

## Pre-trip Information for Teachers

---

### Program Description

As students enjoy the beauty and fragrance of flowers throughout VanDusen, they investigate the parts of a flower, their role in pollination, and how pollination fits in the life cycle of flowering plants. Students will search for pollinators in action - including a visit to our active beehives - while exploring the connections between pollinators, plants, and food production.

### Learning Objectives

Students will:

1. Search for a variety of flowers and pollinators and observe them in action
2. Learn about the parts of a flower and how each part is involved in the pollination process
3. Link pollination to the life cycle of flowering plants
4. Begin to understand the interdependence between pollinators and plants and how they are linked to the everyday needs of human beings

## Curriculum Connections

### Kindergarten

#### BIG IDEAS

- Plants and animals have observable features
- Daily and seasonal changes affect all living things

#### CURRICULAR COMPETENCIES

- Demonstrate curiosity and a sense of wonder about the world
- Observe objects and events in familiar contexts
- Ask simple questions about familiar objects and events
- Make exploratory observations using their senses
- Experience and interpret the local environment
- Discuss observations; Share observations and ideas orally

#### CONTENT

- Basic needs of plants and animals
- Adaptations of local plants and animals
- Seasonal changes
- Living things make changes to accommodate daily and seasonal cycles

## **Grade 1**

### **BIG IDEAS**

- Living things have features and behaviours that help them survive in their environment

### **CURICULAR COMPETENCIES**

- Demonstrate curiosity and a sense of wonder about the world
- Make simple predictions about familiar objects and events
- Experience and interpret the local environment
- Compare observations with predictions through discussion
- Transfer and apply learning to new situations

### **CONTENT**

- Classify living and non-living things
  - Names of local plants and animals
  - Structural features of living things in the local environment
  - Behavioral adaptations of animals in the local environment
- 

## **Grade 2**

### **BIG IDEAS**

- Living things have life cycles adapted to their environment

### **CURICULAR COMPETENCIES**

- Demonstrate curiosity and a sense of wonder about the world
- Make simple predictions about familiar objects and events
- Compare observations with predictions through discussion
- Identify simple patterns and connections
- Transfer and apply learning to new situations

### **CONTENT**

- Metamorphic and non-metamorphic life cycles of different organisms
  - Similarities and differences between offspring and parent
- 

## **Grade 3**

### **BIG IDEAS**

- Living things are diverse, can be grouped, and interact in their ecosystems

### **CURICULAR COMPETENCIES**

- Demonstrate curiosity and a sense of wonder about the world
- Make predictions based on prior knowledge
- Make observations about living and non-living things in the local environment
- Experience and interpret the local environment
- Identify some simple environmental implications of their and others' actions

### **CONTENT**

- Biodiversity in the local environment
  - Energy is needed for life
-

## Grade 4

### BIG IDEAS

- All living things sense and respond to their environment

### CURRICULAR COMPETENCIES

- Demonstrate curiosity and a sense of wonder about the world
- Make observations about living and non-living things in the local environment
- Experience and interpret the local environment
- Identify some environmental implications of their and others' actions
- Make predictions based on prior knowledge

### CONTENT

- Animals and plants have different ways of sensing and responding to their environment

## Preparing students for their visit to a botanical garden

### Visiting a botanical garden

A botanical garden is a place of beauty, where students will get to see and learn about a variety of plants. Have a discussion about what the students think a botanical garden is and what they might be able to see at a botanical garden. Use our 'What is a botanical garden' fact sheet for reference.

### Garden Visitor Guidelines

Refer to our Garden Visitor Guidelines sheet at the end of this document, and discuss with your students why it is important not to pick any living plants in the Garden:

- If you pick a living plant, it can no longer grow or be enjoyed by other visitors to the Garden
- Plants and their parts, such as seeds, cones and leaves are all food sources for wildlife or a home for insects.

## Preparing students for the program

*These interdisciplinary activities are designed to integrate science, visual art and language arts in preparation or as a follow up to your visit to VanDusen. Feel free to adapt the activities to be relevant to the age group and experience of your students.*

### Introductory Activity

- Take your class outside into the school grounds to an area where they will see a variety of flowers (or bring some examples into the classroom)
- Get them to investigate the flowers (smell them and touch them carefully).
- Ask them to describe the flowers (colour, scent, shape etc...) in their own words
- Can they see any insects around the flowers?
- Get them to make an observational drawing of a flower of their choice

Back in the classroom have a discussion about flowers:

- How many different types of flowers can they name?
- What are flowers?
- Why do we have flowers?
- Can they name any flowers parts?

## Getting to know a flower

Investigation: *Flower Dissection*

You will need large perfect flowers like crocuses, tulips, lilies, rhododendrons, or magnolias. You can do this as a demonstration, in small groups, or have each student dissect a flower.

- Start on the outside of the flower. Look for green or petal-like parts outside or at the base of the petals. These are the **sepals**. In lilies, these are the same colour as the petals. Sepals protect the flower when it is in its bud stage. Gently pull the sepals off.
- Next look at the **petals**. The petals protect the stamens and pistils and attract pollinators. Look at the colours and markings on the petals. Gently take off the petals.
- Look for the **stamens**, the male parts. They are thin stalks with club-like heads. These heads are called anthers, and are where pollen is produced. Gently touch an anther with your finger. Does any pollen brush off? Find the base of the stamen and gently pick it off. Repeat for each stamen
- Now you have the **pistil(s)**, the female part of the flower. The top of the pistil, called the **stigma**, is where pollen lands. Below it is the **style** (stalk), and the enlarged **ovary** below the style is where seeds develop. Look for all three parts.
- Get your students to sketch each part of the flower and to label their sketches

## Pollinator Discussion

- Go back outside to look at the flowers. If you do not have any flowers in your school grounds, bring some examples into the class, collect pictures or find a suitable film/documentary
- Hopefully, you will get to see some pollinators in action (again, seek out relevant visuals or film to show this)
- Ask your students to consider what the insects are doing: observe them in action. Start a discussion going on why they are visiting flowers

## Meet the Pollinators

Bees are our biggest pollinators. The other major animal pollinators in North America are beetles, flies, butterflies, moths and hummingbirds.

<b>Pollinator</b>	<b>Colour attraction</b>	<b>Scent attraction</b>	<b>Shape attraction</b>
bee	Blue, purple, yellow and ultraviolet	sweet	Varied shapes, landing pads, nectar guides
butterflies	Bright orange, yellow, pink, white and blue	sweet	Tubular, landing area
beetle	White and pale yellow	Strong, fruity smells	Open shapes like composites
flies	White, green, yellow and brown	Strong, meaty smells	Composites and spathes (such as skunk cabbage)
moths	White	Strong, heavy scents	tubular
hummingbird	Red and orange	none	Tubular, nectaries
bats	White and green	Strong, fermented	Large, tough flowers

Pollinators show general preferences for flower scent, colour or shape. However, most pollinators visit many different flowers and most flowers rely on more than one pollinator. There are only a few direct relationships between a specific flower and a specific animal.

## **Making Seed Balls Activity**

Want to have some fun while making the world a greener, more environmentally-friendly place? Make exploding balls of seeds that are both fun to throw and an easy way to grow native wildflowers. When you are making your seed balls, we recommend you use native wildflower seeds. Native wildflowers are plants that have been a natural part of an ecosystem for long before humans started changing that ecosystem.

### Materials

1/2 oz native wildflower seeds.  
 3 1/2 oz dry, organic potting soil  
 1 1/2 oz dry clay (we suggest powdered red pottery clay)  
 Water  
 A mixing bowl  
 A cookie sheet for drying the seed balls  
 wax paper

### Instructions

1. Line cookie sheet with wax paper.
2. Mix seeds and potting soil together.
3. Add dry clay and mix again.
4. Slowly add water while still mixing the seeds, potting soil, and water into a well-blended paste.

5. When you are able to form a ball of the blended material without it falling apart, you are ready to stop mixing.
6. Mold the mixture into small (~1 inch diameter) balls and place cookie sheet or tray with wax paper.
7. Allow balls to dry in the sun for at least one day.

#### Now what?

All you have to do is throw them at a patch of dirt and watch it explode! Once it rains (or you water them), they have everything they need to grow. They also make great gifts! Put them in a plastic bag and give them to all your friends.

Source: <https://climatekids.nasa.gov/seed-ball/>

### **Online Resources**

Explore the following pollinator resources available online as well as others, courtesy of Border Free Bees and available at <http://borderfreebees.com/resources/>:

[Attracting Pollinators](#)

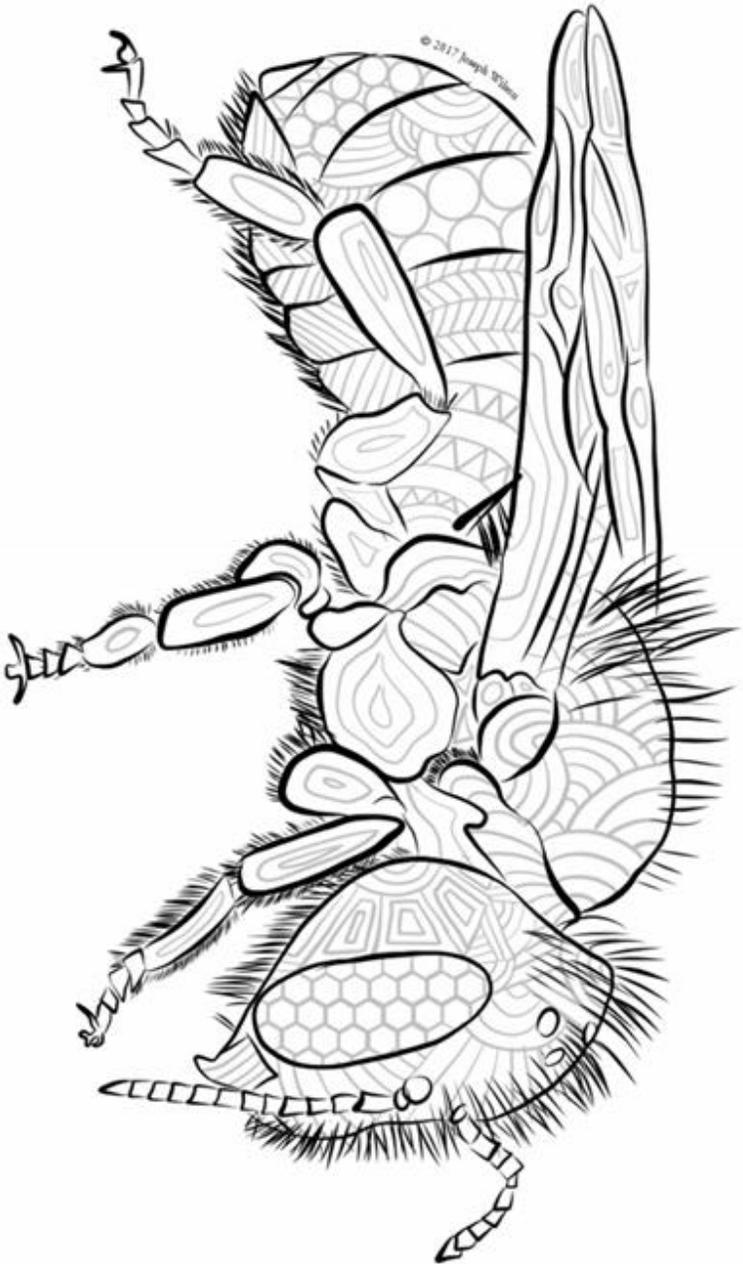
[Common Pollinators of BC](#)

[Pollinator Quick ID Guide](#)

[Bee Observer Cards](#)

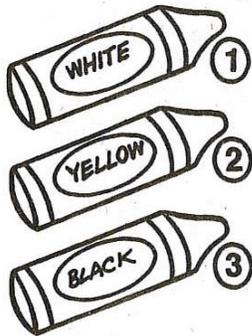
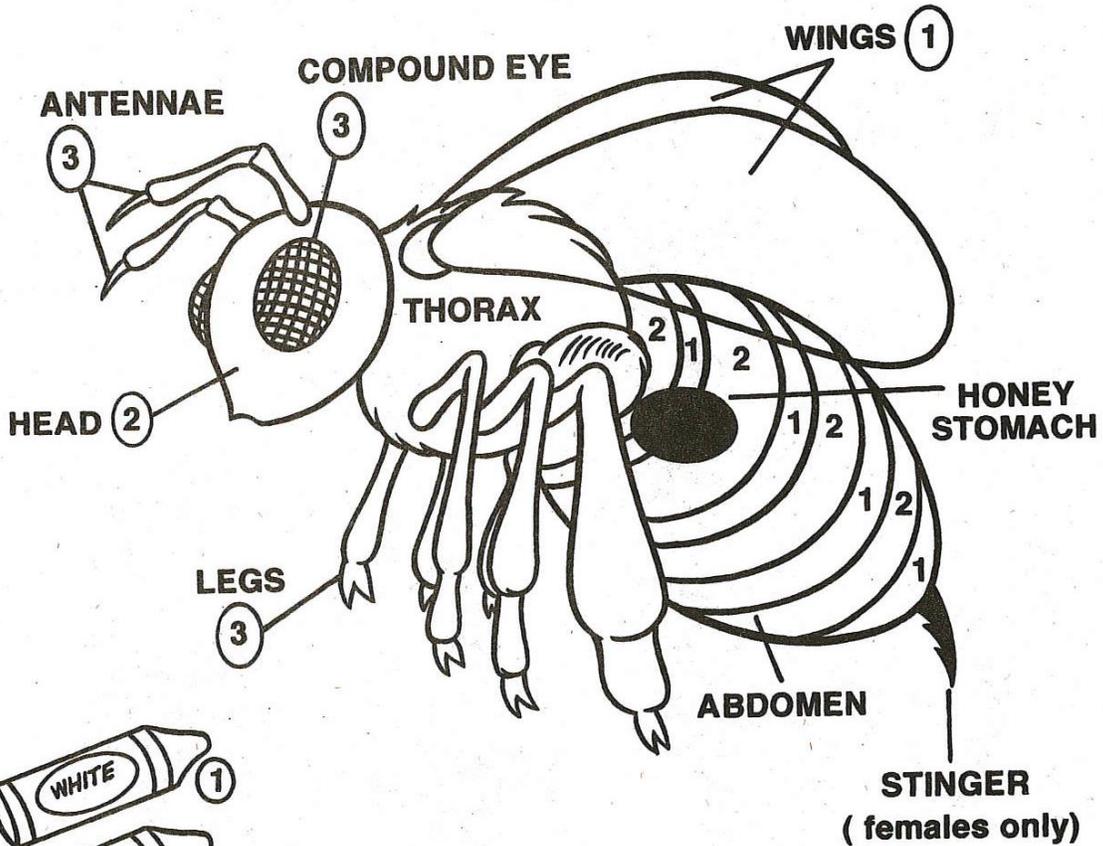
[Interactive Poster of Pollinators](#)

# Mason Bee (*Osmia*)



The genus *Osmia* includes some of the most economically important bees in North America, responsible for pollinating many orchards and fruit crops, and for picking up the slack when honey bees fall short. Some species will build nests entirely from mud, thus earning them the common name 'Mason Bees'. To learn more about mason bees and their relatives, check out "[The bees in your Backyard](#)" by Joseph Wilson and Olivia Carril.

# Anatomy of a Bee

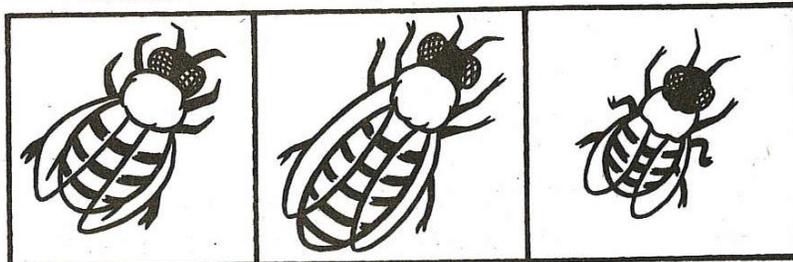


Sizes of the three types of honeybees

Drone

Queen

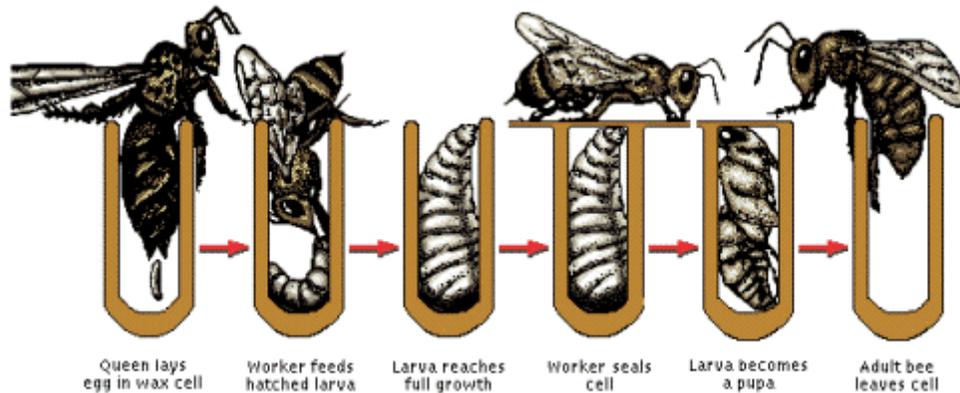
Worker bee



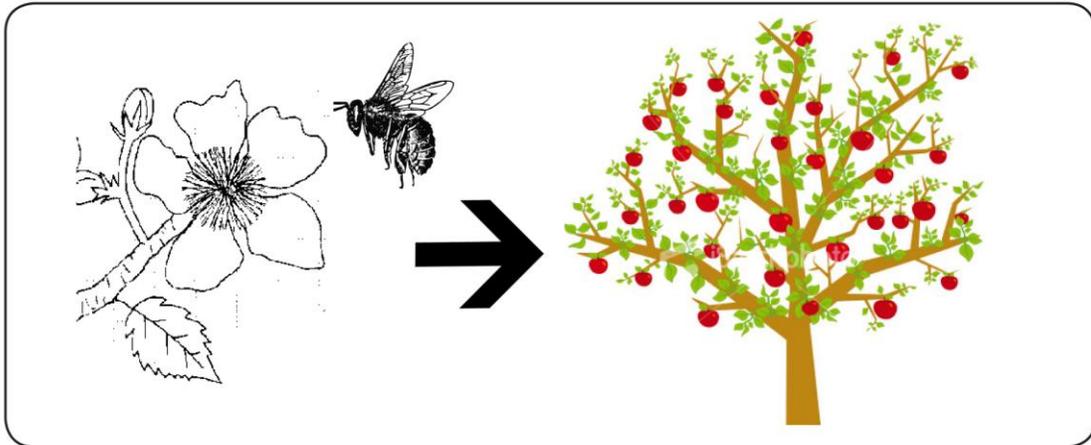
## The life cycle of a honeybee

Honey bees are one of the most common types of bees that farmers use. Introduce the lifecycle of a honeybee to your students. Ask them to illustrate their own life cycle. The example image below is just one way in which they could do this.

1. The **queen** lays each egg in a different cell of the honeycomb.
2. As soon as the egg is laid, the **larva** is growing inside it.
3. After three days, the egg hatches and a larva crawls out.
4. As the larva grows, it sheds its skin. It does this five times.
5. Eight days after hatching, the bee larva is fully grown.
6. The larva cannot feed anymore and it starts to change into a **pupa**.
7. After nine days, the pupa changes colour. It has turned into an adult, either a male **drone** or a female **worker**.
8. When it's about three to four weeks old, the **worker** will leave the hive in search of nectar and also takes care of the **drones**, which stay in the hive to mate with the queen.



# From Flower to Fruit



How do apple trees make fruit?  
Glue the sentences in the right order.

 Cut out each sentence separately

The apple tree makes flowers

The flowers are pollinated by bees

Seeds start to form inside the old flower

The tasty apple is ripe with seeds inside

## Flower Wordsearch

e	s	l	s	n	t	a	s	p	s
f	s	l	g	e	p	s	t	e	m
t	l	a	t	c	f	l	a	t	o
e	l	m	s	t	i	g	m	a	s
p	s	l	e	a	f	c	e	l	p
o	w	r	a	r	t	c	n	a	e
l	t	e	e	o	l	r	t	t	e
t	t	l	p	o	l	l	e	n	n
a	l	s	l	t	l	t	s	r	e
f	l	o	w	e	r	e	o	e	g

flower  
petal  
nectar

stigma  
stem

pollen  
leaf

stamen  
root

### Wordsearch Answers

e	s	l	s	n	t	a	s	p	s
f	s	l	g	e	p	s	t	e	m
t	l	a	t	c	f	l	a	t	o
e	l	m	s	t	i	g	m	a	s
p	s	l	e	a	f	c	e	l	p
o	w	r	a	r	t	c	n	a	e
l	t	e	e	o	l	r	t	t	e
t	t	l	p	o	l	l	e	n	n
a	l	s	l	t	l	t	s	r	e
f	l	o	w	e	r	e	o	e	g

## Glossary

**Anther:** The male part of a flower, which produces the pollen

**Carpel:** Female reproductive organ of flowering plants, consisting of stigma, style and ovary

**Fertilization:** The joining together of a male and female reproductive cell to form a new organism

**Filament:** The part of the stamen that holds the anther in position for pollen dispersal

**Flower:** The reproductive structure of a flowering plant

**Nectar:** A sugar-rich liquid produced by the flowers of plants in order to attract pollinating animals

**Ovary:** The part of the flower where the eggs are housed and fertilization occurs

**Ovule:** The ovules are inside the ovary in a flower. Each ovule produces an egg cell. If an ovule is fertilized by pollen, it will develop into a seed

**Petals:** The showy, often brightly coloured part of a flower. Petals attract pollinators and protect the male and female parts of the flower from damage

**Pollen:** The male sex cells of seed plants that carries the gametes (reproductive cells) to fertilise female eggs

**Pollination:** The transfer of pollen from the stamen (male part of the flower) to the pistil (female part of the flower)

**Pollinator:** The agent that transfers pollen from an anther to a stigma

**Reproduction:** The process of generating offspring

**Stamen:** The male reproductive organ of a flower, consisting of a pollen-bearing anther and a supporting filament

**Sepals:** Modified leaves that surround the base of a flower to protect the developing seed or fruit

**Stigma:** The tip of the female part of the flower, which receives the male pollen grains

**Style:** The narrow elongated part of the pistil between the ovary and the stigma