🌍 Lesson Plan: Cycles of Life and Biomes

Grade Level: 5
Subject: Life Science
Duration: 45–60
NGSS 5-LS2-1: Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

🎯 Learning Objectives

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

- **Describe** the nitrogen, carbon dioxide, and oxygen cycles and explain how matter moves through ecosystems.
- **Identify** the role of decomposers in recycling nutrients back into the soil.

PREVIEW

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- **Oxygen:** A colorless, tasteless, odorless gas that forms about 20% of Earth's atmosphere. Plants produce oxygen through photosynthesis, and animals need it to breathe and live.
- **Carbon Dioxide:** A heavy colorless gas made of one carbon atom and two oxygen atoms that makes up about 1/100 of Earth's atmosphere. Animals breathe out carbon dioxide, and plants need it for photosynthesis.
- **Precipitation:** Water that falls from the atmosphere to Earth's surface in the form of rain, snow, sleet, or hail.
- **Tundra:** A very cold biome with frozen soil most of the year, little precipitation, and few plants. Only organisms adapted to extreme cold can survive there.

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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-cycles-of-life-and-biomes.pdf)
- Vocabulary matching worksheet (https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-5-cycles-of-life-and-biomes-1.pdf)
- Cycles of Life and Biomes Worksheet 0 (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-5-cycles-of-life-and-biomes-0.pdf)
- Cycles of Life and Biomes Worksheet 1 (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-5-cycles-of-life-and-biomes-1.pdf)
- Small container with lid

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- Use the Study Guide to explain the nitrogen cycle, emphasizing that nitrogen makes up 80% of Earth's atmosphere but most organisms cannot use it directly. (https://newpathworksheets.com/api/guide/study-guide-science-grade-5-cycles-of-life-and-biomes.pdf)
- Demonstrate a simple mixture by combining salt and pepper in a small container to show how decomposers break down and separate materials, just as they separate nutrients from dead organisms.

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- Discuss how nitrogen compounds form in the atmosphere through lightning and reach Earth through precipitation, and how bacteria in soil also produce nitrogen compounds.
- Explain the oxygen and carbon dioxide cycles, highlighting how plants produce oxygen through photosynthesis and animals produce carbon dioxide through respiration.

Step 3: Guided Practice (15 minutes)

- Distribute the vocabulary matching worksheet and work through the first few terms as a class, reinforcing key concepts. (https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-5-cycles-of-life-and-biomes-1.pdf)
- Display the nitrogen cycle diagram from the Study Guide and have students trace the path of nitrogen from atmosphere to soil to plants to animals and back to soil. (https://newpathworksheets.com/api/guide/study-guide-science-grade-5-cycles-of-life-and-biomes.pdf)
- Introduce the major biomes (rainforest, deciduous forest, grassland, taiga, desert, tundra) using the Study Guide, discussing the climate and precipitation characteristics of each.

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- Review answers to Worksheet 0 as a class, clarifying any misconceptions about the nitrogen cycle and the role of decomposers. (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-5-cycles-of-life-and-biomes-0.pdf)
- Conduct oral questioning: Ask students to name the three main cycles discussed (nitrogen, oxygen, carbon dioxide) and explain one way each cycle supports life.
- Have students classify three examples: a rainforest (warm, lots of rain), a desert (little precipitation), and a tundra (very cold, frozen soil) by naming the biome and one key characteristic.

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Differentiation Strategies

For advanced learners:

- Challenge advanced learners to research and compare the water cycle with the nitrogen cycle, creating a Venn diagram showing similarities and differences.
- Have students investigate how human activities such as burning fossil fuels affect the carbon dioxide cycle and propose solutions to reduce negative impacts.

For learners needing support:

- Provide a pre-labeled nitrogen cycle diagram with color-coded arrows showing the direction of nitrogen movement for students who need visual support.
- Offer one-on-one assistance during independent practice, using simplified language and concrete examples such as 'plants drink nitrogen from soil like you drink water' to explain

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- NewPathWorksheets: Cycles of Life and Biomes (https://newpathworksheets.com/science/grade-5/cycles-of-life-and-biomes)
- Study Guide: Cycles of Life and Biomes (https://newpathworksheets.com/api/guide/study-guide-science-grade-5-cycles-of-life-and-biomes.pdf)
- Worksheet 0: Cycles of Life and Biomes (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-5-cycles-of-life-and-biomes-0.pdf)
- Worksheet 1: Cycles of Life and Biomes (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-5-cycles-of-life-and-biomes-1.pdf)

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- Worksheet 2: Cycles of Life and Biomes (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-5-cycles-of-life-and-biomes-2.pdf)
- Worksheet 3: Cycles of Life and Biomes (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-5-cycles-of-life-and-biomes-3.pdf)
- Vocabulary Set 1: Cycles of Life and Biomes (https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-5-cycles-of-life-and-biomes-1.pdf)
- Vocabulary Set 2: Cycles of Life and Biomes (https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-5-cycles-of-life-and-biomes-2.pdf)

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CYCLES OF LIFE AND BIOMES

Cycles within the Environment

Decomposers are nature's recyclers! Decomposers break down dead organisms; this process releases nutrients back into the soil for plants to use.

The Nitrogen Cycle

Nitrogen is a colorless, odorless gas which makes up about 8/10 of Earth's atmosphere and is essential for ALL life.

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properly. Like water, nitrogen is cycled through the environment.

However, most organisms can't take in nitrogen directly from the atmosphere.

Nitrogen compounds are different kinds of chemicals that contain nitrogen and can be taken in by organisms. Nitrogen compounds are the way that most organisms receive the nitrogen they need to survive.

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Nitrogen compounds form in the atmosphere. The heat given off by lightning can cause gases to mix together in the atmosphere, forming nitrogen compounds. Nitrogen compounds reach the Earth's surface by way of precipitation. Nitrogen compounds can also be made by some types of bacteria in soil.

The Nitrogen Cycle Process

Nitrogen is taken in by plants through their roots, animals eat plants, and the nitrogen is passed along the food chain to animals.
Herbivores get nitrogen by eating plants.
Carnivores get nitrogen by eating herbivores.
Nitrogen is returned to the soil when an organism dies – decomposers break down the dead organisms and change the nitrogen compounds in the dead organism's body into the kind plants can use.
Then the nitrogen cycle begins again.

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process of photosynthesis.

Oxygen and carbon dioxide are also in water. Carbon dioxide and oxygen dissolve in water and are used by water organisms to live. These organisms in the water use oxygen and carbon dioxide during the processes of respiration and photosynthesis.

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Biomes of the World

What is a biome?

A **biome** is a large ecosystem with similar organisms and climate. Here are some examples of biomes.

A **rainforest** is a warm ecosystem made up of many different varieties of plant and animal life which receives large amounts of rain.

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

Grasslands have tall grasses but no trees. This ecosystem receives very little rain…trees need a good deal of rain to grow, which is why they don't grow here.

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night. A desert is known as an area of land that receives less than 25 cm of precipitation each year. It is the lack of water that makes it a desert.

The **Tundra** is a very cold ecosystem that receives little rain. Its soil is frozen most of the year.

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Cycles of life and Biomes

Sci E

Name_____ Class_____ Date_____

1 **Decomposers** are known as _____.

A carbon dioxide inhalers
B decay builders
C nature's recyclers
D creators of oxygen

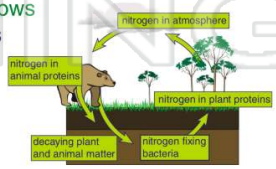
2 What **process** do decomposers **speed up** which releases nutrients into the soil?

A decaying
B respiration
C photosynthesis
D combustion

3 What **colorless, odorless gas** makes up about $\frac{8}{10}$ of the Earth's atmosphere and is **essential** for life?

A carbon
B nitrogen

4 What do the arrows represent in this **nitrogen cycle** chart?



A release of nitrogen

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7

A true
B false

B Lightning
C Wind
D Rain

9 How do **nitrogen compounds** that are formed in the air reach the Earth?

A wind
B precipitation
C drop to earth by gravity
D birds

10 What is a way that **nitrogen compounds** are formed in the **soil**?

A by certain types of bacteria in the soil
B through cellular respiration
C through photosynthesis
D by combustion

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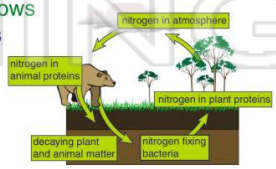

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A

5

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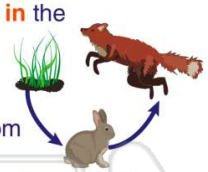
Cycles of life and Biomes

Sci E

Name_____ Class_____ Date_____

1 How do animals **take in** the **nitrogen** they need?



A by eating soil
B by breathing air from the atmosphere
C by eating plants or other animals
D through the process of cellular respiration

2 The **decaying** of a dead organism's body is one way that _____.

A nitrogen is removed from the soil
B carbon dioxide is removed from the soil
C nitrogen is returned to the soil
D carbon dioxide is returned to the soil

3 _____ is a **heavy, colorless gas** that that only makes up $\frac{1}{100}$ of the Earth's atmosphere.

A Carbon dioxide
B Oxygen

4 Oxygen makes up $\frac{2}{10}$ of the Earth's atmosphere. Carbon dioxide only makes up $\frac{1}{100}$ of the Earth's atmosphere. How much **more oxygen** than carbon dioxide is in the atmosphere?

5

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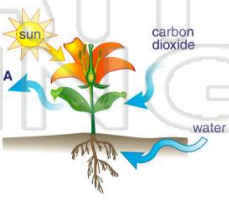
D methane gas and carbon dioxide

C Nitrogen
D Helium

9 If a large number of plants and trees were taken out of an ecosystem, which gas would **decrease**?

A oxygen
B carbon dioxide
C nitrogen
D carbon

10 On this photosynthesis chart, what does **A** represent?



A carbon dioxide
B oxygen
C nitrogen
D helium

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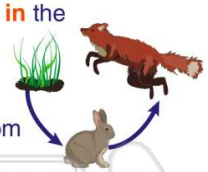

A by eating soil
B by breathing air from the atmosphere
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D through the process of cellular respiration

C

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B

5

B

7

D methane gas and carbon dioxide

C Nitrogen
D Helium

B

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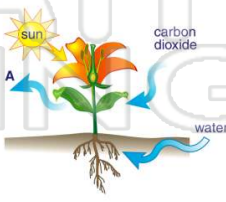

A carbon dioxide
B oxygen
C nitrogen
D helium

B

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Cycles of life and Biomes

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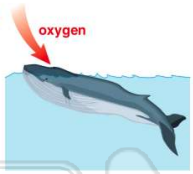
Name_____ Class_____ Date_____

1 Whales are **different** from fish because _____.

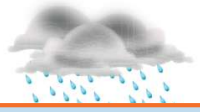


A whales use lungs to take in oxygen
B fish use lungs to take in oxygen
C whales breathe with their gills
D carbon dioxide is taken in by whales

2 What is the term for a **large ecosystem** with plant life and other organisms suited for that particular climate?

A a state
B a population
C a biome
D a habitat

3 Which biome would be best suited for a plant that requires **warm temperatures** and a lot of **rain**?



A rainforest
B deciduous forest

4 **Coniferous plants** live year-round through very cold winters and warm and wet summers in this biome. What is the name of this **biome**?

A rainforest

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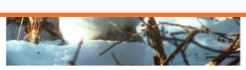
C sharp claws
D webbed feet



each year
D receives less than 5 cm of rain each year

9 Why do very few plants grow in a **tundra** biome?

A The climate is too dry.
B The soil is frozen most of the year.
C There is too much rainfall.
D The temperatures are too warm.

10 All **living organisms** can only **survive** in ecosystems where _____.

A some of their needs are met
B all their needs are met
C they can find a mate
D they can find shelter

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Cycles of life and Biomes

Sci E

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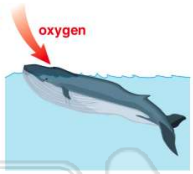

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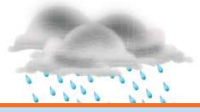

A rainforest
B deciduous forest

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C

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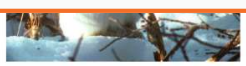
D

7

C sharp claws
D webbed feet



C

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Cycles of life and Biomes

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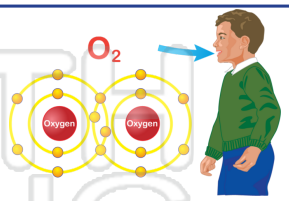
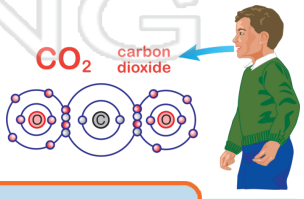
Match each of the following terms to its definition:

Polar zone	Carbon dioxide	Biome	Deciduous forest
Grassland	Nitrogen	Nitrogen compounds	Oxygen

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. by a p

4. rain

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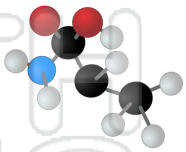
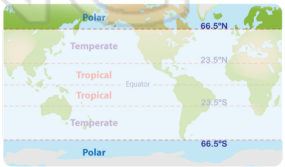
5. which

6. 80% o

7. - types of chemicals that contain nitrogen and are used by to organisms to take in nitrogen



8. - the climate zones greater than 66.5 degrees latitude north and south



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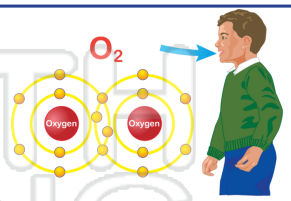
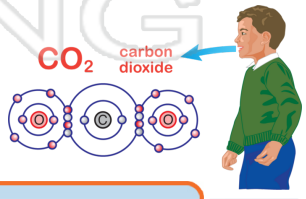


2. carbon dioxide - a heavy colorless gas composed of one carbon and two oxygen molecules; makes up about 1/100th of the earth's atmosphere; a special gas that people and animals give off and is needed by plants



3. bio
climat

4. dec

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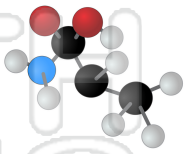
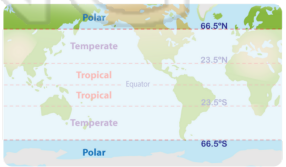
5. gra
very li

6. nitr
atmos

7. nitrogen compounds - types of chemicals that contain nitrogen and are used by to organisms to take in nitrogen



8. polar zone - the climate zones greater than 66.5 degrees latitude north and south



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