



UNIT 4

INHERITANCE AND VARIATION OF TRAITS: LIFE CYCLES AND TRAITS



12 weeks

Unit 4: Inheritance and Variation of Traits: Life Cycles and Traits

In this unit, students develop an understanding of the similarities and differences of organisms' life cycles. Students will understand that all plants and animals go through a growth and development cycle, but that each cycle is unique and diverse. Students will develop models to describe that organisms have unique and diverse patterns of life.

Students should acquire an understanding that organisms have different inherited traits, and that the environment can also affect the traits that an organism develops. Students will focus on the variation of traits within organisms other than humans. They will notice patterns of similarities and differences in traits shared between offspring and their parents, or even among siblings. They will analyze and interpret the data to provide evidence that traits are inherited from parents and variations of these traits exist in groups of similar organisms.

Students will also use evidence to explain how traits can be influenced by environmental factors, such as the food they eat, the experiences they have, and what the organism learns. In addition, students will construct an explanation using evidence for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

Unit 4 Performance Expectations

- ❖ **3-LS1-1 Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.**
Clarification Statement: Changes organisms go through during their life form a pattern.
Assessment Boundary: Assessment of plant life cycles is limited to those of flowering plants. Assessment does not include details of human reproduction.
- ❖ **3-LS3-1 Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.**
Clarification Statement: Patterns are the similarities and differences in traits shared between offspring and their parents, or among siblings. Emphasis is on organisms other than humans.
Assessment Boundary: Assessment does not include genetic mechanisms of inheritance and prediction of traits. Assessment is limited to non-human examples.
- ❖ **3-LS3-2 Use evidence to support the explanation that traits can be influenced by the environment.**
Clarification Statement: Examples of the environment affecting a trait could include insufficient water stunting normally tall plants; and, a pet dog becoming overweight that is given too much food and too little exercise.
- ❖ **3-LS4-2 Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.**
AR Clarification Statement: Examples of cause and effect relationships could be plants of the same species with larger thorns may be less likely to be eaten; and, animals of the same species with more effective camouflage or coloration may be more likely to survive and produce offspring.



Unit 4 Essential Questions:

- ❖ How are organisms' life cycles similar and different?
- ❖ How do organisms vary in their traits?
- ❖ How do variations in traits help organisms to survive and reproduce?

In Unit 4, students will understand...

- ❖ Reproduction is essential to the continued existence of every kind of organism.
- ❖ Plants and animals have unique and diverse life cycles.
- ❖ Many characteristics of organisms are inherited from their parents.
- ❖ Other characteristics result from individuals' interactions with the environment, which can range from diet to learning.
- ❖ Many characteristics involve both inheritance and environment.
- ❖ Different organisms vary in how they look and function because they have different inherited information.
- ❖ The environment also affects the traits that an organism develops.
- ❖ Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing.

Foundational Knowledge:

Prior to 3rd grade, students should have knowledge, understanding of, and experiences with the following ideas:

- ❖ Plants and animals have predictable characteristics at different stages of development.
- ❖ Plants and animals grow and change.
- ❖ Adult plants and animals can have young.
- ❖ In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive.
- ❖ Organisms have characteristics that can be similar or different.
- ❖ Young animals are very much, but not exactly like their parents, and also resemble other animals of the same kind.
- ❖ Plants are also very much, but not exactly like their parents, and also resemble other plants of the same kind.
- ❖ Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways.

With the implementation of new standards, students may not have had opportunities to engage in these foundational understandings and ideas before 3rd grade. You may need to provide opportunities for students to experience these ideas as you move forward.



Unit Vocabulary:

| | | |
|---|-----------------------|-----------------------------|
| organism | traits | environment |
| unique | characteristics | species |
| diverse | inherited/inheritance | advantages in survival |
| life cycle: birth, growth, reproduction, death | offspring | advantages in finding mates |
| | influence | advantages in reproducing |
| | variation | |

Additional Content Connections:

*These connections provide opportunities to score to other content standards with focused instruction.

ELA:

- ❖ Speaking and Listening
 - SL.3.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly.
 - SL.3.2 Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
- ❖ Reading Informational
 - RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.
- ❖ Writing
 - W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons.
 - W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
 - W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.

Mathematics:

- ❖ Measurement and Data
 - 3. MD.B. 3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled picture graphs and scaled bar graphs. (3-LS4-2)
 - 3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters. (3-LS3-1, 3-LS3-2)



Inheritance and Variation of Traits: Life Cycles and Traits

Students who demonstrate understanding can:

3-LS1-1 Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. [Clarification Statement: Changes organisms go through during their life form a pattern.] [Assessment Boundary: Assessment of plant life cycles is limited to those of flowering plants. Assessment does not include details of human reproduction.]

3-LS3-1 Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. [Clarification Statement: Patterns are the similarities and differences in traits shared between offspring and their parents, or among siblings. Emphasis is on organisms other than humans.] [Assessment Boundary: Assessment does not include genetic mechanisms of inheritance and prediction of traits. Assessment is limited to non-human examples.]

3-LS3-2 Use evidence to support the explanation that traits can be influenced by the environment. [Clarification Statement: Examples of the environment affecting a trait could include insufficient water stunting normally tall plants; and, a pet dog becoming overweight that is given too much food and too little exercise.]

3-LS4-2 Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. [AR Clarification Statement: Examples of cause and effect relationships could be plants of the same species with larger thorns may be less likely to be eaten; and, animals of the same species with more effective camouflage or coloration may be more likely to survive and produce offspring.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

| Science and Engineering Practices | Disciplinary Core Ideas | Crosscutting Concepts |
|--|--|---|
| <p>Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.</p> <ul style="list-style-type: none"> Develop models to describe phenomena. (3-LS1-1) <p>Analyzing and Interpreting Data Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.</p> <ul style="list-style-type: none"> Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS3-1) <p>Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.</p> <ul style="list-style-type: none"> Use evidence (e.g., observations, patterns) to support an explanation. (3-LS3-2) Use evidence (e.g., observations, patterns) to construct an explanation. (3-LS4-2) | <p>LS1.B: Growth and Development of Organisms</p> <ul style="list-style-type: none"> Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1) <p>LS3.A: Inheritance of Traits</p> <ul style="list-style-type: none"> Many characteristics of organisms are inherited from their parents. (3-LS3-1) Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. (3-LS3-2) <p>LS3.B: Variation of Traits</p> <ul style="list-style-type: none"> Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1) The environment also affects the traits that an organism develops. (3-LS3-2) <p>LS4.B: Natural Selection</p> <ul style="list-style-type: none"> Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2) | <p>Patterns</p> <ul style="list-style-type: none"> Similarities and differences in patterns can be used to sort and classify natural phenomena. (3-LS3-1) Patterns of change can be used to make predictions. (3-LS1-1) <p>Cause and Effect</p> <ul style="list-style-type: none"> Cause and effect relationships are routinely identified and used to explain change. (3-LS3-2, 3-LS4-2) <hr style="border: 0.5px dashed black;"/> <p>Connections to Nature of Science</p> <p>Scientific Knowledge is Based on Empirical Evidence Science findings are based on recognizing patterns. (3-LS1-1)</p> |

