

CYCLING OF MATTER AND ENERGY THROUGH PHOTOSYNTHESIS AND CELLULAR RESPIRATION

Science Reading

Photosynthesis, Cellular Respiration, and the cycling of matter and energy

Photosynthesis

According to the World Wildlife Fund, we lose about 36 football fields of forest every minute through clear-cutting for agriculture, ranching, development, logging, and climate change. This impact affects both humans and other animal species. To better understand this impact, we need to know how plants are important and what they do for us. Plants are important because they undergo a process called photosynthesis.

Photosynthesis is how plants make their own food and how they store energy. This means that almost all the energy living things use comes from the sun. Plants are tiny structures called chloroplasts, which are found in the leaves. Chloroplasts contain a green pigment called chlorophyll, which gives plants their green color. Chlorophyll's job is to capture energy from sunlight, much like a solar panel. That light energy is then used to start a chemical reaction of photosynthesis. In this reaction, plants combine carbon dioxide from the air and water from the soil to make glucose (a type of sugar) and oxygen. The glucose stores energy from the sun and the oxygen is released into the air.

When a deer eats the leaves, it gets the stored energy from the plant's glucose. Inside the deer's cells, another process called cellular respiration breaks down the glucose using the oxygen the deer breathes in. This process happens in the mitochondria and releases the energy the deer needs to run, grow, and survive. Carbon dioxide and water are produced and released back into the environment.

The matter in an ecosystem—like carbon, oxygen, and water—cycles continuously through living and nonliving parts of the environment. When a deer breathes out carbon dioxide, plants take it in during photosynthesis and use it, along with water and sunlight, to make glucose and release oxygen. That matter becomes part of the plant and is passed on to animals that eat the plant. The matter from the plants becomes part of the animal's body and is later returned to the environment through waste, breathing, or death. Even after the deer dies, decomposers like fungi and bacteria break down its body, returning valuable nutrients to the soil. These nutrients help new plants grow, continuing the cycle of matter (Diagram 1).

Energy flows through an ecosystem in one direction, beginning with the sun. Plants capture the sun's energy through photosynthesis and store it as glucose. When animals eat plants, they take in energy, which their cells use through cellular respiration to support growth, movement, and other processes. Although it may seem like the energy disappears, it isn't lost—it's transformed. As the energy, much of it is converted into heat and released into the environment. This follows the conservation of energy, which states that energy cannot be created or destroyed—it can only change from one form to another, such as from sunlight to chemical energy to heat (Diagram 2).

Diagram 1: A deer eats grass and stores energy in the form of glucose, along with matter like carbon, oxygen, and water. Inside the deer's cells, the glucose and oxygen are used to release energy. Carbon dioxide and water are returned to the environment, continuing the cycle of energy flow and matter reuse.

Diagram 2: Photosynthesis is the process by which plants use sunlight, carbon dioxide, and water to produce glucose and oxygen. The chemical equation for photosynthesis is: $6\text{CO}_2 + 6\text{H}_2\text{O} \xrightarrow{\text{Energy}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$.

Cellular Respiration

We all know the importance of oxygen—it's what we breathe to stay alive. But did you know that more than just our lungs play a key role in helping our bodies release energy? Every time you run a race and feel completely exhausted by the end? That's because your body has used up all the energy it has. Marathon runners often eat a big meal the night before a race, full of carbohydrates. Why do they do this? Because those foods contain sugars that provide energy. Cellular respiration is the process that turns food into usable energy called cellular respiration.

Cellular respiration is a chemical process that happens inside your body's cells. It takes place in the mitochondria, often called the cell's "powerhouse." During cellular respiration, the food you eat is broken down into a sugar called glucose, which enters your bloodstream and is carried to your cells. Oxygen from the air you breathe moves from your lungs into your bloodstream and is carried to your cells as well (Diagram 1). When glucose and oxygen meet inside the cell, a chemical reaction called cellular respiration occurs. This reaction releases energy, carbon dioxide, and water as waste. Your body does, like running, thinking, growing, and staying warm.

Diagram 1 shows how cellular respiration works. It shows a digestive system that breaks down food into glucose, and then shows glucose entering the bloodstream and being carried to the cells, where it is used for energy.

Glucose from the food you eat and oxygen from the air you breathe enter the cell. Inside the cell, they undergo chemical reactions called cellular respiration (Diagram 2). This process releases energy, carbon dioxide, and water. The energy is used to power everything you do. The carbon dioxide and water are released as waste.

Cycling of Energy and Matter

Have you ever walked through a forest and thought about how everything is connected? The tall trees, the deer, the birds, and even the mushrooms growing on the ground all participate in the movement of energy and matter through the ecosystem.

It all starts with the sun. Plants, like trees and ferns, use energy from sunlight to make their own food in a process called photosynthesis. Inside their leaves are tiny parts called chloroplasts, which capture sunlight and use it to combine carbon dioxide from the air and water from the soil to make glucose (a type of sugar) and oxygen. The glucose stores energy from the sun and the oxygen is released into the air.

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MS LS1-6

MS LS1-7

Digital and Print

Reading Passages

Notes

Worksheets

Task Cards

Scroll Through

To take a peek inside!

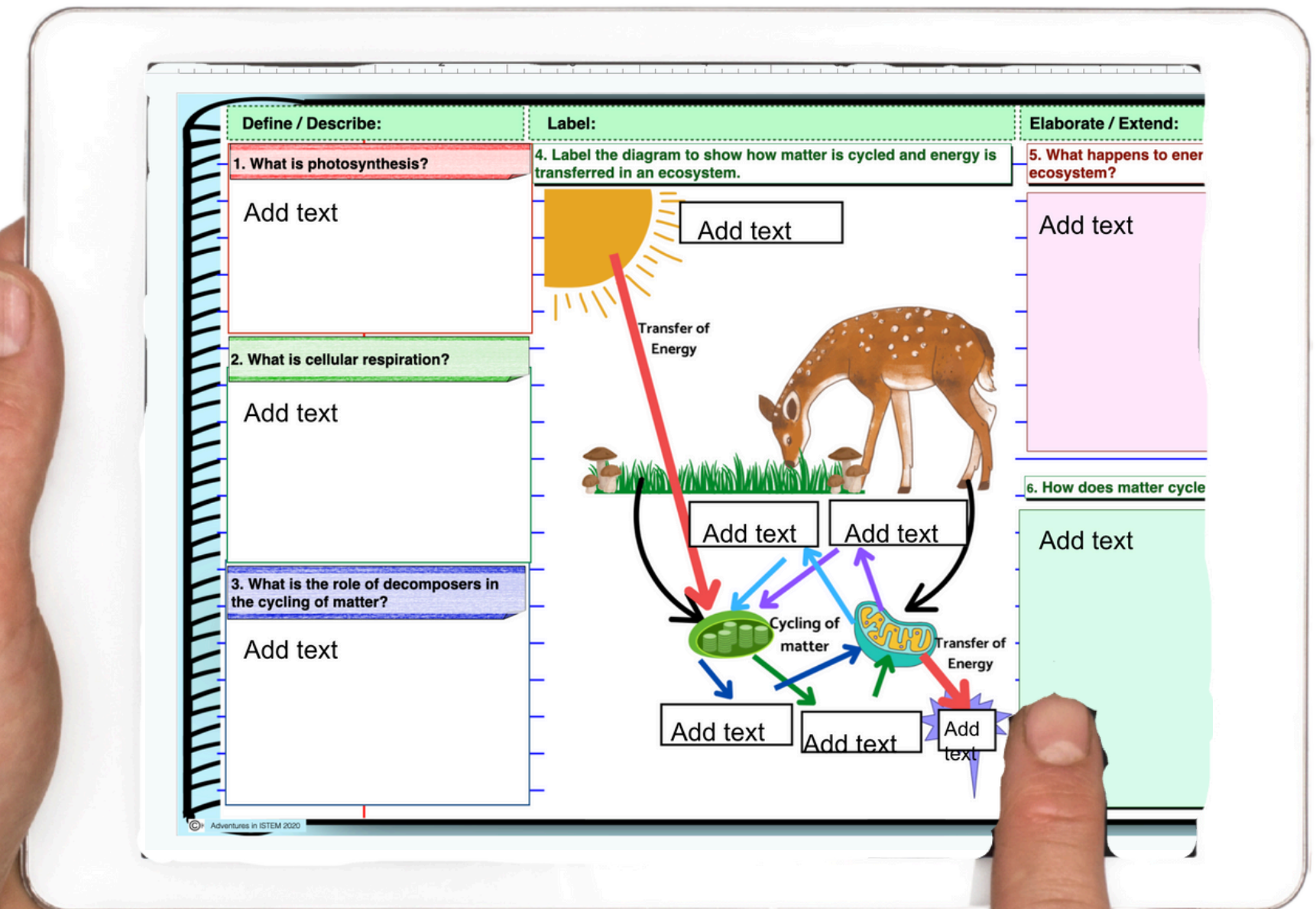
Help students learn about the cycling of matter and energy through an ecosystem with photosynthesis and cellular respiration. Then, test their comprehension with these easy to read science reading passages.

Resource *includes*

- ✓ 3 Reading Passages
- ✓ 3 Note-taking guides
- ✓ 3 Comprehension Worksheets
- ✓ 4 Task cards
- ✓ Answer key
- ✓ Digital version

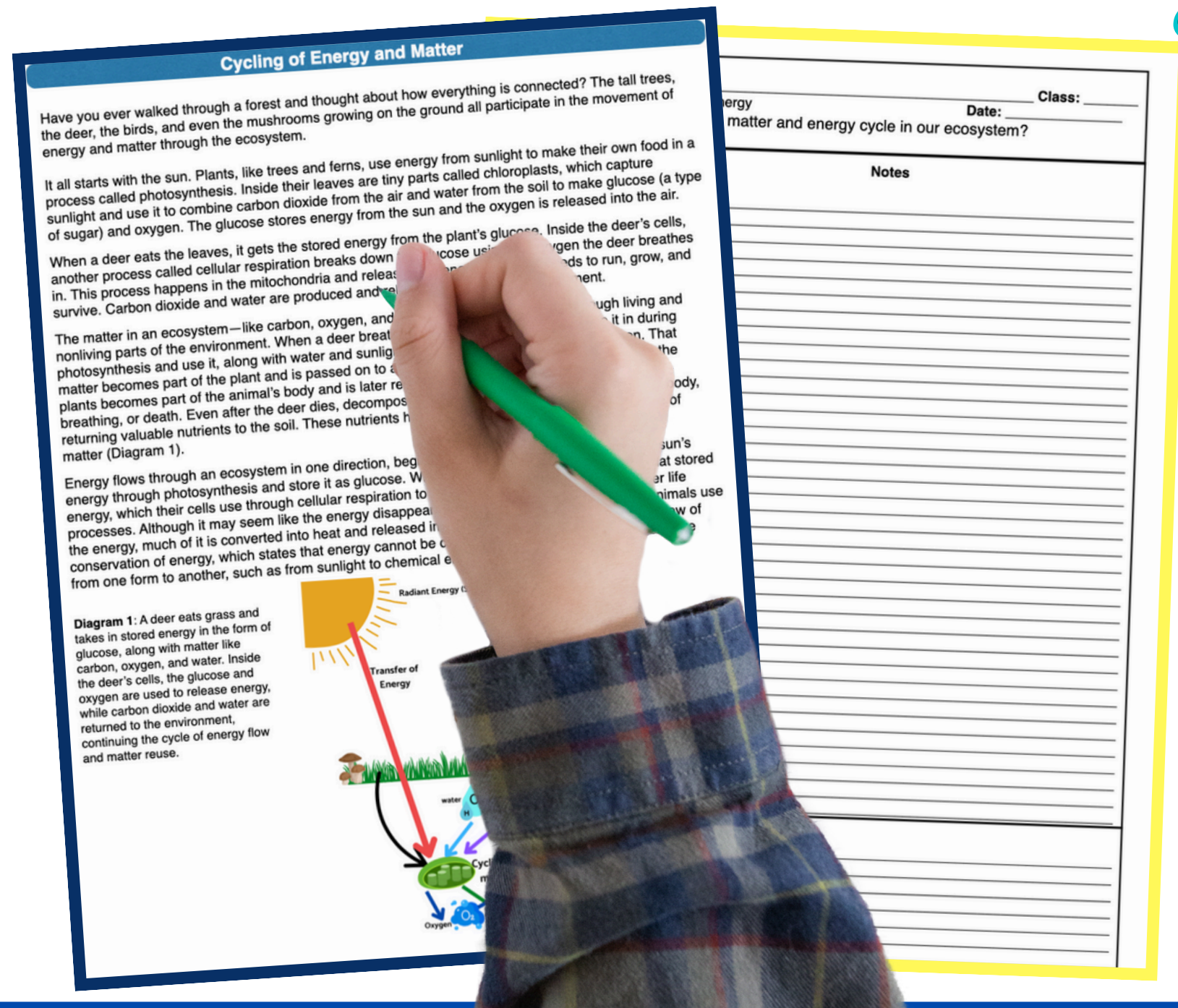
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Science Reading



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Topics Included



Photosynthesis



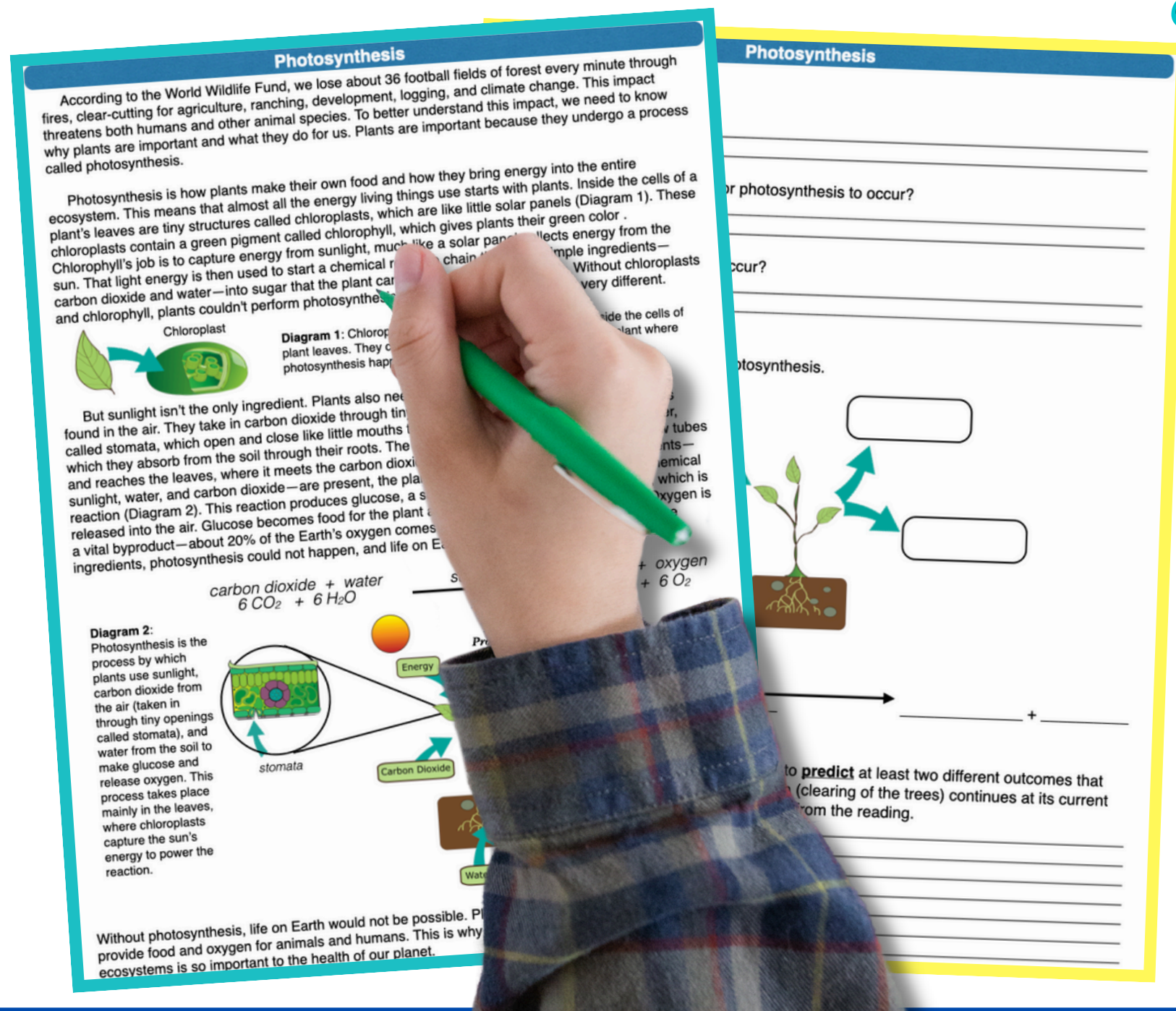
Cellular Respiration



Cycling of Matter and Energy

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Science Reading

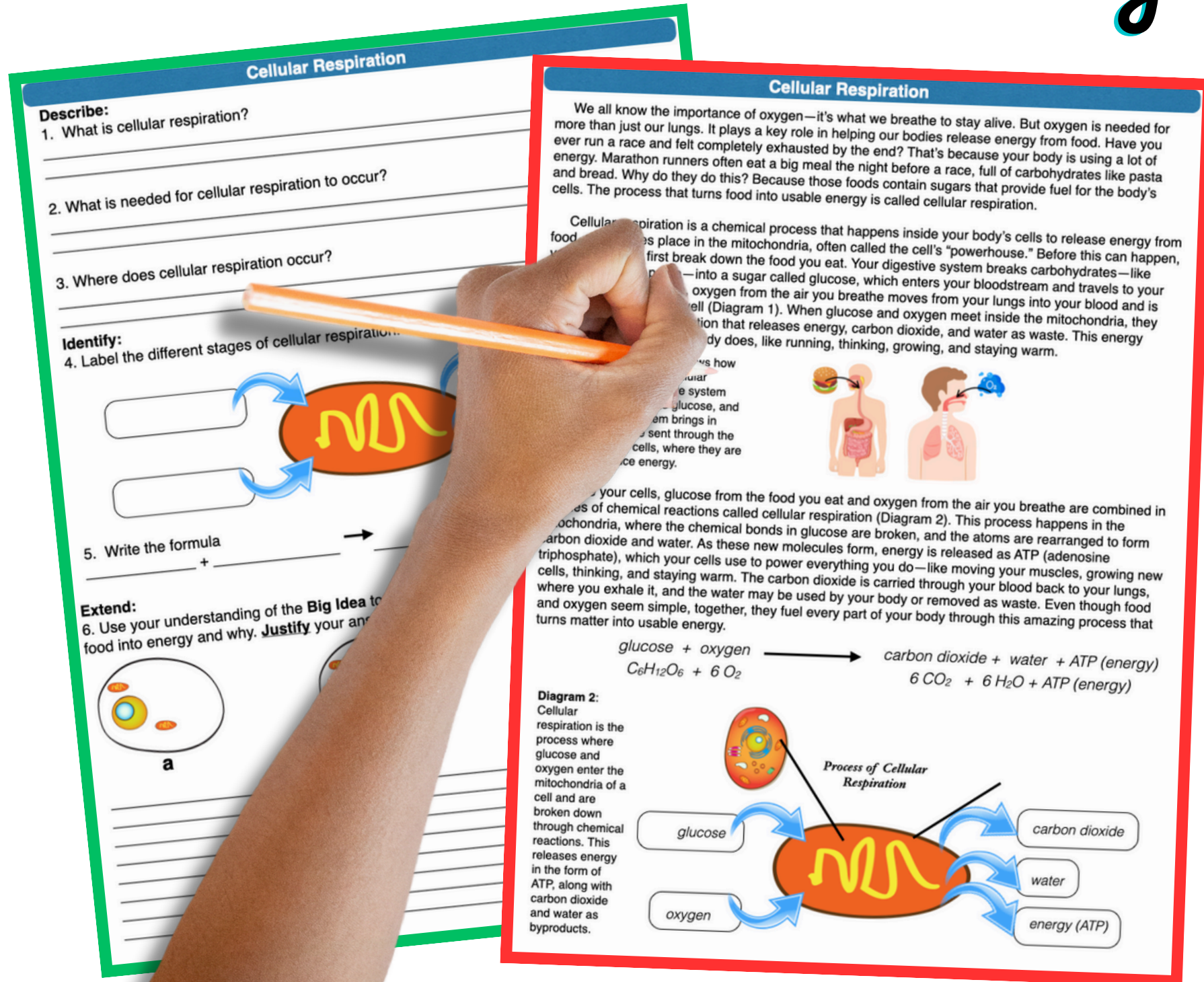


What Are *students* Doing?

- ✓ **Marking the text**
- ✓ **Filling in the guided note-taking template**
- ✓ **Reviewing and applying their knowledge**
- ✓ **Reinforcing their understanding**

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Science Reading



Different ways to use the *science readings*

✓ Substitute plan on days you will be out

✓ Introduction of the material at the beginning of the unit

✓ During the explain phase of the 5E model

✓ As part of a science station

✓ For reteach to reinforcing their understanding

✓ During the review at the end of the unit

Why? **SCIENCE READING PASSAGES?**

- ✓ **Increase science literacy in the classroom**
- ✓ **Simple passages to help students comprehend the information**
- ✓ **Note-taking template to help students interact with the reading**
- ✓ **Worksheets to review and apply their knowledge**
- ✓ **Reinforcement task cards to continue their understanding**


I like that this helped my students with increasing their reading stamina, and they were able to annotate and pull out the main ideas. - Brenda

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Science Reading



Check out what teachers just like you have said about this product:



I really enjoyed using this with my students. My students were able to read and complete the questions independently, which is not always the case. – Melissa



Our biology teacher and I share a lot of the same students this semester, so finding reading activities I can sprinkle into my English classes is a blessing! We discuss the passages together as a class and talk through any confusion students may have on the science concepts, as well as discussing the writing elements of the passage. Highly recommend!– Laura



My students really enjoyed this one. It broke down the concepts very easily in language that my students could understand. – Breanna

Each topic *includes*



One page science reading passage to teach the topic.



Notes with questions to guide their reading



Comprehension worksheets to review the information using multiple levels of questioning



Task cards to extend their learning and for extra review



Answer keys to easily check the student knowledge



Digital version for more flexibility on how to use the lesson



Lesson Design to help you differentiate the lesson in your classroom

The collage displays various educational resources for science topics. At the top left, a worksheet titled "Photosynthesis" includes a "Describe:" section with three questions: "1. What is photosynthesis?", "2. What materials are needed for photosynthesis to occur?", and "3. Where does photosynthesis occur?". Below these is an "Identify:" section with a diagram of a plant and the instruction "4. Label the different stages of photosynthesis." To the right, another worksheet titled "Cellular Respiration" features a "Question:" section asking "Why is oxygen important and how is it used in cellular respiration?". Below this is a "Notes" section with lined paper. In the center, a green-bordered worksheet titled "Cycling of Energy and Matter" contains a reading passage about energy flow in an ecosystem, starting with "Have you ever walked through a forest and thought about how everything is connected?". The passage discusses photosynthesis, cellular respiration, and the cycle of matter. Below the text is a diagram labeled "Diagram 1: A deer eats grass and takes in stored energy in the form of glucose, along with matter like carbon, oxygen, and water. Inside the deer's cells, the glucose and oxygen are used to release energy, while carbon dioxide and water are returned to the environment, continuing the cycle of energy flow and matter reuse." The diagram shows a sun, a plant, a deer, and arrows indicating the flow of energy and matter. At the bottom right, a digital presentation is shown on a laptop screen. It has a title "Directions: 1. Answer the questions" and two columns of text boxes. The left column contains a diagram of a cell with a virus and the text "A virus attacks the chloroplasts in plant cells. What would happen if all the chloroplasts in the cell were destroyed?". The right column contains a diagram of a cell and the text "You look through a microscope and notice that the cell has a nucleus and a cell wall. What other characteristics do you need to know in order to determine if it is a prokaryote or a plant cell?".

HOW TO USE THE RESOURCE IN

3 simple steps

1


Print the PDF version, make copies, and hand out to students

2

Use the digital version by clicking the titles in the RED BOX to make your own copy (found at the end of the PDF)

3

Share the resource with your students using your favorite LMS (Google Classroom, Powerschool (schoolology), Canva...)



**Interactive Digital Flip Book**

Teachers Guide

What You Will Need To Get Started:

- Download link for the Google Resource by clicking on the titles in the red box

Cell Energy Digital Flip Book Student
Cell Energy Digital Flip Book Teacher
- Access to the Internet and a Google Account (Free)
- Google accounts or Microsoft OneDrive accounts for your students to save their work
- Open the file on your Google Drive. The link will prompt you to make a copy


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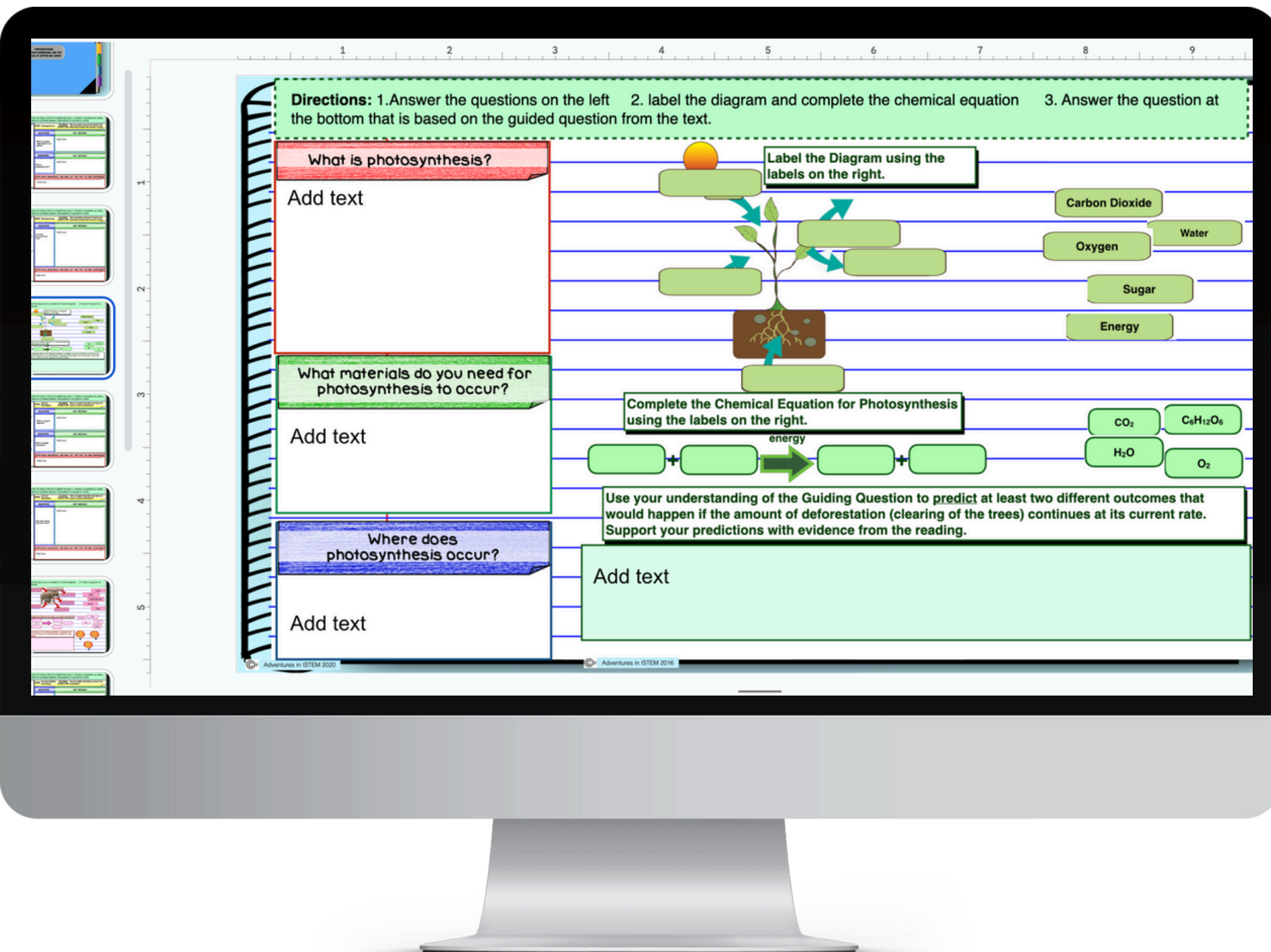
3. Download right away

Download

4. Use with your class

5. Leave a review on your My Purchases page to get reward points to spend on new resources!

Leave a review



Save Money and Grab the Life Science Bundle

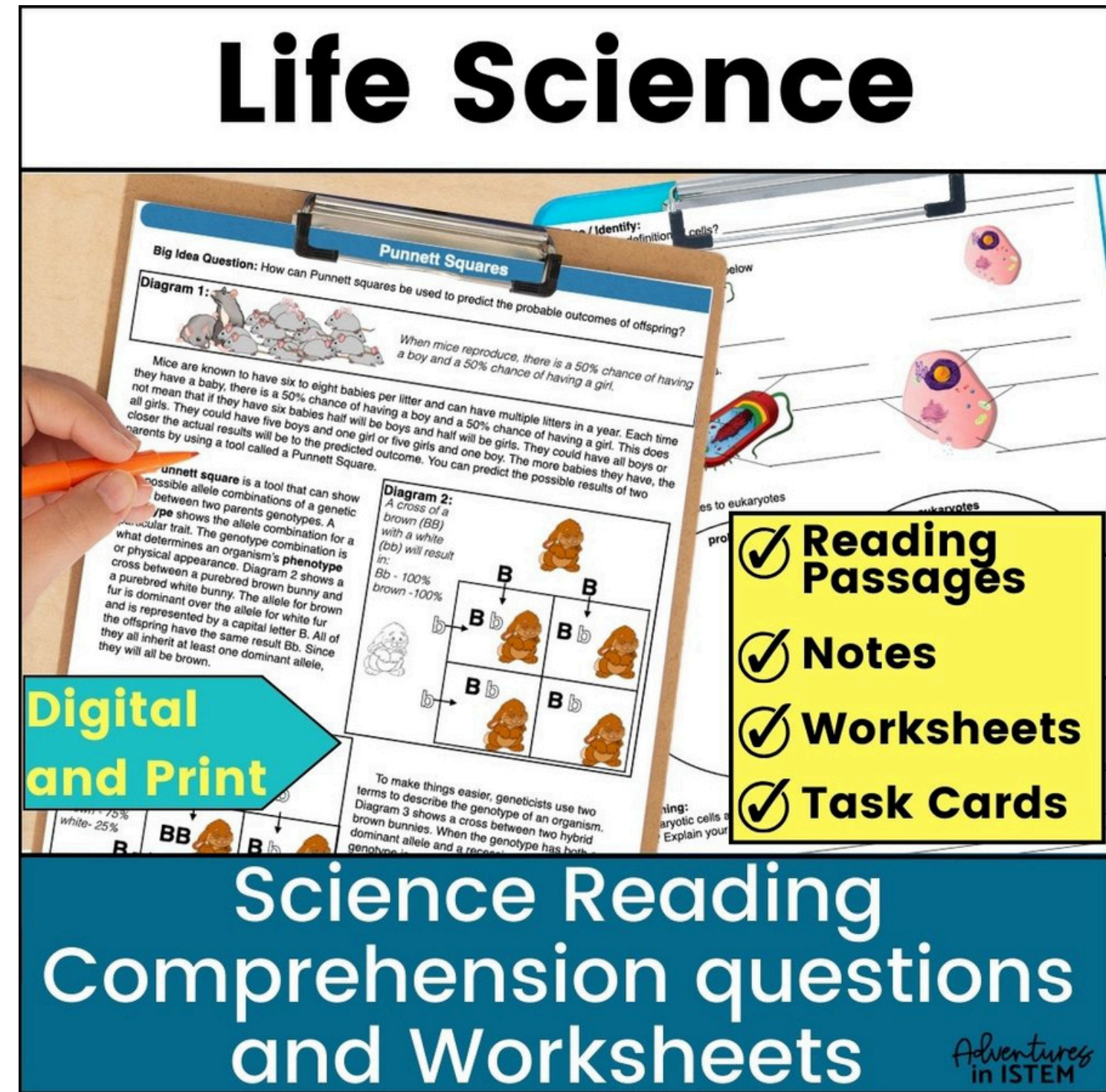
Life science readings with notes and comprehension worksheets all together.

This bundle covers:

- ✓ Most of NGSS MS-LS1 (Cells, Photosynthesis, Cellular respiration)
- ✓ NGSS MS-LS2 (Ecosystems)
- ✓ NGSS MS-PS3 (Heredity)
- ✓ NGSS MS-PS4 (Evolution)

“My students and I absolutely loved this resource!!! The way this was planned out with the reading, diagrams, and questions was perfect. I mainly used this with my students but they used it one day with a substitute and they wrote to tell me how great it was! (I think they thought I created it so I have to tell them otherwise!)”

Life Science



Big Idea Question: How can Punnett squares be used to predict the probable outcomes of offspring?

Diagram 1: When mice reproduce, there is a 50% chance of having a boy and a 50% chance of having a girl. Mice are known to have six to eight babies per litter and can have multiple litters in a year. Each time they have a baby, there is a 50% chance of having a boy and a 50% chance of having a girl. This does not mean that if they have six babies half will be boys and half will be girls. They could have all boys or all girls. They could have five boys and one girl or five girls and one boy. The more babies they have, the closer the actual results will be to the predicted outcome. You can predict the possible results of two parents by using a tool called a Punnett Square.

Diagram 2: A cross of a brown (BB) with a white (bb) will result in: Bb - 100% brown - 100%

Bundle Contents:

- ✓ Reading Passages
- ✓ Notes
- ✓ Worksheets
- ✓ Task Cards

Science Reading Comprehension questions and Worksheets

Adventures in ISTEM

Not Ready for the Bundle or Don't teach all of those Topics? Check out these other options

Ecosystems

NGSS MS-LS2

- ✓ Reading Passages
- ✓ Notes
- ✓ Worksheets
- ✓ Task Cards

Digital and Print

Science Reading Comprehension questions and Worksheets Bundle

Adventures in ISTEM

Covers All NGSS MS-LS2
Ecosystems

Heredity

NGSS MS-LS3

- ✓ Reading Passages
- ✓ Notes
- ✓ Worksheets
- ✓ Task Cards

Digital and Print

Science Reading Comprehension questions and Worksheets Bundle

Adventures in ISTEM

Covers All NGSS MS-LS3
Heredity

Evolution

NGSS MS-LS4

- ✓ Reading Passages
- ✓ Notes
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- ✓ Task Cards

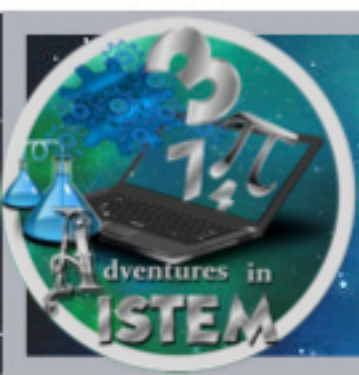
Digital and Print

Science Reading Comprehension questions and Worksheets Bundle

Adventures in ISTEM

Covers All NGSS MS-LS4
Evolution

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Free Sample

You can print the following pages for a free sample of what a science reading looks like and how you could use it in your classroom. Click the title in the red box for the digital version of the reading.

What You Will Need To Get Started:

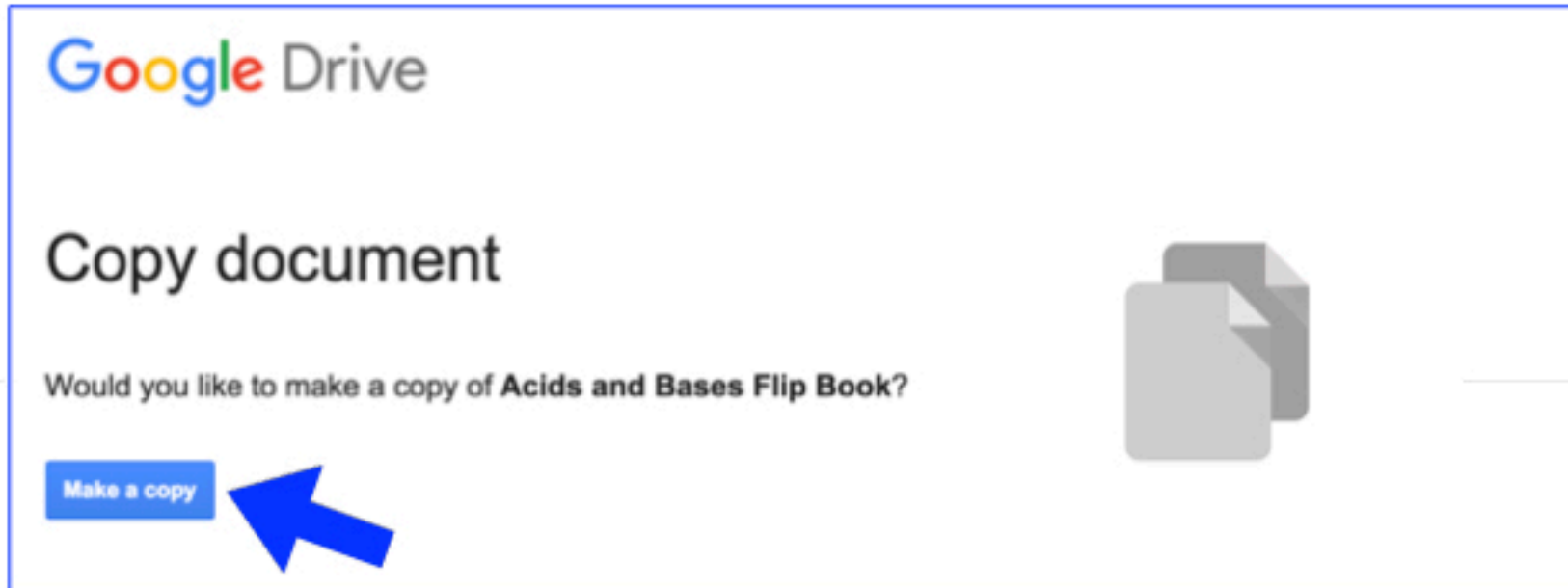
1. Download link for the Google Resource by clicking on the titles in the red box

Outer Planets Guided Reading Digital Notes

2. Access to the Internet and a Google Account (Free)

3. Google accounts or Microsoft OneDrive accounts for your students to save their work

4. Open the file on your Google Drive. The link will prompt you to make a copy



5. This new copy is now yours to edit and share with your students

6. Printer access if you choose to print the finished product as an actual flip book

Outer Planets

Big Idea Question: *Why are they called gas giants? What are some key characteristics?*

The outer solar system is made up of four gas giants. They are Jupiter, Saturn, Uranus, and Neptune. Since they are so far away from the Sun, they are able to hold onto their gas atmospheres and are made up mostly of gas but have solid rocky cores. Because they are so massive, they have a greater gravity than the terrestrial planets. They are also much colder than the terrestrial planets since they are so far away from the Sun. They also all have rings, and many planetary satellites.





Basic facts:

Jupiter: Largest planet in our solar system. Its mass is twice as much as the other seven planets combined. Now that's massive! It is made up mostly of hydrogen gas, and it is known for its massive storm—which is more like a hurricane that is the size of three Earths put together. Since it is made up of mostly gas, it is able to spin around pretty quickly. In one Earth day, Jupiter will have had three days. Now that's fast! It also has the most planetary satellites. To date, the number is at 67. It has the most gravity of all the planets.

Saturn: This planet is known for its many rings that circle it which are made of gas and ice. It is the least dense of all planets. In fact, if you put Saturn in a tub of water, it would actually float. It's amazing that something that massive could actually float. Crazy. Its atmosphere is mostly helium and hydrogen and its gravity pull could tear a comet apart if one got close enough.

Uranus: This planet does not reflect much light since it is so far from the sun. We know about it from our space probes that we sent out into space. The methane gas in its atmosphere is what gives it its greenish color. The rotation of Uranus is unique because it is so tilted it actually spins on its side. Its poles would be found in the same location as our equator, weird. This rotation causes one pole to be in complete darkness for half of its revolution. Could you imagine having night last half a year and a day lasting the other half?

Neptune: The outermost planet in the solar system. Its blue color is caused by its methane gas in its atmosphere. There is a hurricane-like storm that is the size of Earth. It has the fastest winds of any of the planets moving at more than 1,000 km/h (a high wind on Earth is considered 100km/hr).

				
Distance from Sun	5 AU	9 AU	19 AU	30 AU
Rotation (day/night)	9 hours	10 hours	17 hours	16 hours
Revolution (year)	11 Earth years	29 Earth years	83 Earth years	163 Earth years
Diameter (size)	142,984 km	120,536 km	51,118 km	49,528 km
Density	1.33 g/cm ³	0.69 g/cm ³	1.27 g/cm ³	1.64 g/cm ³
Gravity	236% of Earth's	92% of Earth's	89% of Earth's	112% of Earth's
Planetary Satellites	67	62	27	14

The planet information is current as of April 2015

Name: _____ **Class:** _____

Topic: Outer Planets

Date: _____

Big Idea Question: Why are they called gas giants? What are some key characteristics?

Questions

What do the outer planets have in common?

What is a unique characteristic about each outer planet?

Which planet is the most similar to Jupiter?

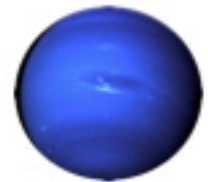
Notes

Summary:

Outer Planets

1. Comparing the planets: Fill in the data table

	1	2	3	4
place the planets in order from closest to the Sun to furthest from the Sun				
place the planets in order from shortest day to longest day				
place the planets in order from shortest year to longest year				
place the planets in order from smallest size to largest size				
place the planets in order from least dense to most dense				
place the planets in order from least amount of planetary satellites to most amount of planetary satellites				



2. Using Patterns: Compare the number of planetary satellites to the diameter, location from the Sun, and the density. Which characteristic do you think has the most influence on how many planetary satellites an outer planet will have?

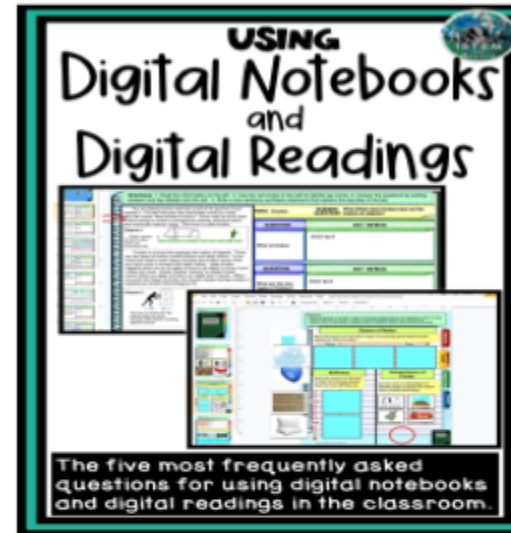
3. Why do you think the characteristic you choose in question 2 has more influence on the number of planetary satellites than the other characteristics? Explain.

4. Thinking beyond the table, what is another factor that could be influencing the number of planetary satellites the outer planets have? Explain.

Digital Resources

Using Digital Products?

If you are new to using digital lessons than I recommend to check out my blog post that contains the most frequently asked questions. Click the picture for the link.



I would also recommend checking out my Google Slide videos that demonstrate how to drag and drop pieces, write in the text boxes, add objects, and more. These are short videos that can easily be shared with students and parents. Click the picture for the link



Teaching STEM Through Inquiry

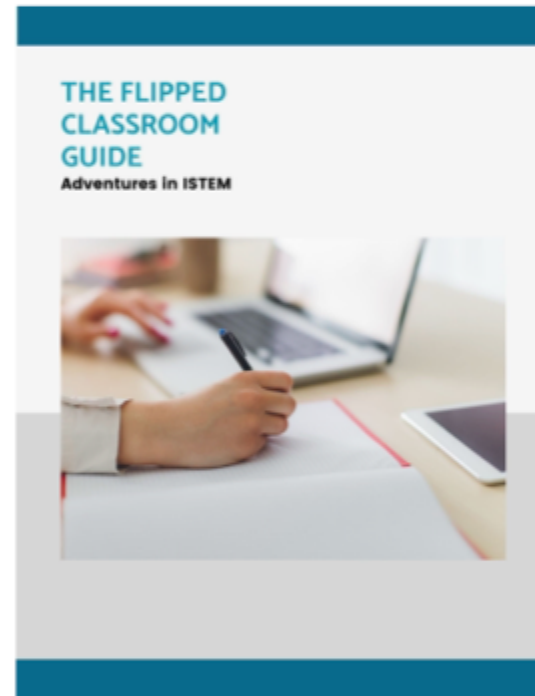
Thank You

Thank You for taking the time to visit my store and downloading one of my products. I hope you find this resource a useful tool for your classroom. I appreciate your support and look forward to your feedback.

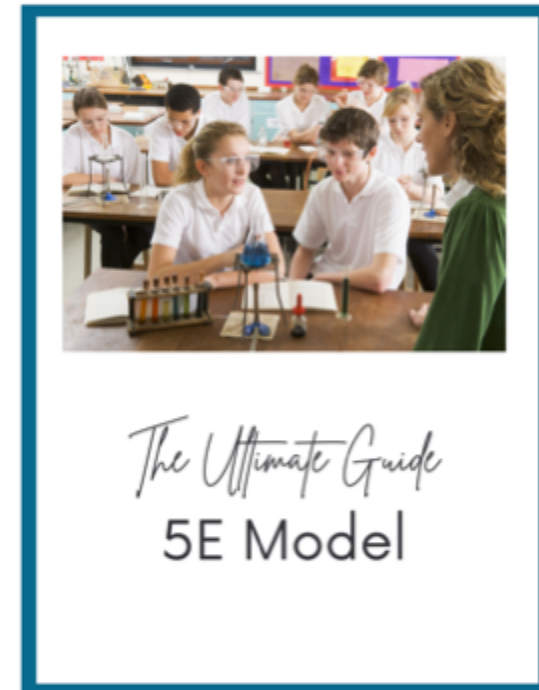
Giving Back

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