"Structures of Life"
Grade 4 – Summative Assessment

Assessed Understandings

Students will understand:

1. The process of seed germination.
2. Organisms use structures to travel from their parent plants to different locations.
3. Reading and interpretation of a bar graph.
4. Plant structures have specific functions.
5. The Sun is the source of energy for all plant growth.
6. The life cycles of different organisms can be compared for similarities and differences.
7. Habitat and behavior of a crayfish can be identified.
8. Organism structures have very specific functions that are relevant to individual classes of organisms.

Teacher Notes for the "Structures of Life" Assessment

Introduction

These items are designed to provide an assessment of what students know and understand at the completion of the *FOSS Structures of Life* module. This document includes teacher directions, response sheets for the individual students, and analytic scoring rubrics for each question. **A close look at the rubrics prior to the administration of the assessment will be helpful to the teacher.**

Time and Preparation for the Assessment

This assessment should take approximately **one hour** to administer. You may read aloud any portion of the assessment to any child who has such a need. Please help students with any vocabulary words they do not know. This is not a test of reading, writing, or artistic ability, and students will not be scored on these skills. Students should answer all questions individually and not in groups.

Directions for Administration

Please do not provide any assistance to students while they are completing this assessment.

Question 1: This question reflects the student's knowledge of the process of germination.

1. What do dry seeds need to germinate?

Question 2: Students will give evidence of change over time through germination.

2. What **two** changes occur in a seed when germination has started?

Question 3: This question drives the student's understanding that green plants get their energy from the sun.

3. Where do green plants get their **energy** to make food?

Question 4: The concept of hydroponics illustrates that plants can be grown without soil. This is a process to be used when there is a lack of suitable soil and lack of space.

4. Bean seeds were grown in a hydroponic environment. List **two** reasons why humans would grow plants in this way.

Question 5: In scientific drawings, it is important to comprehend the information by labeling. The students are given a drawing to identify and label parts of a structure.

5. Label the following structures on the seed drawing: <u>seed coat</u>, <u>cotyledon</u>, and <u>embryo</u>.

Question 6: Transferring of student's knowledge from data provided on a bar graph allows for evidence in drawing conclusions on a specific topic.

6. Use **specific data** from the graph to describe two differences in the growth of Plant A and Plant B, from Day 4 to Day 8.

Question 7: Interpreting graphs is a fundamental part of the scientific method.

7. What effect does removing the **cotyledon** have on Plant A?

Question 8: Identifying similarities and differences of structures and their functions on organisms is the focus concept for this kit.

8. Compare how a crayfish and a Bess beetle **use their legs** to survive in their environment. Write one different use and one similar use of their legs.

   Similarity: _____

   Difference: _____

Question 9: Comparing and contrasting the life cycles of organisms begins the understanding of change over time.

9. Look at the life cycles of the bean plant and crayfish. Describe **two** ways their life cycles are the same.

Question 10: Organisms are dependent and interdependent in an environment. However, their structures and functions are essential to their individual survival.

10. Choose **one** pond organism from the picture. Describe how **one** structure on this organism allows it to survive in the pond.

Question 11: Territorial organisms function in a habitat. Some similar characteristics are found in their activities.

11. Crayfish are **territorial**. Explain this statement.

Scoring Rubrics
"Structures of Life"
Summative Assessment

Question 1: What do dry seeds need to germinate?

This question measures the student's ability to understand the need for water for seeds to germinate.

Criterion for a Complete Response:

1. Indicates water.

Code	Response
	Complete Response
10	Meets criterion above.
11	Meets criterion and includes other completely correct responses such as space or the right temperature.
19	Any other scientifically correct response.
	Incorrect Response
70	States sunlight (without water indicated).
71	States soil (without water indicated).
72	States nutrients (without water indicated).
76	Repeats the substance or stem of the question.
79	Any other incorrect response, including multiple incorrect responses.
	Non-Response
90	Crossed out, erased, illegible, or impossible to interpret.
99	Blank.

Question 2: What two changes occur in a seed when germination has started?

This item measures the student's ability to describe observable changes in a bean seed that has begun to germinate.

Criterion for a Complete Response:

1. Observes two changes in the seed coat, embryo, or cotyledon as follows: (students do not have to identify the specific structures by name)
   a. Seed coat: splitting, coming off, becoming lighter in color, or becoming softer.
   b. Cotyledon: swollen or bigger in size than a dormant or dry seed.
   c. Embryo: visible or emerging plant.

Code	Response
	Complete Response
20	Meets criterion above.
29	Any other scientifically correct response.
	Partially Correct Response
10	Records only one correct observation.
19	Any other partially correct response.
	Incorrect Response
70	Response provides no observable changes that indicate germination.
76	Repeats the substance or stem of the question.
79	Any other incorrect response.
	Non-Response
90	Crossed out, erased, illegible, or impossible to interpret.
99	Blank.

Question 3: Where do green plants get their energy to make food?

This item measures the student's ability to recognize the Sun as the source of energy for plants to make food.

Criterion for a Complete Response:

1. States sun, sunlight, or light.

Code	Response
	Complete Response
10	Meets criterion.
19	Any other scientifically correct response.
	Incorrect Response
70	Response indicates air or water.
71	Response indicates the soil or ground.
72	Response indicates parts of the plant.
76	Repeats the substance or stem of the question.
79	Any other incorrect response.
	Non-Response
90	Crossed out, erased, illegible, or impossible to interpret.
99	Blank.

Question 4: Bean seeds were grown in a hydroponic environment. List two reasons why humans would grow plants in this way.

This item measures the student's ability to recognize the need for growing plants hydroponically.

Criteria for a Complete Response:

1. States lack of good soil.
2. States water polluted.
3. States lack of space.
4. States ease in adding nutrients.

Code	Response
	Complete Response
20	Meets two of the criteria above.
29	Any other scientifically correct response.
	Partially Correct Response
10	States one correct criterion.
19	Any other partially correct response.
	Incorrect Response
70	No evidence that indicates hydroponics.
79	Any other incorrect response.
	Non-Response
90	Crossed out, erased, illegible, or impossible to interpret.
99	Blank.

Question 5: Label the following structures on the seed drawing: seed coat, cotyledon, and embryo.

This item measures the student's ability to identify and label the structures on a germinating bean seed.

Criterion for a Complete Response:

1. Labels seed coat, cotyledon, and plant embryo.

Code	Response
	Complete Response
20	Meets criterion above.
29	Any other scientifically correct response.
	Partially Correct Response
10	Labels seed coat and cotyledon but omits or incorrectly labels plant embryo.
11	Labels seed coat and plant embryo but omits or incorrectly labels plant cotyledon.
12	Labels plant embryo and cotyledon but omits or incorrectly labels seed coat.
19	Any other partially correct response.
	Incorrect Response
70	Labels only one structure correctly.
79	Any other incorrect response.
	Non-Response
90	Crossed out, erased, illegible, or impossible to interpret.
99	Blank.

Question 6: Use specific data from the graph to describe two differences in the growth of Plant A and Plant B from Day 4 to Day 8.

This item measures the student's ability to interpret plant growth data from a bar graph.

Criterion for a Complete Response:

1. Compares the difference in growth using graph data. Examples:
   a. After Day 3, Plant A grew about 1 cm each day, and Plant B grew about 2 cm each day.
   b. By Day 8, Plant A grew about 7 cm, and Plant B grew about 12 cm.

Code	Response
	Complete Response
20	Meets criterion above.
29	Any other scientifically correct response.
	Partially Correct Response
10	Describes Plant A as growing slower or Plant B as growing faster. Specific data was not included.
11	Meets criterion but uses wrong measurement units, i.e., inches instead of centimeters.
19	Any other partially correct response.
	Incorrect Response
70	Indicates plants are the same height.
71	Gives explanation instead of description of graph.
72	Explains only Day 3 using data from the graph.
73	Explains only Day 4 using data from the graph.
79	Any other incorrect response.
	Non-Response
90	Crossed out, erased, illegible, or impossible to interpret.
99	Blank.

Question 7: What effect does removing the cotyledon have on Plant A?

This item measures the student's understanding of the function of the cotyledon for plant growth.

Criterion for a Complete Response:

1. Explains that the growth of Plant A is affected because, when the cotyledon is removed, the food source provided by the cotyledon is gone.

Code	Response
	Complete Response
10	Meets criterion above.
19	Any other scientifically correct response.
	Incorrect Response
70	Describes graph instead of giving an explanation.
71	States Plant A grows more slowly than Plant B.
76	Repeats the substance or stem of the question.
79	Any other incorrect response.
	Non-Response
90	Crossed out, erased, illegible, or impossible to interpret.
99	Blank.

Question 8: Compare how a crayfish and a Bess beetle use their legs to survive in their environment. Write one different use and one similar use of their legs.

This item measures the student's ability to compare similarities and differences in the function of similar structures in the Bess beetle and crayfish.

Criteria for a Complete Response:

1. Describes a similarity and a difference in the function of the legs.
   Similarities: walking, holding on, and digging
   Differences: swimming

Code	Response
	Complete Response
20	Meets criterion above.
29	Any other scientifically correct response.
	Partially Correct Response
10	Describes only one similarity.
11	Describes only one difference.
19	Any other partially correct response.
	Incorrect Response
70	Response identifies only legs of one organism.
79	Any other incorrect response.
	Non-Response
90	Crossed out, erased, illegible, or impossible to interpret.
99	Blank.

Question 9: Look at the life cycles of the bean plant and crayfish. Describe two ways their life cycles are the same.

This item measures the student's ability to compare similarities in life cycles of the bean plant and the crayfish.

Criterion for a Complete Response:

1. Describes two ways the life cycles are similar. Examples:
   a. Life cycles are continuous, cyclic, or repeating.
   b. Both organisms grow and get bigger.
   c. Adults reproduce.

Code	Response
	Complete Response
20	Meets criterion above.
29	Any other scientifically correct response.
	Partially Correct Response
10	Describes only one similarity.
19	Any other partially correct response.
	Incorrect Response
70	Response states no similarities.
79	Any other incorrect response.
	Non-Response
90	Crossed out, erased, illegible, or impossible to interpret.
99	Blank.

Question 10: Choose one pond organism from the picture. Describe how one structure on this organism allows it to survive in the pond.

This item measures the student's understanding of specific animal structures that enable them to survive in a pond habitat.

Criteria for a Complete Response:

1. Identifies one of the following pond organisms: bird (heron), fish, frog, mosquito, turtle, or plant. Identifies one structure on the organism that allows it to function or survive in its habitat.
2. Explains how the structure helps the organism survive in the pond habitat (e.g., the structure helps the organism conduct specific life processes such as eating, breathing, or moving).

Code	Response
	Complete Response
10	Meets criteria above.
19	Any other scientifically correct response.
	Incorrect Response
70	Meets only criterion 1 but includes no explanation.
79	Any other incorrect response.
	Non-Response
90	Crossed out, erased, illegible, or impossible to interpret.
99	Blank.

Question 11: Crayfish are territorial. Explain this statement.

This item measures the student's understanding of the territorial behavior of crayfish.

Criterion for a Complete Response:

1. Explanation includes a definition of territorial (e.g., crayfish are aggressive and protect their home).

Code	Response
	Complete Response
10	Meets criterion.
19	Any other scientifically correct response.
	Incorrect Response
70	Assigns human qualities to the crayfish, i.e., needing friends or being scared.
79	Any other incorrect response.
	Non-Response
90	Crossed out, erased, illegible, or impossible to interpret.
99	Blank.