



Life Cycles of Insects

3

☑ **Lesson Objectives**

Core Content Objectives

Students will:

- ✓ Describe insect life cycles and the processes of complete and incomplete metamorphosis
- ✓ Describe how some insects look like miniature versions of adults when they are born from eggs
- ✓ Explain why some insects molt
- ✓ Describe how some insects go through four distinct stages of development, including egg, larva, pupa, and adult

Language Arts Objectives

The following language arts objectives are addressed in this lesson. Objectives aligning with the Common Core State Standards are noted with the corresponding standard in parentheses. Refer to the Alignment Chart for additional standards addressed in all lessons in this domain.

Students will:

- ✓ Plan, draft, and edit an informative text that presents information from “Life Cycles of Insects,” including an introduction to a topic, relevant facts, and a conclusion (W.2.2)
- ✓ Participate in a shared research project on the life cycles of insects (W.2.7)
- ✓ With assistance, categorize and organize facts and information from “Life Cycles of Insects” to determine the differences between complete and incomplete metamorphosis (W.2.8)
- ✓ Generate questions and gather information from multiple sources to answer questions about the life cycles of insects (W.2.8)

- ✓ Add drawings to descriptions of insect metamorphosis to clarify ideas, thoughts, and feelings (SL.2.5)
- ✓ Prior to listening to “Life Cycles of Insects,” identify orally what they know and have learned insects

Core Vocabulary

larva, n. The immature stage of an insect’s complete metamorphosis, between egg and pupa; insect larva do not resemble the adult insect

Example: A butterfly egg turns into a larva known as a caterpillar.

Variation(s): larvae

metamorphosis, n. The process of change, taking place in two or more distinct stages, in the life of an insect

Example: Tadpoles develop into frogs during a process of change known as metamorphosis.

Variation(s): metamorphoses

molt, v. To shed old feathers, hair, skin, or shells, making way for new growth

Example: As it grows, a snake will molt, leaving behind the skin it sheds.

Variation(s): molts, molted, molting

nymph, n. The immature stage of an insect that does not undergo a complete metamorphosis, between egg and adult; the nymph resembles the adult insect

Example: The nymph stage of a cicada can last for years before the cicada emerges as a fully-developed, winged adult.

Variation(s): nymphs

progression, n. A continuous and connected series of actions or events


Example: The progression of the phases of the moon from new moon to full moon and back to new moon again follows a predictable pattern.

Variation(s): progressions

pupa, n. The inactive, immature stage of an insect, between larva and adult

Example: The moth larva spun its cocoon, a safe place to stay during its transformative pupa stage.

Variation(s): pupae

<i>At a Glance</i>	Exercise	Materials	Minutes
<i>Introducing the Read-Aloud</i>	What Have We Already Learned?	journals from previous lessons; chart paper, chalkboard, or whiteboard	10
	Purpose for Listening		
<i>Presenting the Read-Aloud</i>	Life Cycles of Insects		15
<i>Discussing the Read-Aloud</i>	Comprehension Questions	Image Cards 6, 7	10
	Word Work: Progression	drawing paper, drawing tools	5
 Complete Remainder of the Lesson Later in the Day			
<i>Extensions</i>	On Stage	Image Cards 1, 2, 8–13	20
	Insects Journal	trade books; journals from previous lessons	



Life Cycles of Insects

3_A

Introducing the Read-Aloud

10 minutes

What Have We Already Learned?

Ask students what three body parts all insects have (head, thorax, abdomen), and ask them how many legs all insects have. (six) Remind students that most, but not all insects, have wings. Tell them that the cockroach in the previous lesson gave them a hint about the insect they will meet today, an insect that holds its front legs together in a prayer position. Ask students to guess its name. Tell them this insect will be the narrator of today's read-aloud.

Now tell students that today they will learn about the stages in the life of an insect. Tell students that all living things are born, and all living things die, but that different types of animals experience different stages of development in between. Ask them to name the stages of a human being's life cycle. (infant, child, adolescent, adult)

Purpose for Listening

Tell students that not all insects experience the same stages of development. Their life cycles vary according to the types of insects. Ask students to listen carefully to be able to identify two distinctly different ways insects develop and to be able to name the stages of each kind of change.



Life Cycles of Insects

◀ Show image 3A-1: Praying Mantis

Hi, boys and girls. It's time to meet one of the most fascinating insects on the planet. That's me. I'm a praying mantis, named for the way I hold my two front legs together as though I am praying. I might look like I am praying, but my incredibly fast front legs are designed to grab my food in the blink of an eye!

I'm here to talk to you about the life stages of insects—how insects develop from birth to adult. Many insects undergo a complete change in shape and appearance. I'm sure that you are already familiar with how a caterpillar changes into a butterfly. The name of the process in which a caterpillar changes, or morphs, into a butterfly is called **metamorphosis**.



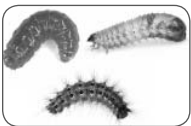
◀ Show image 3A-2: Life cycle of a butterfly ¹

1 [Point to each stage of the life cycle as you read it.]

2 What is a host? (an animal or plant on which, or in which, another organism lives)

3 The word *larva* is singular, and the word *larvae* is plural.

Insects like the butterfly pass through four stages in their life cycles: egg, **larva** [LAR-vah], **pupa**, and adult. Each stage looks completely different from the next. The young never resemble, or look like, their parents and almost always eat something entirely different. The female insect lays her eggs on a host plant.² When the eggs hatch, the larvae [LAR-vee] that emerge look like worms.³ Different names are given to different insects in this worm-like stage, and for the butterfly, the larva state is called a caterpillar.



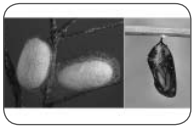
◀ Show image 3A-3: Insect larvae: maggot, grub, and caterpillar

4 [Point to the insect on the top left part of the image.]

5 [Point to the insect on the top right part of the image.]

6 [Point to the insect on the bottom part of the image.]

Fly larvae are called maggots;⁴ beetle larvae are called grubs;⁵ and the larvae of butterflies and moths, as you just heard, are called caterpillars.⁶ Larvae feed and grow as quickly as they can. They also **molt**, or shed their hard exoskeletons, many times as they grow, because the exoskeletons don't grow with them. In this way, insect larvae grow larger each time they molt, until they are ready to change into adult insects.



← **Show image 3A-4: Cocoon (soft silk) and chrysalis (hard case)**

Once the larvae have eaten all that they can eat, they take a break. Sometimes people call this next stage a resting stage, but the larvae are hardly resting. A larva often spins a cocoon⁷ to protect itself during the pupa stage when it will remain quite still for several weeks. Inside this shell-like covering, the pupa transforms, or changes, into something that looks altogether different than before. Some insects have a soft cocoon for the pupa stage, and some, like the butterfly, have a harder case called a chrysalis.⁸

7 [Point to the image on the left.]

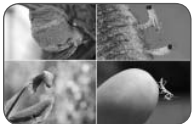
8 [Point to the image on the right.]



← **Show image 3A-5: Butterfly emerging from chrysalis**

If you have ever seen a butterfly emerge from its chrysalis, you know how extraordinary it is to watch the first flutter of its fully developed butterfly wings. Its wings were completely invisible before it disappeared into its seemingly magic chrysalis. It looks nothing like it did at any of its earlier stages. Scientists call this **progression**, through four separate stages, a complete metamorphosis.⁹ I can't argue with that, can you? The change is indeed complete. Butterflies, moths, beetles, and flies all undergo a complete metamorphosis.

9 The word *progression* means a connected series of events.



← **Show image 3A-6: Life cycle of praying mantis: egg case, nymphs emerging, older nymph, adult**

Not all insects change so completely. Some insects' young, like mine, are miniature, or very small, models of their parents after hatching. They do change, so they do experience a metamorphosis, but because it is not a complete change, scientists call it an incomplete metamorphosis.

Just like you, the young start off as a smaller version of what they will end up being. Just as you started off as a baby person and are slowly growing into an adult person, some young insects slowly grow and change into an adult.

A praying mantis goes through three life stages: egg, **nymph**, and adult.¹⁰ In the autumn, the female mantis lays as many as 400 eggs inside an egg case, attached to a plant. In spring, the eggs

10 [Point to each stage of the life cycle as you read about it.]

hatch. The tiny praying mantis babies emerge from the egg case. These brand-new hatchlings, or nymphs, don't quite look like me, do they? A little later, the nymph resembles me more—the only thing it is missing is its wings. Even though you can't see them yet, there are tiny developing wing buds. These nymphs eat the same sorts of food as I do as an adult praying mantis—flies, aphids, moths, and other insects—just smaller.

Let's take a close look at one of these nymphs.



◀ **Show image 3A-7: Praying mantis nymph**

Can you tell at this stage that it is an insect? Can you find its head? How many legs are on its thorax? ¹¹ Can you see how many pairs of wings it has? ¹² Is there a third section as well? What's that called? ¹³

What is the outside skeleton of an insect called? Right—an exoskeleton. The baby insect, or nymph, is born with an exoskeleton, but these hard, nonliving coverings do not grow with the growing praying mantis nymph. As a nymph grows, its exoskeleton splits open.



◀ **Show image 3A-8: Praying mantis nymph, molting**

The nymph wriggles out to reveal softer skin that can stretch and expand before it hardens. It molts its exoskeleton again and again, growing a new one as many as ten times before it reaches adulthood. ¹⁴ The nymph stage often lasts all summer long. After its final molt, each surviving praying mantis has a fully developed exoskeleton and full-grown wings like mine. Grasshoppers, crickets, and cockroaches belong to the group of insects that experience an incomplete metamorphosis similar to this one.

An insect's life cycle is quite short compared to yours. In some cases, it takes only a few weeks. Scientists believe that this is one reason there are so many insects on the planet. They are forever breeding and need to reproduce rapidly because they have so many enemies.

Not all insects, however, have short life cycles.

11 (six)

12 There are two tiny wing buds, but they are hard to see.

13 (abdomen)

14 What does the word *molt* mean?



← **Show image 3A-9: Cicada and molted skin**

The cicada looks a little like a grasshopper and is thought to have the longest life cycle of any insect, ranging from two to seventeen years. The adult cicada lays her eggs on twigs. When the eggs hatch, the nymphs fall to the ground and burrow into the soil, searching for tree roots. They feed on the tree's sweet root sap. Cicadas undergo incomplete metamorphosis, so there is no pupal stage. The nymphs remain hidden beneath the ground, continuing to shed their exoskeletons.¹⁵ Once they are fully-grown, they make their way to the surface again, shed their skin one last time, and emerge as winged adults. For some reason, all of the cicadas in an area emerge at once either every thirteen years or every seventeen years.

15 [Point to the empty exoskeleton on the right side of the image.] What is the word that means to shed its exoskeleton?



← **Show image 3A-10: Swarm of cicadas**

When the cicadas all emerge, they fly everywhere, and their calls are very loud. When hundreds of flying insects swarm through the air, their loud buzzing noises and the snapping of their wings make quite a loud noise!

Next time, you will meet some other flying insects that may also travel in swarms. Can anyone guess what insects they might be? I'll give you a clue: Bzzzzzzz.....

Discussing the Read-Aloud

15 minutes

Comprehension Questions

10 minutes

If students have difficulty responding to questions, reread pertinent passages of the read-aloud and/or refer to specific images. If students give one-word answers and/or fail to use read-aloud or domain vocabulary in their responses, acknowledge correct responses by expanding the students' responses using richer and more complex language. Ask students to answer in complete sentences by having them restate the question in their responses.

1. *Literal* What word is used to describe the progression of events, or change, that occurs in an insect's development? (metamorphosis)

2. *Inferential* [Show Image Cards 6 (Complete Metamorphosis) and 7 (Incomplete Metamorphosis).] Some insects undergo a complete metamorphosis, whereas others undergo an incomplete metamorphosis. What stages are the same in both complete and incomplete metamorphoses? (egg, adult)
3. *Inferential* Is the change that takes place in the growth of human beings more like that of complete or incomplete metamorphosis? Why? (incomplete; Like insect nymphs, human infants resemble their adult parents from birth.)
4. *Inferential* Why do insects molt, or shed their exoskeletons? (to make way for new growth)
5. *Inferential* In which stage of development do insects often look like tiny worms? (larval stage; larvae)
6. *Inferential* In which season(s) of the year would you expect to see the most insects? Why? (Answers may vary, but should include the fact that many insects lay eggs that hatch in spring.)

[Please continue to model the *Think Pair Share* process for students, as necessary, and scaffold students in their use of the process.]

I am going to ask a question. I will give you a minute to think about the question, and then I will ask you to turn to your neighbor and discuss the question. Finally, I will call on several of you to share what you discussed with your partner.

7. *Evaluative Think Pair Share:* In today's read-aloud, you heard that beetle larvae are called grubs. From that information alone, can you tell whether beetles undergo complete or incomplete metamorphosis? How? (Yes, they must go through a complete metamorphosis because the terms larva and larvae, although similar to the nymph stage of incomplete metamorphosis, are only used to describe those insects undergoing a complete change in which the young do not resemble the adult insects.)
8. After hearing today's read-aloud and questions and answers, do you have any remaining questions? [If time permits, you may wish to allow for individual, group, or class research of the text and/or other resources to answer these questions.]

Word Work: Progression

5 minutes

1. In the read-aloud you heard, “Scientists call this *progression*, through four separate stages, a complete metamorphosis.”
2. Say the word *progression* with me.
3. A progression is a connected series of actions or events.
4. The progression of the phases of the moon from new moon to full moon and then back to new moon again happens in a regular pattern. [Students who have been in the Core Knowledge Language Arts program studied the phases of the moon in Grade 1 *Astronomy*.]
5. What other things can you think of go through a progression? Try to use the word *progression* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students’ responses: “_____ is a progression of . . . ”]
6. What’s the word we’ve been talking about?

Use a *Drawing* activity for follow-up. Directions: Draw a picture of something that happens in a progression. For example, you can draw a picture of the progression involved in making your favorite snack, or the progression of actions you take in the morning to get ready for school, or some other progression of events. When you have drawn your picture, write one sentence describing the steps in the progression you illustrated.



Complete Remainder of Lesson Later in the Day



Life Cycles of Insects

3_B

Extensions

20 minutes

On Stage

Tell students that they will have the opportunity to act out the stages of metamorphosis today.

Show students Image Cards 2 (Cockroach), 8 (Praying Mantis), 9 (Grasshopper), and 10 (Cricket).

Tell students that each of the insects pictured in this group of images undergoes incomplete metamorphosis. Review the three stages of incomplete metamorphosis: egg, nymph, and adult.

Show students Image Cards 1 (Butterfly), 11 (Moth), 12 (Fly), and 13 (Ant).

Tell students that each of the insects pictured in this group of images undergoes complete metamorphosis. Review the four stages of complete metamorphosis: egg, larva, pupa, adult.

Divide students into groups of three or four. Give each group an Image Card depicting one of the insects. Groups of three will receive a card with an insect undergoing incomplete metamorphosis (praying mantis, grasshopper, cricket, cockroach). Groups of four will receive a card with an insect undergoing complete metamorphosis (moth, butterfly, fly, ant). Working cooperatively with their group members, students will each represent a different stage of development for their given insect.

After students have had time to perform in their small groups, ask them to gather together again as a class. Then tell them that you are going to describe each developmental stage in one sentence. Ask students to regroup according to the part they played in the development of the insects (all eggs will be together, etc.).

Say:

“I am the first stage of development in all insects. I am laid by an adult and remain rather helpless, unable to move until I change forms.” (egg)

“I am the second stage of development, following the egg, and resemble my parent.” (nymph, for those undergoing incomplete metamorphosis)

“I am the second stage of development, following the egg, and do not look at all like my parent. Rather, I am wormlike in appearance.” (larva, for those undergoing complete metamorphosis)

“I am the third and final stage of development, following the nymph stage.” (adult, for those undergoing incomplete metamorphosis)

“I am the third, seemingly quiet, stage of development, following the larval stage.” (pupa, for those undergoing a complete metamorphosis)

“I am the fourth and final stage of development, following the pupal stage.” (adult, for those undergoing complete metamorphosis).

Insects Journal

Have students look through trade books for pictures of insect life cycles. Have them draw a picture of the life cycle of one insect in their journals, and, based on what they heard in the read-aloud and in the On Stage Extension they just completed, have them determine whether their chosen life cycle is one of complete metamorphosis or incomplete metamorphosis.

Tell students they should write down any questions they have about the life cycles of insects. Have students work in pairs or small groups to look through trade books or other sources to search for answers to their questions.

Have students share their drawings and sentences with the class, and encourage them to expand upon their vocabulary, using richer and more complex language, including, if possible, any domain-related vocabulary.