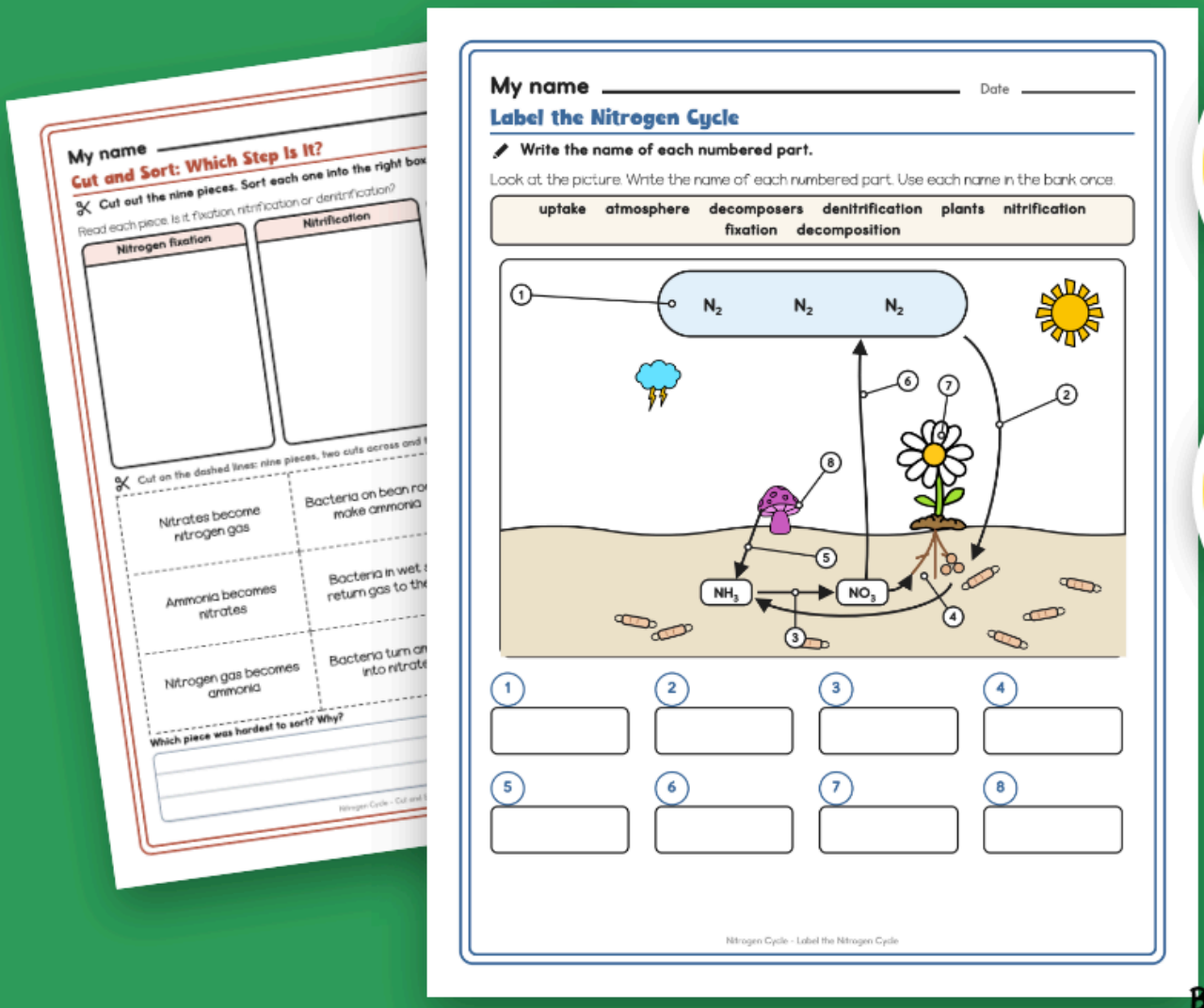
NITROGEN CYCLE

DIAGRAM · SEQUENCE · SORT · SHORT ANSWER · KEY



GRADES 6-9

25 STUDENT PAGES

Bright Path Sped

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- It works offline. No account, no subscription, no internet connection needed after you download it.

Print at 100 percent

Turn off fit to page and shrink to fit so the ruled lines stay 0.34 inch apart. Every student page is black and white inside a colored border, so it still reads when copied in black and white.

Student work

A filled-in tracker, class grid or team note carries a real student's name. Keep it in the data folder, and use a first name only on any page that leaves your hands.

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PREVIEW

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How To Read a Page

The parts of a student page, then the kinds of sheet in the order they come.

The parts of a page

- **The answer box.** A bordered box for a letter, a number or a word. Click it to type, or print and write in it.
- **The ruled work box.** Lines 0.34 inch apart for sentences. Write one idea to a line.
- **The check box.** True or false, yes or not yet: click or mark.
- **The word bank.** A box of words to use. Some words are used once, some not at all.
- **The cut line.** Nine pieces in a short grid, edge to edge: a few straight cuts across and down.

Kind of sheet	How many	What the student does
Readings and cards	4 sheets	Read, answer, and keep the process cards to look things up.
Words and matching	4 sheets, 22 items	Match words and parts; try a worked example.
Diagram and chart	2 sheets, 23 items	Label the cycle, then fill in a chart for the five processes.
Order and story	2 sheets, 12 items	Put six steps in order, then fill in the story with the bank.
True or false and mistakes	3 sheets, 16 items	Check sentences, fix false ones, find Mara's mistakes.
Writing	4 sheets, 12 questions	Short answers with at least four ruled lines, then explain-it boxes with at least five each.
Quizzes, exit tickets, sorts	12 items, 3 tickets, 18 pieces	Two quizzes, one exit sheet, two cut-and-sort mats.

PREVIEW

Untimed, unscored on the page

No student page has a timer or a score on it. The keys and the tracker are for you. The answer keys are on pages 30 to 35.

Short answers and explain-its

Their keys (page 34) say what to look for, not one right sentence. Accept any answer that uses a fact from the readings or the process cards.

Printing and the type-in fields

Every page prints clean in black and white. The name line, every answer box, every ruled box and every check box are type-in fields in any PDF reader: click one, type, then save. This is a fillable PDF, not a slideshow or a word-processor file.

Room to work

Short-answer boxes hold four lines and explain-it boxes hold five. If a student needs more room, hand over one page a day, or let students write on scrap paper and copy their best sentences into the box.

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My name _____ Date _____

Reading 1: Nitrogen in the Air and Soil

Read about nitrogen in the air and soil. Then answer.

The nitrogen cycle, fixation and nitrification

Nitrogen is in every living thing. It is part of **proteins**, which living things use to grow. Most of the air is **nitrogen gas**, written N_2. But plants cannot use nitrogen gas straight from the air. It has to be changed first. The **nitrogen cycle** is the path nitrogen takes through the air, the soil and living things. **Nitrogen fixation** changes nitrogen gas into ammonia, a form plants can use. Some bacteria do this in the soil. Others live in small bumps called nodules on the roots of plants such as beans and peas. Lightning fixes a little nitrogen too. Next, in **nitrification**, other soil bacteria change ammonia into **nitrates**.

Main idea: What is this reading mostly about?

Check what you read. Write the letter in the box.

1. What does nitrogen fixation do?
   - **A** Changes nitrogen gas into ammonia
   - **B** Makes sugar from sunlight
   - **C** Breaks down dead leaves

2. Why can plants not use nitrogen gas from the air?
   - **A** There is no nitrogen in the air
   - **B** Plants only use oxygen
   - **C** It has to be changed into a usable form first

3. Where do nodule bacteria live?
   - **A** On the leaves of trees
   - **B** On the roots of plants such as beans and peas
   - **C** In the clouds

PREVIEW

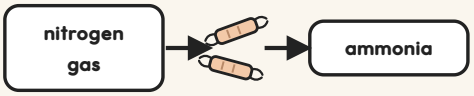
Preview · Bright Path Sped

My name _____ Date _____

Process Cards 1

Read the cards. Keep them all week.

Nitrogen fixation



Takes in	nitrogen gas (N2) from the air
Gives out	ammonia, a form plants can use
Who does it	bacteria in the soil and in root nodules
Nitrogen moves	from the air into the soil

Nitrification



Takes in	ammonia in the soil
Gives out	nitrates, which plants can take up
Who does it	bacteria in the soil
Nitrogen moves	stays in the soil as a new form

Uptake



Takes in	nitrates from the soil, through the roots
Makes	proteins that the plant uses to grow
Who does it	plants; consumers get nitrogen by eating
Nitrogen moves	from the soil into living things

Pick one process. Tell what it does in your own words.

PREVIEW

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My name _____ Date _____

Nitrogen Cycle Words

Match each word to what it means.

Write the letter of the meaning in the box. Use the readings to help you.

1	nitrogen cycle		A	A bacterium or fungus that breaks down dead matter.
2	nitrogen fixation		B	The path nitrogen takes through the air, soil and living things.
3	nitrification		C	Changing nitrates back into nitrogen gas.
4	decomposer		D	Changing ammonia into nitrates, done by soil bacteria.
5	nitrate		E	A form of nitrogen that plants take up through their roots.
6	denitrification		F	Changing nitrogen gas into ammonia.

Use two of the words in one sentence about the nitrogen cycle.

PREVIEW

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My name _____ Date _____

Match the Parts of the Cycle

Match each word to what it means.

Write the letter of the meaning in the box. Use the process cards to help you.

1	**Protein**		A	A living thing that gets nitrogen by eating plants or other animals.
2	**Bacteria**		B	A small bump on a bean or pea root where bacteria live.
3	**Root nodule**		C	The layer of gases around Earth; most of it is nitrogen gas.
4	**Ammonia**		D	A body-building material that has nitrogen in it.
5	**Legume**		E	A form of nitrogen made by fixation and by decomposition.
6	**Consumer**		F	The top layer of land where roots grow and many bacteria live.
7	**Soil**		G	Tiny one-celled living things; some change nitrogen from one form to another.
8	**Atmosphere**		H	A plant, such as a bean or pea, that has nodules on its roots.

Pick one pair. Tell how the two things are connected in the cycle.

PREVIEW

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My name _____ Date _____

Fill In the Chart

Fill in the chart for each process.

Use the process cards. Words from the bank can help. A word may be used more than once.

nitrogen gas **ammonia** **nitrates** **plant proteins** **dead matter and waste**

bacteria **plants** **decomposers**

Nitrogen fixation	**Starts as**	
	Ends as	
	Who does it?	
Nitrification	**Starts as**	
	Ends as	
	Who does it?	
Uptake	**Starts as**	
	Ends as	
	Who does it?	
Decomposition	**Starts as**	
	Ends as	
	Who does it?	
Denitrification	**Starts as**	
	Ends as	
	Who does it?	

PREVIEW

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My name _____ Date _____

Fill In the Story

Fill in each blank. Use the word bank.

Read the story in order. Fill each blank with a word from the bank. Two words are not used.

roots	sunlight	consumer	air
nitrates	**proteins**	**soil**	**decomposers**

1. Bacteria in the _____ and on roots change nitrogen gas into ammonia.

2. Soil bacteria change ammonia into _____.

3. A plant takes in nitrates through its _____.

4. A _____ eats the plant, so nitrogen moves into its body.

5. _____ break down the dead consumer and return ammonia to the soil.

6. Bacteria in wet soil change nitrates into gas, and the gas returns to the _____.

Pick one sentence. Tell what happens to the nitrogen next.

PREVIEW

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My name _____ Date _____

True or False 2

Is it true or false? Check one.

Check true or false for each sentence.

1. Denitrification puts nitrogen gas back into the air. ☐ true ☐ false

2. Plants take up nitrates through their leaves. ☐ true ☐ false

3. Consumers get nitrogen by eating plants or other animals. ☐ true ☐ false

4. Decomposition returns nitrogen to the soil as ammonia. ☐ true ☐ false

5. Nitrogen fixation changes nitrogen gas in the soil into nitrates in the air. ☐ true ☐ false

6. Proteins have nitrogen in them. ☐ true ☐ false

Pick one false sentence. Fix it so it is true.

PREVIEW

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My name _____ Date _____

Short Answers 2

Answer each question in sentences.

Use facts from the readings and the process cards. Write in sentences.

4 Why do decomposers matter in the nitrogen cycle?

5 How does nitrogen move from a plant to a consumer?

6 A classmate says nitrogen is used up when a plant dies. Give one fact that answers them.

PREVIEW

My name _____ Date _____

Explain It 2

Explain your thinking in sentences.

Use what you know about the nitrogen cycle. Say why.

Start with: I know that ____ because ____.

4 Follow nitrogen from the soil into a plant, then a consumer, then back to the soil. Name each step.

5 Why is the nitrogen cycle called a cycle and not a one-way trip?

6 Why does the air keep its nitrogen gas even though plants and bacteria use nitrogen all the time? Use the word denitrification.

PREVIEW

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My name _____ Date _____

Quiz B

Pick the best answer. Write its letter.

Take your time. Guess if you are not sure.

7 Which process returns nitrogen gas to the air?

A Nitrogen fixation
B Uptake
C Denitrification

8 Which group gets nitrogen by eating plants or other animals?

A Consumers
B Producers
C Lightning

9 What does decomposition put into the soil?

A Oxygen
B Ammonia
C Sunlight

10 Where does denitrification happen?

A In dry sand with lots of air
B On leaves in the sun
C In wet soil with little oxygen

11 Which gas makes up most of the air?

A Nitrogen
B Oxygen
C Carbon dioxide

12 Which form of nitrogen can plants take up?

A Nitrogen gas
B Nitrates
C Sunlight

PREVIEW

My name _____ Date _____

Check My Own Work

Check your own work. Mark yes or not yet.

1	I can say what the nitrogen cycle is.	☐ yes	☐ not yet
2	I can name the parts of the cycle on a diagram.	☐ yes	☐ not yet
3	I can tell what nitrogen fixation takes in and gives out.	☐ yes	☐ not yet
4	I can tell what nitrification and uptake do.	☐ yes	☐ not yet
5	I can tell what decomposers and denitrification do.	☐ yes	☐ not yet
6	I can put the steps of the cycle in order.	☐ yes	☐ not yet
7	I can explain why plants cannot use nitrogen gas from the air.	☐ yes	☐ not yet
8	I can explain one way bacteria help the cycle.	☐ yes	☐ not yet

The part I can explain best is...

The part I still need help with is...

PREVIEW

My name _____ Date _____

Cut and Sort: Who Is It?

Cut out the nine pieces. Sort each one into the right box.

Read each piece. Is it a producer, a consumer or a decomposer?

Producers	Consumers	Decomposers

Cut on the dashed lines: nine pieces, two cuts across and two cuts down.

Grass	A mushroom on a log	A hawk
A fungus on dead leaves	A frog	A bean plant
A deer	A sunflower	Bacteria that break down waste

Which piece surprised you? Why?

PREVIEW

Answer Key: Worked Example, Diagram, Chart

Accept any correct answer that matches the process card. Chart answers come from the process cards.

Worked Example: your turn page 10

Step	Answer
Step 1 key words	nitrates / nitrogen gas
Step 2 process	Denitrification
Check	No: nitrification ends with nitrates, and this process ends with nitrogen gas.

Label the Nitrogen Cycle page 13

Number	Part
1	atmosphere
2	fixation
3	nitrification
4	uptake
5	decomposition
6	denitrification
7	plants
8	decomposers

Fill In the Chart page 14

Process	Starts as	Ends as	Who does it?
Nitrogen fixation	nitrogen gas	ammonia	bacteria
Nitrification	ammonia	nitrates	bacteria
Uptake	nitrates	plant proteins	plants
Decomposition	dead matter and waste	ammonia	decomposers
Denitrification	nitrates	nitrogen gas	bacteria

PREVIEW

Answer Key: Writing

These pages have no single right sentence. Accept any answer that uses a fact from the readings or the process cards.

Short answers: what to look for pages 19, 20

Item	Look for
19.1	The nitrogen cycle is the path nitrogen takes through the air, soil and living things. Any two places: the air, the soil, plants, animals or dead matter.
19.2	Plants need nitrogen in a form such as nitrates. Fixation changes the gas into ammonia, and nitrification changes ammonia into nitrates.
19.3	The bacteria fix nitrogen into ammonia that the plant can use, and the plant gives the bacteria a home on its roots. Accept any answer that says the bacteria make usable nitrogen.
20.1	They break down dead plants, dead animals and waste and return nitrogen to the soil as ammonia, so it can be used again.
20.2	The plant holds nitrogen in its proteins. When a consumer eats the plant, the nitrogen moves into the consumer.
20.3	Decomposers break down the dead plant and return the nitrogen to the soil as ammonia. Any clear fact about nitrogen returning to the soil or the air is correct.

Explain it: what to look for pages 21, 22

Item	Look for
21.1	Fixation changes nitrogen gas into ammonia. Then nitrification changes the ammonia into nitrates, and the plant takes up the nitrates through its roots.
21.2	Any two: fixation (makes ammonia), nitrification (makes nitrates), decomposition (returns ammonia to the soil) or denitrification (returns gas to the air). They move nitrogen from one form to the next.
21.3	Fixation takes nitrogen gas out of the air and makes ammonia; denitrification changes nitrates back into nitrogen gas that returns to the air.
22.1	Uptake moves nitrates into the plant. The consumer eats the plant. When the consumer dies, decomposition returns ammonia to the soil.
22.2	Nitrogen keeps moving between the air, the soil and living things and returns to where it started. Accept any answer that says it comes back.
22.3	Denitrification changes nitrates back into nitrogen gas and returns it to the air, so nitrogen goes back into the air.

Exit tickets

- Exit tickets (page 26): ticket 1 names what the chosen process starts as and ends as; ticket 2 names two living things that help move nitrogen (for example bacteria, plants, decomposers); ticket 3 is open.

PREVIEW

Nitrogen Cycle Tracker

One student, every scored sheet. Filled example: page 40.

Student _____ Teacher _____ Month _____

Page	Page type and set	Items	Right	Date	Notes
5	Reading 1: Nitrogen in the Air and Soil	3			
6	Reading 2: Plants, Decomposers and Wet Soil	3			
9	Nitrogen Cycle Words	6			
11	Match the Parts of the Cycle	8			
12	Which Process?	8			
13	Label the Nitrogen Cycle	8			
14	Fill In the Chart	15			
15	Put the Steps in Order	6			
16	Fill In the Story	6			
17	True or False 1	6			
18	True or False 2	6			
23	Find the Mistake	4			
24	Quiz A	6			
25	Quiz B	6			
28	Cut and Sort: Which Step Is It?	9			
29	Cut and Sort: Who Is It?	9			

How to fill this in

Write how many items the student got right with no prompt, and the date. A blank means not tried yet, never wrong. There are 109 items on the 16 scored sheets. Answer keys: pages 30 to 35. Filled example: page 40.

This unit we are working on (your own standard or wording)

PREVIEW

Team Note

Use this page between team meetings or when a student moves classes, to hand off what changed without writing a note from scratch. Everything below is observable, with a blank for the number or the wording your team already uses.

Student _____ Team member _____ Date _____

Kind of sheet	Covered since last note (Y/N)	Items right	Still blank
Readings and words			
Matching			
Diagram and chart			
Order and story			
True or false			
Find the mistake			
Quizzes			
Sorts			

What I saw (observable, not a conclusion)

- Matched ___ of 16 parts and clues (pages 11, 12).
- Labeled ___ of 8 parts of the diagram (page 13).
- Put ___ of 6 steps in order (page 15).
- Got ___ of 12 true or false sentences right (pages 17, 18).
- Explained what one process does in a complete sentence: yes / no / with a reminder.

Next step

- Next page or set: ___, because ___ (what you saw).
- What to try in another class or at home: ___.
- What to keep doing because it is working: ___.
- Anything for the team meeting to decide: ___ (this page records what happened, never a label or a plan).

Summary, in one or two sentences, for whoever reads this next

A filled-in line, for reference

"Got 5 of 6 true or false sentences right on 10/17. Next step: reread Reading 1 and ask which process changes nitrogen gas into ammonia." That is the level of detail this page is built for. It matches the filled example on page 40.

PREVIEW

Jordan's Tracker (Invented Student)

Jordan R. is invented; nothing on this page describes a real student. The blank tracker is on page 36.

Student: Jordan R. (an invented student)

Teacher: Ms. Patel (invented)

Month: October

Page	Page type and set	Items	Right	Date	Notes
5	Reading 1: Nitrogen in the Air and Soil	3	2	10/6	Mixed up nitrogen gas and ammonia
6	Reading 2: Plants, Decomposers and Wet Soil	3	3	10/7	-
9	Nitrogen Cycle Words	6	5	10/8	Mixed up nitrate and nitrification
11	Match the Parts of the Cycle	8	6	10/9	Swapped consumer and legume
12	Which Process?	8	7	10/10	Missed the uptake clue
13	Label the Nitrogen Cycle	8	5	10/13	Named fixation as uptake
14	Fill In the Chart	15	11	10/14	Left four boxes blank
15	Put the Steps in Order	6	4	10/15	Put decomposition before the consumer
16	Fill In the Story	6	5	10/16	Wrote air where soil goes
17	True or False 1	6	5	10/17	Thought plants use nitrogen gas from the air
18	True or False 2	6	6	10/17	-
23	Find the Mistake	4	3	10/20	Missed the decomposer sentence
24	Quiz A	6	6	10/21	-
25	Quiz B	6	4	10/21	Mixed up fixation and denitrification
28	Cut and Sort: Which Step Is It?	9	7	10/22	Put the nitrification piece in the fixation box
29	Cut and Sort: Who Is It?	9	-	-	-

How to read it

Jordan R. has done **15 of 16** scored sheets and got **79 of 100** items right with no prompt. **3** sheets were all right and **12** carry a note. Every number comes from the table.

What the table points to

The lowest sheet is Label the Nitrogen Cycle (5 of 8). That is where the next practice goes. The 1 sheet left blank is not tried yet, never wrong.

PREVIEW