



# ZooLab buzzes into action to save the bees!

**Bees are beautiful, fascinating insects which are vital to a healthy environment. Our new workshop gives you the opportunity to get un-bee-lievably upclose with nature's pollinating royalty!**

**We need bees. We may take them and other pollinating insects such as butterflies, beetles, flies and wasps for granted - but they are vital for a stable, healthy environment.**

The vast majority of plants we need for food rely on pollination by bees; they visit more than 90% of global crop types. Bees also pollinate around 80% of wildflowers in Europe, making them integral to a healthy ecosystem and providing a valuable foodsource for other animals who rely on these plants and berries as part of their foodchain.

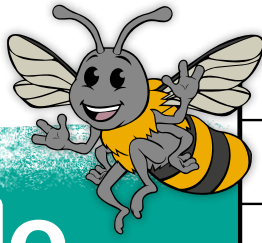
There are 267 bee species in Britain, each collecting nectar and pollen as food. In spite of this, honeybees are in trouble and many solitary and wild bumblebees are also in decline. There is growing public and political concern at bee decline across the world. This decline is caused by a combination of stresses - from the loss of their habitat and food sources to the effects of climate change.

ZooLab is passionate about educating schools about the many ways you can be more Bee Aware! Simple steps such as planting wild flowers or even fruit and vegetables help provide a food source (for you and the bees) and allows cross pollination.

ZooLab's new workshop is a fun and interactive opportunity to view a bumblebee hive upclose and spot the Queen! Children will learn about the importance of bees and what life in the hive is like. They will also be taught about the different types of bee and why pollination is so important to a healthy ecosystem.

You can also get involved and do your bit for the environment! We've partnered with bumblebee experts *Agralan* give you the opportunity to purchase your own hive and pots for your flowers at a discounted price!

Bees are a fantastic symbol of nature and ZooLab are committed to making a difference through education and action to ensure they not only survive, but thrive!



# Bumble Bee Hive

## Search for the following words:

Hive	Pollen
Honey	Queen
Kiwi	Flower
Bumble	Stinger
Mason	Potato
Buzz	Plant
Worker	Tomato
Drone	Garden
Nectar	Survey

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

## Use the words to fill in the gaps:

Bees live in a ..... There are lots of different sorts of bees; ..... bees live alone while ..... bees live in very large hives with thousands of bees. .... bees live in a hive with 300-400 bees. Female bees are called ..... while male bees are called ..... Bees have a ..... on the end of their abdomen.

A bee will visit a ..... in the ..... and drink the ..... whilst there the bee collects ..... too. The bee then visits a different flower and pollinates the flower, the plant will then produce its seeds, these can be fruit and vegetables. Bumble bees pollinate an important pizza topping, they pollinate ..... plants. Another ..... bumblebees pollinate are ..... plants. We wouldn't have chips, crisps or jackets without bumblebees.

Bees are decreasing in number due to losing their habitat and pesticides, they do not have enough food to eat. We can help the bees by planting some wild flowers or growing some fruit and vegetables. We can go outside in the garden and carry out a ..... to see which bees are around our school. Bumblebees also pollinate the ..... fruit too.

**Honeybee**



**Total:**

**Bee Fly**

Bee Flies aren't bees at all, they are a type of fly but they look like bees.



**Total:**

**Orange tailed Mining bee**



**Total:**

**Buff-tailed bumblebee**



**Total:**

**Wasp**

There is no hair on a wasp, the black and yellow is also very vivid.



**Total:**

**Mason bee**



**Total:**

**Red tailed bumblebee**



**Total:**

**Hover Fly**

Hover flies aren't bees either, they just look like bees or wasps.



**Total:**

**Seen any others? Draw them here!**

**White tailed bumblebee**



**Total:**

**Common carder bee**

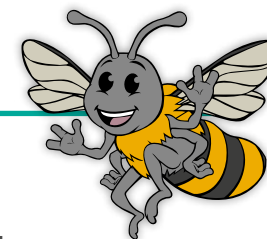


**Total:**

**Bee Aware!**

**Task 1:** Choose one of the bees and do some research back in the classroom. See what you can find out about it.

**Task 2:** Find out what flowers they like to drink nectar from. Maybe you can get these for your school?



# Bee Identification & Research Sheet



Insect type	
Description	
What time of year do you see them?	
What plants do they like?	
How long do they live for?	
Do they live in a big group or alone?	
What is their life cycle?	

Draw a picture



# Make your school Bee Aware!



Turning your school into a Bee-Friendly Space is easy!  
We've got hints and tips to suit every space and budget.



## Fully Booked!

A bee hotel is the ideal resting place for a bee on-the-go. Follow our instructions sheet on how to make the perfect bee abode.

## Parsley, sage, rosemary & thyme

Bees don't all have a sweet tooth - they like savoury too! Pots of herbs are a delicious treat for both humans and bees alike. The bees will appreciate the snack and your school canteen can use them to make any school lunch delicious. Win win!



## Get green fingers!

Vegetable patches and fruit trees are a brilliant way to attract bees into your school garden. They can also provide you with some of your 5-a-day and keep both you and the bees healthy in the process!

## Let's bee friends

Why not plant a bee friendly garden in the school grounds? Remember for everyone's safety - we can't use weed-killers or pesticides. Cottage garden flowers like hollyhocks and wall flowers planted near a water source are ideal!



## Honeysuckle makes bee's bellies rumble.

Bees love the taste of honeysuckle! Planting some in large planters or to climb the wall is the perfect snack to reenergise a busy bee on the go.



## Create a buzz in the air!

You can also get involved and do your bit for the environment! We've partnered with bumblebee experts Agralan to give you the opportunity to purchase your own hive and pots for your flowers at a discounted price!

Bumble Bees are not swarming Bees and only older worker bees and drones will actually leave the hive. The others remain in the hive working and bumbling away.



To purchase a discounted hive for your school, simply phone  
**Agralan 01285 860015**

(Quote ZooLab and the date of your workshop to receive your ZooLab discount)



# Fun Bee Facts



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Make your brain a hive of buzzing information with these fascinating & fun-bee-lievable facts.



## Size matters!

The world's largest Bumble Bee is the *Bombus tahlbomii* of South America. The Queen Bumblebee is the size of a flying mouse. Eeek!



A bumblebee flaps its wings 200 times per second!



## Bangerzzz and eggs!

If you like your eggs with sausages, you're in luck! Bumblebee eggs might remind you of your breakfast fry-up. Their eggs are shaped like sausages. Teeny tiny sausages!



## Deadly hungry

Bees have to constantly eat as they have extremely fast metabolisms. A Bumblebee with a full stomach is almost 40 mins from starvation.



## A sting in the tail

Bumblebees don't die when they sting like honeybees. So, yes a honeybee can sting twice, however male bumblebees don't have a stinger at all and female bumblebees aren't very aggressive.



## Room for a little one?

Bumblebee nests are smaller to those of other species. They have a maximum of 300-400 worker bees compared to that of tens of thousands in a honeybee nest.

## Bees have smelly feet!

Bees, like all insects are covered in an oily film that makes them waterproof. When they land on a flower, they leave their chemical signature behind. Other bees can smell these oily footprints and know not to land on the same place the nectar has been taken. They also use them at the hive as a sort of smelly 'Welcome Home' mat.



# What's the buzz about Bumblebees?



**There are 267 species of bees in the UK - here's how to differentiate your honeybees from your bumblebees!**

**Globally there are more bees than other types of pollinating insects, so they are the world's most important pollinator of food crops.**

Pollinators transfer pollen and seeds from one flower to another, fertilizing the plant so it can grow and produce food. Cross-pollination helps at least 30 percent of the world's crops and 90 percent of our wild plants to thrive.

In order to survive, bumblebees require nectar for energy and pollen for protein. They are less dependent on weather conditions than honeybees, which allows them to work in cloudy and colder conditions. This makes them ideal for cross pollination which will improve the yield and quality of the crop. Bumblebees help pollinate a wide range of crops including:

- Strawberries
- Blueberries
- Cherries
- Raspberries
- Beans
- Peppers
- Plums
- Apples
- Pears
- Tomatoes

Bumblebees are often get demonised because they come with a stinger built into their tail. In truth they are docile and friendly creatures and will only sting if severely aggravated or threatened.

Most bumblebees are social insects that form colonies with a single queen. The colonies are smaller than those of honeybees, growing to as few as 50 individuals in a nest. At the end of the life of the colony, the bumblebees will die off. New queens will be produced that will fly away to create colonies of their own.

Agralan can now supply *Bombus terrestris audax*, which are native British bumblebees in a wooden shelter containing a colony. The colony consists of a queen and workers, with a supply of 'nectar' to feed the bumblebees if a natural source of nectar is in short supply. Simply place your colony in the garden, open it and the bumblebees will fly out to forage

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# Bee Food Chains

Within a habitat things interact with each other to form an ecosystem.

As part of the ecosystem energy is passed from plants (which produce carbohydrates, like sugar, and protein) to the animals who eat the plants (and use the carbohydrates and proteins to build their bodies) and then on to the animals who feed on that animal.

Bees drink nectar from flowers. If we put this in a food chain, the bee is the **PRIMARY CONSUMER** and the flower is the **PRODUCER** as the flower produces the food for the bee.

The **SECONDARY CONSUMER** is the animal that would eat the **PRIMARY CONSUMER**, the **TERTIARY CONSUMER** is the animal that would eat the **SECONDARY CONSUMER**. Can you create some food chains?



Producer				
By Product				
Primary Consumer				
Secondary Consumer				
Tertiary Consumer				



# Bee Glossary

## Common Words



**Eusocial insect:** An insect that forms a colony, typically with one reproductive female known as a “Queen”. The colony is otherwise separated into castes of sterile members, commonly “worker” and “soldier” class. Eusocial insects include species of bees, wasps, ants, termites, aphids and beetles.

**Hive:** A manmade nest for bees to live. Generally only honeybees are kept this way, as other bees do not have widespread commercial value.



**Honey:** Honey is nectar that has been partially digested, dried and stored for later consumption over the winter by bee larvae.



**Honeybee:** A eusocial bee that produces an excess of honey that may be harvested by beekeepers.



**Hornet:** A subclass of wasp that tend to be physically larger and are eusocial, forming paper nests from chewed wood pulp. Hornets tend to be more aggressive than other wasps, though the European hornet is an exception.

**Nectar:** A sugary liquid secreted by some plants that serves as a source of food for many insects and birds, such as honeybees and hummingbirds. It encourages pollinating insects to visit the plant.



**Nest:** A naturally formed home for insects. The term is used for eusocial and solitary bees.



**Pollen:** A powdery substance that contains the male DNA necessary for a second plant to reproduce. It is commonly eaten by bees and some wasps. Some flowering plants will use nectar to attract a bee, so that it ends coated in pollen and can fertilise the next plant or more that it visits.

**Swarm:** A large group of flying insects. Typically, honeybees only swarm to establish a new nest or colony.



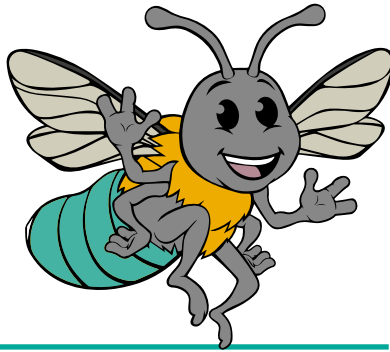
**Wasp:** A carnivorous flying insect resembling a bee. They do not produce honey, instead they feed on smaller insects. They may be eusocial or solitary.



# Bee Glossary

## Anatomy

**Abdomen:** The rear segment of an insect. It holds the digestive and reproductive organs, as well as a stinger.



**Insect:** An animal that consists of six legs, an exoskeleton and a three-part body (Head, thorax, abdomen)



**Pollen basket:** A part of a honey bee's hind leg that pollen can be scooped into.



**Queen:** A bee that has been fed enough royal jelly to mature reproductive organs and breed new workers and drones. When enough honey is stored in a hive, a new queen may form a swarm and establish a new nest.



**Sting:** An injection of venom from a bee or wasp. This varies in intensity between species, with some species causing fatalities.



**Worker:** A female bee that has undeveloped reproductive organs. Sterile and cannot reproduce. Performs all other roles of a hive, such as defence and food collection.

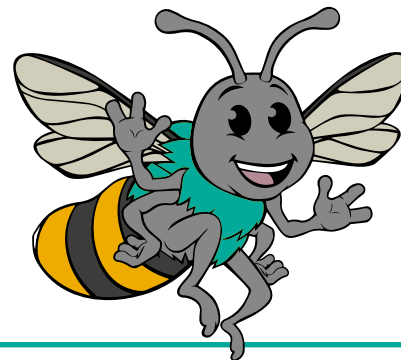


**Antennae:** Paired sensory organs at the top of an insect's head that allow it to sense a variety of things, commonly scent, taste and touch.

**Drone:** Male honeybee. Only used to fertilise a queen of another nest.



**Thorax:** The midsection of an insect that separates the head from the abdomen. It holds the legs and wings of an insect.





# Bee Glossary

**Bee veil:** Cloth used to protect a beekeeper's face and neck from stings.

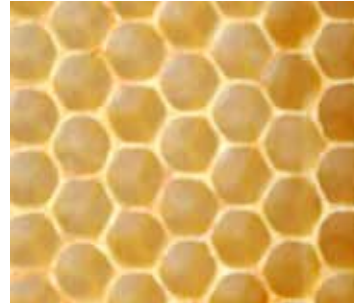


## Beekeeping

**Apiary:** A location that holds one or several hives. Also called a Bee Yard.



**Cell:** A hexagonal storage box for nectar to become honey, or to mature larvae. Cells become sealed/capped when nectar dries enough to become honey.



**Apiculture:** Another name for beekeeping.



**Honeycomb:** A mass of hexagonal wax cells within a nest, used to store honey, larvae, and pollen. Honey may be removed from honeycomb by a honey extractor and reused.



**Beeswax:** Natural wax secreted by bees in order to form honeycomb.



**Royal jelly:** A secretion of honey bees that is used to feed larvae but may be used in greater quantities to force the development of a new queen.





# Bee Conservation

Bumblebees and honeybees are in trouble! They are slowly disappearing. Place a tick in the box below to match the correct reasons for bees becoming endangered:

Climate change is affecting the bees

☐

They drink too much nectar

☐

Butterflies attack the bees

☐

Bees sting and people don't like them

☐

We eat all their honey

☐

Badgers dig up their hives

☐

Pesticides harm the bees

☐

Pollution is harming the bees

☐

Their habitat is being destroyed

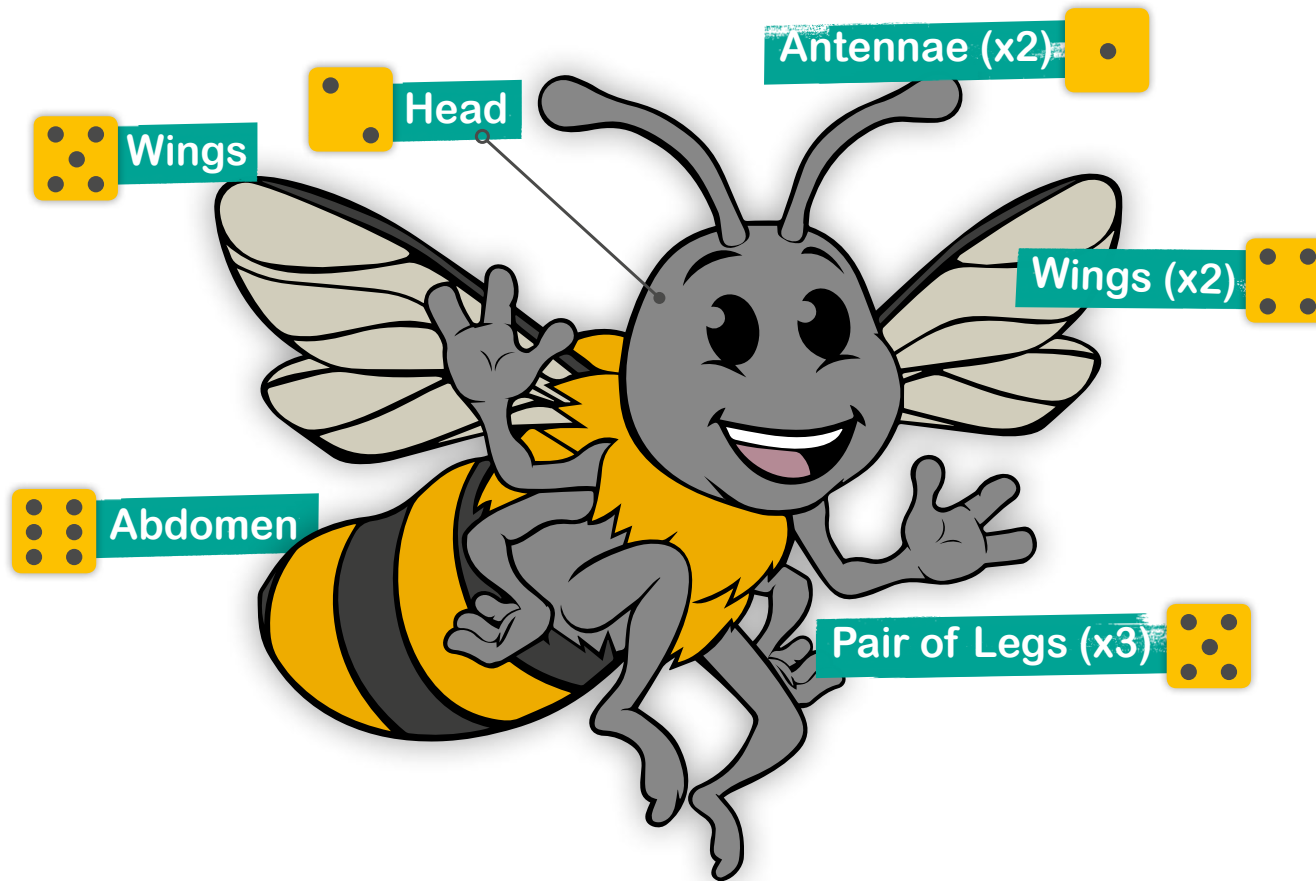
☐

# Bee Beetle Drive!

Take it in turns to throw the dice.  
You must throw a six to start playing.

Once you have a body and a head  
you can add other body parts can  
be added by throwing the correct  
number. The first player to draw  
a completed bee wins!

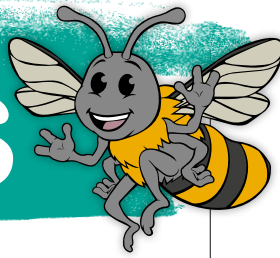
Draw your bee below!



**ZOOLAB**

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# Bee Maths



A forager bee leaves the bee hive and flies to a flower 10 metres away to drink some nectar, she then flies even further to a flower another 7 metres away. How many metres did she fly?

$$\begin{array}{r} 10 \\ + 7 \\ \hline \end{array}$$

metres

She then flies back to the hive, how far was her whole trip?

$$\begin{array}{r} 10 \\ + 7 \\ + 17 \\ \hline \end{array}$$

metres

In the hive there are 200 bees, 50 bees are drones and 1 is a queen. How many workers are left?

**The number of drones and the queen.**

$$\begin{array}{r} 50 \\ + 1 \\ \hline \end{array}$$

Subtract your above answer to get the total

$$\begin{array}{r} 200 \\ - \end{array}$$

workers in the hive.

The hive is 15 metres away from the house. The Bee friendly flower garden is past the hive and is 6 metres away on the other side of the hive. How far away is the Bee friendly flower garden from the house?

$$\begin{array}{r} 15 \\ + 6 \\ \hline \end{array}$$

metres from the house

There are 120 wax cells in the hive and 74 are being used for honey. How many are empty?

$$\begin{array}{r} 120 \\ - 74 \\ \hline \end{array}$$

empty wax cells.



# Bee Pom Poms!

## STEP 1:

Cut two circles out of cardboard as shown



## STEP 2:

Place both circles together and cover using alternating stripes of black and yellow wool until the cardboard is fully covered.



## STEP 4:

Separate the two cardboard circles and secure in the middle by tying wool around the centre.

## STEP 3:

Carefully use small scissors to cut the wool between the two circles.



## STEP 5:

Once tied, remove the cardboard and viola! You should now have a stripey bee pom pom!



## STEP 6:

Repeat this step using smaller cardboard circles and black wool. This will form the head of your bee. Attach this to the body as shown.



## STEP 7:

Using pipe cleaners, attach the bee's antenna and wings. Now your bee is complete!





# Bee our guest!



**Whether you're opening a spacious bee hotel or simply a small bee & bee, here's how to bee-come a buzzing hotellier!**

As their name suggests, solitary bees don't live in hives and instead make their nests on their own and lay their eggs in tunnels. So why not offer solitary bees five-star accommodation with an easy-to-make hotel.

**STEP 1:** In a nutshell, you will make or buy a box or container stuffed full of different-sized hollow tubes, which each have a 'dead end' and are 15 cm or so long. You can get really creative with your materials and designs; just make sure your masterpiece is robust enough to stay outdoors for several years.

**STEP 2:** Build a box as shown, making sure it is 15 cm deep and the roof has a good overhang to keep off the rain. How you design your roof depends on your carpentry prowess. If woodwork isn't your strong suit, a wooden wine box or something similar would do nicely.

**STEP 3:** Cut your various tubes to 15cm length and drill deep holes of varying sizes (between 2-6mm diameter) into blocks of wood and logs, again about 15cm deep (angle them slightly upward so the rain doesn't get in).

Fill your box up with your tubes and blocks of wood. Squeeze all the tubes in together so they stay put.



**STEP 4:** Position your box. Fix it firmly at about waist or chest height on a fence or wall. Very importantly, place it facing south in a sunny position, near your bee-friendly flowers and shrubs. Spring is the busiest time for potential residents looking for a new abode. Sit and watch adult female bees find the nest on sunny