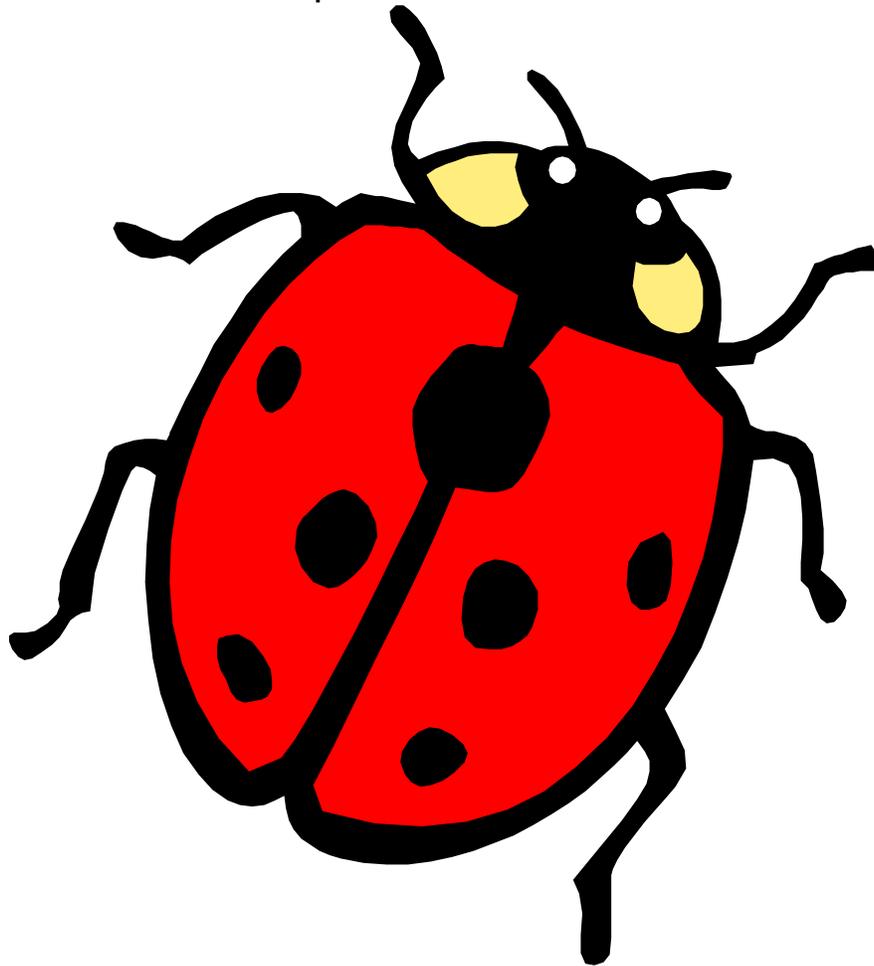


**ELEMENTARY SCIENCE PROGRAM**  
**MATH, SCIENCE & TECHNOLOGY EDUCATION**

A Collection of Learning Experiences  
**FROM SEED TO PLANT,  
EGG TO ADULT**

Updated October 2006



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# FROM SEED TO PLANT, EGG TO ADULT

## GRADE 1

### Unit Overview:

From Seed to Plant, Egg to Adult introduces students to the life cycles of plants and animals. Students will classify seeds by properties, plant seeds, care for plants, observe and record plant growth, and participate in classroom projects. Students will also observe the life cycle of a ladybug and participate in the care of a living creature.

### Scheduling:

This unit may take from seven to nine weeks to complete depending upon the growth rate of the plants, goals of the teacher, and interests of the students. Use of the section included in this manual called More Ideas may extend the time span of this kit. Special arrangements will need to be made for plant care over weekends and vacations.

### Materials to be obtained locally:

Please make **one** student activity book for **each** student.

colored pencils/crayons	plant samples
notebooks	scissors
folders	paste
chart paper	seed samples
felt tip markers	yarn or tape to bind book
water	aphid pictures
paper towels	paper ladybug
variety of leaves	paper leaf with aphid
colored pencils/markers	paper egg
construction paper	paper larva
variety of fruits/vegetables	paper pupa
hole punch	bowl
disposable camera (optional)	metric rulers
leaf or small branch	stapler

### Caution

Remind students to wash their hands after handling any of the materials in the kit.

### About the Format

Each learning experience is numbered and titled. Under each title is the objective for the learning experience.

Each learning experience page has two columns. The column on the left side of the page lists materials, preparations, basic skill processes, evaluation strategy, and vocabulary. The evaluation strategy is for the teacher to use when judging the student's understanding of the learning experience.

The right column begins with a "Focus Question" which is typed in italicized print. The purpose of the "Focus Question" is to guide the teacher's instruction toward the main idea of the learning experience. The "Focus Question" is not to be answered by the students. The learning experience includes directions for students, illustrations, and

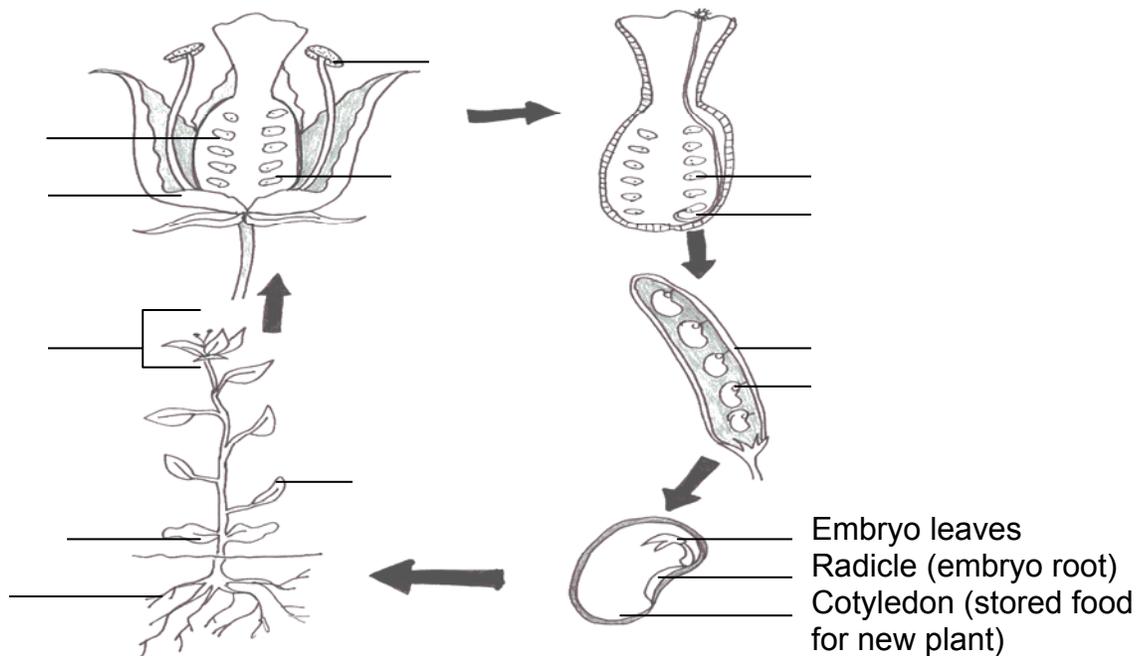
discussion questions. These discussion questions can be used as a basis for class interaction. A **Student Assessment** has been included in the **Teacher's Manual** and the **Student Activity Manual**. If you do not want the students to have the assessment beforehand, remove it from the **Student Activity Manual** before printing a class set of the student manuals.

## **Background Information**

If we were to look at the life cycle of the bean plant we could start with the flower, the reproductive structure of the plant. The bean flower has both male (sperm produced parts) and female (egg produced parts) in the same flower. (The corn plant may have separate male and female flowers on the same plant.) The male **anther** of the bean plant produces grains of **pollen**, each which contain a sperm cell. The ovary located at the bottom of the female **pistil** contains **eggs** inside an **ovule**. The pollen from the male anther must reach the top of the female pistil **the stigma**. The stigmas are like doorways to the ovary. The pollen may be carried by insects, winds, or water depending upon the plant and its structure. Next, the sperm cells in the pollen grain must get to the egg cell in the ovule. The pollen grain grows a microscopic tube that bores through the pistil and carries the sperm to the egg. Most flowers contain many ovules so the number of pollen tubes growing through the pistil could be many.

When the egg has been **fertilized**, many changes occur in the flower. The petals dry up because they are no longer needed to attract insects to the flower. The ovary grows and develops into a **fruit**. The fertilized egg develops into the small **embryo** plant (what you see when you open a bean seed). The rest of the ovule develops into the **cotyledons**. The cotyledons serve as food for the embryo plant. The ovule is now a **seed** inside the fruit of the plant, which was once the ovary.

In other words, when you look at a string bean pod, you are looking at the fruit of the plant, which was once the ovary of the flower. Inside are the beans, once the ovules, which are the plant's seeds with the embryo plant inside it and two cotyledons to nourish it.



## **Dicot and Monocot**

**Dicots** are seeds that have two parts, like a bean seed. The outside covering of the seed is the seed **coat**. If you look closely at the seed coat, you can see a division going down the middle of the seed. If you opened the seed at that division, you will see the tiny plant, the embryo, and two large parts of the seed that are called cotyledons. Because the bean seed has these two parts, it is a **dicotyledon** or dicot for short.

Monocots are seeds that have only one cotyledon, such as a corn seed. The corn seed will not split like the bean seeds. It stays in one piece. One cotyledon surrounds the embryo.

## **Seed Germination**

**Germination** begins when the seed begins to grow. A dry seed will stay dormant until it is soaked in water. Then it begins to germinate. The cotyledons store food for the embryo or baby plant inside the seed. When the seed starts to germinate, the first part that comes out is the main root. The skin starts to split and the tiny shoot straightens, carrying the cotyledons with it. The main root gets bigger, side roots, and leaves appear.

Seeds have particular requirements if they are to germinate successfully. Two that are particularly important are warmth and moisture.

If a seed does not germinate, it can be dug up out of the soil to see what happened to it. If it is rotten, it was probably over watered. If it is unchanged, it may have been under watered. Be sure that the seeds are not being overheated, planted too deeply, or that the soil has not been pounded too hard on top of them. Most seeds will begin to germinate within ten to fourteen days.

### Approximate Number of Days to Germinate Under Optimum Temperature and Moisture Conditions

Bean – 6 - 10 days

Corn – 6 - 10 days

Pea – 6 - 8 days

Radish – 4 -5 days

Squash – 4- 5 days

## **Growing Tips for Plants**

1. Plant seeds twice as deep as the seed's diameter.
2. When multiple seeds are planted in the jars, they need to be spaced apart particularly beans and peas.
3. Keep seeds constantly moist until they germinate. Covering the jars with clear plastic or wax paper may help maintain warmth and moisture if it is a problem. Remove the coverings as seedlings sprout.
4. Water the plants with a sufficient amount of water. Yellow leaves or brown stems on plants indicate that they are being over watered.
5. Expose your plants to sunlight as much as possible. The plants should be on a warm window sill to provide warmth for germination. Plants should not touch the window glass. Eastern windows receive 2-4 hours of morning sun. This is the best location for radishes, lettuce, and other leafy vegetables. Western windows receive diffused light. Most vegetables will now grow well with this exposure. A window with southern exposure is the best. If none of the windows in your room face south,

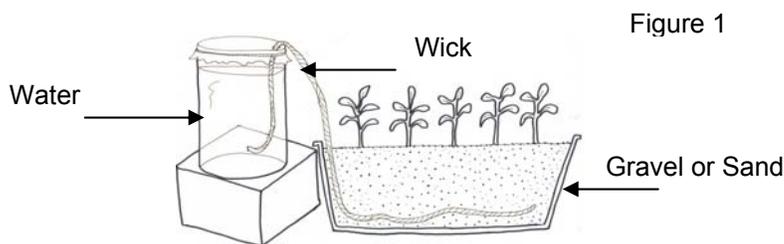
plants could be placed in another room periodically. You may need to rotate plants if they begin to lean toward the light. Be careful that plants don't dry out or get too hot.

6. Keep plants at least one foot away from the hot air ventilator so they don't dry out. Brown leaves indicate dry air damage.
7. A 60°F to 80°F temperature range is adequate for indoor plants. It may be necessary to remove the plants from the window sill at night and over the weekends so plants don't become too cold at night. Plants should be 10-15 degrees cooler at night than during the day.
8. Use the planter sticks (wooden dowels) provided in the kit to hold tall plants up. Use the twisties also provided in the kit to hold the plants to the planter sticks.
9. Over vacations, make arrangements for plant care with your custodian. Sending plants home during the vacation periods is not recommended since they are tender and tend to break in transit. Mature plants can be sent home with students. (See Keeping Classroom Plants Over Vacations below).

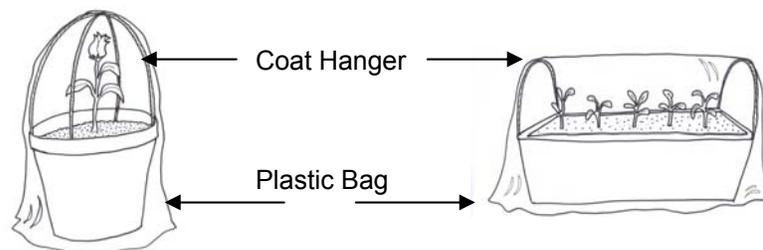
### **Keeping Classroom Plants Over Vacations**

The two most important factors in growing classroom plants, especially during school vacations are adequate light and the proper amount of water. Place your plants in a location where they will receive adequate light. Listed below are four methods for keeping them properly watered during a school vacation.

1. For class gardens, use a wick of cotton clothesline run under the potting soil to a jar filled with water. Cover the jar with a lid or plastic wrap to cut down on the evaporation of the water. (See figure 1)



2. Class gardens or individual plants growing in jars grouped together in a box or similar container could also be kept by cutting and bending coat hangers or other wire into arches and place in box at both ends parallel to each other. Water and cover with a large plastic bag or clear plastic sheeting. (See figures 2 and 3)



## Transplanting Plants

It may be necessary to transplant extra seedlings so that there is only one plant growing per jar or the plants may be growing so well they outgrow the jar they are in and need to be placed in a larger container. Remove the seedling from the jar by gently loosening the soil. The seedlings can then be placed in another jar filled with soil. The roots of the seedling must be completely covered with soil and watered immediately.

## Photosynthesis

A major difference between green plants and animal life is the ability of plants to make their own food through the process of **photosynthesis**. Photosynthesis involves a series of chemical reactions. Green plants combine water from the soil and carbon dioxide from the air, using energy from the sun. The chlorophyll in the plant (found in the chloroplasts) captures this light energy and a reaction takes place. This reaction results in energy, which is used to make sugars (food) that is stored by the plant to live and grow. Oxygen is released as a waste product.

## Ladybugs

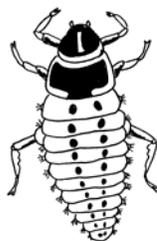
Ladybugs, also known as ladybirds and ladybird beetles, are small, round beetles about the size of a pea. They are usually thought of as the red insect with the black spots. However, they can be found in a variety of colors. Ladybugs can be yellow with black spots, orange with yellow spots, or black or brown with white, red, or yellow spots. Others are found with no spots at all. The ladybug is given its name by the number of spots on its wing. The most common is the two-spot ladybug. There is also the seven-spot ladybug, ten spot ladybug, etc. There are 5,000 varieties of ladybugs in the world and 150 of them are found in the United States.

## Parts of a Ladybug

The ladybug is an insect; therefore, it has a head, thorax, abdomen, six legs and two antennae. The legs are attached to the thorax even though it may look like the legs are attached to the abdomen. Ladybugs have two transparent flying wings that are underneath the cover wings when they are not in flight. The cover wings are hard and shell-like. They provide protection for the ladybug. At the end of each leg, the ladybug has two sharp claws and sticky pads for gripping to surfaces.

## Metamorphosis

The ladybug goes through a **complete** metamorphosis. It has four stages that take about one month to complete. The process starts when the female ladybug lays her eggs. The eggs are yellow or orange, and they are laid in clusters under a leaf or stem that is infested with aphids, scale, and/or other plant-eating insects. The female ladybug often does not lay her eggs in one spot but will lay clusters in different locations in case a predator finds the eggs. After several days, depending on temperature, the eggs hatch into **larvae**. At first, the larvae are pale yellow and only about one centimeter in length, but after only a few hours its bright colors appear. The larvae are covered with structures called **bristles** that look like hair. The larva eat the same food as the adult ladybug.



Ladybug larva

That is why the female ladybug lays her eggs on a leaf that contains aphids and scale so the larva will have something to eat when it comes out of the egg. After three to four weeks, the larvae enter the pupa stage. The larva that is full-grown attaches itself to a leaf or branch with a sticky substance that looks like a silky pad. After approximately one week, the pupa splits open and a pale colored adult ladybug emerges. After its wings (yellow or orange) appear, they change to their final color within a few hours. The ladybug has a life span of approximately one year.

### **Food**

As mentioned previously, the ladybug eats aphids (an insect that feeds on plants), scale insects, and other insects that are often harmful to plants. By feeding on these pests, ladybugs save many plants, crops, and trees. They are considered natural pesticides. In some countries, including the United States, ladybugs are raised and sold to control insect pests.

### **Aphids**

Aphids are tiny insects, sometimes known as plant lice. They are often found at the tips of young plants (roses, pea, tomato, strawberry, and dandelions). The aphids have a straw-like mouthpiece called a proboscis. They use their proboscis to suck sap from leaves, stems, and branches of these plants. Their feeding causes the plants to wilt and die. Sometimes they carry diseases between plants which also causes the plants to die. Aphids are eaten by ladybugs and their larva. Some birds and insecticides also kill aphids.



### **Scale**

Scale is a group of insects closely related to aphids. They too have a proboscis that sucks the sap from the plant leaves, stems, and branches. Scale live in large colonies that can cover and destroy plants (banana, fig, citrus, pine). Ladybugs and some small wasps help farmers by eating huge numbers of the scale. One female scale may produce thirty million young in one year.

### **Ladybug Defenses**

Ladybugs protect themselves in many ways. When they spot danger, they turn onto their backs and lay very still until it is safe for them to walk or fly away. They do this so they are able to hide their bright colors. They also produce a bad tasting and smelling fluid that they excrete from their joints that keeps some animals from eating them. Their bright colors warn predators of bad taste. Ladybugs may bite if squeezed. For protection in the winter, they seek shelter and hibernate under a piece of tree bark, under a rock, or inside a house. They often cluster in large groups when they hibernate.

# Learning Experience 1: Getting Started

**Objective:** Students will draw pictures of adult animals and plants early in their life cycle and discuss their background knowledge of plant and animal life cycles.

## **Materials:**

### **For each student:**

From Seed to Plant, Egg to Adult

Student Activity Book

Colored pencils/crayons\*

Notebooks\*

Folders\*

### **For the class:**

Ladybug larva coupon

Chart paper\*

Felt tip markers\*

\*provided by teacher

## **Preparation:**

When you are ready for the larva to be sent to your classroom, **send the coupon that is in the kit** to the company. Allow **2-3 weeks** for delivery. Notify the school office that you will be receiving live perishable materials and that you should be notified as soon as they arrive. Each student should obtain a notebook and folder with pockets to hold their activity sheets for this unit.

You may wish to introduce this learning experience by reading trade books with the students. Examples might be: *The Very Hungry Caterpillar*, *The Very Lazy Ladybug*, or *The Crunching Munching Caterpillar*. For additional titles, look under More Ideas in the back of this teacher's manual.

## **Basic Skills Development:**

Discussing

Describing

Brainstorming

## **Evaluation Strategy:**

Students will use their background knowledge to contribute ideas to a KWHL chart.

## **Vocabulary:**

life cycle

adult

observe

*What do we know about the life cycles of plants and animals?*

In the student's From Seed to Plant, Egg to Adult Student Activity Book, students are to identify the picture of each adult plant and/or animal on the page.

## **Discussion Questions:**

Do you think these plant and animals always looked this way? Why or why not?

In the box next to each picture, students are to draw a picture of what the plant or animal looked like before it grew to be an adult. (The plant was once a smaller seedling, the turtle was a smaller version of the adult, the frog could be shown as a tadpole or developing frog, and the butterfly could be shown as a caterpillar.)

## **Discussion Questions:**

What do you think each adult animal/plant looked like before it became an adult?

How do you know it looked that way?

Have you ever seen any of these adult animals? Have you ever seen these animals in their growing forms?

What did you learn about the plants and animals from this discussion and your pictures?

Introduce the term life cycle to students using the KWHL strategy. Students will explore their knowledge about life cycles of plants and animals and then expand on it throughout the unit. Brainstorm all that the students already **know** about

# Learning Experience 1 continued

## Page 2

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plant and animal life cycles. Record their ideas on a class-size KWHL chart. Ask students what they would like to know more about concerning plant and animal life cycles and record their ideas under the “**want to know**” column. Now that the students have decided what they want to know, they need to think about “**how they are going to find out**” the answers to the questions they have. (This may set the stage for the upcoming lessons. Students may understand that one way is to observe and investigate the organisms directly.) After the hands-on activities, maintaining journals, and discussions, students can then record information in the “**what we learned and still want to learn**” column. This process can also be done in cooperative groups where students gather information in small groups then share their ideas with the class.

Life Cycles KWHL Strategy			
What we know	What we want to know	How are we going to find out	What we learned and still want to learn

## Learning Experience 2: Plant Seeds

**Objective:** Students will plant seeds in individual containers and describe the basic needs of plants for proper development.

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### **Materials:**

#### **For each pair of students:**

2 From Seed to Plant, Egg to Adult Student Activity Books  
2 plastic jars  
Seeds (bean seed and vegetable seed of choice)  
Potting soil  
Sand  
Water\*

#### **For the class:**

KWHL chart

\*provided by teacher

### **Preparation:**

Read background information on pages 3 -5. The planting jars should be checked daily, even though it may not be necessary to water the plants daily.

### **Basic Skills Development:**

Discussing  
Observing  
Describing  
Manipulate Materials

### **Evaluation Strategy:**

Students are able to demonstrate the proper method for planting seeds and describe that a plant needs water, sunlight, and nutrients from the soil to survive.

### **Vocabulary:**

soil  
nutrients

*What is the proper method to plant a seed?*

Review with the students their KWHL chart and pick out the items they know or want to know about plant growth and development. Discuss with the students the needs of plants (sunlight, food, and water. Also discuss how a plant grows and develops. Roots grow underground, stem and leaves grow above ground.)

A diagram is provided on the next page to show the basic parts of a plant. Have students write the basic parts of a plant on their activity sheet for Learning Experience #2 in the Seed to Plant, Egg to Adult Student Activity Book.

Each pair of students are to receive two plastic jars. In one plastic jar, they are to plant a bean seed and in the other plastic jar they can choose another vegetable seed they would like to grow. It may be beneficial to plant a couple of the same seeds in each jar to increase the chances of germination. If multiple plants grow, then they can be transplanted later. Be sure there are a sufficient number of lima bean seeds, wax bean seeds, and corn seeds for Learning Experience #5.

First, students are to pour sand into the bottom of their jar. Students are then to fill their pot with soil. They are to poke a hole in the soil (twice as deep as the diameter of the seed). They are to place their seed in the hole, cover it with soil, then pat the soil down. Repeat these steps with all the seeds. Water the soil until it is damp. Set the jars in a

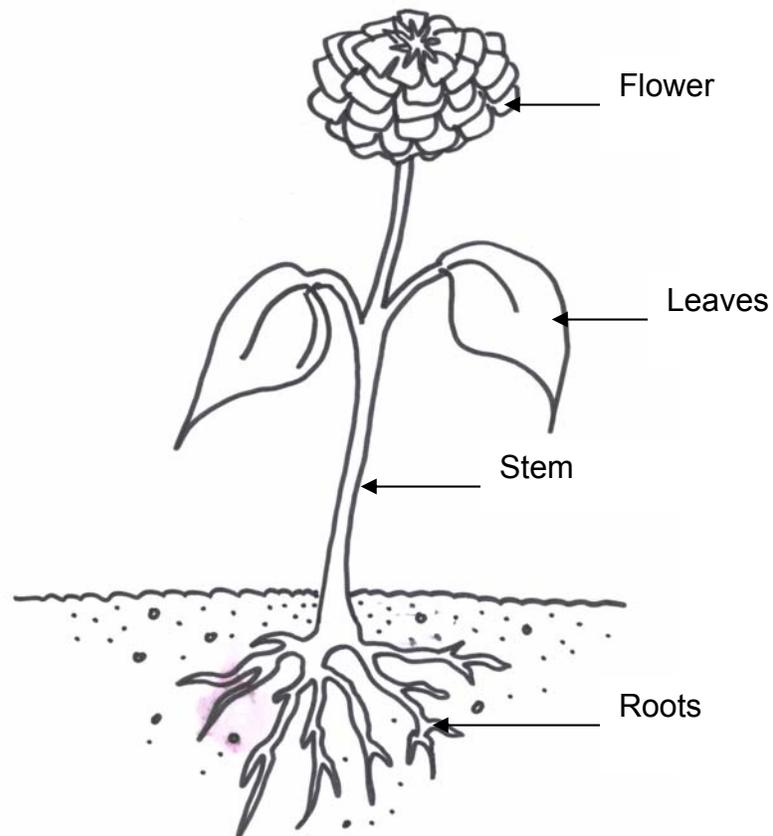
## Learning Experience 2 continued

### Page 2

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location where they can get a lot of light but not near a cold or drafty window.

As students are waiting for their seeds to sprout, Learning Experiences #3-5 can be completed. Learning Experience #6 should be started once plants begin to grow.



## Learning Experience 3: Seeds in Fruits

**Objective:** Students will create drawings of seeds in various fruits and compare and contrast the appearance of seeds and their location in the fruit.

### **Materials:**

#### **For each student:**

From Seed to Plant, Egg to Adult

Student Activity Book

Double lens magnifier

#### **For the class:**

2 plastic knives

Variety of fruits/vegetables\*

Chart paper\*

Felt tip markers\*

\*provided by teacher

### **Preparation:**

Read background information on page 3. Set-up of fruit stations may be necessary for this learning experience. Create a class chart to help organize the information about the seeds (see page 13).

### **Basic Skills Development:**

Classify

Observing

Describing

Gathering & Organizing Data

Interpreting Data

### **Evaluation Strategy:**

Students will identify important characteristics of various seeds in fruit and compare and contrast their similarities and differences.

### **Vocabulary:**

fruit

vegetable

seed

nuts

flower

*What part of a plant has seeds?*

Gather a selection of fruits that have different kinds of seeds. (e.g. apple, citrus fruits, grapes, plums, peaches, cucumbers, tomato, pea pods, peanuts, (the largest known seed) coconut or ask students to bring in an example of a food that has seeds.

### **Discussion Questions:**

What kinds of seeds do you know of?

Where do you know them from?

Why are seeds important?

Explain to students that they will be looking for seeds in a variety of fruits. The **fruit** is the edible part of the plant that carries the seed. Students can make a list of fruits they know, which also should include items that they know as some vegetables (vegetables are the edible roots, leaves, or stems of a plant) and nuts.

Have a variety of fruits cut open so students can observe the seeds with their double lens magnifier. Depending on the number of fruits, students can observe each fruit or get into groups and observe four different fruits and share their observations with the class. Students can record their observations on the activity sheet for Learning Experience #3 in the Seed to Plant, Egg to Adult Student Activity Book.

Display a class chart containing the names of the fruits. Ask students to share their observations of the fruit. Be sure students are including information about the location of seeds, number of seeds, size, color, and shape of seeds.

# Learning Experience 3 continued

## Page 2

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Sample seeds may even be taped to the chart.

Name of Fruit	Where Seeds Are	Number of Seeds	What Seeds Look Like

### **Discussion Questions:**

Are any of the seeds different in the same fruit?

If so, why do you think this is so?

How are the fruit seeds the same? Different?

How could we classify these seeds into groups?

### **Extension:**

Go outside and take a nature walk. Look for seeds outside and collect some. Discuss where these different seeds came from and how they may travel outdoors. Some seeds may fly (dandelions/maple seeds), stick to things (thistles), drop under the plant, or are carried by animals.

# Learning Experience 4: Classify Seeds

**Objective:** Students will create a word chart for each property and classify the seeds based on their properties.

**Materials:**

**For each pair of students:**

Cardboard tray  
One kind of each seed (lima, corn, wax, red kidney, pea, radish, squash)

**For the class:**

Chart paper\*  
Felt tip markers\*

\*provided by teacher

**Preparation:**

It is recommended that one of each seed remains in its envelope so the seed can be readily identified.

**Basic Skills Development:**

Classifying  
Discussing  
Observing

**Evaluation Strategy:**

Students will determine similarities and differences among seeds based on properties such as: color, size, shape, and texture.

**Vocabulary:**

property  
texture  
shape

*What are the properties of different seeds?*

Distribute one of each kind of seed on a sorting tray (cardboard tray) to each pair of students.

**Discussion Questions:**

How are these seeds alike?  
How are they different?  
Can you identify what may grow from the seeds?

Discuss with students the properties that could be used to group seeds such as: color, size, shape, or texture. Brainstorm with students some words that could be used to describe each property. Create a list on chart paper.

**PROPERTY WORD CHART**

<u>Size</u>	<u>Shape</u>
large	small
small	long
long	wide
short	thin

<u>Color</u>	<u>Texture</u>
brown	smooth
red	bumpy
black	flat

**Discussion Questions:**

Can you think of other ways to group these seeds?  
What does this learning experience tell you about the seeds?

Ask student pairs to classify seeds into different groups based on the properties listed.

Discuss as a class some of the groups they put their seeds in and which seeds went into each group.

# Learning Experience 5: Parts of a Seed

**Objective:** Students will open three different seeds, identify the parts of the seed, and create a diagram of how the parts of the seed contribute to plant growth.

## **Materials:**

### **For each student:**

From Seed to Plant, Egg to Adult

Student Activity Book

3 lima bean seeds (one dry and one soaked)

3 corn seeds (one dry and one soaked)

3 wax bean seeds (one dry and one soaked)

Double lens magnifiers

Plastic bag

Cardboard tray

Paper towels\*:

### **For the class:**

Book - "Incredible Plants"

Masking tape

Stapler\*

Bowl\*

Water\*

Chart paper\*

Felt tip markers\*

\*provided by teacher

## **Preparation:**

Read background information on page 4. Seeds may germinate in 24 hours. Students can then observe the seeds for several days. If mold develops, dispose of germination bag. Soak the lima bean seeds, corn seeds, and wax bean seeds in water for 24 hours prior to this learning experience. Caution: after 30 hours of soaking the seeds, they begin to rot.

## **Basic Skills Development:**

Discussing

Observing

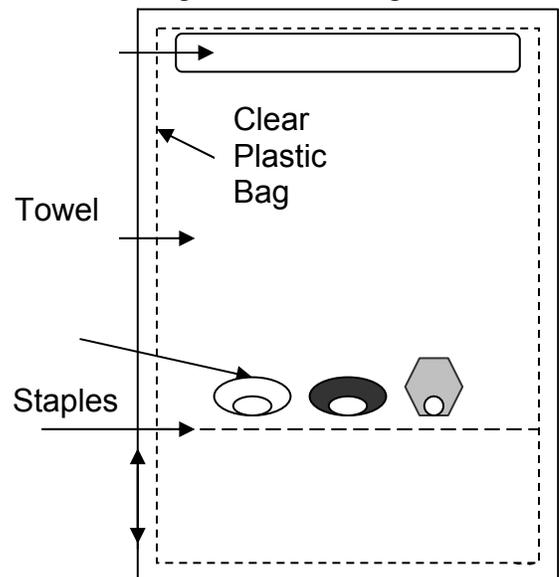
Describing

*What is inside a seed?*

## **Session 1:**

Discuss with students the experiences they have had growing seeds and what seeds need in order to grow. Distribute the dry seeds and ask students to observe their dry seeds with a double lens magnifier.

Students are to set up germination bags with one lima bean seed, one corn seed, and one wax bean seed. Students are to take a layer or two of wet paper towels and place them in a plastic bag. Place the three seeds in a row on the paper towels in the plastic bag and staple the bag 4 cm. from the bottom. Have students write their names on the bag to ID which is theirs. Seal the bag. Tape the bag to a window. Observe seeds daily. Add water to the paper towel if needed. On the first page of their activity sheet for Learning Experience #5 in the From Seed to Plant, Egg to Adult Student Activity Book, students can draw what their seeds look like on each day they observed their germination bag.



# Learning Experience 5 continued

## Page 2

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### **Evaluation Strategy:**

Students will open bean seeds and corn seeds and identify the parts of the seed and its function.

### **Vocabulary:**

embryo  
seed coat  
cotyledon  
germinate  
root  
sprout

### **Discussion Questions:**

What changes might you see?  
What do you think will happen first?

Once students see the seeds begin to sprout in their bags, discuss germination/germinate with students meaning “starting to grow”.

### **Session 2:**

Have students place a dry lima bean seed and a soaked lima bean seed on a paper towel on a cardboard tray. Discuss and list observations about the soaked seeds and compare dry and soaked seeds.

Record observations on chart paper. Note that the seeds have swollen in size and that the skins come off easily.

Ask students to carefully open the soaked seeds on their tray. When students open the seeds, they are to observe and discuss the parts they see inside each seed.

On the activity sheet for Learning Experience #5 in the From Seed to Plant, Egg to Adult Student Activity Book, students are to draw what they observe in each seed. As a class, discuss the parts each group saw and create a class drawing on chart paper of each seed. Label the three main parts: embryo, seed coat, cotyledon (Incredible Plants Book, page 22)

Cotyledons are the leaf-like structures in the seed. In dicot seeds, there are two halves to the seed (ex. bean). The two halves are the seed leaves of the bean seed. Corn is a monocot, thus the seed has only one part and sends up only one seed leaf (cotyledon).

# Learning Experience 5 continued

## Page 3

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### **Discussion Questions:**

What do you see in your seed?

What do you think each part does for the growing plant?

How are the seeds alike? How are they different?

What do you see inside the seed that you observed in your germination bag?

# Learning Experience 6: Plants Appear

**Objective:** Students will observe their seedlings and keep a journal of their plant's growth.

**Materials:**

**For each pair of students:**

2 From Seed to Plant, Egg to Adult Student Activity Books  
2 double lens magnifiers

**For the class:**

A variety of leaves\*

\*provided by teacher

**Preparation:**

Leaves will need to be gathered prior to this learning experience. Because students are going to keep a journal of their plant's growth, several copies of the activity sheet for this learning experience will need to be distributed to students.

**Basic Skills Development:**

Observing  
Discussing  
Describing

**Evaluation Strategy:**

Students will discuss the observation of their seedlings and keep an accurate journal of their plant's growth.

**Vocabulary:**

seedling  
journal

*How are the planted seeds changing?*

Students should see their plants begin to appear in their jars. Explain to students that we are going to begin to observe the growth and development of our plants.

Pass out a variety of different leaves around to the students. Ask students to carefully observe the leaves and answer some questions about what they see.

**Discussion Questions:**

Is the leaf all the same color?  
What is the surface of the leaf like?  
What shape is it?  
If you look closely at the leaf, what do you see?  
How is the leaf you are looking at different than others?

Explain that these are the kinds of careful observations they will be making with their plants.

Ask student pairs to complete the activity sheet for Learning Experience #6 in their From Seed to Plant, Egg to Adult Student Activity Book by carefully observing their seedling with a double lens magnifier. This activity sheet asks students to journal the growth of their plant. Students can complete the journal daily or weekly.

If some students do not see their emerging plant, tell them to gently dig in the jar to find their seed to determine what happened. If the seed has rotted, it will need to be replaced. If it has sprouted, but not yet visible above the level of the soil, replace the soil over the seed and water it.

# Learning Experience 6 continued

## Page 2

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### **Discussion Questions:**

Why do you think there are differences in the growth and development of the plants?

Why do you think certain seeds have not germinated?

Why do you think some of the seedlings are not yet visible?

(Possible reasons: depth of planting, amount of water, temperature, differences in growth rates among the kinds of seeds).

# Learning Experience 7: Plants Grow Taller

**Objective:** Students will create a bar graph to illustrate the growth of their plant and compare its growth over time.

---

**Materials:**

**For each pair of students:**

2 From Seed to Plant, Egg to Adult Student Activity Books

Wooden dowel

Twist ties

Colored pencils/markers\*

\*provided by teacher

**Preparation:**

If students have not had experience with measuring or graphing, a mini-lesson may need to be given to introduce and teach these skills. This learning experience should be started after many plants have appeared above the soil. As plants growth taller, the small dowels and twist ties provided in the kit can be used to provide support for the plant.

**Basic Skills Development:**

Observing

Measuring

Predicting

Discussing

Gathering & Organizing Data

Interpreting Data

**Evaluation Strategy:**

Students will accurately measure and record plant growth over time.

**Vocabulary:**

centimeter

height

growth

*How tall will my plant grow?*

Students are to use the activity sheet for Learning Experience #7 in the Seed to Plant, Egg to Adult Student Activity Book to keep a bar graph of their plant's growth over time. This measuring activity can be completed daily over a two week period or longer.

On the activity sheet, students are to record the date they are taking the measurement of their plant on the bottom of the graph. Then students hold their paper up to the plant (make sure they begin to measure at the zero mark on the graph) and mark the height of the plant on the graph. They can then color the bar on the graph at that marking. Students can then begin to make predictions on how tall their plant will be the next day and place a mark on their graph where they think the next days' measurement will be.

**Discussion Questions:**

Did your plant grow at the same rate each day? Week?

If your plant grew in spurts, can you explain why?

Were your predictions on your plant's growth correct? How accurate were you?

If you were accurate, how did you pick your prediction height?

How tall did your plant grow from your first measurement to your last measurement?

How did your plant's growth compare to the other plants in the class?

What may be causing these differences in growth?

## Learning Experience 8: Parts of a Plant

**Objective:** Students will go out on a nature walk and observe plants in their natural environment and identify each part of the plant and how each part of the plant is important for survival.

---

### **Materials:**

#### **For each pair of students:**

2 From Seed to Plant, Egg to Adult  
Student Activity Books

#### **For the class:**

Hand trowel  
Book - "Incredible Plants"  
Plant samples\*  
Disposable cameras (optional)\*

\*provided by teacher

### **Preparation:**

Plotting out the nature walk around the school yard may provide the teacher the opportunity to locate and point out specific plants for students to observe.

### **Basic Skills Development:**

Discussing  
Observing  
Collecting  
Generating

### **Evaluation Strategy:**

Students will identify the parts of a plant and identify their importance for plant development.

### **Vocabulary:**

survival  
environment  
leaf  
stem  
root  
photosynthesis  
chlorophyll

*What does each part of the plant do to help it grow?*

Discuss with students the changes they are seeing in their plants and some of the different parts they see. Take the students on a nature walk around the school yard to begin to take a closer look at the plants that are growing there. Use the hand trowel to dig up some of the dandelions, weeds, etc. to get samples of root systems, stems, and leaves. Display them back in the classroom for students to observe. Discuss what they observe.

### **Discussion Questions:**

What changes have you seen in your plants?

What parts of the plant have been developed? (Leaves, roots, and stems)

Do you see any similar parts on the plants we have gathered?

Look on pages 10, 22, 30, and 34 of the Incredible Plants Book. Which part of the plant begins to grow first? (Roots)

Why do you think this happens?

What do the roots do for the plant? (Anchors plant, carries food and nutrients from soil)

From the picture, how do the roots change as the plant grows? (Root system develops)

Are the root systems of the plants we gathered similar or different?

What do you think are the function of the plant's stems? (Structure, support)

What would happen to the plant if the plant's stems were weak or broken?

What are the functions of the leaves? (Veins carry water and minerals to the

## Learning Experience 8 continued

### Page 2

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leaf and take way food made in the leaf through photosynthesis)  
What makes leaves green? (Chlorophyll takes in light energy and this energy makes sugars. Sugars are used as a food by the plant to live and grow and oxygen is a waste product of this process.

Students are to observe their plants for these very important parts and then complete the activity sheet for Learning Experience #8 in the From Seed to Plant, Egg to Adult Student Activity Book that asks them to draw a plant and identify the important parts of the plant. Students can then pair up with a partner and share their pictures and explain to their partner the function of each part of their plant.

#### **Extension:**

If possible, get a couple disposable cameras or digital camera to take on the nature walk. Have students take turns taking pictures of various plants/root systems on the walk. Later, pictures can be developed and placed into a science journal. Students can even add captions to pictures if desired.

# Learning Experience 9: Life Cycle of a Plant

**Objective:** Students will reflect on the changes and development of their plant by drawing its life cycle and ordering pictures to illustrate the life cycle of a plant.

---

**Materials:**

**For each pair of students:**

2 From Seed to Plant, Egg to Adult

Student Activity Books

Scissors\*

Paste\*

**For the class:**

Chart paper\*

Felt tip markers\*

\*provided by teachers

**Preparation:**

Divide the chart paper into six to eight different boxes so students have a place to draw their pictures. Number each box.

**Basic Skills Development:**

Observing

Describing

Discussing

**Evaluation Strategy:**

Students will accurately illustrate and order the life cycle of a plant.

**Vocabulary:**

life cycle

seedling

seed

mature plant

*What is a plant life cycle?*

Gather students together to share some of their plant journal entries from Learning Experience #6. Describe some of the changes that have occurred in the plant. (height, leaves, color, appearance)

Discuss the changes or stages of development from seed to present plant.

Ask student volunteers to draw or paste pictures from the journal of each of the stages they observed in their plant on chart paper. Include the root changes, too. The first box starts with the seed. Ask students what they think will happen to their plant next and include those pictures on the chart, as well. Label those pictures as ones that are predictions or what we think will happen with our plant. Identify stages that include seed, young plant, and mature plant.

**Discussion Questions:**

Did every plant go through the same stages?

What were some of the stages that occurred?

What are some of the stages we may not have observed yet?

As a review, students can complete the activity sheet for Learning Experience #9 in the From Seed to Plant, Egg to Adult Student Activity Book. There are eight pictures that show the life cycle of a bean plant. The pictures on page 1 of the activity sheet are to be cut out. Then they are to be ordered and pasted into page 2 of the activity sheet.

# Learning Experience 9 continued

## Page 2

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Answers to activity sheet:

1 or 6, 5 3, 8, 4, 7, 2, 1 or 6

# Learning Experience 10: Plant's Biotic Potential

**Objective:** Students will identify ways in which seeds scatter and give reasons why some plants reach their biotic potential and others do not.

---

**Materials:**

**For the class:**

Biotic potential chart  
Chart paper\*  
Felt tip markers\*  
Seed samples\*

\*provided by teacher/student

**Preparation:**

Asking students to bring in seeds they find in their backyard could be a good lead-in to this lesson.

**Basic Skills Development:**

Observing  
Inferring  
Discussing

**Evaluation Strategy:**

Students will name three ways in which seeds scatter and give reasons why plants reach their biotic potential.

**Vocabulary:**

biotic potential  
population  
disease  
predator

*What is the biotic potential of a plant?*

Review with students the needs of plants and record on chart paper (light, water, air, soil, proper temperature.)

Discuss with students how many seeds germinated and how many did not.

**Discussion Questions:**

Why did some seeds germinate and others did not?

What needs may not have been met?

If our plants had been out in the environment, what other things may have happened to the plant? (disease, predators)

**Discussion Questions:**

What are some ways that seeds travel?

Can you give an example?

Are there any seeds that you have seen that traveled by wind, water, or animal?

Does every seed that travels produce a plant? Why or why not?

What would happen if every seed did produce a plant?

Show students the biotic potential chart one part at a time. The lower left hand image shows 20 bean seeds. To the lower right is an image that illustrates that each bean seed may grow into a full plant. The center image shows 20 plants that may result from the 20 seeds. Those 20 plants in turn might produce over 400 seeds. These seeds could then produce a large number of plants illustrated on the back of the poster.

# Learning Experience 10 continued

## Page 2

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If every one of those seeds developed into a plant, we would have a huge number of bean plants, as pictured when the chart is fully open. Review with students again, then discuss.

### **Discussion Questions:**

What do you notice about the plant we started with and all the other plants that developed from that plant? (They look very similar and closely resemble the parent plant)

Why do you think they look so similar?

If time permits, another nature walk could be taken by the class to look for seeds that may have traveled into the school yard or students can take a nature walk in their backyard and look for seeds they could bring in for the class. Discuss each seed's design and discuss how it may travel from place to place.

# Learning Experience 11: Arrival Day

**Objective:** Students will prepare ladybug larvae culture vessel.

---

**Materials:**

**For each pair of students:**

Octagon Aquarium  
Nylon mesh  
Rubberband  
Spray bottle with water  
Leaf or small branch\*

**For the class:**

Video – “Ladybugs” – (15 min.)  
Live ladybug larva  
Ladybug diet (food)

**Preparation:**

Teacher and students should prepare the aquarium provided in the kit for the ladybug larvae.

**Basic Skills Development:**

Following Directions  
Observing

**Evaluation Strategy:**

Students will successfully prepare a ladybug larvae environment and will display respect for living things when handling the larvae.

**Vocabulary:**

ladybug  
larva/larvae

*What do we do when the ladybug larvae arrive?*

Watch video “Ladybugs” (15 min.) as an introduction for students on these insects.

Each pair of students should prepare his or her own ladybug larvae culture vessel.

The ladybug larvae will arrive in a tube with food.

Caution students to never shake or tap the vessel.

**Impress upon the students that ladybugs are very fragile in all stages of their life cycle.**

Due to the fragility of the ladybug larvae, place all of the food beads, branch and leaves, and ladybug larvae into the octagon aquarium. Use your spray bottle to spray water on the inside of the aquarium (2 sprays should do it). Gently, shake the contents of the large tube of larvae into the aquarium. Cover the top of the aquarium with a piece of nylon mesh and secure with a rubberband.

All students should be able to observe the changes and growth in the larvae.

Continue to spray water through the nylon mesh each day. Do not overspray as larvae can drown if water collects on the bottom of the aquarium. Replace the leaves as often as possible.

# Learning Experience 12: Larva & Pupa

**Objective:** Students will study the ladybug larvae and make accurate observations. Students will gather accurate data on the larvae they observe.

## **Materials:**

### **For each student:**

From Seed to Plant, Egg to Adult Student Activity Book  
Double lens magnifiers

### **For the class:**

Ladybug aquarium  
Masking tape  
Ladybug lifecycle figures (4)  
Metric rulers\*

\*provided by teacher

## **Basic Skills Development:**

Observing  
Gathering Data  
Measuring

## **Preparation:**

Read the background information on the larva on page 6. The activity sheet for this learning experience will need to be duplicated several times so students can keep a journal of the growth of the ladybugs.

## **Evaluation Strategy:**

Students will keep an illustrated notebook of their observations of the life cycle of the ladybug.

## **Vocabulary:**

larva  
journal  
pupa

## *What do the ladybug larvae look like?*

Students may keep the ladybug larvae aquarium on the window's ledge or large table so they can observe them daily. Students should be reminded not to shake or tap the aquarium.

Students should keep a journal containing drawings of the ladybug larvae and the changes that occur throughout the rest of the ladybug's life cycle. The activity sheet for Learning Experience #12 in the Seed to Plant, Egg to Adult Student Activity Book can act as a page in the journal. Encourage the use of magnifiers to make observations.

## **Picture of your ladybug larva:**



**Date:**

**Length of larva:**

**Comments:**

## **Discussion Questions:**

How many legs does a larvae have?  
Do you think a bird would eat a larva?  
Why or why not?  
How can you tell if the larva has grown?  
Have you ever found a ladybug larva?  
Where did you find it?

Students should observe and record when the larva turned into a pupa. Students should observe the pupa with double lens magnifiers and discuss this change.

# Learning Experience 12 continued

## Page 2

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Remind students that the pupa is very delicate and that they are not to touch the pupa.

### **Discussion Questions:**

What happened to the larvae as time went by?

Could you tell they were going into a pupa stage? If so, how?

What happened as they formed into pupae?

Can you identify any parts of the ladybug forming?

# Learning Experience 13: Meet the Ladybugs

**Objective:** Students will observe the ladybug emerging from the pupa and identify the body parts of the ladybug and explain their function.

## **Materials:**

### **For each pair of students:**

2 From Seed to Plant, Egg to Adult Student Activity Books

2 petri dishes

2 double lens magnifiers

Adult ladybugs

### **For the class:**

5 medicine cups

5 sponges

Sugar

Spray bottle

Aquarium

Chart paper\*

Felt tip markers\*

Construction paper (optional)\*

Leaf or small branch\*

\*provided by teacher

## **Preparation:**

Read background information on the parts of a ladybug on page 6. Take an adult ladybug from the aquarium for each student pair and place in a Petri dish with cover. Prepare food for aquarium as explained on page 31. Place new leaves and branches in the aquarium.

## **Basic Skills Development:**

Observing

Discussing

Describing

## **Evaluation Strategy:**

Students will accurately observe and identify the main parts of a ladybug and explain their function.

## **Vocabulary:**

thorax	adult
abdomen	claws
magnify	observe
antennae	flying wings
cover wings	shell

*What happens when the ladybug emerges?*

If possible, have students observe the ladybugs emerge from the pupa. Hopefully the ladybugs will not all emerge on a weekend. Students should continue to illustrate and record their observations in their journal.

## **Discussion Questions:**

What happened to the pupae? How could you tell something was going to happen?

Describe what you observed when the ladybug emerged from the pupa.

What parts of the ladybug do you observe are the same as the larva?

Different?

Encourage students to discuss their experiences with ladybugs and inquire what they already know about these insects.

Student pairs are to observe a ladybug with a double lens magnifier inside a petri dish and discuss with their partner the parts they see on their ladybug. Students are to then contribute to a class list on chart paper of the parts of the ladybugs that they observe. A class picture of a ladybug could accompany the list of parts. Identify the head, thorax, abdomen, and six legs as characteristics of insects.

## **Discussion Questions:**

Does the ladybug have eyes?

Do all ladybugs look alike?

What are some differences we see between the ladybugs?

How many legs does a ladybug have?

Where are the legs attached?

Describe how they walk/move?

Does the ladybug have antennae?

# Learning Experience 13 continued

## Page 2

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What do you think the antennae are used for?

Do you notice anything at the end of the ladybug's leg? What do you think they are for?

What do you think the cover wings are there for?

Do you notice any mouth parts?

Students are to then complete the activity sheet for Learning Experience #13 in the Seed to Plant, Egg to Adult Student Activity Book by cutting and pasting the label for each part of the ladybug. Students could also use construction paper to recreate their ladybugs then describe each part of the ladybug to a partner or to the class.

Once students have observed their ladybugs closely, they are to place them back in the class aquarium. The food for the ladybugs is to be made from one part sugar to four parts water. Once the solution is made, then the sponges can be soaked in the solution and placed in the small medicine cup provided. The ladybugs will eat from the sponges. Using a spray bottle, spray water on the side of the aquarium. It will provide the ladybugs with their water supply. Any excess water can be wiped clean. Creating an environment for the ladybugs with a variety of leaves and branches can help their life span which could result in the continuation of the life cycle. Ladybugs love to eat tiny aphids found on the leaves of plants. Students can make further observations of the ladybugs in the aquarium.

### Answers to Activity Sheet

1. antenna
2. head
3. cover wings
4. flying wings
5. abdomen
6. legs
7. thorax

# Learning Experience 14: Ladybug Life Cycle

**Objective:** Students will recreate the life cycle of a ladybug through role playing and writing a story.

## **Materials:**

### **For each pair of students:**

2 From Seed to Plant, Egg to Adult

Student Activity Books

Yarn or tape to bind book\*

Scissors\*

Construction paper\*

### **For the class:**

Aphid pictures for students\*

Paper ladybug\*

Paper leaf with aphid\*

Paper egg\*

Paper larva\*

Paper pupa\*

Hole punch\*

Ladybug life cycle figures

\*provided by teacher

## **Preparation:**

Read background information on ladybug life cycle and aphids on pages 6 and 7.

## **Basic Skills Development:**

Discussing

Creating Models

## **Evaluation Strategy:**

Students will accurately identify each part of the life cycle and what occurs at each stage.

## **Vocabulary:**

life cycle

metamorphosis

adult

egg

pupa

larva

aphid

## *What is the life cycle of a ladybug?*

Ask students to recall their plant's life cycle and discuss each phase.

Explain to students that the ladybug also goes through a life cycle that consists of four stages. The ladybug goes through a four stage metamorphosis.

Metamorphosis = change. In other words, the ladybug goes through four different stages before it becomes an adult. Create a paper model of a ladybug, leaf with aphid, egg, larva, and pupa to discuss the life cycle of the ladybug. Students can help you arrange each stage of the ladybug life cycle in proper order. Use the ladybug lifecycle figures to help demonstrate.

## **Discussion Questions:**

Which one crawled out of the egg?

(larva – larva placed next to egg)

The ladybug larva ate aphids and grew bigger. Then it began to change what did it look like? (pupa – pupa placed next to larva)

The pupa stays very still and changes to what? (ladybug – ladybug placed next to pupa)

What does the adult ladybug do? (fly away, eats more aphids, eventually the female finds another leaf with aphids and lays eggs)

Role play with students the complete life cycle of the ladybug. Have copies of the picture of the aphids arranged on the floor. Discuss what aphids are, where they are found in the environment, and why they are important to the ladybugs. Begin with an egg (curl up in an squatting position). Larva crawls out of the egg and over to an aphid, eats the aphids and grows bigger (crawl, pretend

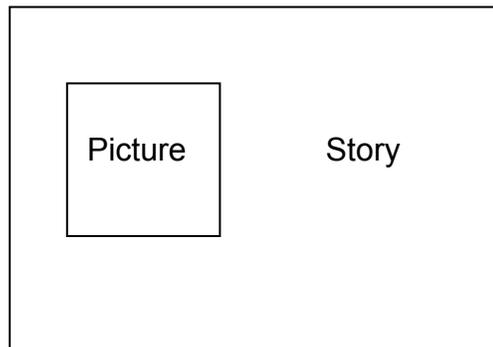
# Learning Experience 14 continued

## Page 2

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to eat, and stretch out). Pupa (be still and make wings by folding your arms and holding them close to your chest). Adult (pretend to fly away or fly outside to find more aphids).

Ask students to create a ladybug life cycle book by cutting out each picture on the activity sheet for Learning Experience #14 in the Seed to Plant, Egg to Adult Student Activity Book. Students are to order the pictures and each picture becomes a page in their book. The pictures can be pasted to construction paper.



Students can write a story on the pages of their book next to each picture. Students could also dictate stories. The pictures can then be bounded by yarn or tape.

# Learning Experience 15: Comparing Life Cycles

**Objective:** Students will compare and contrast the life cycles of plants and ladybugs.

**Materials:**

**For the class:**

Chart paper\*  
Felt tip markers\*

\*provided by teacher

**Preparation:**

Draw an “H” chart on the chart paper for this learning experience. A mini-lesson on how to compare and contrast two items may be necessary for students. Contrasting plants and animals may be a helpful starting point for students.

**Basic Skills Development:**

Describing  
Comparing  
Contrasting

**Evaluation Strategy:**

Students will contribute to a class chart that compares and contrasts the life cycle of plants and animals.

**Vocabulary:**

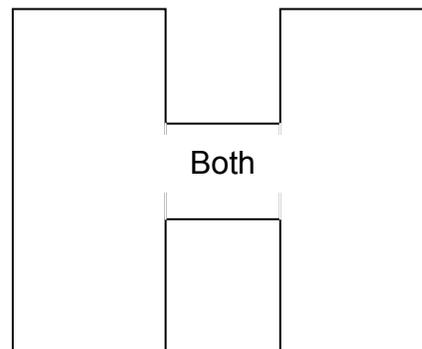
life cycle  
alike  
different

*What do the plant and animal life cycles we studied have in common?*

Discuss with students the plant and animal life cycles we have observed. Create an “H” chart on chart paper to compare the plant life cycle to the ladybug life cycle.

This organizer is similar to a venn diagram. If there is something that plant and ladybug lifecycles have in common, these items can be written in the “both” section of the chart.

Plant Life Cycle                      Ladybug Life Cycle

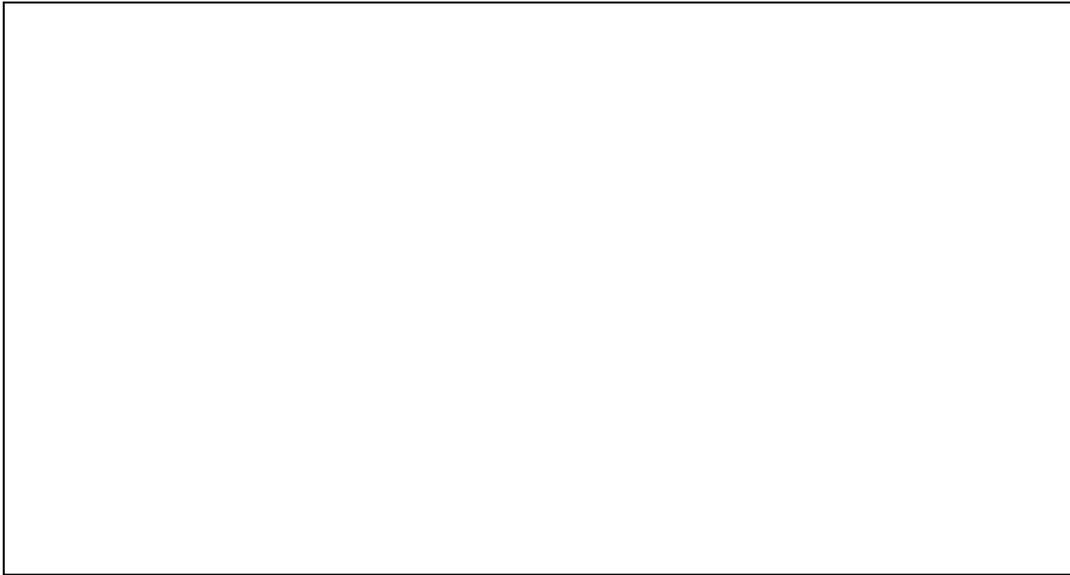


**Discussion Questions:**

How are the life cycles of plants and animals the same?  
How are they different?  
What do plants need to survive?  
What do animals need to survive?



5. In the box below, draw a picture that shows how a seed grows. Label each stage - seed, seedling and mature plant.



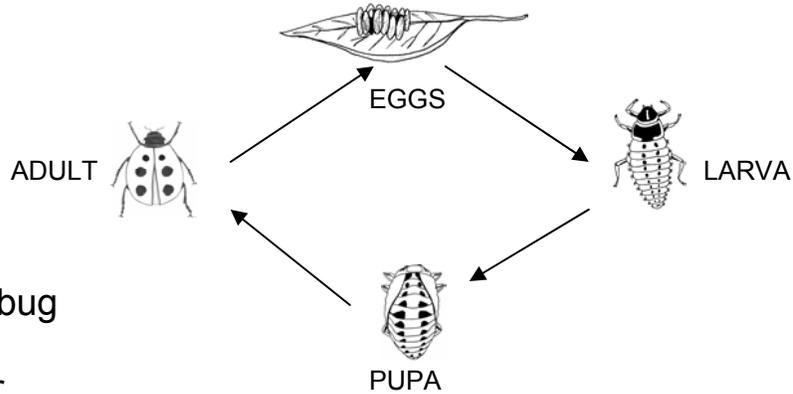
6. If you put a plant inside a box that had just one hole in it, facing a window, you would see the plant start to grow out of the hole. This would happen because:

- A. the plant was looking for water.
- B. the plant was growing toward the sun.
- C. the plant grows better in a box.
- D. the plant grew so much in the box that it ran out of room.

7. Where does the energy come from for plants to make food?

- A. from the soil
- B. from the water
- C. from the flowers
- D. from the sun

8. The diagram shows the life cycle of which animal?



- A. ladybug
- B. frog
- C. deer
- D. bird

9. The length of time from an animal's birth to its death is called its:

- A. life span
- B. gestation
- C. maturity
- D. habitat

10. Ladybugs lay like to eat

- A. plant leaves
- B. soil
- C. aphids
- D. plant roots

## **From Seed to Plant Student Assessment Key**

1. B
2. D
3. A
4. C
5. Look at students' drawings and labels
6. B
7. D
8. A
9. A
10. C

## MORE IDEAS

### Language Arts

- ◆ Write a story about how it feels to be a sprouting seed.
- ◆ Read the story Johnny Appleseed to the class and discuss legends.
- ◆ Read the story Jack the Beanstalk and have student write their own stories about seeds and their magical properties.
- ◆ Read the story Leo the Late Bloomer and ask students to focus on the different rates of growth and development. Students could demonstrate something that they have learned that they could not do before.

Book suggestions: (Plant Books)

Carle, Eric. The Very Hungry Caterpillar  
Kuchalla, Susan. All About Seeds  
Hickman, Pamela. A Seed Grows: My First Look at a Plant's Life Cycle  
Arbo, Cris. A Dandelion Seed  
Lobb, Janice. Dig & Sow! How Do Plants Grow?  
Gibbons, Gail. From Seed to Plant  
Jordan, Helene. How A Seed Grows  
Lerner, Carol. My Indoor Garden  
Rockwell, Anne. One Bean  
Carle, Eric. The Tiny Seed  
(Ladybug books)

Henley, Karen and Tess Erwin Stahlin. Five Little Ladybugs  
Ernst, Lisa Campbell. Bubba & Trixie  
Allen, Judy and Tudor Humphries. Are You A Ladybug?  
Chrustowski, Rick. Bright Beetle  
Carle, Eric. The Grouchy Ladybug  
Crewe, Sabrina. The Ladybug (Lifecycles)  
Fowler, Richard. Ladybug on the Move  
Elsohnross, Michael. Ladybugology  
Tickle, Jack and Isobel Finn The Very Lazy Ladybug  
Metzger, Steve. Ladybug's Birthday  
Wickstrom, Lois. Ladybugs for Loretta  
Freeman, Becky. The Loveable Ladybug

### Art

- ◆ Make ladybugs with construction paper, glue, colored pencils/crayons.
- ◆ Make "potato print" ladybugs on a leaf cut from a stencil. Dip half a potato in red paint and stamp on the leaf. Allow to dry then add the details.
- ◆ Make a collage of plant and animal pictures cut from magazines. Separate pictures into plant and animal groups. Discuss the differences between the two.
- ◆ Take photographs of the plant growth and create a photo album of your plant's life cycle.

## **Social Studies**

- ◆ Discuss the history of different foods (beans, squash, corn, and syrup). Samples could be brought to class.
- ◆ Discuss different cultures, the type of farming that they do, and the foods they eat.
- ◆ Read about George Washington Carver and his work with agricultural products.

## **Math**

- ◆ Measure the height of the students in the room and create a graph of their heights. Repeat in six weeks and record any changes.
- ◆ Measure changes in seed growth by not only measuring height but measuring number of roots, root length, length of stem, length, and number of leaves and chart results.
- ◆ Make a ladybug clock like in the story The Grouchy Ladybug by Eric Carle and work with students on how to tell time.

## **Science**

- ◆ Invite a horticulturist to class to talk about raising plants.
- ◆ Take a field trip to a green house, farm, or nursery.
- ◆ Ask students to bring in items that come from plants and discuss their importance.
- ◆ Plant seeds on a wet sponge, cotton, or paper towels and see if they grow.
- ◆ Have students bring in an old sock, wet it and place it over one of their shoes. Take a nature walk and as students are walking, they may be gathering up seeds that are on the ground. Come back to the classroom and place the sock in a sunny window. Keep sock damp and see if any seeds germinate from it.
- ◆ Place a piece of celery or a white carnation in water with food coloring in it. As they sit in the water, students will see that the leaves of celery and petals of the flower will begin to turn colors. This shows the capillary action in the stems of the plant.
- ◆ Take a nature walk to find ladybugs in their natural environment.
- ◆ Set up experiments with plants under different conditions to see how plant growth is effected by the amount of water, light, temperature, and soil type
- ◆ Plant a class garden (indoor or outdoor). If a cardboard box is used for an indoor garden, tape the plastic sheeting inside the box and put 8 cm of potting soil in the box. Label tongue depressors and place in the soil to label the seeds that have been planted.
- ◆ Discuss the kinds of animals that eat seeds.
- ◆ Find out as a class if all plants grow as seeds. Some fruits and vegetables grow from placing a piece of fruit or vegetable in the soil. (Kiwi, potato, carrot)

## **Health**

- ◆ Talk with students about the nutritional value of different kinds of fruits/vegetables.

## **INQUIRY AND PROCESS SKILLS**

Classifying	Arranging or distributing objects, events, or information in classes according to some method or system.
Communication	Giving oral and written explanations or graphic representations of observations.
Creating Models	Displaying information by means of graphic illustrations or other multi-sensory representations.
Formulating Hypothesis	Constructing a proposition or assumption of what is thought likely to be true based on reasoning, which serves as a tentative testable theory.
Gathering & Organizing	Collecting information about objects and events which show a specific situation.
Generalizing	Drawing general conclusions from information.
Identifying Variables	Recognizing the characteristics of objects or events which are constant or change under different conditions.
Inferring	Making a statement or conclusion based on reasoning or prior experience to explain an observation.
Interpreting Data	Analyzing information that has been collected and organized by describing apparent patterns or relationships in the information.
Making Decisions	Choosing an alternative from among several and basing the judgment on defensible reasons.
Manipulating Materials	Handling or treating materials, equipment or procedures skillfully and effectively.
Measuring	Making quantitative observations by comparing to a standard.
Observing	Becoming aware of an object or event by using any of the senses to identify properties.
Predicting	Making a forecast or estimate of what future events or conditions may occur.

## GLOSSARY

Abdomen:	the lower portion of an insects body, below the thorax.
Adult:	an animal/insect that is fully developed or mature.
Alike:	in the same manner, form, or degree; having similarities.
Antennae:	moveable sense organ on the head of insects.
Aphid:	plant lice, suck sap from leaves, stems, and branches of plants. This feeding causes plants to wilt and die. Aphids are the ladybug's source of food.
Biotic potential:	the capacity of an organism or species to reproduce and survive – assuming no death due to unfavorable conditions.
Centimeter:	one-hundredth of a meter.
Chlorophyll:	the green coloring matter of leaves and plants, needed for photosynthesis.
Claws:	a sharp, usually curved, nail on the foot of an animal.
Cotyledon:	the part of the seed containing stored food, used by the embryo for its initial growth (food).
Cover wings:	hard, shell like wings on the ladybug that provide protection.
Dicot:	two halves to the seed leaves (bean).
Different:	not identical in character or quality.
Disease:	the condition of the body in which there is incorrect function.
Egg:	the round reproductive body produced by the female of certain animals.
Embryo:	the part of a seed from which a plant develops (baby plant).
Environment:	people, animals', or objects' surroundings.

Flower:	the part of the plant that bears the seed and usually has brightly colored petals; blossoms or blooms.
Flying wings:	wings underneath the cover wings of the ladybug that are used when the ladybug is in flight.
Fruit:	the developed ovary of a seed plant.
Germinate/Germination:	to begin to grow or develop.
Growth:	the act or process of growing; size or stage of development.
Height:	the distance upward; distance between the lowest and highest points.
Journal:	a daily record of events.
Ladybug:	brightly colored beetle that feeds on aphids and other small insects. Also known as the ladybird beetle.
Larva:	the worm-like stage of most insects following the egg and before the pupa stage (plural: larvae)
Leaf:	any of the green parts growing from the stem of the plant.
Life cycle:	sequence of stages of growth in the life of an organism. (egg to adult)
Magnify:	to increase the size of an object as with a lens.
Mature plant:	the adult plant.
Metamorphosis:	a change in body structure from egg to adult.
Monocot:	one seed leaf (corn)
Nutrients:	providing nourishment.
Nuts:	a dry fruit consisting of a kernel that can be eaten and has a shell.
Observe:	to become aware of an object or event by using any of the senses to identify properties.

Photosynthesis:	the process by which plants use the sunlight as their source of energy to change water and carbon dioxide into food for the plant with the help of chlorophyll.
Population:	the number of people or animals living in any one place.
Predator:	an animal that preys upon other animals.
Property:	any trait, characteristic, or essential quality of a living or non-living thing.
Pupa:	the stage between the larva and adult stages of an insect's life cycle characterized by a long period of rest (plural: pupae).
Root:	underground part of the plant. Serves to anchor the plant and absorb water and minerals from the soil.
Seed:	the part of a flowering plant that will grow into a new plant under the right conditions.
Seed coat:	the skin or coating of a seed.
Seedling:	a plant grown from a seed; any young plant.
Shape:	the appearance of the figure or body or a person or object.
Shell:	the hard, outer covering of an animal, egg, or nut.
Soil:	the thin layer of the earth's surface in which plants grow.
Sprout:	a new growth; to put forth buds or shoots.
Stem:	the main stalk or trunk of a tree, shrub, or other plant, extending above the ground and bearing the leaves, flowers, etc.
Survival:	continue to live or be in existence.
Texture:	the visual and tactile quality of a surface.
Thorax:	the portion of an insect's body between the head and abdomen.
Vegetable:	the edible roots, leaves, or stems of a plant.

## **TEACHER REFERENCES**

Braithwaite, Althea. Ladybirds. Longman Group, 1985

Fischer, Nagel, A& H. Life of the Ladybug. Carolihold Books, 1981.

Jeunese, Gallimard & Bourgoing, Plascale. The Ladybug and Other Insects. Scholastic, 1991

Johnson, Silvia. Ladybugs. Lerner Publications, 1983.

Merrill, Clarie. A Seed is a Promise. Scholastic Book Service.

Sholinsky, Jane. Growing Plants from Fruits and Vegetables. Scholastic Book Services, 1974.

Watts, Barrie. Ladybug. Silver Burdett Press, 1987

### **Media Library**

Call the media library to order media materials and to check on new materials that are available. The number to be reached is (716) 376-8212.

### **Web Sites**

<http://www.members.aol.com/LADYBUGGS/links.html>

<http://www.seedtests.com>

<http://www.kunafin.com/ladybugs.htm>

<http://www.ent.iastate.edu/imagegallery/lady/>

<http://www.nysaes.cornell.edu/ent/biocontrol/predators/harmonia.html>

<http://www.botany.com>

## **Major Science Concepts to be Addressed:**

Living objects, including plants and animals, live and thrive when their needs are met.

Each plant has properties that enable the plant to meet its needs.

The parts of plants have functions which help the plant to live and thrive.

Roots help plants take in water.

Leaves help plants utilize sunlight.

Roots, stems, stalks, trunks, and other similar structures provide support for the plants.

Parts of some plants change and meet the immediate needs of the plant.

For example:

Leaves turn toward light and some close in the dark

Roots grow more rapidly in moist areas

Each kind of plant goes through its own stages of growth and development during the life of the plant.

Stages of development in some plants include seeds, seedlings, and adult plants.