🌱 Lesson Plan: Plant Responses and Adaptations

Grade Level: 5
Subject: Life Science
Duration: 45–60
NGSS 5-LS1-1: Support an argument that plants get the materials they need for growth chiefly from air and water.

🎯 Learning Objectives

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

- **Identify** different types of plant responses to environmental stimuli such as light, gravity, and touch.
- **Describe** how tropisms (phototropism, gravitropism, and thigmotropism) help plants survive

- **Growth Hormones:** Plant chemicals that affect the growth of a plant by causing more plant cells to grow or causing plant cells to grow larger.
- **Adaptation:** Features that help an organism survive in a particular environment. A plant's features come from its DNA.
- **Succulents:** Plants that store water in their stems and leaves, such as cacti in the desert.
- **Biome:** A large ecosystem with similar organisms and climate.

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

- Printed copies of the Study Guide (https://newpathworksheets.com/api/guide/study-guide-science-grade-5-plant-responses-and-adaptations.pdf)
- Activity Lesson: Biomes worksheet (https://newpathworksheets.com/api/activity-lesson/activity-lesson-science-grade-5-plant-responses-and-adaptations-biomes-3.pdf)
- Plant Responses and Adaptations Worksheet 0 (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-5-plant-responses-and-adaptations-0.pdf)
- Plant Responses and Adaptations Worksheet 1 (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-5-plant-responses-and-adaptations-1.pdf)
- Vocabulary matching worksheet (https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-5-plant-responses-and-adaptations-1.pdf)
- Small potted plant (for demonstration)
- Flashlight or lamp

touch). (https://newpathworksheets.com/api/guide/study-guide-science-grade-5-plant-responses-and-adaptations.pdf)

- Explain growth hormones and how they cause plant cells to grow larger or multiply, affecting plant height and shape. (https://newpathworksheets.com/api/guide/study-guide-science-grade-5-plant-responses-and-adaptations.pdf)
- Demonstrate gravitropism by explaining that roots always grow downward (toward gravity) to reach water and nutrients, while stems grow upward (away from gravity) to reach sunlight.

- Discuss plant adaptations for different biomes using the Activity Lesson, highlighting desert succulents with water-storing stems, rainforest epiphytes that grow on other plants, and tundra plants with hair on leaves to trap heat. (https://newpathworksheets.com/api/activity-lesson/activity-lesson-science-grade-5-plant-responses-and-adaptations-biomes-3.pdf)

Step 3: Guided Practice (15 minutes)

- Work through the vocabulary matching worksheet as a class, reinforcing key terms like tropism, adaptation, phototropism, and gravitropism. (https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-5-plant-responses-and-adaptations-1.pdf)
- Show images of different biomes and have students identify which plant adaptations would be most helpful in each environment (for example, long roots in the desert, broad leaves in the rainforest).
- Complete the nitrogen cycle diagram from the Activity Lesson together, discussing how decomposers return nitrogen to the soil for plant growth.

- Review worksheet answers as a class, discussing any questions students found challenging.
- Conduct oral questioning: Ask students to classify everyday examples such as a vine growing around a fence (thigmotropism), a sunflower turning toward the sun (phototropism), or a tree root growing downward (gravitropism).
- Have students complete the vocabulary matching worksheet independently to assess understanding of key terms. (https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-5-plant-responses-and-adaptations-1.pdf)

Differentiation Strategies

For advanced learners:

- Challenge students to research a specific plant adaptation in an extreme environment (such as the Venus flytrap's carnivorous adaptation or the baobab tree's water storage) and present their findings to the class.
- Have advanced learners design an experiment to test phototropism by placing a plant in a box with a single light source and predicting the direction of growth over one week.

For learners needing support:

- Provide a pre-labeled diagram showing the three types of tropisms with arrows indicating the direction of plant growth for visual learners.
- Offer one-on-one assistance during independent practice, helping students connect vocabulary terms to real-world examples they can observe in their own environment.

- Study Guide: Plant Responses and Adaptations (https://newpathworksheets.com/api/guide/study-guide-science-grade-5-plant-responses-and-adaptations.pdf)
- Activity Lesson: Biomes (https://newpathworksheets.com/api/activity-lesson/activity-lesson-science-grade-5-plant-responses-and-adaptations-biomes-3.pdf)
- Worksheet: Plant Responses and Adaptations 0 (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-5-plant-responses-and-adaptations-0.pdf)

- Worksheet: Plant Responses and Adaptations 1 (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-5-plant-responses-and-adaptations-1.pdf)
- Worksheet: Plant Responses and Adaptations 2 (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-5-plant-responses-and-adaptations-2.pdf)
- Vocabulary: Plant Responses and Adaptations 1 (https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-5-plant-responses-and-adaptations-1.pdf)
- Vocabulary: Plant Responses and Adaptations 2 (https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-5-plant-responses-and-adaptations-2.pdf)

PLANT RESPONSES AND ADAPTATIONS

How Plants Survive

A plant can respond to the conditions of its environment. A plant can change its position and grow in a certain direction or manner to meet its survival needs and adapt to a varying environment.

Plants adjust their growth to take in sunlight, water, and nutrients. **Tropism** is the turning or bending of an organism or a part toward or away from an external stimulus, such as light, heat, or gravity.

- **Phototropism** is the reaction of a plant towards light. A plant needs sunlight in order to take in the sun's energy and make food from that energy. A plant will move and bend towards sunlight so that the plant can take in as much sunlight as possible.

Growth hormones are plant chemicals that affect the growth of a plant. Growth hormones cause more plant cells to grow or cause plant cells to grow larger. The plant makes its own growth hormones.

That plant is TALL...
The plant could be tall because its growth hormones made it tall or because it was trying to reach the sunlight.

Adapting to the Environment

Plants have many **adaptations**, which are features that help an organism survive in a particular environment. A plant's features come from its DNA.

Earth is covered with thousands of types of plants that live in many different environments. Plants live in warm, hot, cool, cold, wet, dry, light and dark environments. All plants have adaptations that help them to survive where they live!

Here are some examples of challenging environments and how certain plants adapted:

- **Hot and Dry**
  Some plants that live in the desert (like a cactus) store water in their stems and/or leaves. These types of plants are called

- **Shady Areas**
  Some plants that live in forest (therefore shady) regions climb and grow on other plants in order to reach the sunlight.

  Epiphytes such as mosses and ferns grow on top of other plants to reach sunlight.

- **Colder Regions**
  Evergreen trees often grow in cooler regions. Evergreens do not lose their leaves which is beneficial in those cooler areas.

  Many plants in cooler regions have hair on their stems and leaves in order to trap on heat.

- **Areas that are Mostly Light or Mostly Dark**
  Long-day plants are plants that require a long period of time exposed to sunlight in order to produce flowers.

  Short-day plants are plants that flower only if they are exposed to daylight 12 hours or less.

Competition among Plants

Plants compete for certain resources when those resources are limited.

Plants compete for sunlight for photosynthesis to make food – which means they need to compete for space to grow above ground to reach the sunlight.
Plants also compete for water and minerals from the soil that they need to survive – which means they compete for space for their roots to grow to reach the water and minerals in the soil.

A plant's location in relation to other plants is extremely important. If they are too close to other plants, then many plants will be competing for the same resources!

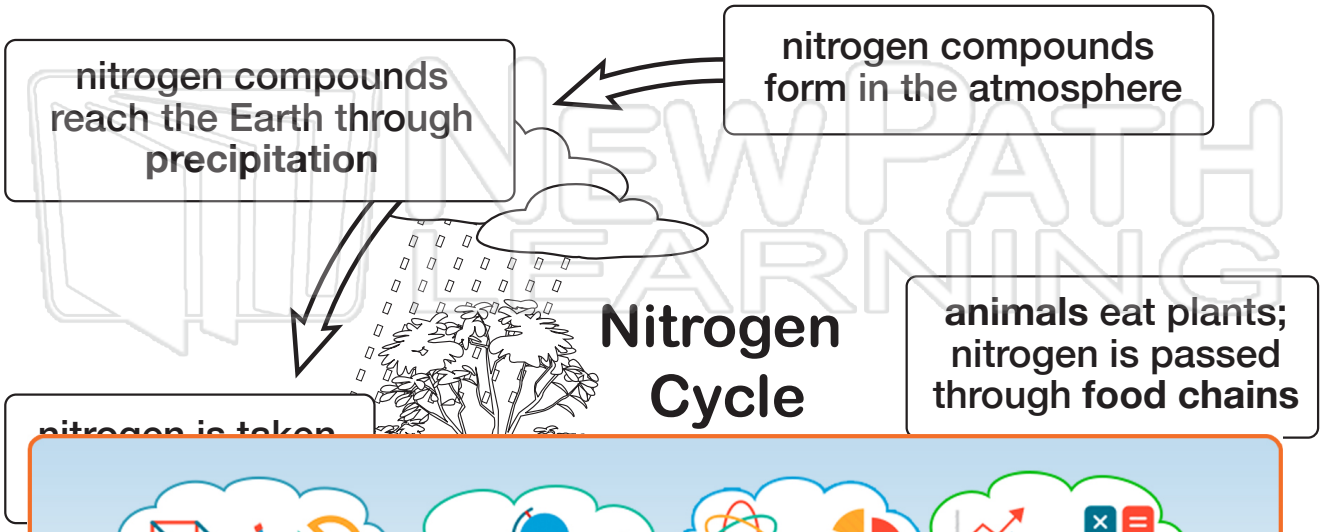
Biomes

Sci E

Name _____ Class _____ Date _____

The Nitrogen Cycle

Nitrogen is a common element in Earth's air and essential for all life on Earth. Like water, nitrogen is **cycled** through the **environment**.



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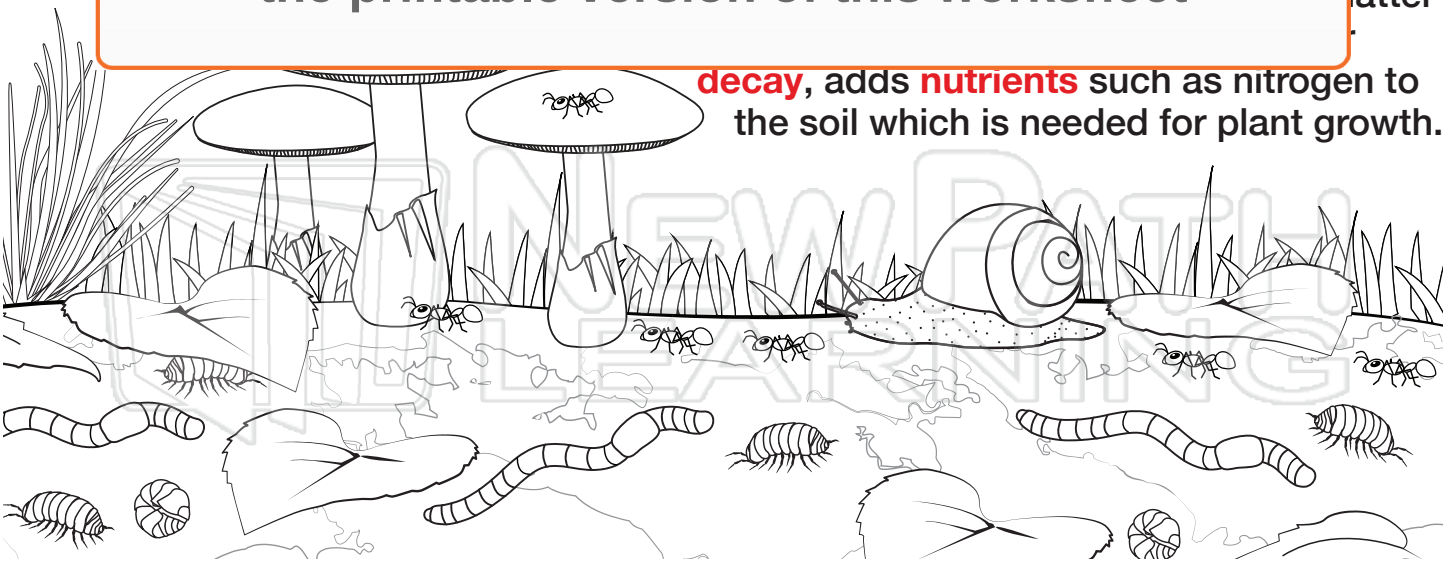
decay, adds nutrients such as nitrogen to the soil which is needed for plant growth.



Biomes

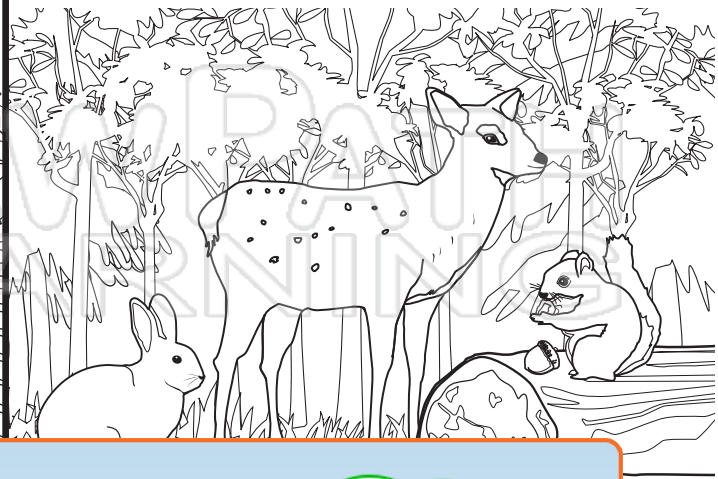
Sci E

Name _____ Class _____ Date _____

A **biome** is a large **ecosystem** with similar organisms and climate.

A **rainforest** is a warm ecosystem with many varieties of plant & animal life. Rainforests receive large amounts of rain.

A **deciduous forest** is a forest with a cooler climate and not a lot of rain.



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PREVIEW

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Grasslands have tall grasses but no trees. They receive little rain which is why trees do not grow here.

Biomes

Sci E

Name _____ Class _____ Date _____

The Nitrogen Cycle

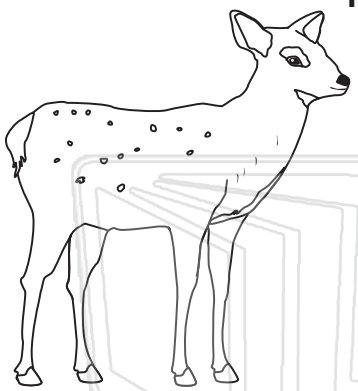
Fill in the boxes to complete the Nitrogen Cycle.

Land Habitats

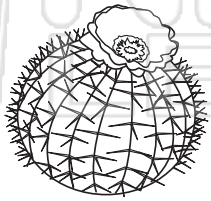
Sci E

Name _____ Class _____ Date _____

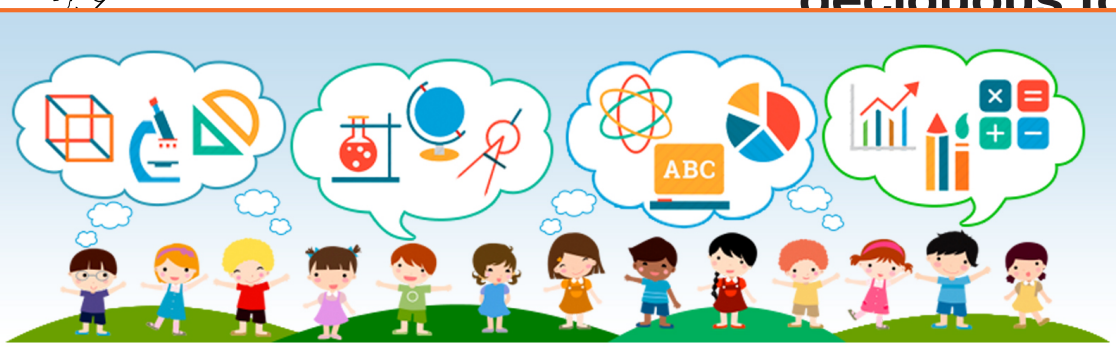
Draw a line to match plants and animals to the correct **biome**. Some may live in more than one type of biome.



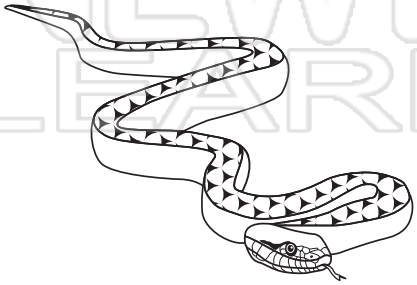
rainforest



deciduous forest



grasslands



Biomes

Sci E

Answer Key

The Nitrogen Cycle

Fill in the boxes to complete the Nitrogen Cycle.

nitrogen compounds form in the atmosphere

nitrogen reaches Earth through precipitation

animals eat plants,

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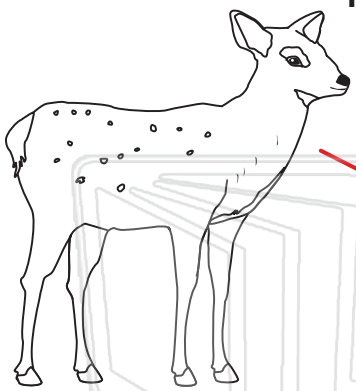
through decomposition of plant and animal waste

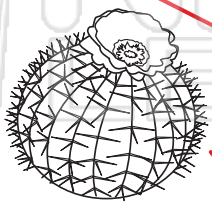
Land Habitats

Sci E

Answer Key

Draw a line to match plants and animals to the correct **biome**. Some may live in more than one type of biome.





rainforest

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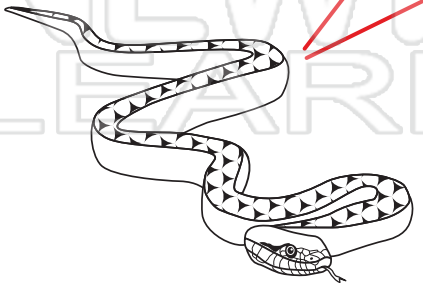


Plant Responses and Adaptations

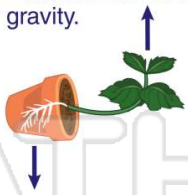
Sci E

Name_____ Class_____ Date_____

1 Plants can move in different directions to meet their survival needs. This picture is an example of a plant moving towards a resource it needs.
What is that **resource**?

A light
B water
C nutrients
D room to grow

2 _____ is the **turning or bending** movement of an organism, or a part, toward or away from an external stimulus, such as light, heat, or gravity.

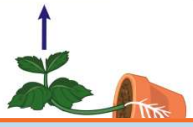


A Respiration
B Transpiration
C Tropism
D Photosynthesis

3 If a plant is placed near a window on a sunny day, its leaves will slowly turn toward the sunlight to collect energy.
Which of the following is the **movement** of a plant towards **light**?

A chemotropism

4 The growth of a plant in response to **gravity** is called _____.



A chemotropism
B phototropism
C gravitropism

5

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to gravity
D thigmotropism, a response to contact

B toward window B
C straight up
D very little

9 **Growth hormones** are natural chemicals released inside a plant to help it grow.
True or false?

A true
B false

10 How do growth hormones **affect** a plant?

A by making its life span longer
B by changing the shape of its flowers
C by increasing the size of its cells
D by changing the color of the plant

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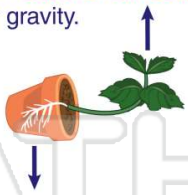

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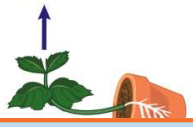

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Plant Responses and Adaptations

Sci E

Name_____ Class_____ Date_____

1 _____ are **changes** or **features** that help an organism survive in a particular environment.

A Instincts
B Adaptations
C Habits
D Abilities

2 Which **adaptation** would most help a cactus living in the **desert**?

A having large leaves
B having short roots
C the ability to store water in its stem
D having a thin stem

3 Which is the **biggest benefit** of a plant having long roots in the desert?

A makes plant taller to reach more light
B can absorb more sunlight

4 Some plants have a **waxy coating** on their stems and leaves to help reduce water loss. In what type of **environment** would a waxy coating be most beneficial?

5

7

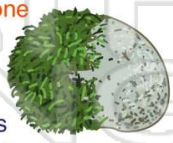
C needles keep the warm air out
D needles let water out of the tree quickly

C plant leaves have hair that trap in heat
D plant leaves not able to produce food in winter

9 Tall grasses in the grasslands have a special adaptation that allows the **roots** to remain alive even if the grasses above the soil die. After **which event** would this adaptation be most crucial to these grasses?

A a thunderstorm
B a wildfire
C a flood
D a windy day

10 **Mosses** normally grow extremely low to the ground. What is one way mosses **reach sunlight**?



A they grow under rocks
B they grow longer stems
C they grow underground
D they grow on top of other objects

Plant Responses and Adaptations

Sci E

Name_____ Class_____ Date_____

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PREVIEW

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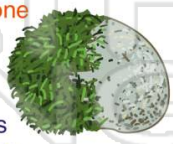

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Plant Responses and Adaptations

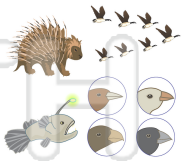
Sci E

Name_____ Class_____ Date_____

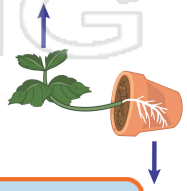
Match each of the following terms to its definition:

Growth hormones	Short-day plants	Thigmotropism	Adaptation
Succulents	Phototropism	Gravitropism	Long-day plants

1. - features that help an organism survive in a particular environment



2. - the growth of a plant in response to gravity



3.

4. to sun

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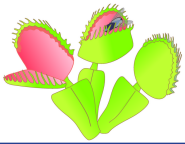
6. daylig

7. - plants that store water in their stems and/or leaves

8. - a plant's movement and growth in response to touch or contact with an object



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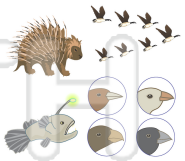
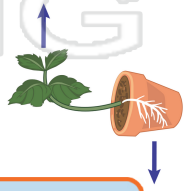


2. gravitropism - the growth of a plant in response to gravity



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7. succulents - plants that store water in their stems and/or leaves

8. thigmotropism - a plant's movement and growth in response to touch or contact with an object