

Insect Life Cycles

Grade Level: 4-8

Lesson Overview

As students explore the life cycles of insects, they will learn about complete and incomplete metamorphosis. Along the way they will learn more about pheromones insects use.

Student Objectives

1. Identify the stages of complete and incomplete metamorphosis.
2. Explain the difference between complete and incomplete metamorphosis.

Materials

- ✓ Life Cycles Worksheet
- ✓ Life Cycles illustrations

For Make Scents of Insects optional interest approach

- ✓ film containers or small souffle containers (30 or one for each student)
- ✓ cotton balls
- ✓ warming oils, extracts, etc. to place small amount on the cotton balls

Vocabulary

- **complete metamorphosis** - a change in form in which the stages of development are egg, larva, pupa, and adult.
- **exoskeleton** - a hard outer structure, such as the shell of an insect or crustacean, that provides protection or support for an organism.
- **incomplete (simple) metamorphosis** - a change in form in which the stages of insect development are egg, nymph, and adult.
- **larva/larval stage** - the immature insect stage that comes after egg and before pupa during complete metamorphosis.
- **metamorphosis** - a change in form.
- **molt/molting** - to shed the skin or exoskeleton.
- **nymph** - an immature form of an insect; the stage between egg and adult in incomplete metamorphosis.

- **pheromone** - a chemical secreted by an animal, especially an insect, that influences the behavior or development of others of the same species, often functioning as an attractant of the opposite sex.
- **pupa** - the inactive stage in the metamorphosis of many insects, following the larva stage and before the adult form.
- **pupate** - leave the larval stage and enter the pupa stage.

Background Information

Although all insects hatch from eggs, depending on the type of insect, the life cycle they go through is either complete or incomplete metamorphosis. This lesson will discuss both types of life cycles, having students compare and contrast utilizing a Venn diagram.

Procedure

1. As an interest approach, have students complete this Making Scents of Insects activity.

One of the ways insects communicate is through pheromones. A pheromone is a chemical secreted by an animal, especially an insect, that influences the behavior or development of others of the same species, often functioning as an attractant of the opposite sex. In this activity students will pretend to be an insect using a little container with a scent inside. They will search for the other student insect that has the same scent as they have without talking. Encourage students to quietly walk around smelling each other's containers until they find their matching student insect and sit down together. They should keep the lid on as much as possible during the activity. Have them try to guess what scent they had.

To prepare for this activity, please gather a small container such as a film canister or small plastic souffle cup for each student. Please keep in mind you will need to make an even number of containers so everyone will have a partner. If there is an odd number of students, the teacher could participate. Then label the bottoms of the containers – half with letters and the other with numbers. Use these to record which two containers have each scent.

Next it is time to add the scents such as oils, extracts, spices, cleaners, perfumes, juices, and drinks. As you choose your scents, please be cautious if your students have any allergies. Warming oils and extracts are some of the stronger scents you can use and will last longer. Please keep in mind that some items could give visual clues. Place scent #1 on two cotton balls and drop one

into a lettered container and one into a numbered container. Then cover with a second cotton ball to hide potential visual clues. Fasten lid securely. Continue until all the containers have scents inside.

After presenting the following information students will complete the Life Cycles Worksheet.

2. Begin the lesson with asking the students to brainstorm a list of insects.
3. After the list is as complete as you feel is necessary, explain to the students that insects are not born alive as mammals are. All insects are hatched from eggs and become adults in stages through a process called metamorphosis. There are two types of metamorphosis: complete and incomplete.
4. Grasshoppers and honeybees use different types of metamorphosis to become adults.
5. A grasshopper is an example of gradual growth or incomplete metamorphosis. The egg hatches, and the tiny insect resembles the adult minus fully developed wings. Through a molting process the insect sheds its exoskeleton the hard external shell several times as it grows from a young nymph to the adult. The old exoskeleton splits down the back and the insect wiggles its way out of its covering. A new, larger shell will form in a matter of hours. After the molt is complete, the insect resumes feeding and begins to grow inside again. Soon, another molt will be required. Insects may shed their exoskeleton from 4 to 40 times in their lives. Once an insect becomes a full-grown adult, however, it stops growing and molting.
6. The honeybee is an example of complete metamorphosis. From the egg comes the larva, which when fully grown transforms into a pupa. The honeybee pupa develops in a sealed comb cell. Later after many changes, the adult honeybee emerges and begins work for the hive.
7. Use the Life Cycles illustrations, to visually depict these different types of metamorphosis.
8. Have students choose an insect and write about its metamorphosis from the insect's perspective. This could be done in either paragraph or graphic novel-type format.

Some examples of insects that evolve through complete metamorphosis and incomplete metamorphosis are:

Complete Metamorphosis

ant
beetle
boll weevil
butterfly
firefly
flea
fly
green lacewing
honeybee
hornet
ladybug
meal worm
mosquito
moth
stink bug
termite

Incomplete Metamorphosis

cicada
cockroach
cricket
dragonfly
earwig
grasshopper
locust
praying mantis
silverfish
sowbug
walking stick
water bug

Extension Activities

This Science lesson coordinates with The Honey Files: A Bee's Life - Worksheet #2. You may also wish to give the students a list of insects and have them use [Insectlopedia](#) or other reference material to determine which insects follow complete metamorphosis or incomplete metamorphosis.

Additional Resources

- Ladybug life cycle https://www.youtube.com/watch?v=ws_D5nXOAJq
- Praying mantis life cycle <https://www.youtube.com/watch?v=shDSU0BaF90>
- Cicada life cycle <https://www.youtube.com/watch?v=mArDqy8RkxM&t=3s>
- Ant life cycle https://www.youtube.com/watch?v=V400oXh_YTQ

Standards

Illinois Science Standard

MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.

Illinois English Language Arts Standard

RST 1: Cite specific textual evidence to support analysis of science and technical texts.

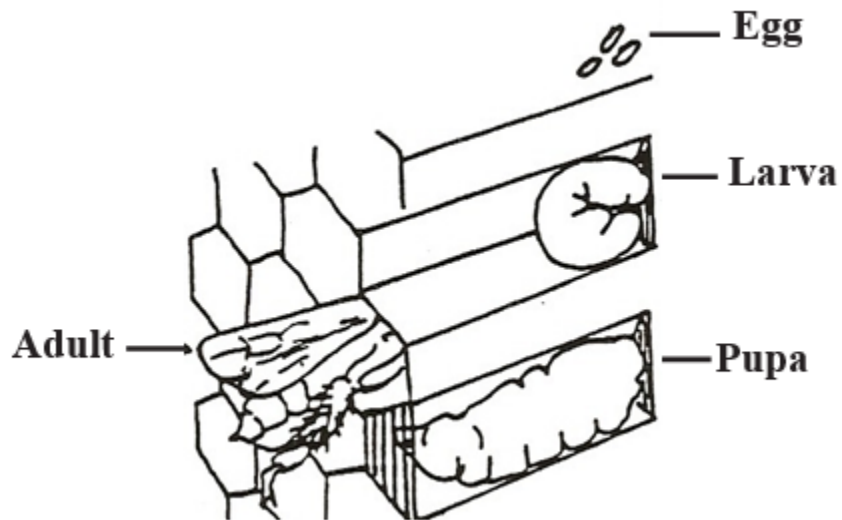
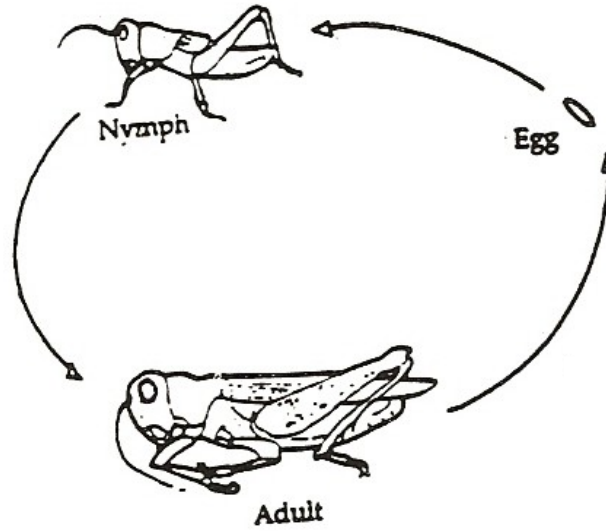
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These mAGic lessons are designed to bring agriculture to life in your classroom. They address the Illinois Learning Standards in math, science, English language arts and social studies.

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Life Cycles Illustrations

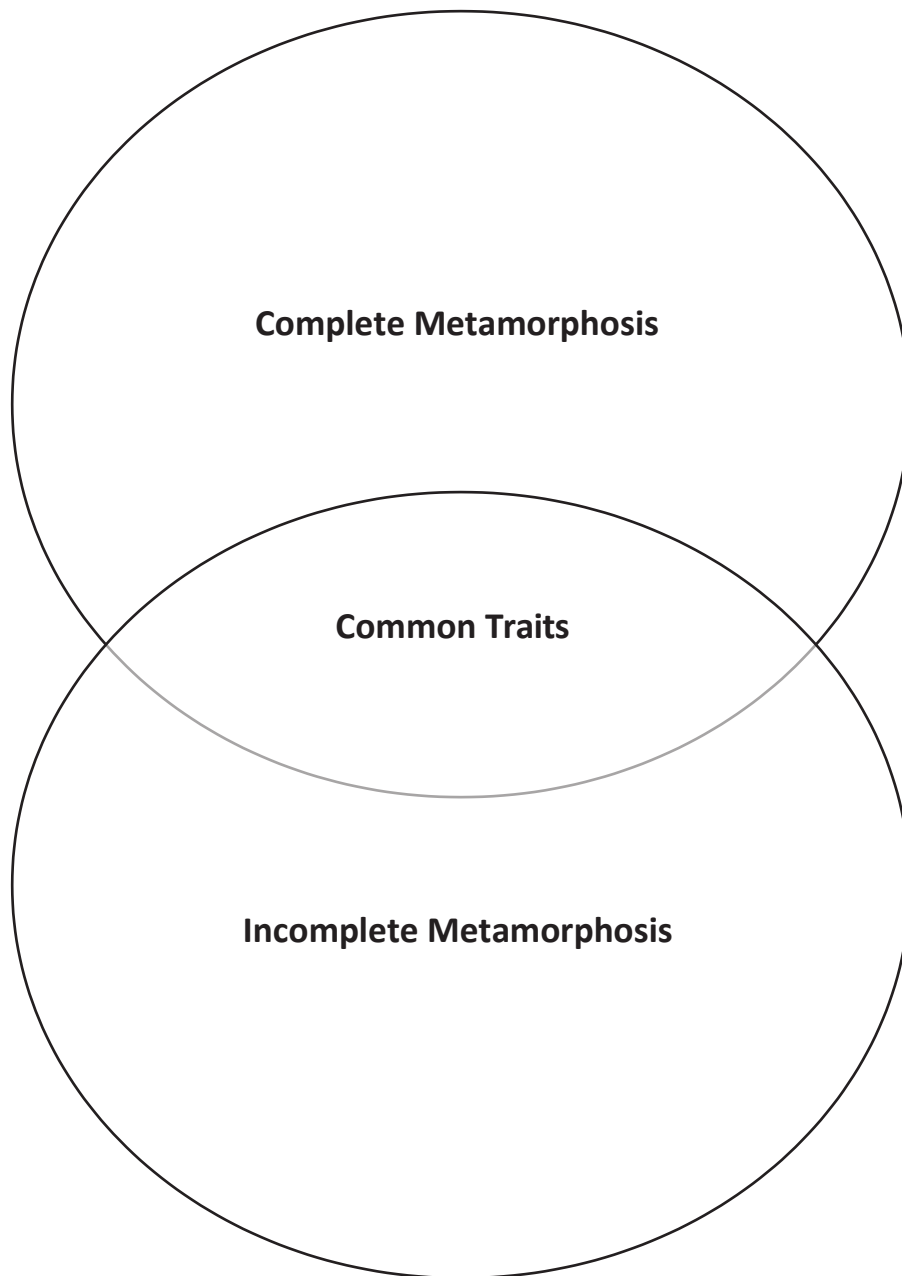


Name _____

Life Cycle Worksheet

List the traits of complete and incomplete metamorphosis in the correct circles below. If any traits are common among both types of metamorphosis list them under “Common Traits”.

Life Cycle



Life Cycle ANSWER KEY

Complete Metamorphosis

- Four phases.
- Egg is the first and beginning phase.
- Larva is the second phase.
- Pupa is the third phase.
- Adult is the fourth and final phase.
- Wings develop internally during the larva phase.
- During the pupa phase, the insect is not active.
- The larvae look very different from the adults.

Common Traits

- Development divided into phases, beginning with an egg and ending as an adult.
- Wings develop during the middle phases.

Incomplete Metamorphosis

- Three phases.
- Egg is the first and beginning phase.
- Nymph is the second phase.
- Adult is the third and final phase.
- Wings develop externally during the nymph phase.
- The nymphs look very similar to the adult insects
- There is no inactive pupa phase.