

# Complete and Incomplete Metamorphosis

Read the following passage. Then answer the questions on the last two pages.

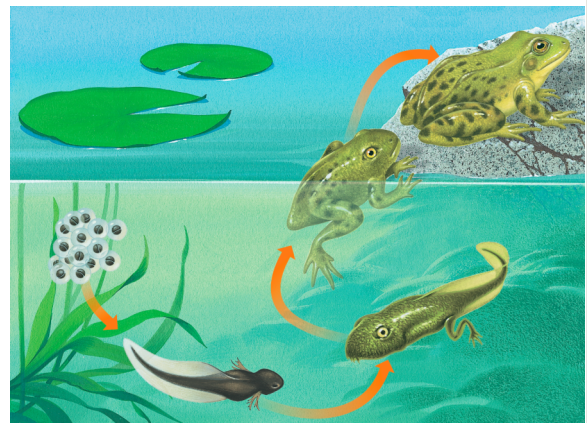
## Growing and Changing

Every living thing has a **life cycle**, which is a series of stages it goes through during its life. Different kinds of animals have different life cycles. For example, a cat's life cycle starts when a kitten is born. The kitten grows a little every day until it becomes an adult. As a kitten grows and develops, it has the same basic body structure. A kitten, a young cat, an adult cat, and an old cat look mainly the same.



## Metamorphosis

When some animals hatch or are born, they look very different from the adults. A young animal changes during its life cycle. An animal that undergoes a drastic change in its body form during its life is said to experience **metamorphosis**. The word *metamorphosis* comes from the Greek words *meta*, which means “change” and *morphe*, which means “form.” A young frog, or tadpole, does not look like an adult frog. Frogs undergo a metamorphosis when they develop from tadpoles into adults.



## Metamorphosis in Insects

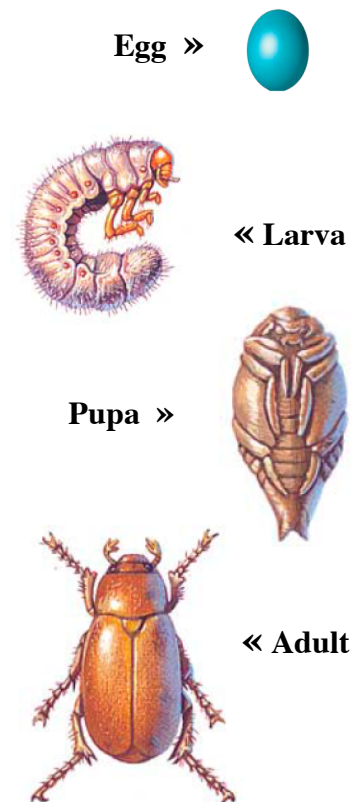
All insects undergo metamorphosis as part of their life cycles. Insects undergo either complete metamorphosis or incomplete metamorphosis.

### Complete Metamorphosis

More than 80% of insects, including flies, beetles, bees, butterflies, and moths, go through complete metamorphosis. The life cycle of an organism that undergoes complete metamorphosis consists of four stages—the egg, the larva, the pupa, and the adult. Study the drawings of these four stages in the beetle's life cycle.

All insects begin life as an egg that was laid by an adult female insect. Inside the egg is a tiny animal called an embryo. The embryo develops inside the egg.

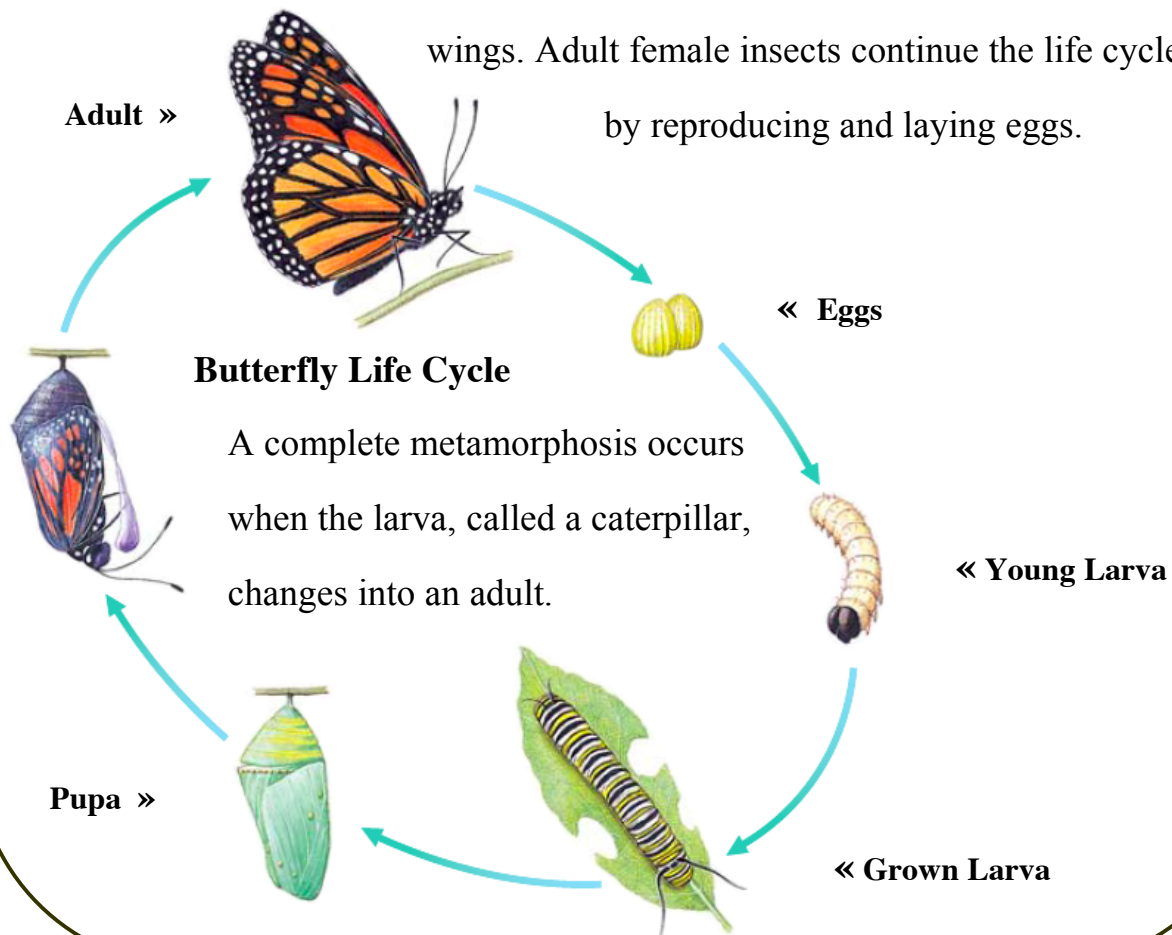
The egg hatches and a **larva** (LAR•vuh) emerges. A larva usually looks like a worm. The larva is the eating and growing stage. Some insects don't eat at all after this stage. Larvae must molt, or shed their skin, a number of times as they grow. That's because their outer layer, called the exoskeleton, cannot stretch or grow. Did you know that caterpillars, grubs, and maggots are all just the larval stages of insects?



After the larva has eaten and grown, the organism enters a resting stage, when it does not feed or move around much. This stage of the life cycle is called the **pupa** (PYOO•puh). During this stage, many body changes take place as the insect is transforming. A complete metamorphosis occurs. New organs, muscles, and body parts are developing. The pupa stage can last from a few days to many months.

Eventually, an adult emerges from the pupa stage. Insects stop molting when they reach their adult size. The adult has all the parts that make it an insect—three body sections, six legs, two antennae, and, usually, wings. Adult female insects continue the life cycle

by reproducing and laying eggs.



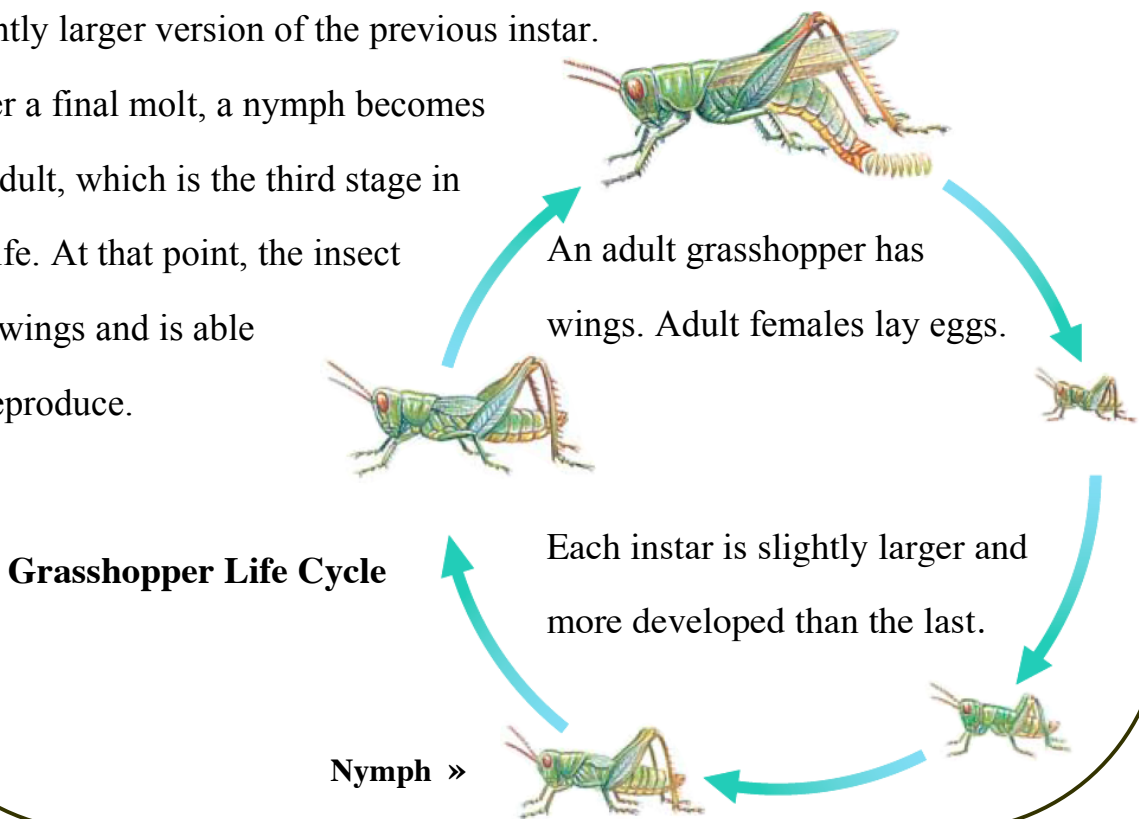
## Incomplete Metamorphosis

The other type of metamorphosis in insects is incomplete metamorphosis. Dragonflies, grasshoppers, and true bugs undergo incomplete metamorphosis. These insects have three stages in their lives.

An egg is the first stage of life. The egg hatches, and the animal is called a **nymph** (NIMF), which is the second stage of life. A nymph eats and grows. It eats the same kind of food the adults eat. In fact, most nymphs look like miniature adults. The main difference is that nymphs don't have wings.

As it grows, a nymph molts its outer covering and replaces it with a larger one. In most cases, nymphs molt from four to eight times. The period of growth between each molt is called an **instar**. Each instar is much like a slightly larger version of the previous instar.

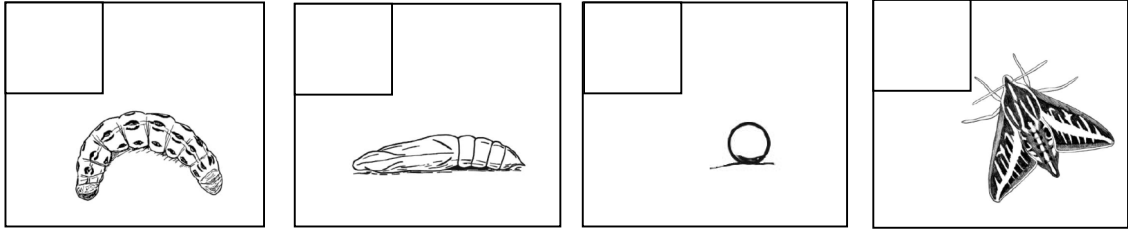
After a final molt, a nymph becomes an adult, which is the third stage in its life. At that point, the insect has wings and is able to reproduce.



# Complete and Incomplete Metamorphosis

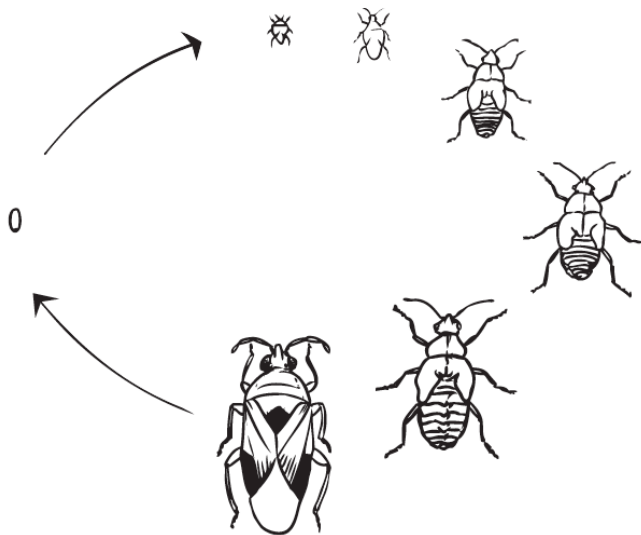
Answer these questions after reading the passage about types of metamorphosis in insects.

**1** Write the numbers 1–4 in the small boxes to put the stages of the life cycle in order. Then label the name of the stage of the life cycle below the drawing.



\_\_\_\_\_

**2** Look at the life cycle below.



Does this life cycle include complete or incomplete metamorphosis? Explain how you know.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

For questions 3–7, write T for true or F for false.

- 3 \_\_\_\_\_ A nymph does not have wings.
  - 4 \_\_\_\_\_ A pupa must eat a lot so that it can grow quickly.
  - 5 \_\_\_\_\_ When a larva molts, it sheds its outer layer of skin.
  - 6 \_\_\_\_\_ Most adult insects have six legs, three body parts, and antennae.
  - 7 \_\_\_\_\_ Incomplete metamorphosis involves a drastic change in body form.
- 8 Complete the Venn diagram below. Tell how insects that undergo complete metamorphosis and incomplete metamorphosis are alike and different.

