



Lesson Plan: Plant Processes

Grade Level: 6

Subject: Life Science

Duration: 45–60 min

NGSS MS-LS1-6: Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

Learning Objectives

By the end of this lesson, students will be able to:

- **Define** photosynthesis and explain its significance in plant life.
- **Describe** the process of transpiration and its role in plant physiology.
- **Differentiate** between respiration and photosynthesis in plants.



PREVIEW

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- **Glucose:** A simple sugar produced during photosynthesis that serves as the primary energy source for plant cells.
- **Xylem:** Vascular tissue that transports water and minerals from the roots upward to the leaves and other parts of the plant.
- **Phloem:** Vascular tissue that transports sugars produced during photosynthesis from the leaves to other parts of the plant where they are needed.

 **Materials Needed:** (all links are included in this PDF)



- Printed copies of the Study Guide (<https://newpathworksheets.com/api/guide/study-guide-science-grade-6-plant-processes-1.pdf>)
- Activity Lesson: Photosynthesis & Respiration (<https://newpathworksheets.com/api/activity-lesson/activity-lesson-science-grade-6-plant-processes-1-photosynthesis-respiration-4.pdf>)
- Worksheet Set 1 (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-plant-processes-1-0.pdf>)
- Worksheet Set 2 (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-plant-processes-1-1.pdf>)
- Vocabulary matching worksheet (<https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-plant-processes-1-1.pdf>)
- Plant leaf diagrams showing chloroplasts and stomata
- Chart paper or whiteboard
- Markers or colored pencils



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produce glucose and oxygen. (<https://newpathworksheets.com/api/guide/study-guide-science-grade-6-plant-processes-1.pdf>)

- Discuss the structure of the chloroplast and the role of chlorophyll in absorbing light energy using diagrams from the Activity Lesson. (<https://newpathworksheets.com/api/activity-lesson/activity-lesson-science-grade-6-plant-processes-1-photosynthesis-respiration-4.pdf>)
- Introduce cellular respiration as the process that releases energy from glucose: $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + ATP$, explaining that this occurs in the mitochondria. (<https://newpathworksheets.com/api/activity-lesson/activity-lesson-science-grade-6-plant-processes-1-photosynthesis-respiration-4.pdf>)



- Explain transpiration and the transportation of nutrients through xylem and phloem using leaf structure diagrams. (<https://newpathworksheets.com/api/activity-lesson/activity-lesson-science-grade-6-plant-processes-1-photosynthesis-respiration-4.pdf>)

Step 3: Guided Practice (15 minutes)

- Work through the vocabulary matching worksheet as a class, reinforcing the key terms and their definitions. (<https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-plant-processes-1-1.pdf>)
- Use the Activity Lesson diagrams to label the parts of a leaf including cuticle, epidermis, spongy tissue, stomata, xylem, and phloem, discussing their functions. (<https://newpathworksheets.com/api/activity-lesson/activity-lesson-science-grade-6-plant-processes-1-photosynthesis-respiration-4.pdf>)
- Demonstrate the two stages of photosynthesis and cellular respiration using the diagrams, emphasizing the inputs and outputs of each process.

Step 4: Independent Practice (15 minutes)



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- Conduct a quick oral quiz asking students to differentiate between photosynthesis and respiration, and to explain the role of xylem and phloem in nutrient transport.
- Have students classify everyday examples: 'Is a plant making food or using food for energy?' to apply their understanding of plant processes.

Differentiation Strategies

For advanced learners:



- Challenge advanced learners to research and present on how environmental factors such as light intensity, water availability, and temperature affect the rate of photosynthesis and transpiration in plants.
- Have students create a detailed diagram comparing and contrasting photosynthesis and cellular respiration, including the organelles involved and the chemical equations for each process.

For learners needing support:

- Provide a pre-labeled diagram of a leaf with color-coded xylem (blue) and phloem (red) for students who need visual support to understand nutrient transport.
- Offer one-on-one assistance during independent practice, using simplified language and step-by-step guidance to explain the processes of photosynthesis and respiration.

Extension Activities



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[plant-processes-1.pdf](#)

- Activity Lesson: Photosynthesis & Respiration (<https://newpathworksheets.com/api/activity-lesson/activity-lesson-science-grade-6-plant-processes-1-photosynthesis-respiration-4.pdf>)
- Worksheet Set 1 (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-plant-processes-1-0.pdf>)
- Worksheet Set 2 (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-plant-processes-1-1.pdf>)
- Worksheet Set 3 (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-plant-processes-1-2.pdf>)



- Worksheet Set 4 (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-plant-processes-1-3.pdf>)
- Vocabulary Set 1 (<https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-plant-processes-1-1.pdf>)
- Vocabulary Set 2 (<https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-plant-processes-1-2.pdf>)



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PLANT PROCESSES

Photosynthesis

In order for an organism to be alive, it needs energy. The energy is needed to complete certain functions that keep it alive. The meals that we eat daily supply us with energy for our cells, and it takes energy to create those meals.

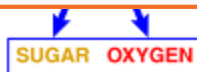
Organisms like plants and algae obtain energy in another way. They use light from the sun to produce energy in a process known as photosynthesis.

Photosynthesis is a process powered by sunlight that uses carbon dioxide and water to produce oxygen and food.



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SUGAR OXYGEN

First Stage of Photosynthesis: The process begins in the leaves or other green parts of a plant. Energy is caught by a structure within a plant cell called the chloroplast.



It is the chloroplasts that give plants their famous green color. This color comes from the pigment, chemicals that absorb light, inside of the chloroplast. The pigment within the chloroplast is called **chlorophyll**. A chloroplast may also contain yellow and orange pigment, but they are usually hidden by the green color of chlorophyll. These other colors can be seen in the fall season.

Lesson Checkpoint:

What part of the plant gives it the green color and also aids in photosynthesis?



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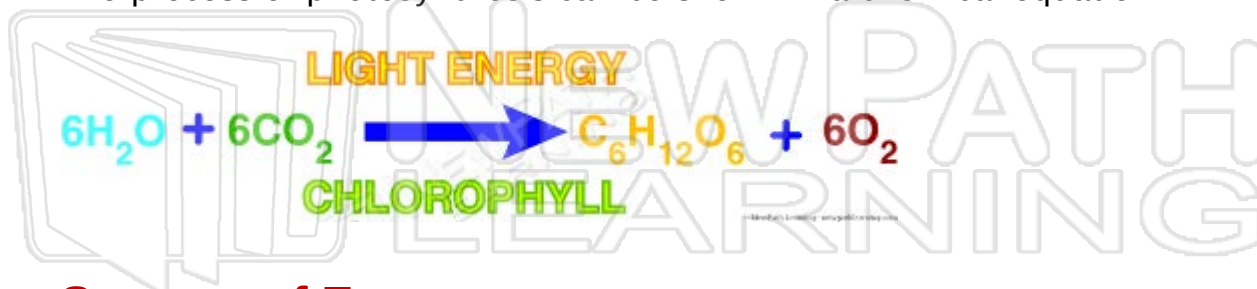


The two materials enter the chloroplast once they enter the cell.

Lesson Checkpoint:

How do the stomata and roots assist during photosynthesis?

The Chemistry of Photosynthesis: The process requires six molecules of water (H_2O) and six molecules of carbon dioxide (CO_2). These molecules undergo chemical changes and oxygen (O_2) and sugars like glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) are produced. The oxygen is let go through the stomata and the sugars are used to power cell functions. The process of photosynthesis can be shown in a chemical equation.



Sources of Energy

All of the organisms on our Earth receive their energy from one source.



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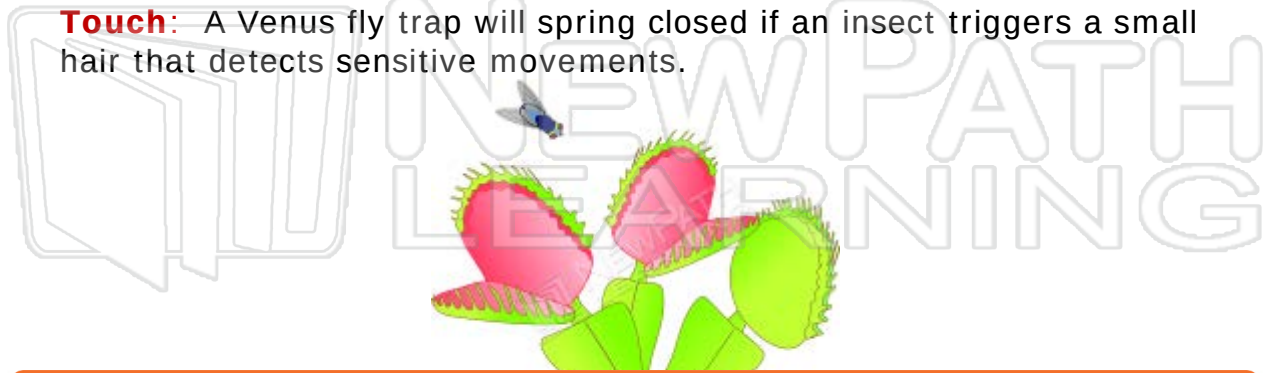
in order to receive more sunlight.



This is an example of a tropism. There are three important types of stimuli that plants will respond to. They are gravity, touch, and light.

Gravity: A plant responds to gravity by growing the roots down into the ground or the stems into the sky.

Touch: A Venus fly trap will spring closed if an insect triggers a small hair that detects sensitive movements.



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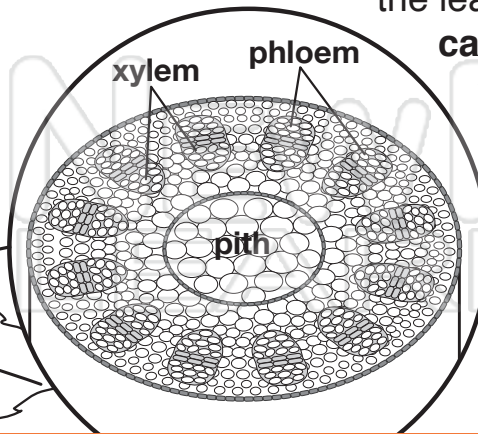
Photosynthesis & Respiration

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Name _____ Class _____ Date _____

Stems

Plants structures each serve a different purpose for keeping a plant alive and healthy. Plant **stems support** the leaves and flowers, and they **carry water and nutrients** within the plant.



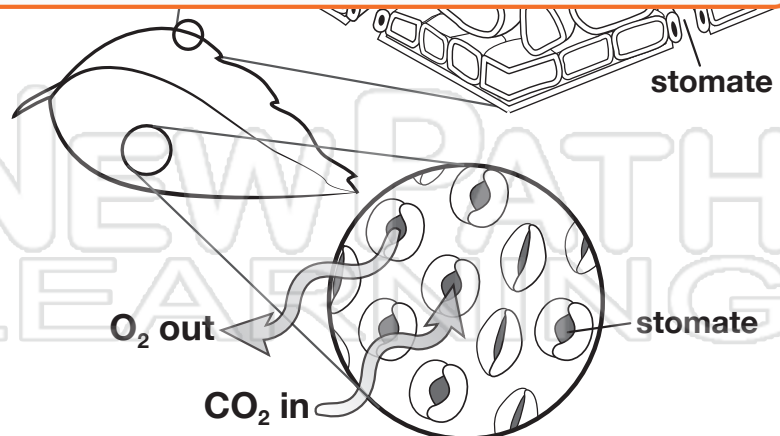
The **xylem** carries **water and nutrients** from the roots to the leaves. The **phloem** carries **sugar** away from leaves to the rest of the plant.



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A plant's leaves are made of many layers of cells. Two outer layers of tough skin cells, called the **epidermis**, provide protection for the leaf. Leaves have tiny pores called **stomates** which allow water and gases to pass in and out of the plant.



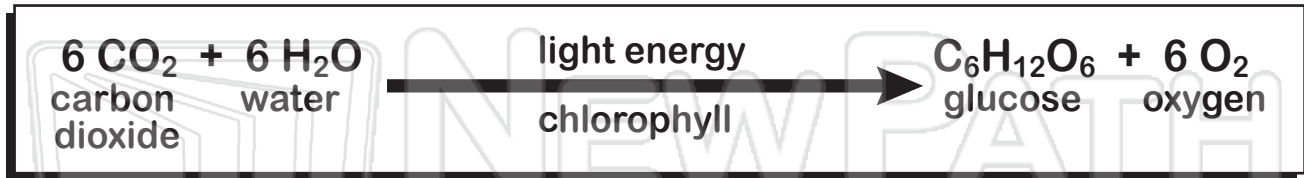


Photosynthesis & Respiration

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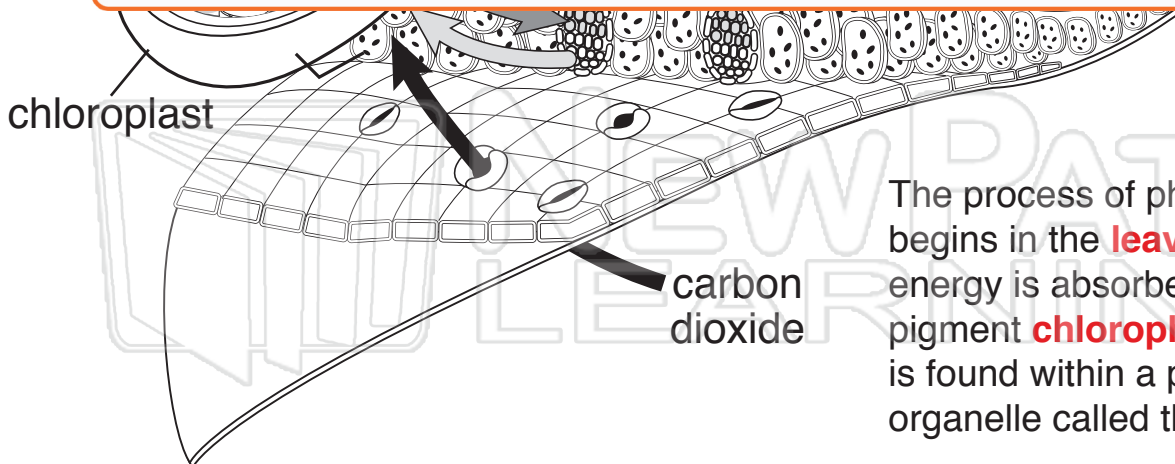
Name _____ Class _____ Date _____

Photosynthesis is a process by which green plants and certain bacteria use the energy from the Sun to **convert carbon dioxide** and **water** into the simple sugar **glucose** ($C_6H_{12}O_6$) and **oxygen**. Plants and animals use glucose as a source of energy for all life processes.



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The process of photosynthesis begins in the **leaves** where light energy is absorbed by the green pigment **chlorophyll**. Chlorophyll is found within a plant cell organelle called the **chloroplast**.



Photosynthesis & Respiration

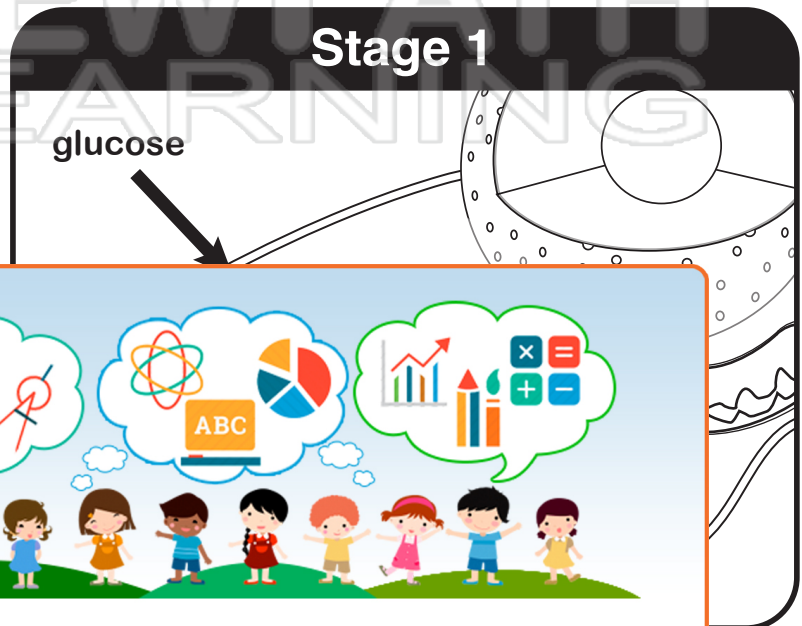
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F

Name _____ Class _____ Date _____

Cellular Respiration is a process by which cells **break down glucose** to release stored **energy**.



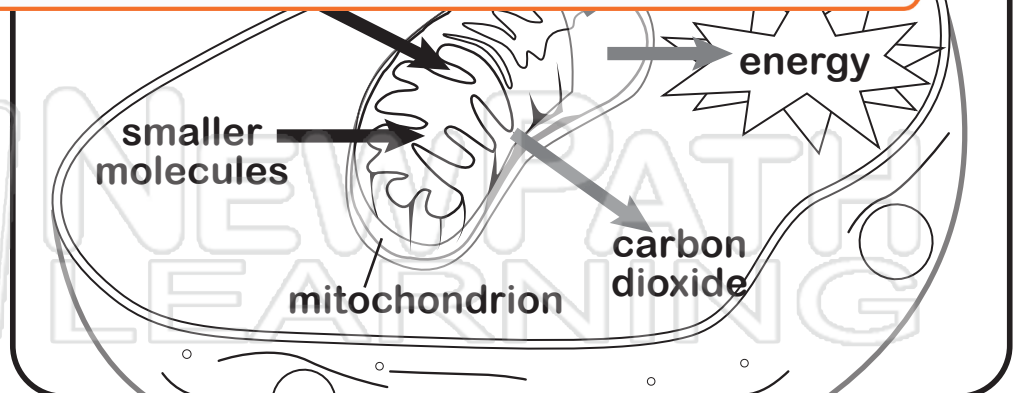
Stage 1 of respiration begins in the cell's **cytoplasm** through the break-down of **glucose** into smaller molecules releasing a small



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During small combustion in the **mitochondria** to produce a large amount of **energy** along with **carbon dioxide** and **water**.



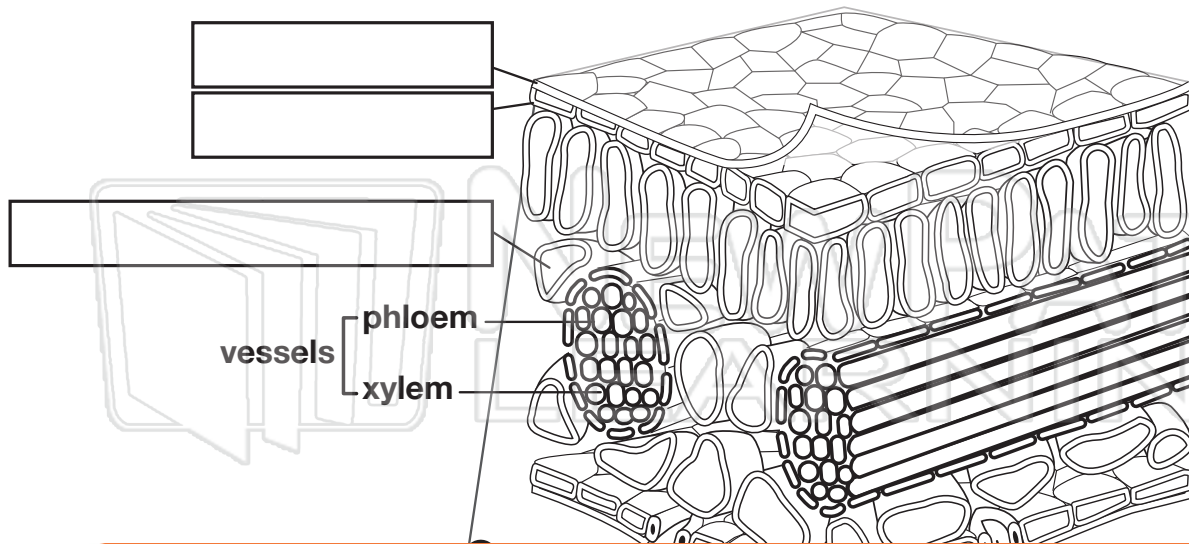


Photosynthesis & Respiration

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Name _____ Class _____ Date _____

Label the leaf parts.



PREVIEW

What

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Roots and stems carry water and nutrients around the plant through vessels.
What does **xylem** do?

What does **phloem** do?



Photosynthesis & Respiration

Sci
F

Name _____ Class _____ Date _____

Fill in the blanks.

_____ found in plant organelles

called _____ absorbs sunlight.

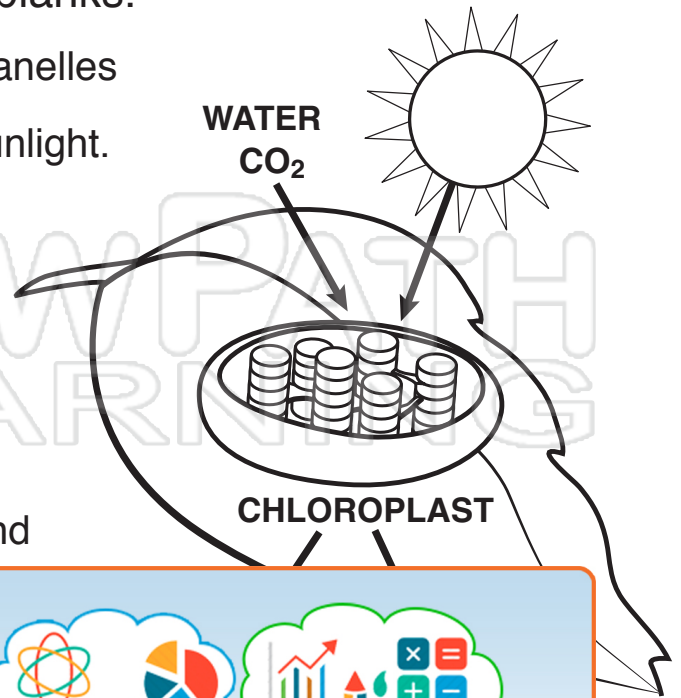
Plants use _____ they

take in from the air around them,

_____ they get from the

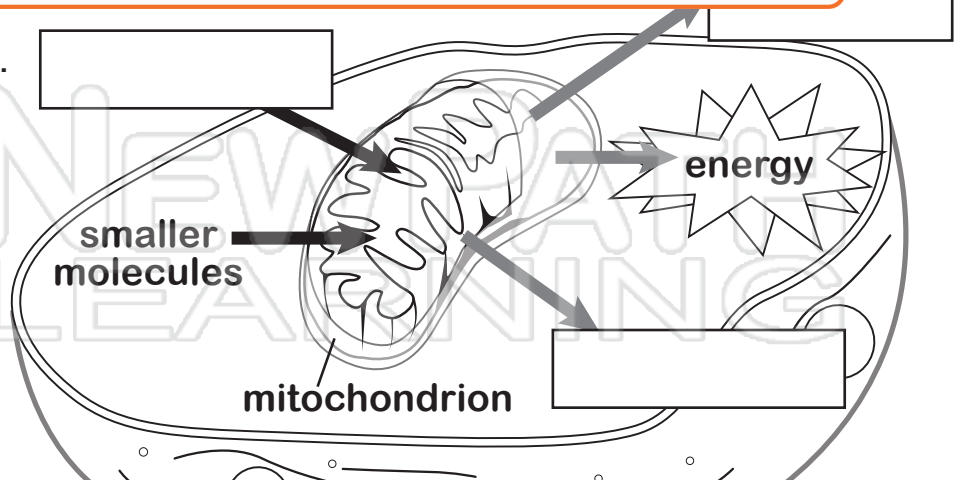
soil, and _____ from the

Sun to produce _____ and



PREVIEW

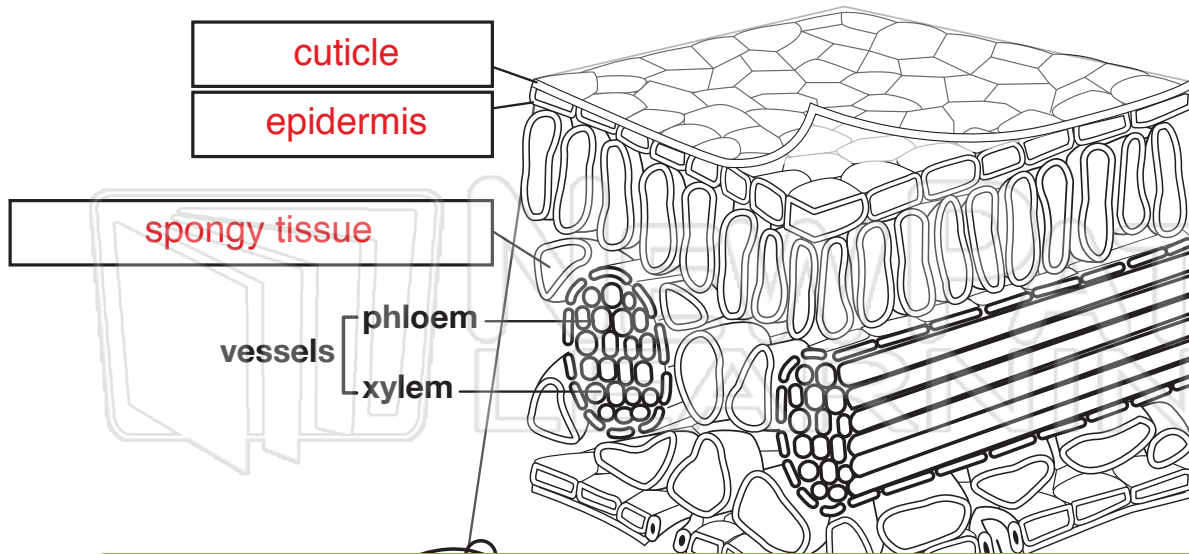
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Answer Key

Label the leaf parts.



PREVIEW

What
Stom
diox

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Roots and stems carry water and nutrients around the plant through vessels.
What does **xylem** do?

The xylem carries water and nutrients from the roots to the leaves.

What does **phloem** do?

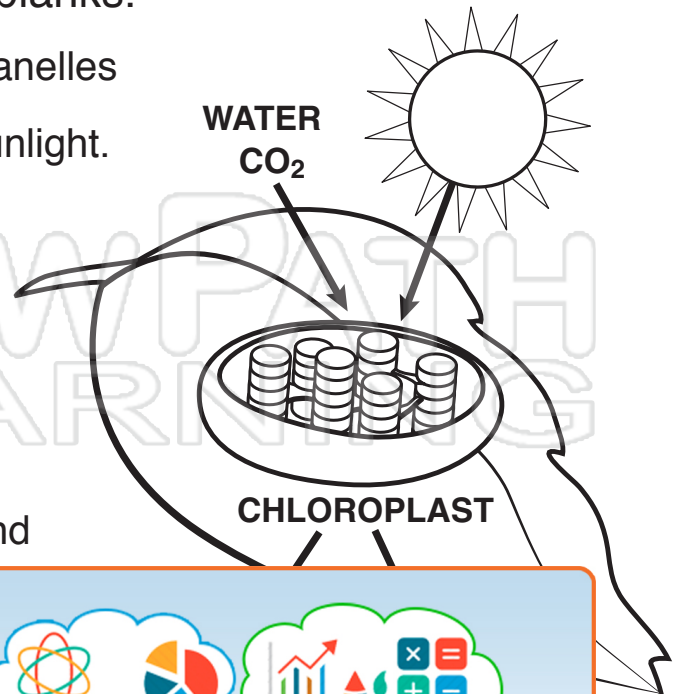
The phloem carries sugar away from leaves to the rest of the plant. Sugar is made in the leaves during photosynthesis.



Answer Key

Fill in the blanks.

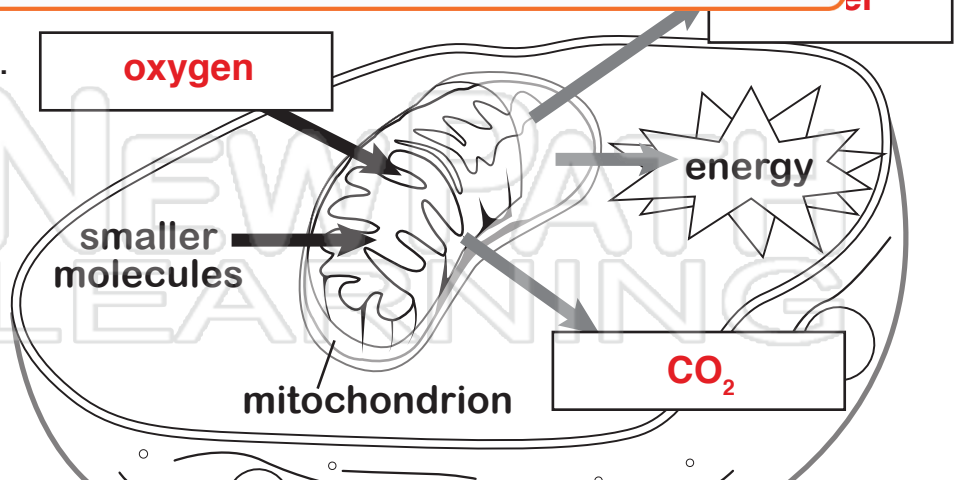
Chlorophyll found in plant organelles
called chloroplasts absorbs sunlight.
Plants use carbon dioxide they
take in from the air around them,
water they get from the
soil, and energy from the
Sun to produce oxygen and



PREVIEW

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and water.





Name _____ Class _____ Date _____

1

Most plants **need energy** to stay alive.

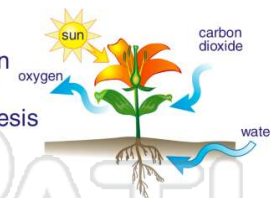
- A true
- B false



2

How do plants obtain **energy**?

- A eating
- B transpiration
- C respiration
- D photosynthesis



3

Which organisms besides plants are **autotrophic**?

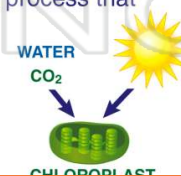
- A mammals
- B amoeba
- C algae
- D worms



4

Photosynthesis is a process that makes _____.

- A energy from food
- B space to live
- C life easier
- D energy from light



5



PREVIEW

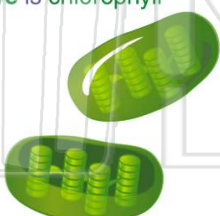
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9

In which **structure** is chlorophyll located?

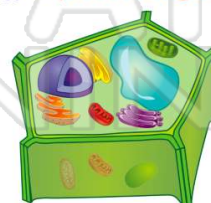
- A cytoplasm
- B nucleus
- C chloroplast
- D mitochondria



10

The **first stage** of photosynthesis is using energy to **produce sugars**.

- A true
- B false





Name _____ Class _____ Date _____

1

Most plants **need energy** to stay alive.

- A true
- B false

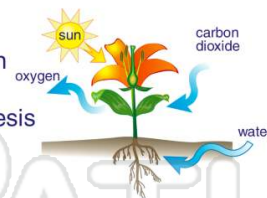


(B)

2

How do plants obtain **energy**?

- A eating
- B transpiration
- C respiration
- D photosynthesis



(D)

3

Which organisms besides plants are **autotrophic**?

- A mammals
- B amoeba
- C algae
- D worms

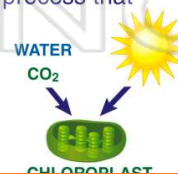


(C)

4

Photosynthesis is a process that makes _____.

- A energy from food
- B space to live
- C life easier
- D energy from light



(D)

5



(D)

PREVIEW

7

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(A)

9

In which **structure** is chlorophyll located?

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- D mitochondria

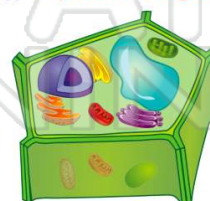


(C)

10

The **first stage** of photosynthesis is using energy to **produce sugars**.

- A true
- B false



(B)

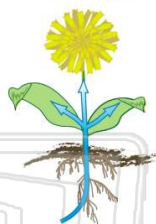


Name _____ Class _____ Date _____

1

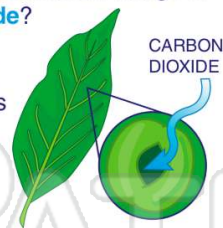
What **structure** brings **water** into a plant?

- A** leaves
- B** stem
- C** roots
- D** root cap

**2**

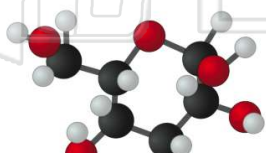
What structures in a leaf brings in **carbon dioxide**?

- A** chlorophyll
- B** chloroplasts
- C** cuticle
- D** stomata

**3**

What is the chemical formula for **glucose**?

- A** CO₂
- B** C₆H₁₂O₆
- C** O₂

**4**

Through which **structures** does the **oxygen** produced by photosynthesis get out of the plant and into the air?

- A** chlorophyll
- B** chloroplasts
- C** cuticle

**5**

PREVIEW

7

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D 12

CHLOROPLAST
↓
SUGAR OXYGEN

9

What is the **source of energy** for all living organisms on earth?

- A** plants
- B** the sun
- C** the moon
- D** algae

**10**

Tropism is a plant's growth response to a particular **stimulus**.

- A** true
- B** false



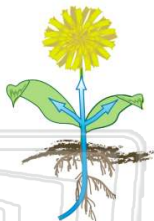


Name _____ Class _____ Date _____

1

What **structure** brings **water** into a plant?

- A leaves
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- D root cap

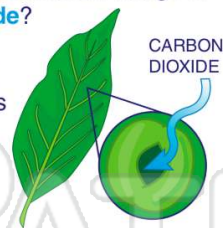


C

2

What structures in a leaf brings in **carbon dioxide**?

- A chlorophyll
- B chloroplasts
- C cuticle
- D stomata

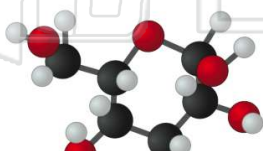


D

3

What is the chemical formula for **glucose**?

- A CO_2
- B $\text{C}_6\text{H}_{12}\text{O}_6$
- C O_2



B

4

Through which **structures** does the **oxygen** produced by photosynthesis get out of the plant and into the air?

- A chlorophyll
- B chloroplasts
- C cuticle



D

5



A

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B

D 12

CHLOROPLAST
↓ ↓
SUGAR OXYGEN

9

What is the **source of energy** for all living organisms on earth?

- A plants
- B the sun
- C the moon
- D algae

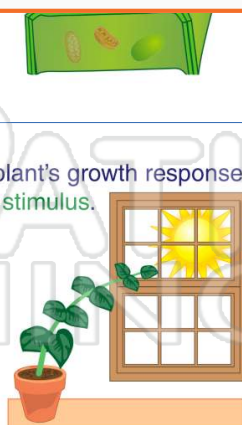


B

10

Tropism is a plant's growth response to a particular **stimulus**.

- A true
- B false



A



Name _____ Class _____ Date _____

Match each of the following terms to its definition:

Glucose

Carbon dioxide

Oxygen

Alcoholic fermentation

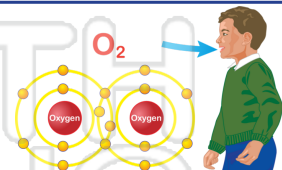
Guard cells

Cellular respiration

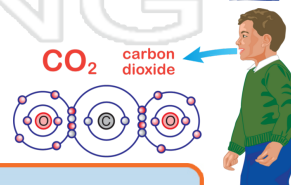
ATP

Chloroplast

1. - a colorless and tasteless gas that forms part of the earth's atmosphere; composed of two oxygen molecules; a special gas that plants give off that humans and animals need to breathe in to live



2. - a heavy colorless gas composed of one carbon and two oxygen molecules; makes up about 1/100th of the earth's atmosphere; a special gas that people and animals give off and is needed by plants



3. single



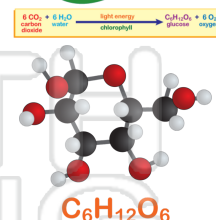
4. provide

5. break down where

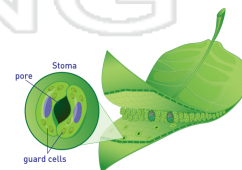
6. contain

produce food in the form of sugar for the plant during a process known as photosynthesis

7. - a simple sugar; often broken down from a more complex carbohydrate molecule



8. - a pair of cells found in a stoma that control the size of the pore opening; help control the amount of gases moving in and out of a leaf





Name _____ Class _____ Date _____

Match each of the following terms to its definition:

Glucose

Carbon dioxide

Oxygen

Alcoholic fermentation

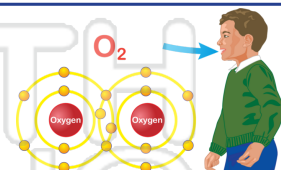
Guard cells

Cellular respiration

ATP

Chloroplast

1. oxygen - a colorless and tasteless gas that forms part of the earth's atmosphere; composed of two oxygen molecules; a special gas that plants give off that humans and animals need to breathe in to live



2. carbon dioxide - a heavy colorless gas composed of one carbon and two oxygen molecules; makes up about 1/100th of the earth's atmosphere; a special gas that people and animals give off and is needed by plants



3. alcohol
single

4. ATP
chemi

5. cellular respiration
down
turn fo

6. chloroplast
that ca
sugar for the plant during a process known as photosynthesis

7. glucose - a simple sugar; often broken down from a more complex carbohydrate molecule

8. guard cells - a pair of cells found in a stoma that control the size of the pore opening; help control the amount of gases moving in and out of a leaf



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