

## Teacher's Guide Grade 5: Life Cycles



**TEKS 5.10: Organisms and Environments.** The student knows that organisms undergo similar life processes and have structures that help them survive within their environments. The student is expected to:

C) describe the differences between complete and incomplete metamorphosis of insects



**Background Information:** This unit reinforces the understanding that all living things have a life cycle, although not all organisms' life cycles are the same. It emphasizes that most complex animals, including mammals, reptiles and birds, have simple life cycles. They are born alive from their mother or hatch from an egg, and then grow and mature into adults that are capable of reproducing. Animals with simple life cycles have all the same traits as their parents when they are born. They are just smaller in size. Over time, they grow and develop into adults.

However, some animals like frogs and many insects, go through more stages of growth and development before becoming adults. The young of these organisms usually do not resemble the parents when they are born. Their bodies change several times during their life cycle. This change in form is called metamorphosis.

This unit provides detailed information of the two types of metamorphosis that insects and some animals go through - complete and incomplete. It uses insect examples of both types of metamorphosis to compare/ contrast the differences in the stages of their development. In complete metamorphosis, a female adult lays eggs from which larva hatch. The larva grows in size and eventually forms a pupa where the insect's body changes into a mature adult capable of reproducing. In incomplete metamorphosis, female adult lay eggs form which nymphs hatch. Nymphs resemble the adults with some differences. The nymph grows larger, and as it grows its body changes to develop the features of an adult.

The stages in the life cycle of plants is also reinforced, including the fact that some plants complete their life cycle in one growing season while it takes some plants years to complete their life cycle.



**Prerequisite Knowledge:** Students have observed the life cycle of plants (seed, seedling, plant, flower, and fruit) and animals such as chicken, frog, and fish. They have also investigated the life cycle stages of insects and are able to compare and illustrate the life cycles of various organisms such as butterflies, beetles, radishes and beans. They know that young organisms inherit traits that resemble their parents' traits. However, this year they are introduced to the term "metamorphosis" which means "to change" and the differences in the stages of complete and incomplete metamorphosis.



**Common Misconceptions:** Some students will equate life cycles with only the examples learned in school. They need to be aware that all living things have life cycles. Students may believe the life cycle ends when an organism dies, but it continues in the offspring produced. Cycles do not have beginnings or endings.

Students may think that all living things that are similar will go through the same stages during their life cycles. They should realize that there are exceptions, such as, a few mammals lay eggs, some fish and reptiles give birth to live young.

Concerning plants, some students will think that the fruit produces the seed. The seed is the result of pollination. The fruit develops around the seed to protect and nourish it until it is planted.



**Essential Questions:**

- 1) How does the life cycle of a grasshopper compare to the life cycle of a butterfly?

*A grasshopper undergoes incomplete metamorphosis. It starts as an egg, then, hatches as a nymph. A nymph is like an adult grasshopper except it is smaller and does not have wings. It then grows and develops into an adult. A butterfly undergoes complete metamorphosis. It begins as an egg also, and then hatches as a larva. The larva eats and grows and then becomes a pupa forming a chrysalis. It grows and develops the characteristics of an adult insect while inside the chrysalis. When development is complete it emerges as a mature adult butterfly.*

- 2) What are some animals that have a simple life cycle? How do they compare to each other?

*People, most mammals, reptiles, birds and fish have a simple life cycle. People and most mammals have similar life cycles since the young are usually born alive from their mothers and the offspring have the same features as the adult. Reptiles, birds and fish are similar since their young hatch from eggs laid by the mother. All of these start animals resemble an adult at birth and then grow and mature to be adults capable of reproducing.*

- 3) Is a frog's life cycle a complete or incomplete metamorphosis? Explain your answer.

*A frog undergoes a complete metamorphosis. It includes the egg, tadpole, froglet and then adult frog stages. In complete metamorphosis the hatchling does not resemble the parent and changes as it grows to be an adult.*

- 4) What are the main differences between complete and incomplete metamorphosis?

*There are three life cycle stages in incomplete metamorphosis (egg, nymph, adult) while there are four stages in complete metamorphosis (egg, larva, pupa, adult). In complete metamorphosis, the young organisms resemble their parents. In incomplete metamorphosis, the young usually do not resemble the adults at all.*



**Notes:**