



Save our bees

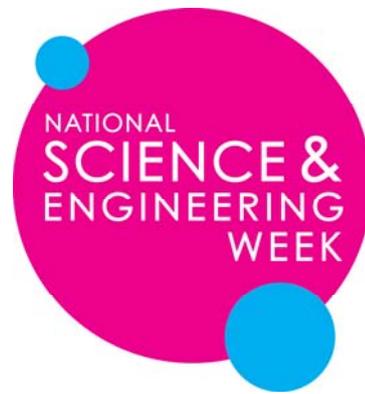
Part of the British Science Association's National Science & Engineering Week activity pack series. www.nsew.org.uk

BIS | Department for
Business Innovation & Skills



Save Our Bees

INFORMATION AND ACTIVITY PACK



As part of National Science & Engineering Week 2009, we asked the general public to help us Save the Bees by planting bee-friendly plants in their gardens and window boxes. This information and activity pack will talk about bees, why they are so important, why they are dying out and why planting bee-friendly plants will help!

Save our Bees can be part of school activities on mini-beasts or the interdependency of living things. Why not take these activities outside and sit in the park or garden close to flowers? Even if you cannot see bees you may hear them if you are lucky.

Why are bees so important to the world?

Bees are vitally important for everyone. Honey bees make honey by mixing nectar with enzymes and by fanning the mixture with their wings to help the water to evaporate. They also make beeswax that we can use in cosmetics, candles and furniture polish. But, overall, they also do so much more...

Bees, including honey bees and bumblebees, pollinate over 250,000 species of plants and more than 100 different crops, including fruits, vegetables, nuts, seeds and many of the foods that farm animals rely on. In all, they are responsible for pollinating around one-third of all the foods we eat. Without bees many plant crops would no longer exist, so no apples or strawberries to eat, no cotton t-shirts and a lot less food for farm animals.

What is pollination?

When bees crawl over flowers to collect nectar to eat, they get grains of pollen stuck all over their furry bodies. When the bees fly to another flower, the pollen grains fall onto the stigma of the flower. This fertilises the plant so that it can make fruit and seeds for the next generation of plants. The bees use the nectar to make honey, so both they and the plant benefit together.



Activity 1) Bee Spotting

Why not see if you can spot some bees?

What sort of bees can you see?

Mated queen bees are the first to be seen in the spring searching for new colony sites. As spring progresses smaller worker bees take over food collection while the queen lays more and more eggs. You can start seeing bees when the warmer spring weather starts and can usually see bumblebees before honey bees.

Look amongst bee-friendly plants for a better chance of spotting them – see “**Helping Bees: making your garden bee-friendly**” for more information on the types of plants that attract bees.



Have a look at the Bumblebee Conservation Trust's "Bumblebee Key" by going to:

www.bumblebeeconservationtrust.co.uk/images/common_bees.jpg

www.bumblebeeconservationtrust.co.uk/images/Rarer_bees.jpg



For further information:

www.bumblebeeconservationtrust.co.uk/bumblebees_id.htm

www.nhm.ac.uk/nature-online/life/insects-spiders/identification-guides-and-keys

Honey bees are sometimes mistaken for wasps (which also have striped abdomens and a sting). The main visible differences are that wasps are bright yellow with yellow on their faces and on their legs. They also have longer antennae than honey bees. The wasp's flight pattern is noticeably different and they can sting repeatedly (whereas a bee can usually only sting once).

For more information on Honey Bees:

<http://www.britishbee.org.uk/files/bees-and-wasps-in-garden.PDF>



Bee Spotting Grid

Fill in the names of flowers visited and when you saw the bee. When did you see the first bee of spring?

Type of bee									
Honey bee 									
Common carder b'bee 									
Red tailed b'bee 									
Early b'bee 									
Buff tailed b'bee 									



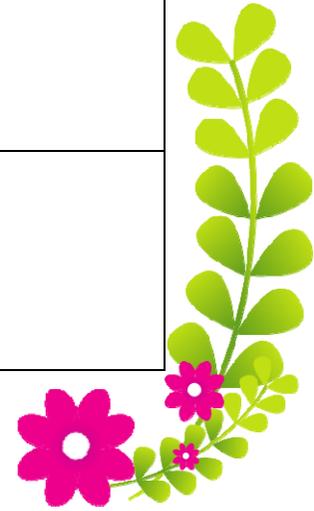
White tailed b'bee



Garden b'bee



Other – did you see any other rarer species?



Activity 2) Bee foods

Think about what you have eaten this week.

Now look at the list of crops that bees pollinate below – if bees were to become extinct, these crops would not be able to survive. How much of what you have eaten this week would not be available if the bees were to disappear?

Almond	Cabbage	Elderberry	Pear
Apple	Carrot	Fennel	Peppers
Apricot	Cashew	Garlic	Plum
Artichoke	Cauliflower	Grapes	Pomegranate
Asparagus	Celery	Hazelnut	Pumpkin
Aubergine	Cherry	Kiwi fruit	Raspberry
Avocado	Chestnut	Leeks	Redcurrant
Beans	Chillies	Lemons	Squash
Beetroot	Chives	Mango	Strawberry
Blackberry	Cinnamon	Melon	Tangerine
Blackcurrant	Clover	Nectarine	Turnip
Blueberry	Coconut	Onion	Vanilla
Brazil nut	Courgette	Orange	Walnut
Broad bean	Coriander	Papaya	Watermelon
Broccoli	Cranberry	Passion fruit	
Brussels sprouts	Cucumber	Peach	

Because bees are so important for the pollination of so many crops, in many countries bee keepers have become contract pollinators rather than honey producers. This involves beekeepers moving large numbers of hives, containing millions of honey bees, to orchards and crop fields at just the right time in their life cycle, so that they can be pollinated successfully.

Roughly two-thirds of the bees in the US are moved to California each year for almond pollination. Almonds are California's number one horticultural export and are under real threat if the numbers of honey bees continue to decline.



Why are our bees dying?

Honey Bees

Honey bees are under real pressure. Billions of bees are dying and one in three colonies died last winter alone.

Honey bee colonies live in very densely packed hives so, if they become infected, diseases can spread very quickly. Think about how quickly you can pass on a cold to your family or class mates?!

One of the biggest threats currently facing honey bees is the varroa mite. This mite moved from Asia to Europe and reached the UK in 1992. It now infests 95% of hives. The mites, who are related to spiders, suck the blood of the bees, especially in their larval stages, and pass viruses on to the bees.

The best ways to treat the mites are with a combination of physical, biological and chemical methods: for example removing mites or infected cells, using chemicals, or using hygienic bees – bees which remove dead pupae and larvae from the hives.

The honey bees can be treated with certain chemicals to kill the mites but unfortunately they are developing resistance to these so they have little effect. When mite numbers rise the bees are overwhelmed and the colony dies! Untreated bee colonies die in 3 to 4 years and even low populations of mites affects the bees' health.

Nearly all wild honey bee colonies have now died out and without bee keepers to look after them and treat these infections, Honey bees could die out altogether in a few years.

Bumblebees

Three of the 25 UK bumblebee species are already extinct, a further five are on the critically endangered list and another 2 species are due for inclusion.

The reason that bumblebees have declined in the countryside is because bees feed exclusively on pollen and nectar, and there are far fewer flowers in the countryside than there once were. Hedges have been dug up and marshes drained. In particular, grasslands which are rich in wildflowers have been almost entirely replaced with fields full of cereals, which do not provide food for bees. Bumblebees also need 'plant corridors' to travel around the country and to avoid in-breeding.

All bees...

The factors involved in declining bee populations are complicated and not fully understood. As well as those mentioned above, other factors involved can include the use of insecticides and changing weather patterns. Insecticides used to kill agricultural pests may harm bees if these are applied incorrectly or without care. Recent wet and cold summers have prevented bees from foraging for food and have affected the time of year that forage plants appear so bees cannot find enough nectar and starve.



Activity 3) Bee-tastic Board Game

Learn about what bees like and what they don't in our bee-tastic board game!

Materials

A4 sheets to form game board – can be enlarged to A3

Sheet of game cards

Scissors

A dice

Counters – you could use a coin, a board game counter or make your own

Preparation

Print out the game board below and enlarge if necessary. To preserve the board, you may wish to laminate this.

Print the game cards and cut these up, these could also be laminated.

You will also need a dice and a counter for each person playing.

Playing the game

To start, each player throws the dice and the person with the highest roll starts the game.

The players move their counters the same number of squares as on the dice. When a player lands on a flower, a card is selected at random – without looking! – and read aloud. The player must then follow the instructions on this card. The first player to reach the finish wins the game!

Further ideas...

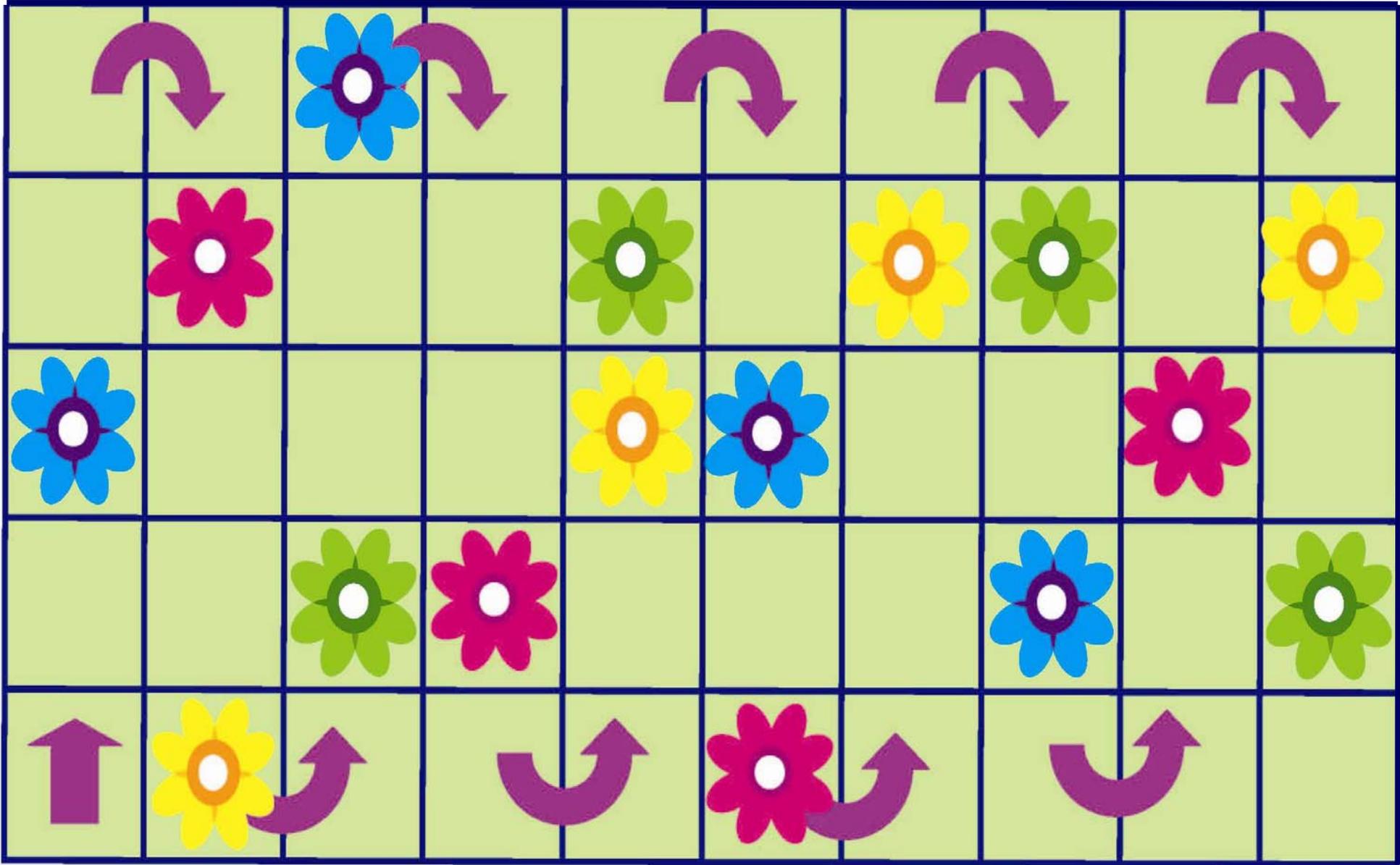
Why not make up your own cards for the game? To help, think about things that are good for the bees and things that are bad...



Bee Game Cards – please cut out!

<p>Go forward 3 squares Your garden has a good selection of flowers for bees</p>	<p>Go back 3 squares Your garden only has sterile bedding plants</p>
<p>Go forward 2 squares You have planted apple and pear trees in your garden</p>	<p>Go back 2 squares The field next door was sprayed with pesticide so some of the bees in your garden were killed</p>
<p>Go forward 2 squares Your bees have produced a good honey crop</p>	<p>Go back 5 squares Almost all of the bees in your hive have died</p>
<p>Go forward 3 squares You have only found a few mites in your hive</p>	<p>Go back 2 squares Some of your bees are seen flying badly</p>
<p>Go forward 2 squares You have treated your colony successfully with chemicals</p>	<p>Go back 3 squares You have counted high numbers of varroa mites in your colony</p>
<p>Go forward 3 squares You counted 3 different species of bumblebees in your garden</p>	<p>Go back 3 squares You used insecticide on your roses</p>
<p>Go forward 5 squares You have planted a patch of wild flowers</p>	<p>Go back 2 squares You cleared the patch of wild flowers from underneath shrubs in your garden</p>
<p>Go forward 3 squares You made a bumblebee nest</p>	<p>Go back 3 squares A rain storm prevents the bees from going out to find food</p>





START

HOME

Helping Bees: making your garden bee-friendly

Have a look at your garden at home or at school and see which plants are living there...

Bees, especially bumblebees, need a range of plants which produce nectar and pollen throughout the spring and summer.



You can find a detailed list of bee-friendly plants at:

www.bumblebeeconservationtrust.co.uk/gardening_for_bumblebees.htm

Here are some familiar ones:

- In early spring, fruit trees such as apples and pears; bluebells and heather
- In late spring and in early summer, alliums, aquilegia, chives, foxglove and white clover
- In late summer, bramble/blackberry, mint, buddleia, sunflower and teasel

A patch of mixed wildflowers will also help; so by letting a corner of the garden 'go wild' you will really help the bees.

Bee-friendly plants include:

anemone	edelweiss	jasmine	rhododendron
antir rhinum	Forget-me-not	lady's slipper	rose
aster	forsythia	lantana	salvia (sage)
azelea	freesia	lilac	sunflower
begonia	fuchsia	marigold	sweet pea
bluebell	gardenia	monarda	thistle
camellia	geranium	narcissus	thyme
carnation	gladiolus	orchid	tulip
chrysanthemum	golden rod	pansy	violet
echinacea	heather	peach blossom	yarrow
crocus	hibiscus	peony	yucca
daffodil	hollyhock	petunia	zinnia
daisy	hyacinth	rudbekia	
dandelion	hydrangea	scabious	
dogwod	hyssop	buttercup	

Remember that pesticide sprays will kill both harmful and beneficial insects, so limit their use or try to use bee-friendly methods to get rid of your pests. For example, dilute washing-up liquid will remove aphids (greenfly) from your roses or lupins. By planting a range of plants in your garden you will encourage predator species which will eat your pests.



Activity 4) Bee nests

Honey bees live in hives that are managed by beekeepers. Bumblebees and solitary bees live in nests and we can help them by providing spaces where they can hibernate or make these nests. For example, you could:

- Put hollow stems in an old coffee tin angled to face the sun and not collect water.
- Bury an old teapot at ground level with just the spout showing, putting a little cotton wool or similar inside.
- Leave wild patches in shaded, quiet corners of gardens. Bumblebees like places like this.



For more information:

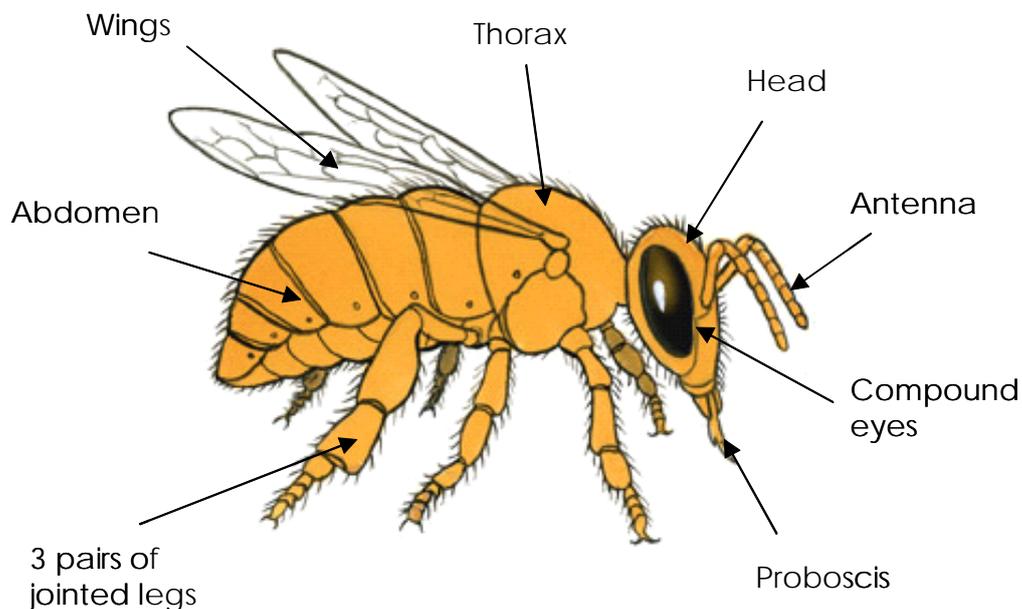
www.open2.net/springwatch/bumblebees.html

Bee-aware of bees!

Insects are the most diverse group of animals on the Earth. With over a million described species, they make up more than half of all known living organisms!

Bees are easy to confuse with wasps and many people are worried about their stings. Bees can sting but in fact they rarely do unless provoked and feel they need to protect themselves and their hive. They have black and yellow stripes because this is nature's way of telling everyone, including us, to keep our distance.

Like all insects, bees are made up of three parts – a head, a thorax and an abdomen. Attached to the head is a tube (proboscis) for sucking nectar and antenna which are responsible for smelling and taste. They can feel vibrations, movement of air, sounds, temperature and humidity, and they have compound eyes.



The bees' compound eyes mean that they see the world very differently from us - more like a mosaic pattern. The eyes do not perceive shapes very clearly but can identify colour brilliantly. Although bees can't see red very well, they can see ultraviolet light which is not visible to humans. This means that the patterns on many petals look very different to bees - often the ultraviolet light makes the flowers look like targets to direct the bees to the pollen and nectar!



Evening primrose in ordinary and u-v light

The compound eye also helps the bee to see where the sun is in the sky, even when it is cloudy. The bees need to know where the sun is to navigate between their hive and the flowers.

The thorax includes the legs, two pair of wings and large muscles that allow them to fly. At the end of each leg are structures called tarsi, which taste what they touch, and stick pads and claws which can grip onto both smooth and rough surfaces so that they can climb and walk anywhere.

The first pair of legs is used for cleaning antennae. The middle pair is used for removal of masses of pollen brought to the hive. The third pair of legs each possesses a pollen basket.

When bees go foraging, the pollen from the flowers gets stuck to the bees' hairs which cover their body. When the bees groom themselves using their legs, the pollen forms into balls which are then stored in their pollen baskets on their legs until they get back to the hive. If you watch bees carefully you can see these!

As Bumblebees have more hair on their body than honey bees, it means that they are able to go out in colder weather and earlier in the year.

The abdomen consists of several segments including the sting, in females, and the wax glands which secrete the wax that makes up honeycomb.

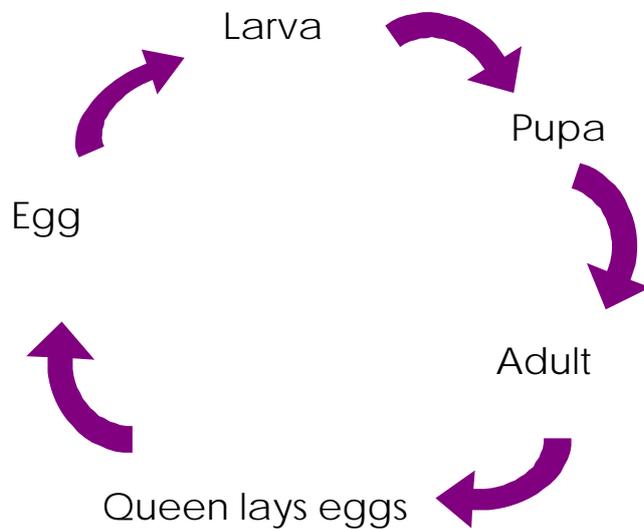
If you are unlucky enough to be stung by a bee, your body produces something called histamines, which can cause itching, redness and swelling. When a bee stings it also produces an alarm pheromone, a type of chemical signal, which tells other bees to be alert to danger. Sadly, each bee that stings will die because the sting gets stuck in the skin and gets left behind when it moves away.

Activity 5) The Bees Knees...

Have a look at the body parts of a bee under the microscope. Can you identify the different body parts on the diagram above on a real bee (you will have to find a dead bee)?



A Honey bee life cycle



Each egg is laid in one of the hexagonal wax cells in the bee hive and hatches into a tiny, white, legless larva. The larva feeds on substances put in the cell by the worker bees, grows, pupates in the cell, hatches as an adult bee and finally emerges from the cell into the hive. The eggs hatch after three to four days and by nine days are fully grown and ready to pupate. The workers put a capping over the cells at this time. Twelve days later the capping is bitten away and the adult emerges.

A bee life cycle is very different from a human life cycle as the young bees look nothing like the adults bees at all. Are there any other creatures that you know about that have a similar life cycle to a bee?

There are three different types of adult honey bee...

Workers:

These are the smallest bees and only measure about 1cm long. They are all female and live about six weeks in the summer. They live longer in the winter as they are not as busy. The worker bees are responsible for making honey, cleaning the hive, guarding, feeding the other bees, building the honeycomb and foraging for food.

Drones:

Drones are slightly bigger than workers. They are all male and live around twelve to sixteen weeks. Drones mate with the queen and do not sting.

Queens:

Queens are the biggest bees. They are all female and there is only one per colony. Queens live for up to four years. Her only job is to lay up to 2,000 eggs per day. She does not have black stripes. Larvae only grow up to become queens when they are only fed with Royal Jelly, a substance secreted by young worker bees. If they are not fed this they will grow up to be workers.

If the hive becomes overcrowded, many of the bees take the queen and leave the hive to find a new house. This is called swarming. The old colony will then build new queen cells within the hive and feed and nurse the baby queens inside the cells. When they hatch, they fight and the strongest wins and becomes the new hive queen.



How bees live

Bees can be solitary or live in colonies. The size of colonies can vary from 50-200 Bumblebees to 100,000s in honey bees. Some bees live on their own – they are called solitary bees. They do not have a sting and don't store honey. After mating, the solitary bee female creates nests in hollow reeds or twigs, holes in wood or, most commonly, in tunnels in the ground. She lays her eggs with some nectar and pollen within her nest.

How do bees communicate with each other?

Bees are very clever creatures and can talk to each other – not with sound but with special chemicals called pheromones and by special dances!

How can chemicals talk?

Pheromones carry their message by smell.

Alarm pheromones are released when a bee stings another animal. They attract other bees to the location and cause the other bees to behave defensively, i.e. sting or charge. Smoke can mask the bees' alarm pheromone so beekeepers pump smoke into hives when they handle them to avoid alarming the bees. Another alarm pheromone has a repellent effect and is possibly used to deter potential enemies and robber bees (a type of worker bee) who try to sneak in to steal honey!

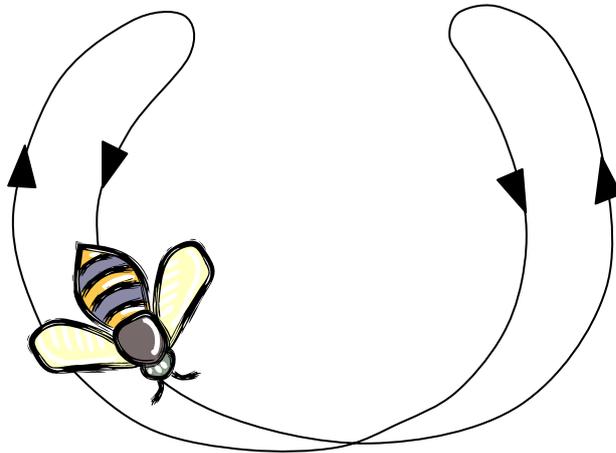
Other types of pheromone are emitted by bee larvae and pupae to tell the adult bees that they are there and do not need to produce anymore young bees. Still others are produced by the queen to tell all the bees that she is still alive and laying new eggs.

The Nasonov pheromone is released by worker bees so that the bees who are looking for food can find their way back to the hive. To spread the pheromones around, bees put their bottoms in the air, which contain the pheromone glands, and fan their wings vigorously! You can see the bees doing this by the door of the hive.



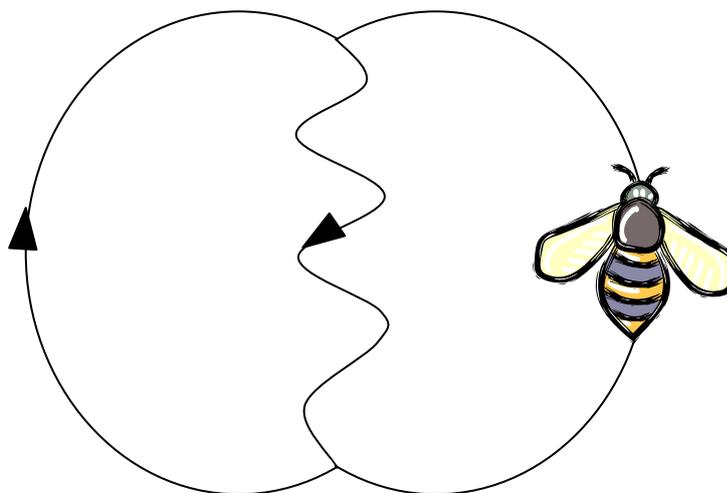
Why do bees dance?

Honey bees can also tell other bees from their hive where there are flowers which are a good source of nectar and pollen. When a worker bee returns to the hive, she can perform a "round dance", where she will move in circular patterns, to tell the other bees the location of food nearby.



When food is further away, the bees can perform a "waggle dance". The waggle dance is a figure of eight dance which can tell other bees the precise direction and distance to a patch of nectar rich flowers or water. If the bee waggles straight up inside the hive it tells the others that they need to fly towards the sun to find food. If they waggle left, they need to fly to the left of the sun, and if they waggle right, they need to fly to the right of the sun. The longer the bee waggles for, the further away the food is.

Other bees in the hive detect the information through touch and vibration.



Activity 6) Role Play: Where have all the bees gone?

Preparation

Each person in the group needs to be allocated a character. Once you have your character, you will need to create a name badge for each person and find the appropriate props (see below).

Each person will have a straw – nectar can only be drunk through a straw (similar to the bees' mouthparts)

You will need a large space with an area designated as the hive – all the bee characters will start off in the hive.

Within the hive you will need a nursery where your larvae/baby bees are growing.

Characters and props

Narrator – beekeeper

1 person. Possibly with beekeeper's veil

Queen Bee

1 person. Needs eggs (perhaps small chocolate eggs)

Worker (forager) bees

Any number of people. Need a bag or basket to collect pollen and nectar.

Drones

Smaller number of drones than workers.

Hygienic bees

Small number of people. Need a duster or broom.

Varroa mites

Any number of people. Each mite should have some post-it notes and some eggs of their own which look different to the queen's eggs.

Flowers

Any number of people. Need a flower, pollen (yellow counters or beads) and nectar (small cups of fruit squash)

Each different type of bee has a different job in the hive. Explain to the children the different jobs of each bee, and let them take turns acting out each job.

The Queen bee never leaves the hive. She always is surrounded and protected by the workers. Her only job is to lay eggs. This is a large job because she has to lay about 2,000 eggs a day. The Queen stays in the hive and moves around the hive laying eggs.

The Drones rarely leave the hive. Their job is to fertilise the queen's eggs. A drone stays in the hive and stays near the queen.

The Workers are the busy bees. They travel back and forth between the hive and the flowers. They bring nectar (fruit squash) and pollen (yellow counters or beads) from the flowers into the hive for the rest of the bees. They will clean and repair the hive and will also make honey.

Hygienic bees clean up dead bees and prevent infections from spreading.

What to do

The beekeeper sets the scene and explains what is happening in each scene



Narrator: "This is one of my hives of honey bees. In the hive the bees are busy making honey. They all work very hard especially the workers, who keep everything clean, feed the young and collect nectar, and the queen who lays all the eggs - up to 2,000 per day. The male drones hang around the queen and help with the eggs!"

Scene 1

A busy hive, workers go out to flowers to collect pollen and nectar (fruit squash). When they get back to the hive, they do a little waggle dance for the other workers to show them where the flowers are. Other workers and hygienic bees tidy up and feed the rest of the bees in the hive. The bees in the hive drink up the nectar (with their straws). The queen is directing operations and laying eggs whilst the drones are nearby helping her.

Scene 2

As the worker bees return to the hive from the flowers, the mites sneak up and catch the bees as they enter the hive.

When the bees enter the hive, the mites drop off and head for the nursery, passing on viruses (post it notes) to the bees on the way.

When the mites get to the nursery, they lay there own eggs there.

Scene 3

Some of the worker bees have viruses (post-it notes) attached to themselves and are unwell. The workers that have the viruses try to get out of hive but are too unwell to reach the flowers. They can't fetch much pollen and nectar so there is very little food for the larvae or bees.

Scene 4

A scene of destruction! Most of the bees are now unwell or dying. It looks like the colony will collapse. The queen wrings her hands and mourns the destruction of her colony. What can be done?

Scene 5

The beekeeper tries to help. He treats the hive with chemicals and gets rid of as many mites from the hive as possible.

Hygienic bees throw out mites and some of the dead or very unwell bees.

After a little time, some of the workers get better and a few manage to stagger out and collect a little nectar and pollen. Lots of bee-friendly plants have been planted nearby which makes it easier for them to find food.

Narrator: 'My bees haven't been very well but enough have survived to ensure that the colony will live! Next year I will need to check for mites much earlier and make sure they do not infect the hive. If my bees had all died out, I would get no honey and the flowers would not be pollinated. I will also make sure there are lots of bee-friendly plants nearby so that they have lots of food.'

THE END

Where have all the bees gone? Character list



Beekeeper	Queen Bee
Worker Bee	Worker Bee
Worker Bee	Worker Bee
Worker Bee	Worker Bee
Worker Bee	Worker Bee
Drone	Drone
Drone	Drone
Drone	Drone
Hygienic Bee	Hygienic Bee
Hygienic Bee	Hygienic Bee
Varroa mite	Varroa mite
Foxglove	Apple Blossom
Lavender	Daisy
Dandelion	Rose

Activity 7) Bee finger puppets



Bee finger puppets are easy to make and you can either make one or a whole swarm! You can use them to show people how bees pollinate flowers or do a “waggle dance”.

What you will need

- Some brown, yellow and black materials for the bee’s body – you can use paper, felt, or furry fabric
- Either sticky tape or a needle and thread (depending on whether you are using paper or fabric)
- Some white felt, silver wrapping paper or tissue paper for the wings
- Pipe cleaners
- Glue
- Scissors

Start your finger puppet by choosing the type of material you would like to make the body from – brown felt/paper or some other dark colour would be good for this.

Cut your material to make two pieces of the “body” shape below.

You will need to sew or glue around the edges of the material - the dotted lines tell you where to stitch. Once you have finished sewing, turn the puppet inside-out to hide the stitching.

If you are using glue, try to keep the glue outside of the dotted lines.

Cut out two circles of black material or paper for the eyes and use glue to stick these to the puppet.

Cut out two or three thin strips of yellow material and glue these all around the bee’s body.

Cut your white/silver material to make your bee wings. You will need to use strong glue in the area marked with the dotted lines on the wing template and press the wings into position on the body.

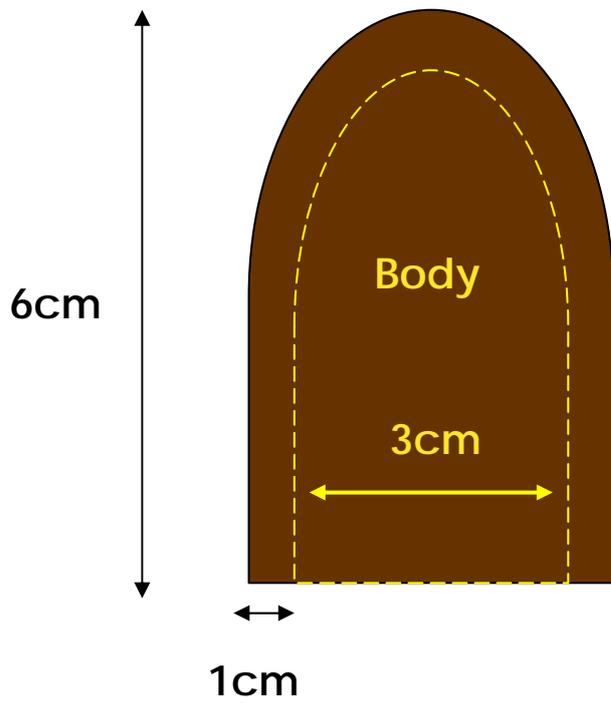
Pipe cleaners can be used for antennae and legs and can be sown or stuck into place.

Wait for the glue to dry before taking your bee for a flight on your finger!



Bee Finger Puppet Template

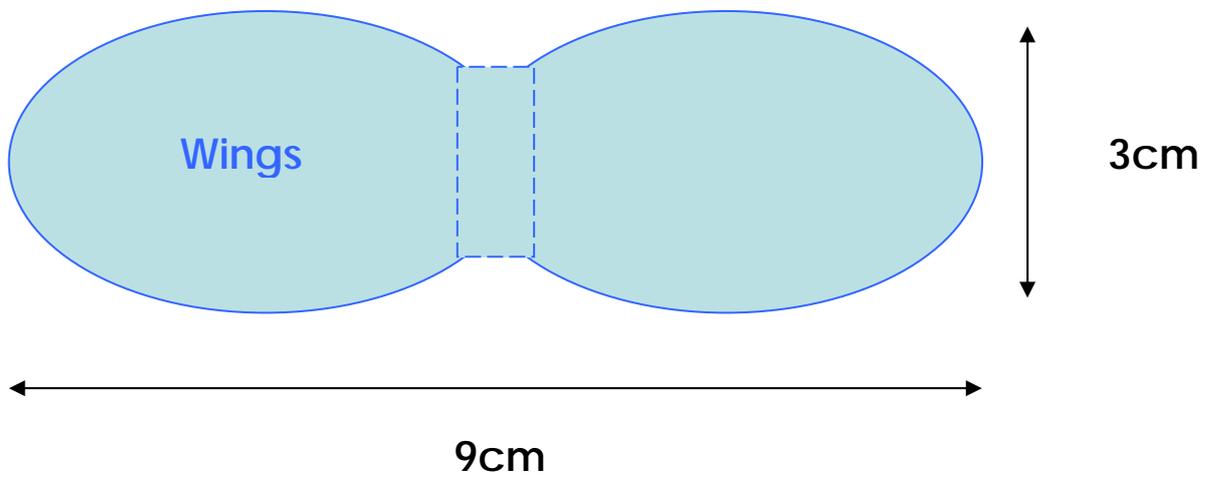




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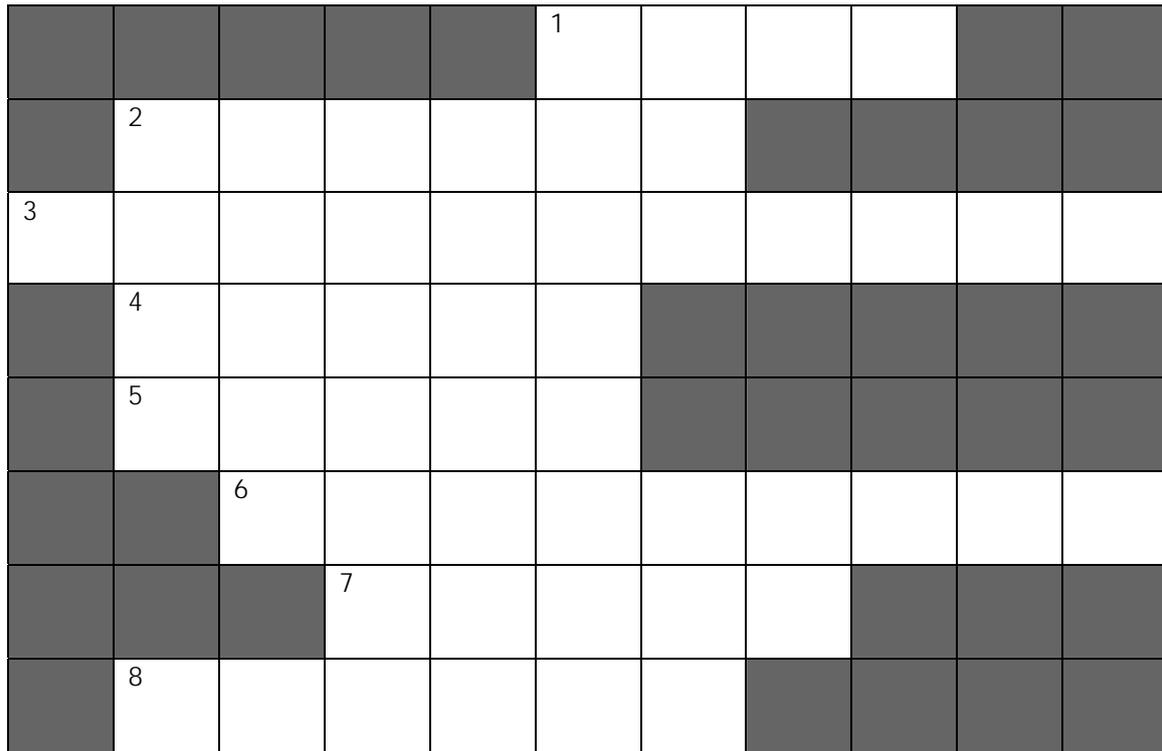


Eye



Activity 8) Bee Crossword





1. Place where honey bees live
2. Name of the mite which attacks bees
3. Important job of bees
4. Male bee
5. Product bees make
6. Large hairy garden bees
7. Egg laying female bee
8. Bees who collect nectar



Activity 9) Save Our Bees Wordsearch

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

Queen
 Drone
 Worker
 Honey bee
 Bumblebee
 Foxglove
 Apple
 Bluebell
 Honey
 Wax





Weblinks

Save our Bees Campaign

www.saveourbees.org.uk

National Science & Engineering Week

www.nsew.org.uk

British Science Association

www.britishscienceassociation.org

British Beekeepers Association

www.britishbee.org.uk

Bumblebee Conservation Trust

www.bumblebeeconservationtrust.co.uk

Rowse Honey

www.rowsehoney.co.uk

Bee School – activity sheets and a chance to win a honey tasting kit

www.beeschool.co.uk

Wikipedia various articles

<http://en.wikipedia.org>

- Bee
- Characteristics of common bees and wasps
- Fruit tree pollination
- Honey bee life cycle
- Crop plants pollinated by bees
- Picture gallery

Useful honey information and recipies

<http://www.rowsehoney.co.uk/articles/recipes/recipes-introduction>

www.honeyassociation.com

www.bbc.co.uk/food/recipes/mostof_honey.shtml

Artificial honey recipe

www.planet_science.com -

PrimaryUpd8

Search for 'vanishing bees' activity

www.primaryupd8.org.uk

Details of how to make a Bumblebee nest - Breathing Places

www.open2.net/springwatch/bumblebees.html

Nature's Calendar - www.naturescalendar.org.uk



Syllabus connections

It is often possible to connect in to a range of topics in the curriculum especially those that are cross curricula. The topics below have been highlighted as those were specific projects related to bees could be used

KS1

Sc1 Scientific Enquiry

- Ideas & evidence in science
- Considering evidence and evaluating

Sc2 Life Processes

- Green plants
- Living things and their environment

KS2

Sc1 Scientific Enquiry

- Links between cause and effect

Sc2 Life Processes

- Life processes common to humans and other animals
- Make links between life processes in familiar animals, plants & environment
- Plant reproduction
- Living things and their environment, about ways in which living things & the environment needing protection

KS3

Sc1 Scientific Enquiry

- How scientists work

Sc2 Life Processes

- Living things in their environment; adaptation and competition;
 - protecting the environment,
 - plant and animal diversity

KS4

Sc1 Scientific Enquiry

- Ideas and evidence in Science
- Investigative Skills, especially considering evidence and evaluating

Sc2 Life processes & Living things

- Living things and their environment; adaptation and competition



Scotland's curriculum

5-14 outcomes

- LT-A2.3 Give the conditions needed by animals and plants in order to remain healthy
- LT-A3.1 Recognise and name some common plants and animals found in the local environment
- LT-B1.1 Give some of the more obvious distinguishing features of the major invertebrate groups
- LT-B1.2 Name some common members of the invertebrate groups
- LT-B3.1 Give examples of feeding relationships found in the local environment
- LT-C3.2 Explain how living things and the environment can be protected, and give examples
- LT-D2.5 Describe the main stages in flowering-plant reproduction
- LT-D3.1 Describe examples of human impact on the environment that have brought about beneficial changes and examples that have detrimental effects
- LT-E3.1 Construct & interpret food webs, make predictions of the consequences of change

Curriculum for Excellence

Scotland's curriculum is changing. Detailed outcomes will be published soon www.LTScotland.org.uk

These activities will contribute to pupils as successful learners; responsible citizens; effective contributors and confident individuals

Standard Grade Biology: Biosphere topic

Intermediate 1 Biology: Growing Plants

Northern Ireland's curriculum

These activities could contribute to the knowledge, skills and understanding in the World around Us area of learning. They could also contribute to different teaching approaches and using a range of activities and contexts.

Using these activities will contribute to Education for Sustainable development and teachers should be able to help children throughout the primary stages to:

- appreciate the environment and their role in maintaining and improving it
- understand how actions can affect the environment.

Wales' curriculum

These activities could contribute to Scientific Enquiry and Life Processes and Living Things areas of KS1 and 2 curriculum.



Crossword Answers

					H	I	V	E		
	V	A	R	R	O	A				
P	O	L	L	I	N	A	T	I	O	N
	D	R	O	N	E					
	H	O	N	E	Y					
		B	U	M	B	L	E	B	E	E
			Q	U	E	E	N			
	W	O	R	K	E	R				

Save Our Bees Wordsearch Answers

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



Thank you for using Save Our Bees

We hope you enjoyed the activities within this pack. To help us to continue to provide new activity packs, we'd like to ask you to tell us a little about what you did for National Science & Engineering Week.

Please take a few minutes to fill in this form. If you used this challenge pack for NSEW, send in this completed form and we will send you a National Science & Engineering Week Certificate.

Organisation: _____

Address: _____

Postcode: _____

Tel: _____

Fax: _____

Email: _____

Which dates did you do National Science & Engineering Week activities on? _____

What did you do?

Please make any comments about this challenge pack, National Science & Engineering Week and/or other possible topics for future packs.

Tick this box to be added to our mailing list. This will keep you up to date with NSEW, including grants, resources and activities. Your contact details will not be passed onto third parties.

Please return to:
Fax: 0870 770 7102
Post: National Science & Engineering Week
FREEPOST LON 20848
London
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