

# Bees virtual

Grade 4

A FACILITATOR'S GUIDE

*Many thanks to Isabel Deslauriers, a real-life bee keeper, for allowing us to use her photos/PowerPoint lesson plan which has been adapted for our site.  
We also thank Beckie Granatstein for developing the bee anatomy activity and eat like a bee for Let's Talk Science in Ottawa.*

**Thank you for volunteering for Let's Talk Science! The following manual will help guide you through the workshop. Please read this manual before visiting the group you are working with.**

## Important Notes

### Introduction & Guidelines

- This manual is meant as a guide to help you prepare for your activity. The introduction includes questions that get at the curriculum link/science concept the workshop covers. You are not expected to memorize this manual. It is a guide and we want you to bring your own experiences and your style of teaching into it.
- As a general guideline, do not speak longer than the age of the students at one time.
- Most workshops fit well in a 1-hour time period but some like bridge building or some high school activities are a little longer.
- Practice your introduction and test out the activities beforehand so you can anticipate sections that may take more time or may be difficult for students.
- If you are working with a partner, work out roles and responsibilities before the visit.

### Safety

As a Let's Talk Science volunteer, safety must be foremost in our minds during all activities. As STEM role models, volunteers must always also model safe science practices.

Always keep in mind the following precautions:

- Emphasize and demonstrate appropriate safety procedures throughout the presentation.
- Be professional but have fun.
- Keep workspaces clean to avoid tripping hazards.
- Allergens should have been checked before reserving the kit (e.g. allergies to latex).
- **Activity Specific Safety:** n/a

### WHMIS

An overview of Canada's Workplace Hazardous Materials Information System (WHMIS) is included in these materials at the end of this manual where needed. No WHMIS sheets are included with this activity.

## Overview of the Workshop

### Grade Level and Curriculum Learning

**Grade 4:** *Plants and animals are interdependent and are adapted to meet their needs from the resources available in their particular habitats; changes to habitats can affect plants and animals and the relationships between them; Society relies on plants and animals.*

### Materials if dropping materials to the school

Bees PowerPoint
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#### Bee Anatomy

Foam balls (3 per student)
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Toothpicks (2 per student)
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Shiny eyes (stickers from the dollar store; 2 per student - show volunteers how to take these off the sheet so the whole row doesn't pull off at once)
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Pipe cleaners: (3 per student cut as below)
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6 legs - 6 pieces that are $\frac{1}{4}$ the length of a pipe cleaner
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2 antennae, a proboscis and a stinger - 4 pieces that are $\frac{1}{8}$ the length of a pipe cleaner
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2 wings - $\frac{1}{2}$ the length of a pipe cleaner
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#### Eat Like a Bee

Cardstock flowers (1 per student)
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Sticky and soft Velcro (1 small piece of each per student student)
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$\frac{1}{2}$ sheet of printer paper
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1 straw
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1 rubber band
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1 paper flower
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#### Communicate like a Bee

Link to the waggle dance <a href="https://www.youtube.com/watch?v=-7ijl-g4jHg">https://www.youtube.com/watch?v=-7ijl-g4jHg</a>
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### Materials if NOT dropping materials to the school

Bees PowerPoint
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#### Bee Anatomy

3 foam balls or 3 balls of clay about 1.5 diameter each
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2 Toothpicks if using foam balls
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Marker to make eyes
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3 Pipe cleaners for legs, wings, antennae, a stinger, and proboscis (these could also be made with playdough or paper or other material)
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#### Eat Like a Bee (make a proboscis)

$\frac{1}{2}$ sheet of 8.5 x 11 inch paper cut lengthwise (a scrap piece of paper works)
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1 paper straw (or a piece of paper rolled up like a straw and taped)
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1 small piece (e.g. 1 cm x 1 cm) of soft Velcro and one small piece of rough Velcro or tape will do
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$\frac{1}{2}$ sheet of paper to make a flower
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Elastic/rubber band/hair elastic (or tape if no elastic)
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Scissors, tape
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#### Communicate like a Bee

Link to the waggle dance <a href="https://www.youtube.com/watch?v=-7ijl-g4jHg">https://www.youtube.com/watch?v=-7ijl-g4jHg</a>
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### Timing of the Workshop

	Approx. Time	Description
<b>Introduction</b>	5-10 minutes	Introduce yourself, find out what they already know, add in bits to fit with the curriculum learning
<b>Bee anatomy</b>	15-20 minutes	Students build a bee with foam balls, pipe cleaners, and googly eyes
<b>Eat like a bee</b>	5 minutes	Make a proboscis
<b>Wrap up</b>	5 minutes	Discussion on their findings

## Activity

**Note:** The **questions** you might ask are in **bolded blue font**. Some *things you might say* are in *blue font* and the possible answers are in *square brackets in black font*. *Actions* are in *purple font*.

Open the “Bees” PowerPoint presentation. The presentation guides the lesson/activity.

### Introduction

Hi everyone! We are Let’s Talk Science volunteers. We come to schools and do hands-on activities. I study [simple terms] \_\_\_\_\_ at the University of Ottawa/Carleton University. I decided to study \_\_\_\_\_ because [when I was your age I loved... I think it’s important to... I’m curious about...].

We’re/I’m here today to talk about bees! We’ll do a game to learn about the life cycle of a bee, build a bee you can take home, eat like a bee, and see how bees communicate.

### Slide #2

**Why do you love bees?** [various answers – fuzzy, cute, some might say they don’t love bees].

**Why do you *not* love bees?** [various answers – they sting, are scary, etc.].

(Note: if they mention stinging, explain that bees don’t actually sting unprovoked. Many people think they’ve been stung by a bee but they have actually been stung by a wasp instead)

I love bees because... they pollinate our food (about 1/3 of our food crops worldwide are pollinated by bees); they are so smart, they are cute, and fuzzy!

Some are also in danger of going extinct (e.g. the Gypsy Cuckoo Bee and Rusty Patch Bumblebee in Ontario). Threats to bees include pesticides, loss of their habitat (due to humans building houses or malls, etc., and agriculture for crops), climate change, and diseases.

### Slide #3

This is what a beehive looks like when someone raises bees. This is Isabel and she and her husband Ray raise bees.

Beekeeping means taking care of bees: giving them a home, medication when they need it, food when there isn't food around, and water in exchange – the bees give me honey.

If they aren't happy with their accommodations, they will leave! So I have to take good care of them.

*Varroa* are a parasitic mite that like bees, so Isabel might give her bees a special medication to help prevent these mites. Pass around the photos of the bee with a red spot near its head.

#### Slide #4

Has anyone ever seen a beehive in nature? Here's what it might look like. Honey bees don't hibernate. They huddle together to keep warm in winter.

#### Slide #5

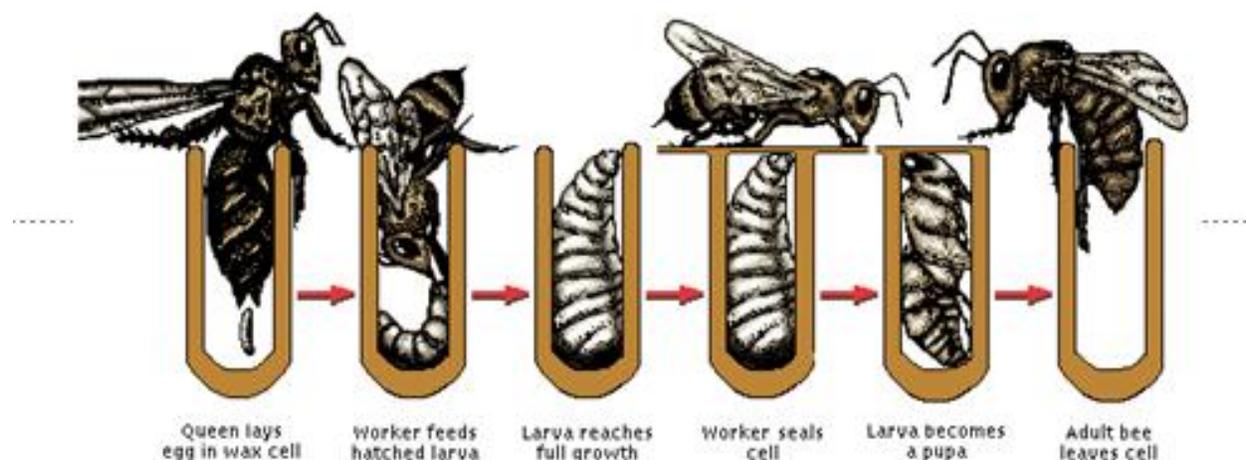
Let's see if we can figure out the life cycle of a bee.

Give the students a few minutes to see if they can decide the order of the bee life cycle. They can write down the numbers associated with each photo in the order they think they go.

Ask a couple to see what order they put them in before showing Slide 6 (the answer slide).

#### Slide #6

**Is this the order you put yours into?** First the Queen lays the egg, workers feed the larva that hatches from the egg, the larva grows large enough to fill the wax cell, the worker bee seals the cell, the larva becomes a pupa, undergoes metamorphosis and the adult leaves the cell.



#### Slide #7

These are larva (white). The bees feed their larva royal jelly. Royal jelly is a special food that is nutrition for the larva and is secreted from glands in nurse bees.

Slide #8

The larva get sealed inside a honeycomb by a wax cap, and transform into pupae.

Slide #9

**Can you see the bee being born?** (Coming out of cell, upper right)

Before we move on to a few more cool things about bees, let's see if we can make a bee.

What type of animal is a bee? [insect] What do all insects have [3 body parts, 2 antennae, 6 legs].

Ask the teacher to distribute 3 foam balls, 2 toothpicks, 6 leg pipe cleaners, and 2 small pipe cleaner pieces for antennae. (If the class was given individual kits ask the teacher to distribute the kits of materials if not already done)

Show students how to put the balls together with the toothpicks.

**Before you put the legs on, what are the names of the body parts?** [head, thorax, abdomen]. **Which body part do the legs go on?** [thorax]. Go ahead and add legs and antennae. Show the students how to hold the pipe cleaners near the end so it's easier to put them into the foam balls.

**Now what other features do bees have that not all insects have?** [wings, stinger, and a special mouth part called a proboscis].

Have the teacher distribute 2 wing pipe cleaners per student, and 2 more short pipe cleaners (stinger and proboscis) and show the students how to make a wing (see training video for this).

Lastly hand out two eyes to each student as they are adding the things above. [If at

Now you have a bee. 😊 Let's take a look at a few more things about bees.

Slide #10

Once bees are born, they have a lot of jobs! A worker bee's life is about 6 weeks long and there are about 20,000 to 80,000 in a hive (their habitat).

Worker bees are females. Male bees are born called drones and their main job is to mate with the queen.

Day 1-2: hive clean up duty

Day 3-11: nurse bee, their glands produce royal jelly to feed larvae

Day 12-34 worker bee: their glands produce wax to build the honeycomb

Day 22-42: forager bee, goes to get pollen and nectar

Some bees have roles like moving around nectar, fanning the nectar to make it into honey, being a soldier (guarding the hive)

Slide #11

In the process of gathering nectar, the bees pick up pollen and transfer it from 1 flower to another. They use their proboscis to gather the nectar.

Nectar is a sugar called *sucrose* and enzymes turn this sucrose into *glucose* and *fructose*. We have an enzyme in our mouth in our saliva (*salivary amylase*) that helps to break down sugars like fructose and glucose). The fanning that some of the bees do, helps to remove extra water from the sugar and protects it from germs/microbes.

Slide #12

Here's a bee bringing back nectar and pollen.

Slide #13

Storing pollen (in the coloured cells) and nectar (in the shiny wet-looking cells).

Slide #14

This is what the inside of Isabel and Ray's beehive looks like when it is filled with honey.

Slide #15

Isabel scraping off the wax caps to drain out the honey.

Bees use a proboscis, a long mouthpart, to get at nectar in the flowers. We're going to make our own proboscis. It needs to sit for a bit so you'll have to wait to try it out til later today or tonight but we can make the proboscis and cut out a flower so you are ready to eat like a bee.

Have the teacher distribute the ½ sheets of paper, tape, straws, elastics, paper flowers, and Velcro to each student or if at home the students should already have their materials ready. If being done at home and students don't have a straw, show them how to roll a piece of paper up tight in a cylinder shape similar to a straw and this works equally as well.

**What to do to make your proboscis**

1. Take the half sheet of paper and fold the two sides towards the middle of the paper lengthwise.
2. Put a piece of tape down the middle to hold the folded parts down as in the photo.
3. Fold about a half a centimetre of the paper at one end and tape it down as in the photo.
4. From the end that is folded and taped, roll the paper tightly all the way to the other end to create a cylinder.
5. Let the paper roll go while you do the next step.



6. Insert about 1-2 cm of the straw into the opening at the end of the roll of paper and tape it in place.
7. Tape along the rest of the open end so it is closed. This is your proboscis.



8. Place a small piece of Velcro on the end of the roll that doesn't have the straw so when it unrolls the Velcro is oriented toward the floor.
9. Reroll the rolled part and put an elastic around the roll. Leave this sit 1-3 hours so it will keep its shape when you blow it.
10. Using the paper flower or a flower you draw and cut out, place a piece of Velcro in the middle (or a piece of tape if the students are at home with no Velcro) (this is pretend nectar).
11. Blow into your proboscis and try to collect nectar by having the proboscis stick to the tape on the flower.



The blowers already have Velcro on the end of them. Have the students put a piece of Velcro in the middle of their paper flower. Then try to blow and get the blower to stick to the Velcro on the flower. It's not always easy!

Move to slide #16 – “How bees communicate”.

Bees communicate using what we humans call the waggle dance. We'll watch it on this video.  
<https://www.youtube.com/watch?v=-7ijl-g4jHg>

### Wrap-Up

Without bees we wouldn't have many foods we eat. Pesticides we use in agriculture, sometimes on our lawns, and other areas, are threatening the bees survival. There are many groups working to ensure we save the bees. One way we can do that is to plant flowers that bees love, use less or none of the pesticides that kill bees, and just be aware of the importance of bees can help people want to take care that they don't kill them.

### Does anybody have any questions?

*If you have extra time, you can ask if they have any questions about university or being a student or about your research.*

Thank you for having us in your class today!