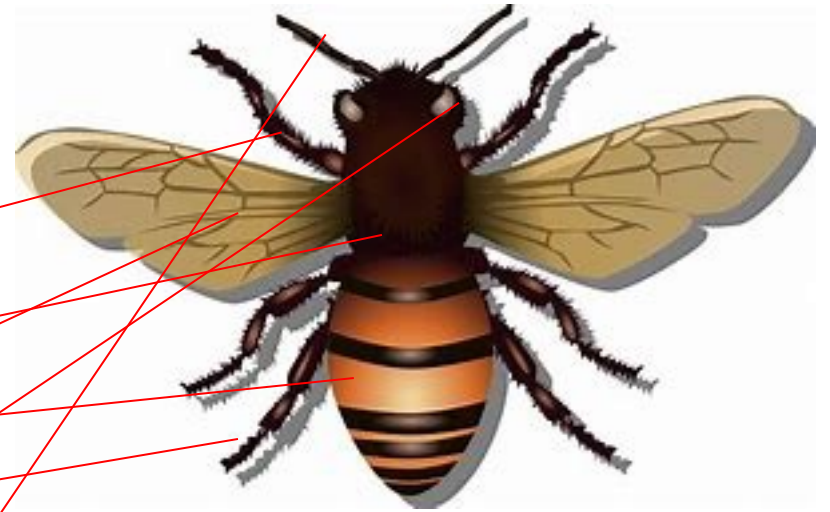
- 2 sets of wings

- 6 legs

- 1 abdomen



You can be BEE anatomy! You can sing this song to *Head, Shoulders, Knees and Toes*.



Head, thorax, abdomen, abdomen 2x  
(touch head, chest, tummy)

6 legs, some wings and exoskeleton

(3 fingers each hand, flap hands on shoulders, go head to toes both hands)

Head, thorax, abdomen, abdomen.

Head, thorax, abdomen, abdomen 2x  
(touch head, chest, tummy)

Big eyes, small size and 2 antennae too

(2 fists, pointer fingers together, pointer fingers on head)

Head, thorax, abdomen, abdomen.

Growing Up WILD

Bees have specialized body parts for honey collecting.

The pollen basket collects the pollen.

Honey is stored in the honey stomach.



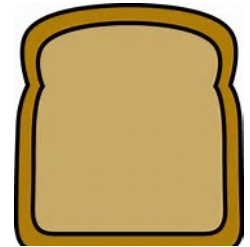
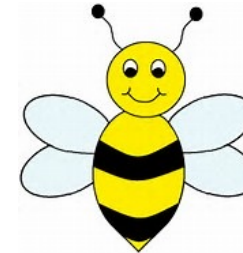
# Bees make three kinds of foods.

Bee milk is made from glands in the bees' heads and is fed to the very young larvae.



©Andy Nornik \* illustrations01.com/03558

Bee bread is made from pollen mixed with honey and is fed to the worker and drone brood. It is full of protein.



Royal jelly is a kind of extra rich bee milk fed to the queen.





# How does nectar become honey?

Bees collect nectar from flowers.  
Nectar is 80-95% water.

They also collect pollen in their pollen baskets, and while they are collecting, they are pollinating flowers.

Honey is about 18% water.

When the bees return to the hive with the nectar, they pass it from bee to bee and fan it with their wings and gradually the water is reduced, and more sugar remains.

They store the honey in the hexagonal (6 sided) cells in the honeycomb.



There are different tools for separating and lifting frames.

- Hive
- Comb
- Honey tool
- Hive smoker
- Bee keeping clothing
- Brush



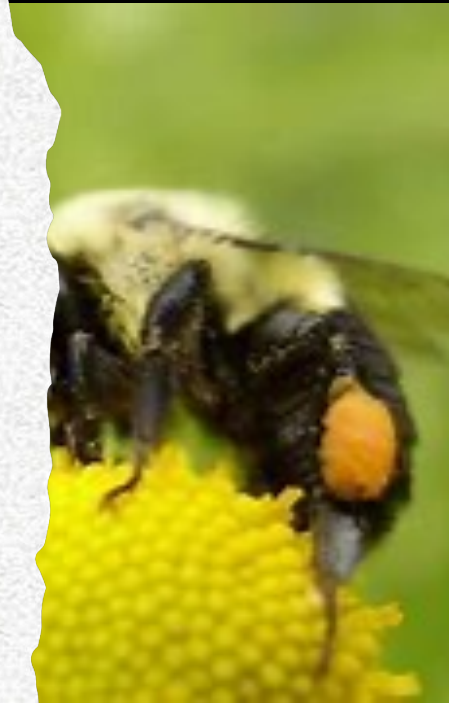


# Big word alerts for big brain thinking!

Propolis is the gummy resin bees make from materials they collect, on their legs, to clean the hive and seal cracks.

Trophallaxis is the exchange of material to share pheromone communication and remove excess water from nectar to turn it into honey.

Corbicula is the hairy part of the leg to transport pollen.



# Hive boxes have several levels.

The bottom board is at the bottom with the hive stand.

The hive body has the frames for the colony.

The honey super is above the hive body and holds the honey for extracting.

The cover is on the top.



# What do we use to extract and process the honey?

First you use the smoker to calm the colony and your hive and frame tools to remove a frame.

The heated knife and uncapping fork unseal the cells.

The frame goes into the extractor which spins out the honey from the cells.

You pour the honey through a double sieve to catch any wax and let it sit to get air bubbles out, before you pour it into jars or bottles.





Bees are social insects. They live in a group called a colony. At different ages worker bees have different roles—the big word for this is *polyethism*. Queen bees lay the eggs. Drones help make the babies.



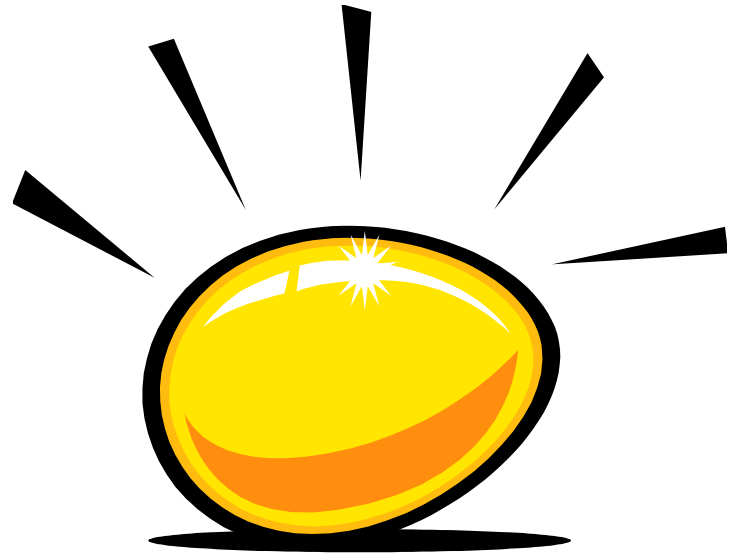
Bee roles include nurse bees that take care of the larvae, housekeeping bees that clean the cells, construction bees that help build the honeycomb, foraging bees that gather pollen and nectar, and guardian bees that protect the hive



# Bee society demonstrates.....

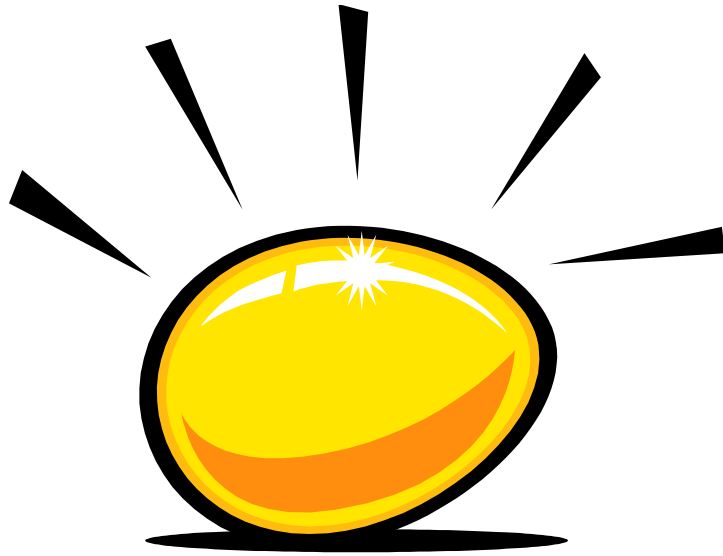
Temporal polyethism, **the age-related division of labor that occurs within honeybee colonies**. At different ages, worker bees perform different tasks. Each worker performs colony tasks in a somewhat predictable order throughout her lifetime.





Drone=daddy

Helps make eggs



Queen=mommy

Lays eggs



# Worker

Food collector





Worker

Nest builder



Worker

Protector



# Worker

Daycare, nanny, babysitter, parent

# Worker

Custodian



# Worker

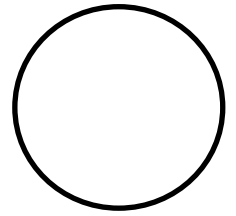
Cook



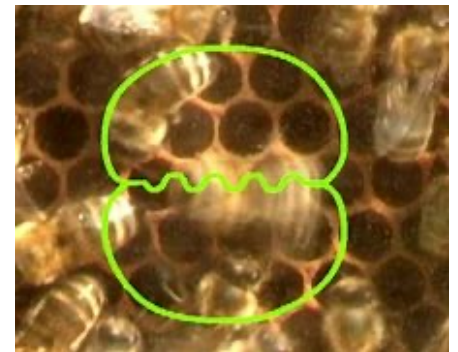


Bees use dances to communicate where to find nectar and pollen.

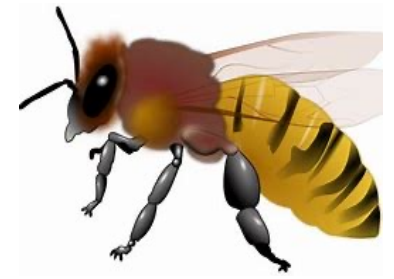
When the source of nectar and pollen is close the bee dance looks more like a circle with the bee shifting clockwise and counterclockwise and is referred to as the round dance.



When the source is farther away the dance is called the waggle dance and looks more like a figure **8** with the speed, duration, and direction of the waggle indicating both distance and direction. Bees judge distance by optic flow and flicker.



# You can be Finger Bees!



*Here is the honeybee. (pincer finger thumb)*



*Here is the hive. (tent hands)*

*Working together (mesh fingers)*



*To keep bees alive! (clap)*



You can sing this song to *Jingle Bells*.

Honeybee, funny bee,



Flying by my nose, (touch nose)

Honeybee, funny bee,



Flying by my toes. (touch toes)

By my head, by my knees, (touch head, knee, elbow)

And also, my elbows.



Honeybee, funny bee



Around and round, she goes. (hand in a circle)

You can sing the song to *Do Your Ears Hang Low?*

Are you wearing fuzz? (wiggling fingers)

Making rumblings like a buzz? (buzzing sound)

Is the garden where you roam? (flying hands)

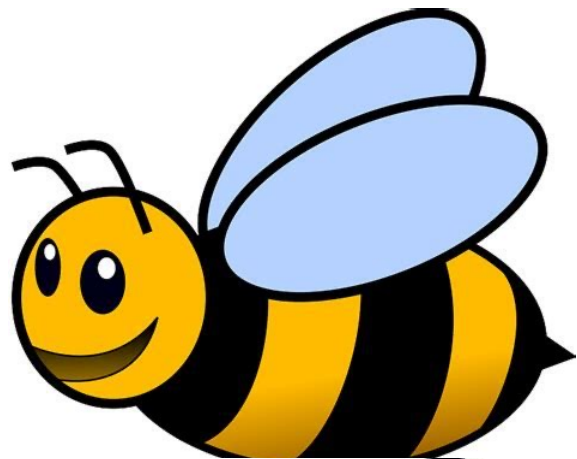
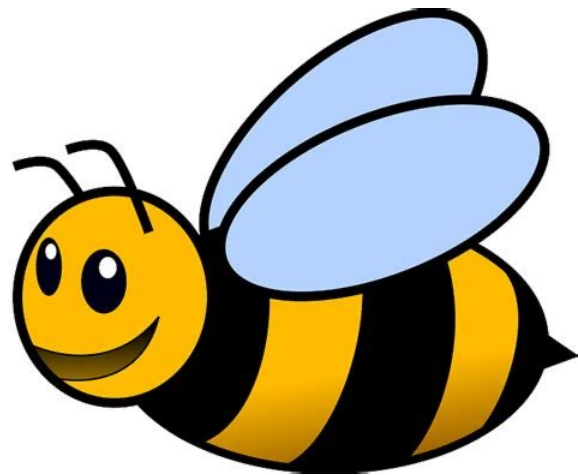
Making a fine hive a home? (triangle hands)

Wearing stripes, a little funny? (drawing fingers across chest)

Knowing how to make the honey? (licking finger)

Now you buzz, buzz, buzz! (buzzing sound)









# BUSY BEEKEEPING

Beekeeping is busy busy!



# Bee clothing

Beekeepers

Bees are social insects with different roles. They live in a colony in the hive.



The hive box has several stories and contains the frames of honeycomb..





Each frame contains a wax honeycomb.





The honeycomb is the substrate for brood cells, pollen, nectar and honey storage.





The hive tool is used to separate the frames.

The brush is used to brush the bees off the extracted frame.



The smoker calms the bees so the frames can be handled safely. The smoke masks alarm pheromones.



A close-up photograph of a wasp nest built inside a plant. The nest is a textured, light-colored structure made of mud or paper, nestled among green leaves. Several wasps with yellow and black stripes are visible on the nest and surrounding foliage. A small red horizontal bar is located in the top left corner of the image.

Bees make  
nests in  
many  
different  
places.

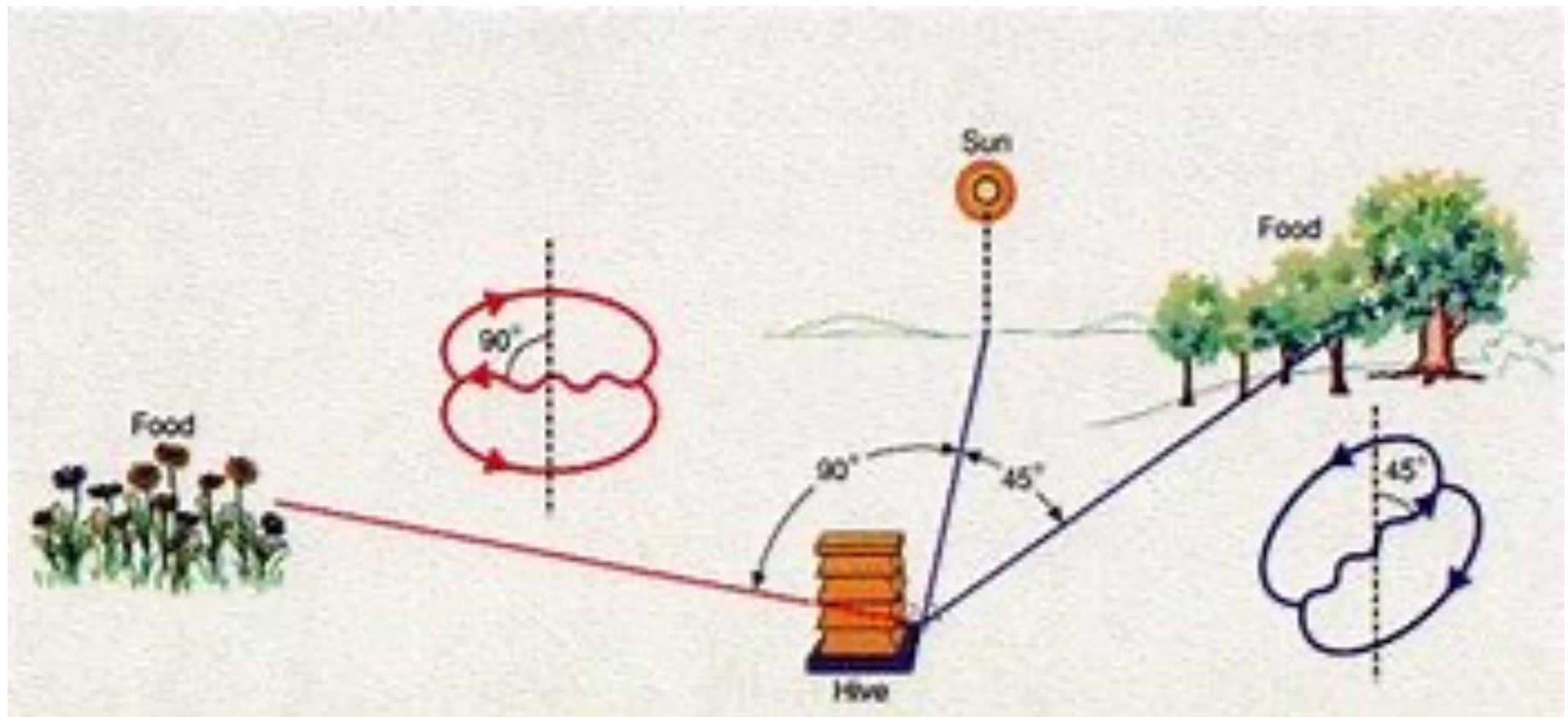
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In a plant! Not all bees live in hives and modern hives are layers of boxes.



You can do the waggle dance and be a bee forager!

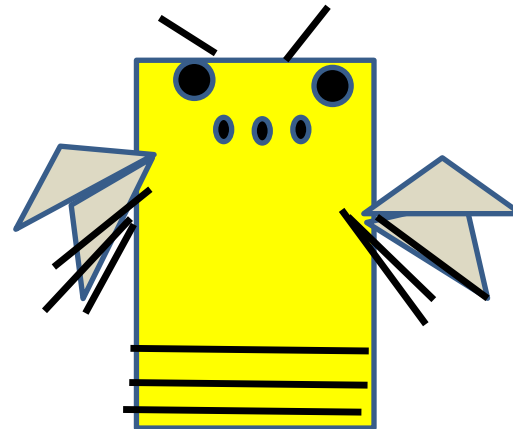
Dance in a figure 8 wagging as you cross and then waggle in the direction of the flowers. Waggle fast if it is close; the longer the waggle, the farther away, A lively dance means good quality food. The optic flow of the image while flying allows the bee to estimate distance. You can search for good nectar and pollen sources around your house!





# You can make a paper roll bee!

You can make a toilet roll bee. Take a cardboard roll and cover it with yellow paper or paint it yellow. Add 4 wings made of paper, coffee filter or  $\frac{1}{4}$  paper plate to the middle. Draw 2 large eyes and 3 small eyes on the top and add 6 toothpick legs, 3 on each side in the middle, and 2 for antennae at the top. Draw black stripes on the bottom.



# Be a Bee Motel Architect!

Most bees do not live in hives. Most bees are solitary. You can build a bee house or bee motel for a solitary bee. The photo includes some sample paper rolls, and papers to make more rolls for a bathroom tissue roll, and a paper towel with plastic straws. In general, paper is better than plastic. You place the rolls in the tube. The tubes go into a container—a canister or milk jug or large milk carton. The end must be closed.



See the 2 tubes. One has straws so you can see how you can rubberband the straws and fit them in the tube; you would need many tubes filled with straws and a container the same length. See the short tube, sample paper straws, and paper cut to the matching length if you want to practice making paper straws for a bee motel. You can put lichen and twigs and moss around straws or tubes to fill the tubes or the container.



You can be Bee Architects!





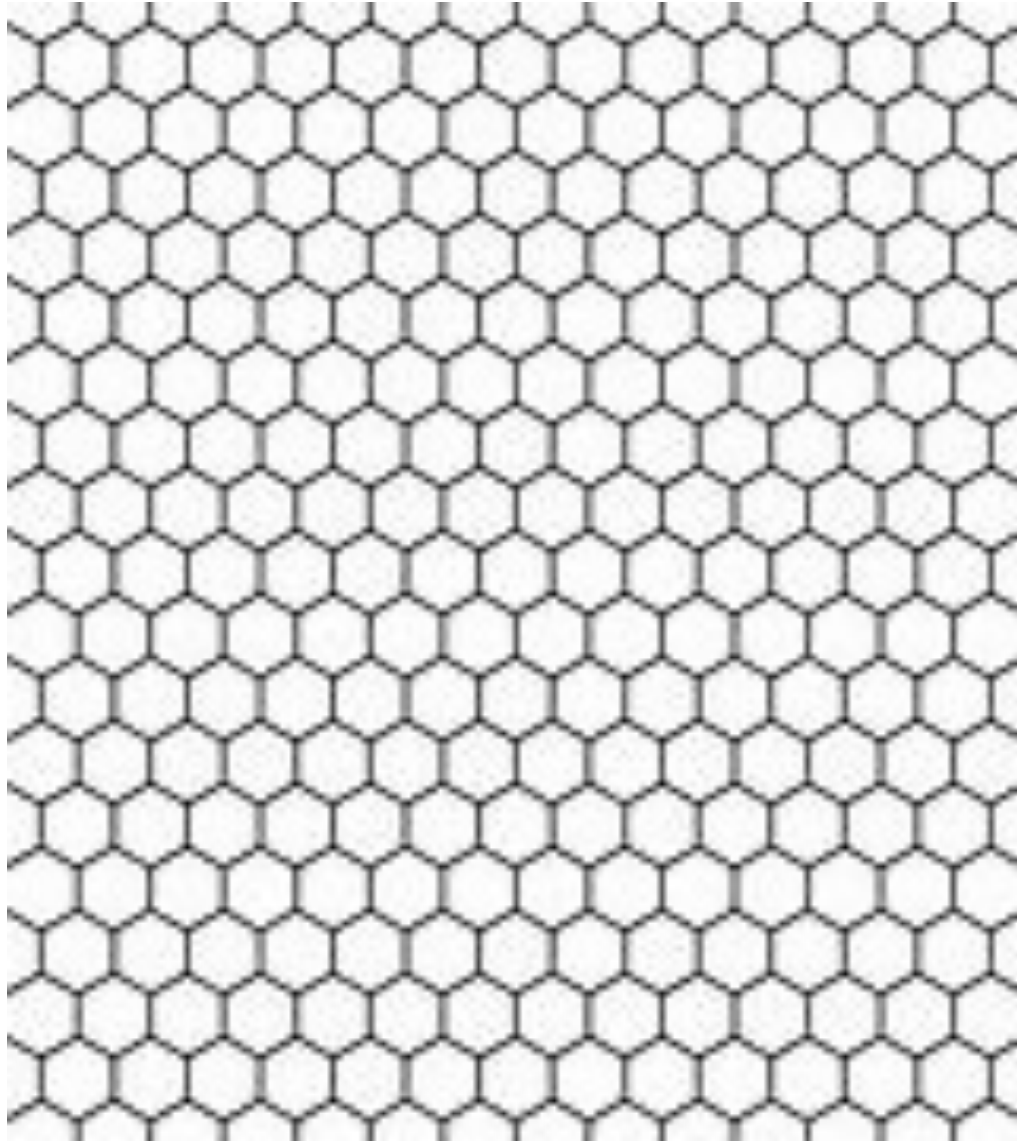
Make a house for a bee!

# Make a bee

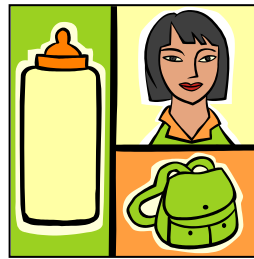
- Add 2 big eyes
- and 3 little eyes to head. Add 2 antennae.
- Add 6 legs and 2 pair wings to thorax.
- Color yellow and add black stripes to abdomen.



You can glue bee roles onto the honeycomb!



Bee roles—janitor, cook, nanny, protector, builder, food collector, queen, drone=daddy





You can glue bee roles onto the honeycomb!



Bee roles on  
honeycomb!

I made a beehive with bee roles!





## Let's be bee thinkers!

Let's be bee thinkers! Did you know that bees come in different colors? Yes, they do! What are some of materials you could use to make a hive or a bee? Could you use play dough, a plastic cup, a toilet tissue roll? What would you use for wings, legs, antennae or eyes?





What could you use to make a bee?

# There are lots of ways to be a BEE chef!

You can make a honeycomb with honeycomb cereal or crackers.



What can you use to make an edible bee? Use your culinary imagination!



You can use a banana, pretzels and chocolate sauce too!





# Be a bee chef!

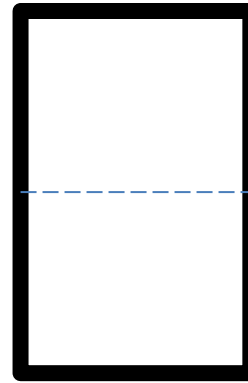
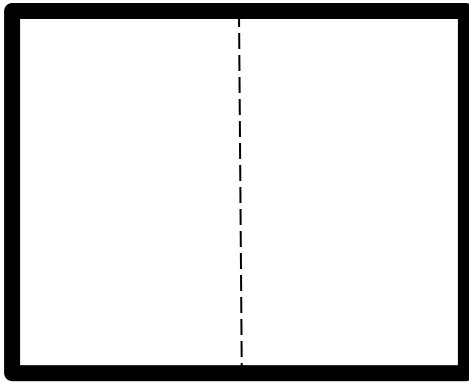


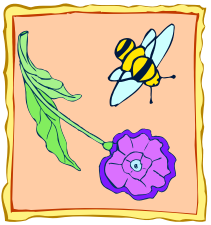
Lots of  
different bee  
roles work  
together in  
the hive!



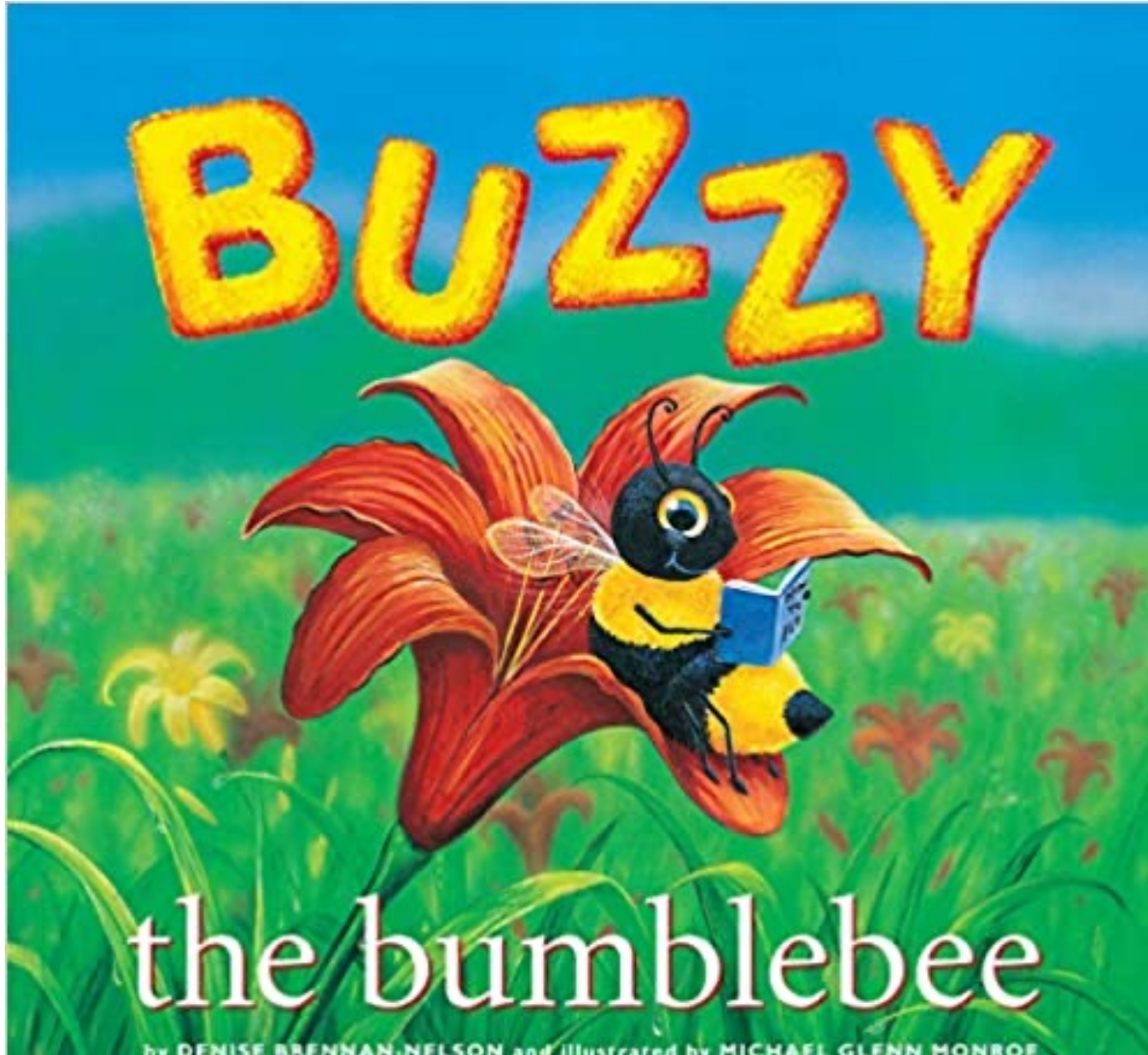
# You can make a mini-book!

- Fold the paper in half
- Then in half again.









In this story  
Buzzy can't fly  
because a book  
said  
bumblebees  
don't fly; he  
learns to solve  
problems and  
believe in  
himself.

<https://www.youtube.com/watch?v=HsiC1RN73f8>





[https://www.youtube.com/watch?v=V2\\_zrmWpflo](https://www.youtube.com/watch?v=V2_zrmWpflo)

In this story a little boy learns how important bees are.