

2021 MCAS Sample Student Work and Scoring Guide

Grade 5 Science and Technology/Engineering Question 13: Constructed-Response

Reporting Category: Life Science

Practice Category: Investigations and Questioning

Standard: [5.LS.1.1](#) - Ask testable questions about the process by which plants use air, water, and energy from sunlight to produce sugars and plant materials needed for growth and reproduction.

Item Description: Identify a part of a plant where photosynthesis takes place, identify water as what is taken up through roots for photosynthesis, and evaluate a student's investigation of how different amounts of sunlight affect photosynthesis.

[View item in MCAS Digital Item Library](#)

Scoring Guide

Select a score point in the table below to view the sample student response.

Score*	Description
3A	The response demonstrates a thorough understanding of the process by which plants use air, water, and energy from sunlight to produce sugars and plant materials needed for growth. The response correctly identifies the part of the pea and lettuce plants where most photosynthesis takes place and what both plants must take up through their roots to perform photosynthesis. The response also clearly explains why the student compared the data from boxes W and Y instead of the data from boxes W and Z to determine the effect of sunlight.
3B	
2	The response demonstrates a partial understanding of the process by which plants use air, water, and energy from sunlight to produce sugars and plant materials needed for growth.
1	The response demonstrates a minimal understanding of the process by which plants use air, water, and energy from sunlight to produce sugars and plant materials needed for growth.
0	The response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.

*Letters are used to distinguish between sample student responses that earned the same score (e.g., 3A and 3B).

Score Point 3A

A science class investigated how sunlight and fertilizer affect the total mass of vegetables produced in a garden. The students filled four planting boxes with equal amounts of soil. They put two boxes in a very sunny area and two boxes in a shaded area. The students added fertilizer to one box in each area. The table below shows the conditions that were different for each box. All other conditions were the same for each box.

Table 1: Conditions for Growing Plants

Condition	Box W	Box X	Box Y	Box Z
sunlight	sunny	sunny	shaded	shaded
fertilizer	no	yes	no	yes

The students planted four identical pea plants and four identical lettuce plants in each box. After six weeks, the students measured the mass of the vegetables produced in each box. The table below shows the students' data.

Table 2: Student Data

Vegetable	Box W	Box X	Box Y	Box Z
Peas	350	200	1000	800
Lettuce	350	200	1000	800

This question has three parts.

A student is investigating the process of photosynthesis.

Part A

Identify the part of the pea and lettuce plants where most photosynthesis takes place.

In the pea and lettuce plant photosynthesis takes place in the leaf.

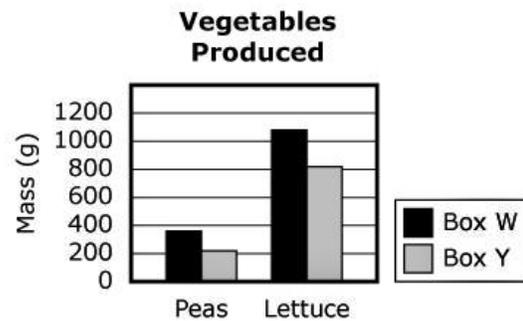
Part B

What must the pea and lettuce plants take up through their roots to perform photosynthesis?

Pea and lettuce plants must take up water from the roots to perform photosynthesis.

Part C

The student is also investigating the effect of sunlight on the total mass of the vegetables produced in the garden. The student graphs the data from box W and box Y, as shown.



Explain why the student compared the data from boxes W and Y instead of the data from boxes W and Z to determine the effect of sunlight.

The student compared boxes W and Y instead of boxes W and Z because both boxes W and Y have no fertilizer when box Z has fertilizer. If the student chose box W and X one had fertilizer so there is no way to tell if the fertilizer or the sunlight helped the plants.

Score Point 3B

A science class investigated how sunlight and fertilizer affect the total mass of vegetables produced in a garden. The students filled four planting boxes with equal amounts of soil. They put two boxes in a very sunny area and two boxes in a shaded area. The students added fertilizer to one box in each area. The table below shows the conditions that were different for each box. All other conditions were the same for each box.

Table 1: Conditions for Growing Plants

Condition	Box W	Box X	Box Y	Box Z
sunlight	sunny	sunny	shaded	shaded
fertilizer	no	yes	no	yes

The students planted four identical pea plants and four identical lettuce plants in each box. After six weeks, the students measured the mass of the vegetables produced in each box. The table below shows the students' data.

Table 2: Student Data

Vegetable	Box W	Box X	Box Y	Box Z
Peas	350	200	1000	800
Lettuce	350	200	1000	800

This question has three parts.

A student is investigating the process of photosynthesis.

Part A

Identify the part of the pea and lettuce plants where most photosynthesis takes place.

The part of the pea and lettuce where most photosynthesis takes place is in the leaves of the plant.

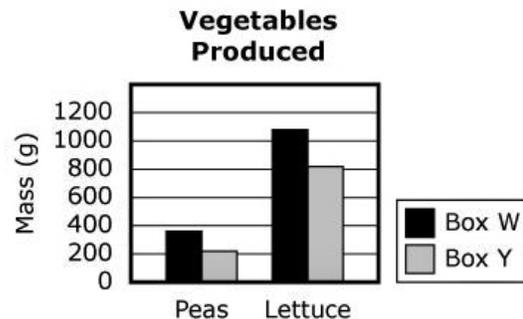
Part B

What must the pea and lettuce plants take up through their roots to perform photosynthesis?

The roots of the pea and lettuce plants must take up water to perform photosynthesis.

Part C

The student is also investigating the effect of sunlight on the total mass of the vegetables produced in the garden. The student graphs the data from box W and box Y, as shown.



Explain why the student compared the data from boxes W and Y instead of the data from boxes W and Z to determine the effect of sunlight.

The student compared the data from boxes W and Y instead of boxes W and Z to determine the effect of sunlight because box W and box Y both don't have fertilizer, so it would be a fair test. Box Z, however, has fertilizer in it and that could change the data since fertilizer helps plants grow.

Score Point 2

A science class investigated how sunlight and fertilizer affect the total mass of vegetables produced in a garden. The students filled four planting boxes with equal amounts of soil. They put two boxes in a very sunny area and two boxes in a shaded area. The students added fertilizer to one box in each area. The table below shows the conditions that were different for each box. All other conditions were the same for each box.

Table 1: Conditions for Growing Plants

Condition	Box W	Box X	Box Y	Box Z
sunlight	sunny	sunny	shaded	shaded
fertilizer	no	yes	no	yes

The students planted four identical pea plants and four identical lettuce plants in each box. After six weeks, the students measured the mass of the vegetables produced in each box. The table below shows the students' data.

Table 2: Student Data

Vegetable	Box W	Box X	Box Y	Box Z
Peas	350	200	1050	800
Lettuce	350	200	1050	800

This question has three parts.

A student is investigating the process of photosynthesis.

Part A

Identify the part of the pea and lettuce plants where most photosynthesis takes place.

The part of the pea and lettuce plant that has most to do with the process of photosynthesis is the leaves.

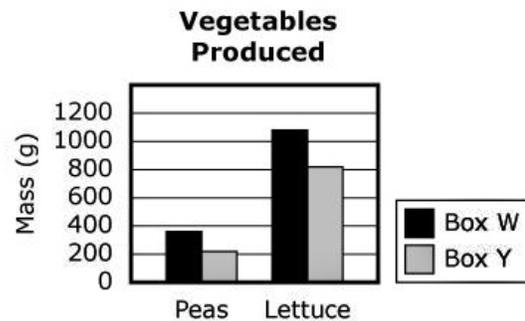
Part B

What must the pea and lettuce plants take up through their roots to perform photosynthesis?

The pea and lettuce plants must take up water in their roots to perform photosynthesis.

Part C

The student is also investigating the effect of sunlight on the total mass of the vegetables produced in the garden. The student graphs the data from box W and box Y, as shown.



Explain why the student compared the data from boxes W and Y instead of the data from boxes W and Z to determine the effect of sunlight.

The student compared boxes W and Y instead of boxes W and Z because W and Y are completely different, they have some of the same things in W and Z.

Score Point 1

A science class investigated how sunlight and fertilizer affect the total mass of vegetables produced in a garden. The students filled four planting boxes with equal amounts of soil. They put two boxes in a very sunny area and two boxes in a shaded area. The students added fertilizer to one box in each area. The table below shows the conditions that were different for each box. All other conditions were the same for each box.

Table 1: Conditions for Growing Plants

Condition	Box W	Box X	Box Y	Box Z
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Table 2: Student Data

Vegetable	Box W	Box X	Box Y	Box Z
Peas	350	200	1000	800
Lettuce	350	200	1000	800

This question has three parts.

A student is investigating the process of photosynthesis.

Part A

Identify the part of the pea and lettuce plants where most photosynthesis takes place.

photosynthesis most takes place in the inner most layer of the plant

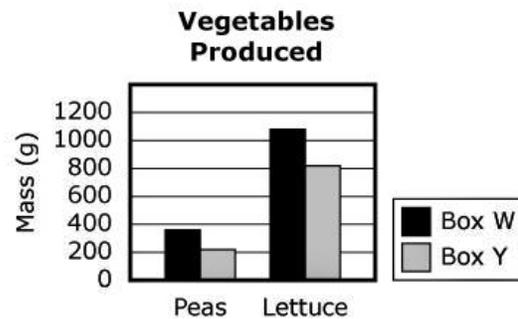
Part B

What must the pea and lettuce plants take up through their roots to perform photosynthesis?

lettus and peas must take water in oder to make photosynthesis to happen

Part C

The student is also investigating the effect of sunlight on the total mass of the vegetables produced in the garden. The student graphs the data from box W and box Y, as shown.



Explain why the student compared the data from boxes W and Y instead of the data from boxes W and Z to determine the effect of sunlight.

because the student knew it would be a lot more different

Score Point 0

A science class investigated how sunlight and fertilizer affect the total mass of vegetables produced in a garden. The students filled four planting boxes with equal amounts of soil. They put two boxes in a very sunny area and two boxes in a shaded area. The students added fertilizer to one box in each area. The table below shows the conditions that were different for each box. All other conditions were the same for each box.

Table 1: Conditions for Growing Plants

Condition	Box W	Box X	Box Y	Box Z
sunlight	sunny	sunny	shaded	shaded
fertilizer	no	yes	no	yes

The students planted four identical pea plants and four identical lettuce plants in each box. After six weeks, the students measured the mass of the vegetables produced in each box. The table below shows the students' data.

Table 2: Student Data

Vegetable	Box W	Box X	Box Y	Box Z
Peas	350	200	1050	800
Lettuce	1050	800	1050	800

This question has three parts.

A student is investigating the process of photosynthesis.

Part A

Identify the part of the pea and lettuce plants where most photosynthesis takes place.

the roots

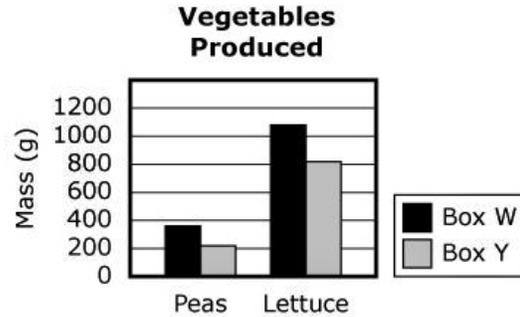
Part B

What must the pea and lettuce plants take up through their roots to perform photosynthesis?

the soil

Part C

The student is also investigating the effect of sunlight on the total mass of the vegetables produced in the garden. The student graphs the data from box W and box Y, as shown.



Explain why the student compared the data from boxes W and Y instead of the data from boxes W and Z to determine the effect of sunlight.

because there is a big difference between them.