



**Science Unit:** *Plants 'n' Bugs*

**Lesson 1:** *Flowers and Pollination*

School year: 2008/2009

Developed for: False Creek Elementary School, Vancouver School District

Developed by: Shona Ellis (scientist), Angela Cotter and Geraldine Miles (teachers)

Grade level: Presented to grades 2; appropriate for grades 2 – 5 with age appropriate modifications.

Duration of lesson: 2 hours

### **Objectives**

1. Identify the parts of a flower.
2. Understand how (flowering) plants reproduce.
3. Learn the relationship between flowers and fruits.
4. Observe and document the parts of a flower
5. Interpret the structure of a food plant.
6. Identify ways in which pollination is accomplished and the importance of insects.
7. Demonstrate the importance in science of observation and asking questions.

### **Background Information**

Understanding the structure of a flower is essential to understanding pollination and plant reproduction. The outer whorl of sterile parts (sepals and petals) as well as fragrances they emit, are often the parts that beckon a pollinator. The primary structures involved with reproduction are to the interior of the flower. Stamens produce pollen in little sacs called anthers. Pollen will ultimately deliver sperm to the eggs. The pistil houses eggs within the ovary. A flower can have one or more pistils. The ovary itself develops into the fruit, which may be fleshy or dry when mature. For successful production of fruit and seed, pollination must be accomplished. Pollination is the transfer of pollen from the anther to the stigma (receptive part of pistil).

### **Vocabulary**

Word:

<u>Anther</u>	Pollen producing part of a stamen
<u>Disc flower</u>	In a member of the sunflower, the flowers that are the centre part of the inflorescence
<u>Egg</u>	A female gamete (ovum)
<u>Fertilization</u>	The fusion of egg and sperm
<u>Fruit</u>	Matured ovary (contains seeds)
<u>Ovary</u>	The structure that houses the eggs in flowering plants
<u>(Ovule)</u>	Students can think of this as the structure that contains the egg
<u>Petal</u>	Floral parts that are often important in attracting pollinators.



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<u>Pistil</u>	The female part of a flower made up of stigma, style, and ovary
<u>Pollen</u>	A particle that contains the male gamete
<u>Pollen tube</u>	Germinates from the pollen grain, carries the sperm to the egg
<u>Pollination</u>	Pollen transfer from anther to stigma.
<u>Ray flower</u>	In a member of the sunflower, the flowers that make up the outer ring of the inflorescence; they are often showy and attract pollinators
<u>Seed</u>	Mature ovule, contains the embryo
<u>Sepal</u>	Outer row of floral parts that usually protect the flower bud.
<u>Stamen</u>	The pollen producing parts of a flower.
<u>Stigma</u>	Part of the pistil to which the pollen lands

### **Materials**

- Hand lenses or magnifying glasses
- Assorted flowers including: lilies, orchids, snapdragons, sunflower, grass (wheat),
- Q-tips
- Sunflower “seeds”
- Assorted fruit including cucumber, tomato, orange, apple.....
- Examples of non-fruit plant foods including carrots, celery.....

### **In the Classroom**

#### **Introductory Discussion**

1. We begin by asking the students what they know about flowers and plant reproduction. Flowers will be in plain view to kindle responses.
  - Discuss with the students what they already know about pollination/pollinators.
2. Additional questions to lead discussion:
  - What are flowers?
  - What is pollen?
  - Why is pollen important for plant reproduction?
  - How does it get from one plant to another?
  - How does this relate to the development of a seed?
  - What is a seed?
3. Briefly describe science activity.
  - Flower dissections and demonstration of how flowers become fruits.
  - Once the fundamentals of floral structure are understood the concept of pollination is introduced.
4. The primary focus of this lesson will be for students to make observations about the floral features of a plant and understand the importance of a flower in plant reproduction. The flower is very important as it dictates the pollination vector.



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5. Briefly describe safety and clean-up guidelines.
  - Prior to lesson identify any student who may have allergies to plants
  - All materials from the day will be put into a composting bin.

### Science Activity

Activity Title: Flower Structure and Pollination

Purpose of Activity: To understand the structures of a flower and how flowers are important in accomplishing plant reproduction

Methods and Instructions:

Set-up prior to experiment:

Flowers set up like display

The following activities will alternate between large group and small group activities.

#### Part 1 – Introduction – in large group

Determine what students already know about pollination through a series of leading questions and answers:

- What are flowers?
- What is pollination – flower model and bee puppet to demonstrate
- Other ways that pollen gets to a flower? Wind, birds, bats.....
- Why are flowers important to us? → seeds/fruits
- What is the function of flowers? → reproduction

#### Part 2 – Lily Dissection – in large group

Each student (or pair of students) is given a lily flower to dissect – identify sepals, petals, stamen, pistil (draw and label on flipchart or chalk board)

- Discuss how reproduction is accomplished
  - A pollen tube grows down to the eggs inside the ovary.
  - What part becomes the fruit? (ovary)
  - Seeds are inside the fruit (fertilized egg results in the development of a seed)
- Show different flower types to introduce concept of variation (these are flowers they will dissect in the next part)

#### Part 3 – Flower Dissection – in small groups of 2-4

Students will examine and dissect flowers, identify the different parts

- snapdragons, and other flowers - not members of the Asteraceae (sunflower family)
- A Q-tip is used to see where pollen would be shed on an insect and where it would be deposited on another flower (the students can pretend the Q-tip is a bee).
- Complete Worksheet: observations, drawing/labeling of a chosen flower, and identifying questions

#### Part 4 – the Sunflower – in large group

- Address student questions. – The worksheets can be collected and the questions answered or they can be saved for research projects.

- Introduce the sunflower – two types of flowers: disk, ray
  - Draw on flipchart or chalkboard
  - Discuss how pollination is accomplished.



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### Part 4 – the Sunflower – in small groups of 2 - 4

Students examine sunflowers and “sunflower seeds”

- Complete Worksheet: observations, drawing/labeling of two types of flowers, and questions.
- Examine the “seed” – students should be able to identify the “seed” as developing from an ovary and therefore is actually a fruit.

### Part 5 – Closure Discussion – in large group

- Recap activities of the day with a Q and A.
- Why so much floral variation? – Diversity in pollination systems.

Preview for next Day:

Insects and Pollination

Reminder: Flowers attract (smell and colour) and reward the pollinator (pollen and nectar)

### **References:**

1. <<http://waynesword.palomar.edu/ww0903a.htm>> Wayne' World On-line text of Natural History – Sunflower Family (Asteraceae), The Largest Plant Family On Earth [There are lots of interesting resources on this site. The diagram of the inflorescence of sunflower is not well done, but the explanation of the family is good.] Accessed Aug. 15, 2009.
2. <<http://school.discoveryeducation.com/lessonplans/programs/plantpollination>> Lesson Plans Library - Mary C. Cahill, middle school science coordinator, Potomac School, McLean, Virginia [Some good basic flower/pollination information] Accessed Aug. 15, 2009.
3. < <http://smithsonianeducation.org/>> **Smithsonian** Education [Many searchable education resources, including a good one on pollination.] Accessed Aug. 15, 2009.

### **Extension of Lesson Plan**

1. Students can do library research to find the answers to their questions.
2. Demonstrate concept of reproduction with examples of fruits (how do we categorize fruits and vegetables).

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# LESSON 1 – WORKSHEET A

**Name the different parts of a flower:**

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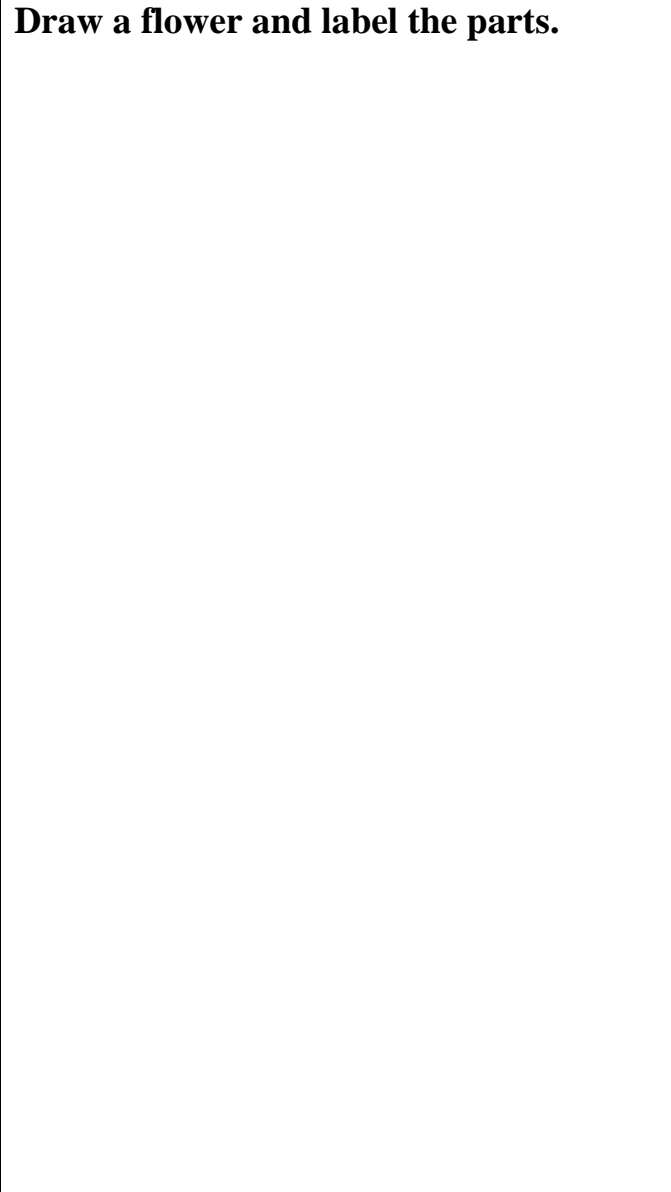
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**Draw a flower and label the parts.**



**On what part of the insect pollinator would the pollen get stuck?**



**Questions I have:**



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# LESSON 1 – WORKSHEET B

<p><b>Name the different parts of a flower:</b></p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<p><b>Draw a disk flower and label with the different flower parts.</b></p>
<p><b>Draw and label a sunflower “seed”:</b></p>	<p><b>What does the ovary of the disk flower become?</b></p>
<p><b>Questions I have:</b></p>	