Simplify Science™

Discovery Activity

Plant Needs

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Standards

5-LS1-1: Support an argument that plants get the materials they need for growth chiefly from air and water.
[Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.]

Vocabulary

- photosynthesis: *the process used by plants to t[illegible] sun[illegible] to energy*
- hydroponics and aquaponics: *methods t[illegible] w p[illegible]ts without soil*

Learning Goal

The student will use evidence fr[illegible]ovi[illegible]rces to explain which 2 of the following components are m[illegible]ost i[illegible]ort[illegible] for plant growth: sunlight, soil, and water.

Success Criteria

- **Criteria 1-** The [illegible]ud[illegible] wri[illegible]a paragraph to support their claim, which includ[illegible] an intro[illegible]duc[illegible] 2-3 pieces of supporting evidence, and a conc[illegible]ion.
- **Criteria 2-** The [illegible]tudent correctly cites 2-3 sources in their paragraph (Figures 1, [illegible]nd/or 3).

Teacher Directions

Plant Needs

Preparing for the Discovery Activity

- Review the sample work to gain an understanding of the task before presenting it to students.
- Each student will need a copy of pages 5-10 and a pencil.

Discovery Activity

- Display page 8, which includes the writing prompt and graphic organizer. Ask students, "From these 3 options, which 2 plant needs do you think are most important?" Allow a brief discussion or ask students to turn and talk.
- Explain that students will use Figures 1, 2, and 3 as evidence to support their claim. Provide students with time to read through each figure and discuss the evidence with a partner. Students can also take notes at the bottom of each page. Monitor and provide support to help students understand each source.
- Bring the class together to quickly discuss what they noticed in each figure.
- *Optional:* display page 9, which provides students with a guide on citing their sources. Point out the sentence starters that are offered for each source. Use page 9 to remind students of the conventions for quoting and to explain the difference between quoting and paraphrasing. Depending on the needs of your students, you may choose to leave this step out or modify it.
- Next, have students begin working on their graphic organizer, on page 8, to organize their thoughts for their paragraph. When they complete their organizer, they can begin writing their paragraph on page 10 or on lined paper. Remind students that they need to use at least 2 of the 3 sources in their paragraphs.

Reflection

- When students finish their paragraph, bring the class together and allow a few students to share their work.
- Explain that soil is less important than water or sunlight. Figure 1 shows that plants can grow in poor soil. Figure 2 shows that plants can grow without soil. Figure 3 shows that soil is not an essential part of photosynthesis.

Teacher Script

Plant Needs

Preparing for the Discovery Activity

- [Provide each student with a copy of pages 5-10]

Discovery Activity

- [Display page 8] "Let's take a look at our writing prompt. The prompt is asking us to decide which 2 components are most important for plant growth. Our options are sunlight, soil, and water. From these 3 options, which 2 plant needs do you think are the most important?" *[Allow students to briefly discuss as a whole class or in partners.]*
- "You will use Figures 1, 2, and 3 as evidence to support your claim about what plants need. I'll give you some time now to read through each page and discuss the evidence with your partner. You can use the lines at the bottom of each page to take notes on the evidence you find." *[Assist as students read through the evidence and make conclusions about which plant needs are most important.]*
- "Now that you have read through Figures 1, 2, and 3, let's talk about what you noticed." *[Ask a few students to share.]*
- Optional: "Now, let's take a look at our Citing Sources page." *[Display page 9.]* "This page includes sentence starters that you can use for each source. Remember, you need to use at least 2 of the 3 sources (figures) in your paragraph. Let's review the conventions for quoting and refresh ourselves on the difference between quoting and paraphrasing." *[Review the Quoting Conventions and the Quoting and Paraphrasing sections of the page.]*
- "It's time to begin working on your graphic organizer. Then, you can write your paragraph. Be sure to include an introduction, 2-3 pieces of evidence, and a conclusion."

Reflection

- "Now that you have written your paragraphs, who would like to share their work?" *[If time allows, a few students can share their paragraphs.]*
- "That's correct – soil is less important than water or sunlight. Figure 1 shows that plants can grow in poor soil. Figure 2 shows that plants can grow without soil. Figure 3 shows that soil is not an essential part of photosynthesis."

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Figure 1

Sunflower Growth

Sunflowers were grown under 3 different conditions: poor sunlight, poor soil, and poor watering. The plant growth data was tracked in the tables below.

Poor Sunlight	
Time (days)	**Height (cm)**
0	0
7	6
14	10
21	14
28	20
35	27
42	3[illegible]
49	36
56	[illegible]0
63	[illegible]
70	51

Poor Soil	
Time (days)	**Height (cm)**
0	[illegible]
7	11
14	1[illegible]
21	[illegible]3
28	[illegible]8
35	[illegible] 52
42	63
49	70
56	81
63	90
70	102

Poor Watering	
Time [illegible]ays)	**Height (cm)**
0	0
[illegible]7	4
14	9
21	17
28	24
35	32
42	37
49	41
56	44
63	46
70	48

Notes:

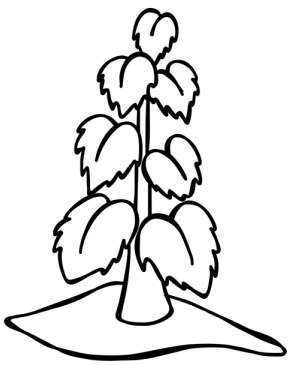

Figure 2

Hydroponics and Aquaponics

Did you know some plants are grown without soil? Hydroponics and aquaponics are two groundbreaking methods of soilless growing. These methods have become more popular as scientists and farmers have worked together to improve the ways we grow our food. While hydroponics includes growing plants in water, aquaponics involves growing plants with the help of fish.

Hydroponics

In Hydroponics, plants are grown in water instead of soil. Nutrients are added to the plants in a few different ways. One type of hydroponics uses plants that are suspended in air, and the nutrients are misted onto the plants' roots. Another type of hydroponics uses tubes that drip nutrients onto the plants' roots. Hydroponic plants often grow even faster than plants that grow in t l! This b ca e soil can be unpredictable, but hydroponics allows plants to the ct amount of nutrients that they need. Hydroponic gardens can be in rs or tdoors, and they can grow all kinds of plants, like herbs, let e, d ev strawberries!

Aquapo cs

Aquapon plants and fish together in a system. The waste from the fish provides the nutrie s that the plants need. The plants clean the water for the fish, so they both help ea other out! Another benefit is that you can eat the fish and the plants. Some commonly-used fish for aquaponics are tilapia, catfish, and trout.

Not only do hydroponics and aquaponics provide the nutrients that plants need, but they are also more environmentally-friendly choices. They use less water and space than traditional gardening. Hydroponics and aquaponics are certainly options worth exploring!

Notes:

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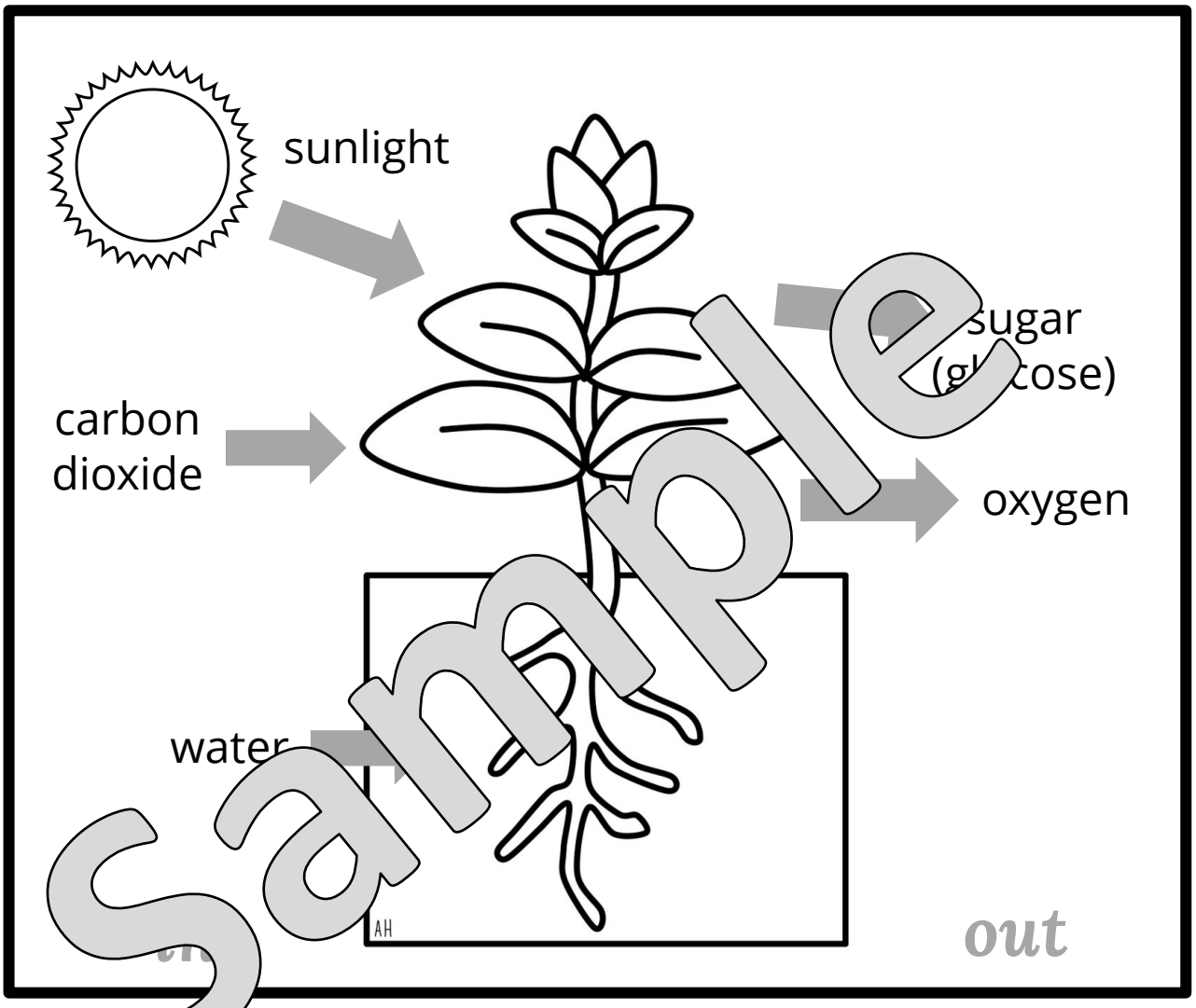
Figure 3

Photosynthesis



Photosynthesis is the process of plants converting **carbon dioxide** to **glucose**, which they need to grow. Plants take in **sunlight** and **water** which helps them convert carbon dioxide to glucose.

Notes:

Writing Prompt

Discovery Activity: Plant Needs

Circle the 2 components that are <u>most important</u> for plant growth:

water **soil** **sunlight**

Then, write a paragraph to explain your choices. Use *Figures 1, 2, and 3* as evidence. Use at least two of the figures as sources.

Your paragraph should include:

- An introduction
- An explanation with 2-3 sources cited as evidence
- A conclusion

<u>Directions:</u> Use the graphic organizer to organize your thoughts and evidence before writing your paragraph.

Source 1:	
Source 2:	
Source 3:	

Citing your Sources

Discovery Activity: Plant Needs

Sentence Starters

Source	Sentence Starters
Figure 1: *Plant Growth Over Time*	• According to *Figure 1*, • Based on research from *Figure _*, • The data from *Figure 1* shows
Figure 2: *Hydroponics and Aquaponics*	• The article in *Figure 2* says • Based on research from Figure • One important fact from *Figure 2* • Paragraph __ in *Figure* says
Figure 3: *Photosynthesis*	• The diagram in Figure 3 shows that • One important point from *Figure 3* is • According to Figure

Quoting and Paraphrasing

Quoting Conventions
❑ Capitalize the true start of the article and use quotation marks around it.
❑ Copy the quote word for word (don't change it at all).
❑ Use quotation marks around the quote.

Plagiarizing vs. Paraphrasing and Quoting	
Plagiarism is copying someone else's ideas in your own writing and claiming them as your own. This is considered stealing and must be avoided!	
Paraphrasing is restating someone else's ideas in your own words**.** **Tips for Paraphrasing:** • Identify the important details. • Rewrite the details in your own words and writing style. • Respond to the information by adding your own ideas.	**Quoting** is using someone else's exact words while giving them credit. **Tips for Quoting:** • Copy the words exactly. • Use quotation marks. • Give credit to the original author by citing the source.

Name: _____

Discovery Activity

Plant Needs

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Figure 1

Sunflower Growth

Sample Work

Sunflowers were grown under 3 different conditions: poor sunlight, poor soil, and poor watering. The plant growth data was tracked in the tables below.

Poor Sunlight	
Time (days)	**Height (cm)**
0	0
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28	20
35	27
42	3
49	36
56	0
63	6
70	51

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Time (days)	**Height (cm)**
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28	8
35	52
42	63
49	70
56	81
63	90
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Poor Watering	
Time (days)	**Height (cm)**
0	0
7	4
14	9
21	17
28	24
35	32
42	37
49	41
56	44
63	46
70	48

Notes:

The sunflower with poor soil grew about 2 times as tall (102) as the sunflower with poor sunlight and the sunflower with poor watering. This shows that soil is less important than water or sunlight.

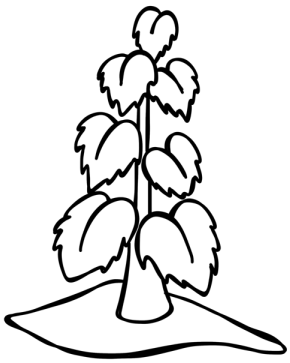

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Figure 2

Sample Work

Hydroponics and Aquaponics

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Hydroponics

In Hydroponics, plants are grown in water instead of soil. Nutrients are added to the plants in a few different ways. One type of hydroponics uses plants that are suspended in air, and the nutrients are misted onto the plants' roots. Another type of hydroponics uses tubes that drip nutrients onto the plants' roots. Hydroponic plants often grow even faster than plants that grow in t l! This b ca e soil can be unpredictable, but hydroponics allows plants to the ct amount of nutrients that they need. Hydroponic gardens can be in rs or tdoors, and they can grow all kinds of plants, like herbs, let e, d ev strawberries!

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Not only do hydroponics and aquaponics provide the nutrients that plants need, but they are also more environmentally-friendly choices. They use less water and space than traditional gardening. Hydroponics and aquaponics are certainly options worth exploring!

Notes:

The explanations of hydroponics and aquaponics show me that plants can grow without soil. Therefore, water and sunlight are more important than soil.

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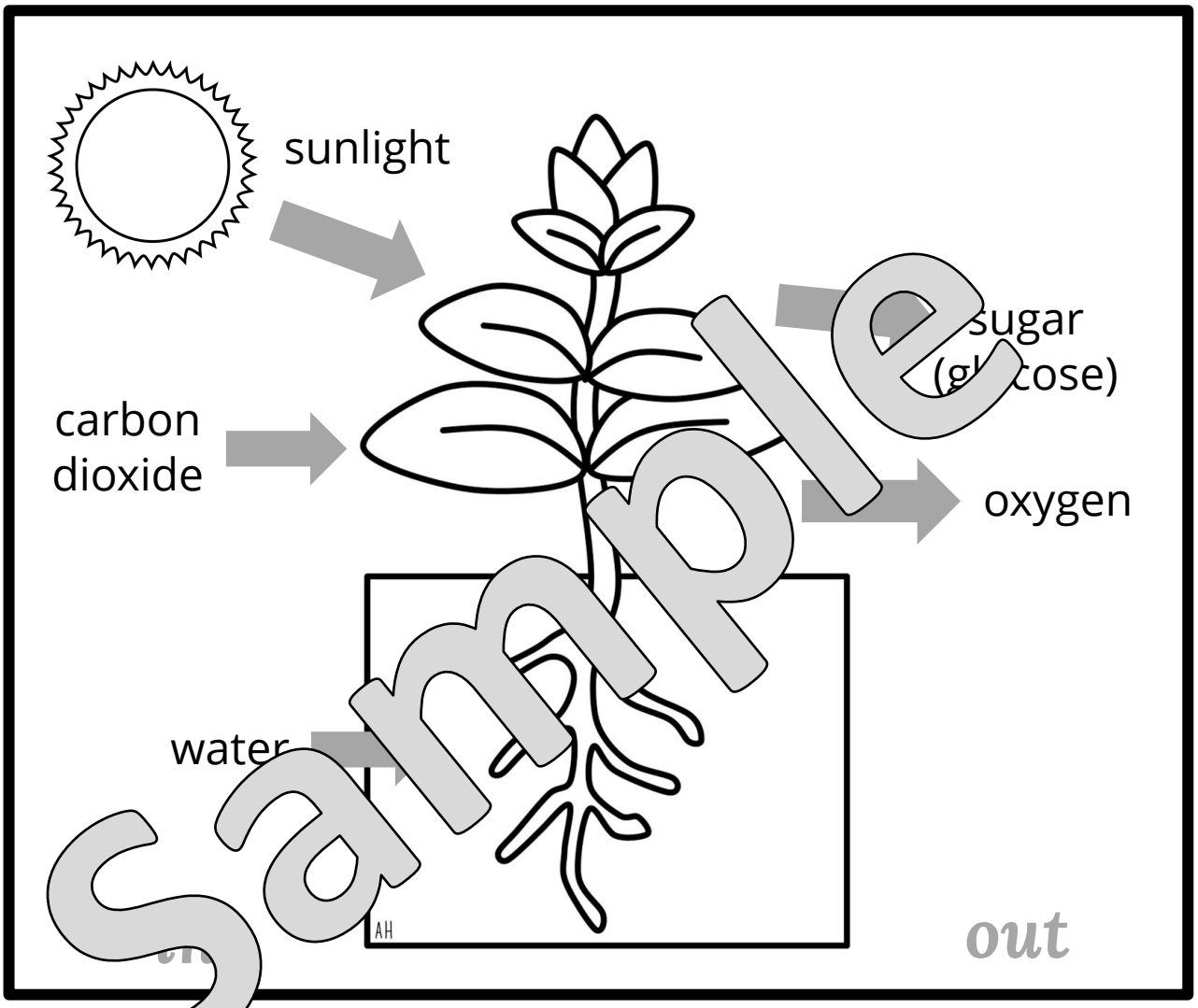
Figure 3

Photosynthesis

Sample Work



Photosynthesis is the process of plants converting **carbon dioxide** to **glucose**, which they need to grow. Plants take in **sunlight** and **water** which helps them convert carbon dioxide to glucose.

Notes:

The photosynthesis diagram shows that the plant needs water and sunlight to undergo photosynthesis. It does not say that it needs soil. This shows that soil is less important.

Writing Prompt

Sample Work

Discovery Activity: Plant Needs

Circle the 2 components that are <u>most important</u> for plant growth:

water **soil** **sunlight**

Then, write a paragraph to explain your choices. Use *Figures 1, 2, and 3* as evidence. Use at least two of the figures as sources.

Your paragraph should include:

- An introduction
- An explanation with 2-3 sources cited as evidence
- A conclusion

<u>Directions:</u> Use the graphic organizer to organize your thoughts and evidence before writing your paragraph.

Source 1: Figure 1	• The sunflower with poor sunlight only grew 51 cm. • The sunflower with poor watering only grew 48 cm. • However, the sunflower with poor soil grew about 2 times as tall (102 cm).
Source 2: Figure 2	• "In hydroponics, plants are grown in water instead of soil." • "Hydroponic plants often grow even faster than plants that grow in soil!" • This shows that soil is not always necessary for plant growth.
Source 3: *[Optional]*	

Name: _____

Discovery Activity

Plant Needs

Sample Work

Believe it or not, soil is not always necessary for plant growth. Water and sunlight are the most important factors in plant growth. The data from Figure 1 shows that a sunflower with poor soil grew 102 centimeters in 70 days. This is roughly 2 times as tall as the sunflowers that were grown with poor sunlight or poor water. This shows me that the correct amounts of sunlight and water are more important to plant growth than soil. Paragraph 2 in Figure 2 says, "In hydroponics, plants are grown in water instead of soil." This proves that soil is not always necessary for plant growth. In fact, the article in Figure 2 even says that these plants may grow at a faster rate than plants that use soil. These methods use other ways of making sure that plants get the nutrients that they need. Therefore, water and sunlight are key to plant growth. Soil is not as important.

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