

ELECTRIC AND MAGNETIC FORCES

Science Reading

Scroll Through

To take a peek inside!

Help students learn about Electric and Magnetic Forces and test their comprehension with these easy to read science reading passages.

Electromagnetism

What happens when you switch on a fan or use a hand-cranked flashlight? These are examples of electromagnetism, where electricity and magnetism work together to power our daily lives. Electromagnetism is the interaction between electric currents and magnetic fields. The movement of tiny particles called electrons inside atoms. When these electrons move, they create magnetic fields, a principle that underlies many everyday objects.

In an electric circuit, the flow of electrons through wires creates magnetic fields. When a wire is connected to a battery, it generates a circular magnetic field around the wire, with the field's direction determined by the current's direction. Coiling the wire into loops, or a solenoid, concentrates the magnetic field. This setup allows electromagnets (diagram 1), like those in junkyard cranes, to lift heavy metal objects efficiently. A strong electric current passing through the coil turns the metal core into a magnet that attracts and lifts heavy metal objects. The magnetic field disappears once the current is turned off, and the metal core loses its magnetism.

Diagram 1: Electromagnet

Closed system: the electromagnet attracts metal objects

Magnetic Forces

What makes your headphones produce sound when connected to your device? It's all about magnetic forces, which, though invisible, are vital in our daily lives. Magnetic forces are the push or pull between objects due to their magnetic fields. Inside your headphones, small magnets, objects that produce a magnetic field, interact with electrical signals to generate energy that converts into sound waves. This process allows you to enjoy your favorite music. Magnets also attract certain metals like iron. Suppose you've ever played with a magnet and seen it pull small metal objects toward it. In that case, you've witnessed magnetic attraction, a fundamental aspect of magnetic forces in various applications, from picking up paper clips to powering electric motors.

Every magnet has two poles: North (N) and South (S). These poles either attract or repel each other. Try pushing two magnets together with the same poles facing each other—they go away due to the repulsive force between like poles. Magnets also create invisible fields around them called magnetic fields, which affect nearby objects. Iron filings around a magnet can help visualize these fields, showing their shape and direction. The Earth's magnetic field influences compass needles, aiding global navigation.

Diagram 2: Magnetic Forces

Opposites attract

Likes repel

A compass is a classic example of magnetic forces in action. The needle inside a compass is a small magnet that aligns with the Earth's magnetic field, helping sailors, explorers, and hikers determine direction. The Earth's magnetic poles (diagram 2). This alignment aids navigation by providing a reliable reference direction. Additionally, magnetic forces are harnessed in navigation systems used in aircraft and ships. Modern advanced magnetic sensors offer precise location data, enhancing safety and accuracy. In modern technology, magnetic forces are integral to the functioning of computer hard drives, where tiny magnetic fields store vast amounts of data, enabling us to save and retrieve digital information efficiently.

Diagram 2: Magnetic compass

Earth's magnetic field

A magnetic compass aligns with Earth's magnetic field

Magnets vary in strength, from those in everyday items to powerful magnets in MRI machines used for medical imaging. In MRI machines, strong magnets create detailed images of the inside of the human body, aiding in diagnosis and treatment. When magnets attract or repel each other, they store potential energy, like a compressed spring released when they separate. This principle is used in magnetic levitation (maglev) trains, where magnetic forces lift and propel the train, reducing friction and allowing high-speed travel. Not all materials respond to magnetic forces the same way. Iron and steel are strongly attracted to magnets, while wood and plastic are not. There are also temporary magnets that only exhibit magnetism in a magnetic field and permanent magnets that retain their magnetism. Temporary magnets are used in electromagnets for cranes that move scrap metal, while permanent magnets are found in everyday items like refrigerator magnets and electric motors. In headphones and speakers, magnets convert electrical signals into sound by interacting with the electrical currents to create vibrations that produce sound waves, allowing us to listen to music and audio from our devices.

Magnetic forces are crucial in our daily lives, powering devices and aiding navigation. Understanding these forces can lead to new technologies and innovations that shape our future. Whether the magnets in our headphones or the Earth's magnetic field guiding a compass, magnetic forces are the invisible but powerful influences surrounding us.

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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

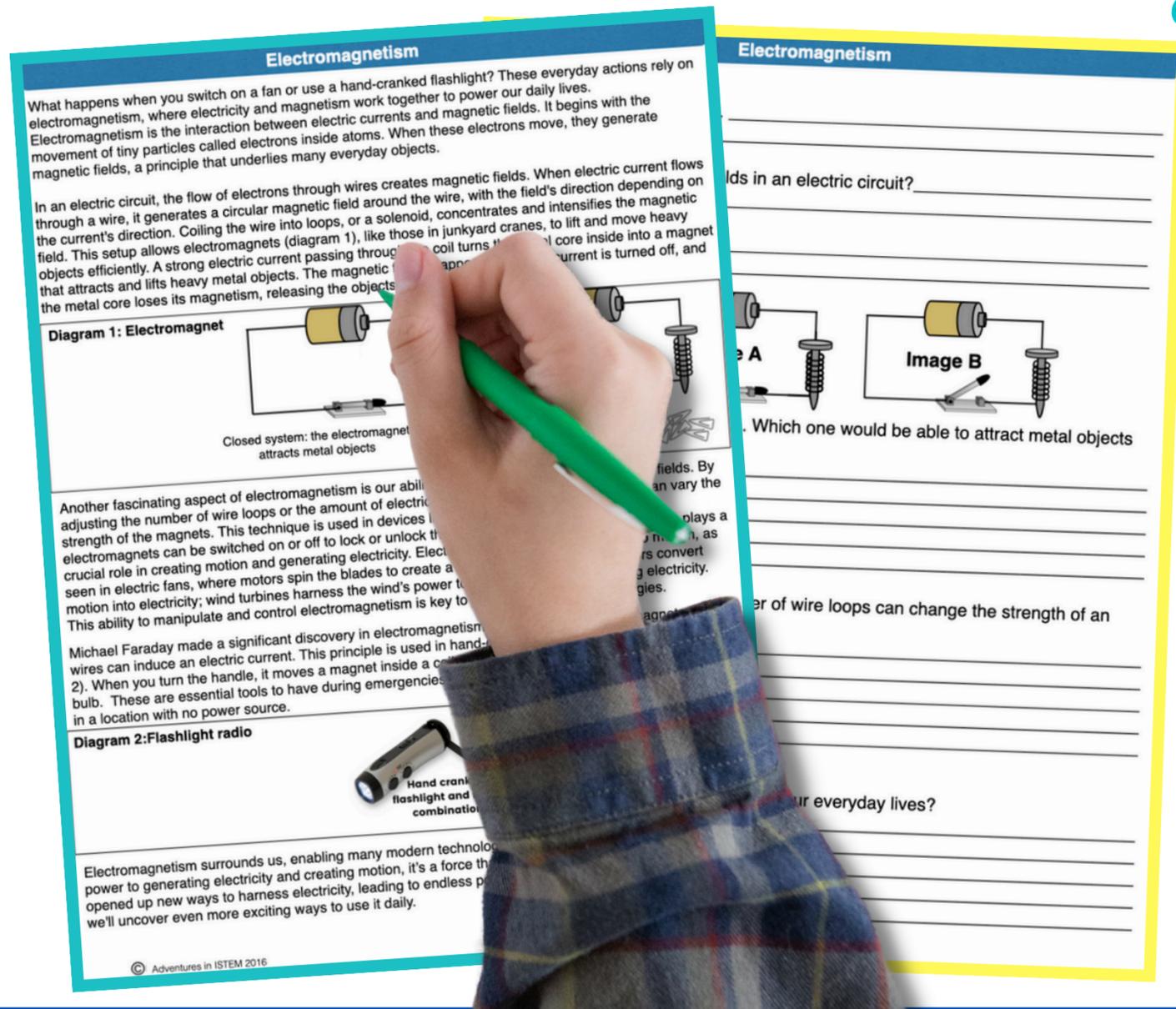


“This resource was absolutely perfect for when I was out sick with covid for multiple days. The content is exactly what I wanted to cover with my students, easy for a substitute to implement, and I was happy knowing my students’ time was being used productively!

Thank you! “- Emily

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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

Magnetic Forces

Define and Describe:

1. Define magnetic forces.
2. What are the two poles of a magnet called?
3. What creates the magnetic fields around magnets?

Identify if the magnets will attract or repel each other.





4.

5.

Explain:

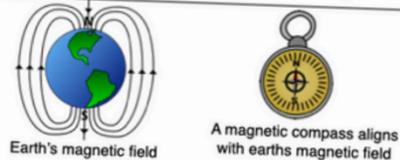
7. What are the differences between temporary and permanent magnets and their applications?
8. What is the importance of magnets in our everyday lives?

Magnetic Forces

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Magnetic forces are crucial in our daily lives, powering devices and aiding navigation. Understanding these forces can lead to new technologies and innovations that shape our future. Whether the magnets in our headphones or Earth's magnetic field guiding a compass, magnetic forces are the invisible but powerful influences surrounding us.

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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

ELECTRIC AND MAGNETIC FORCES

Science Reading



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



"I have incorporated these into my regular lessons and could not be more pleased. They are thorough, engaging and fun. I am very pleased with this purchase." Rahim



"Perfect sub activities! Bought the bundle so I would have something for every unit. If there was nuclear section that would be icing on the cake! :) Maybe in the future?" Karis



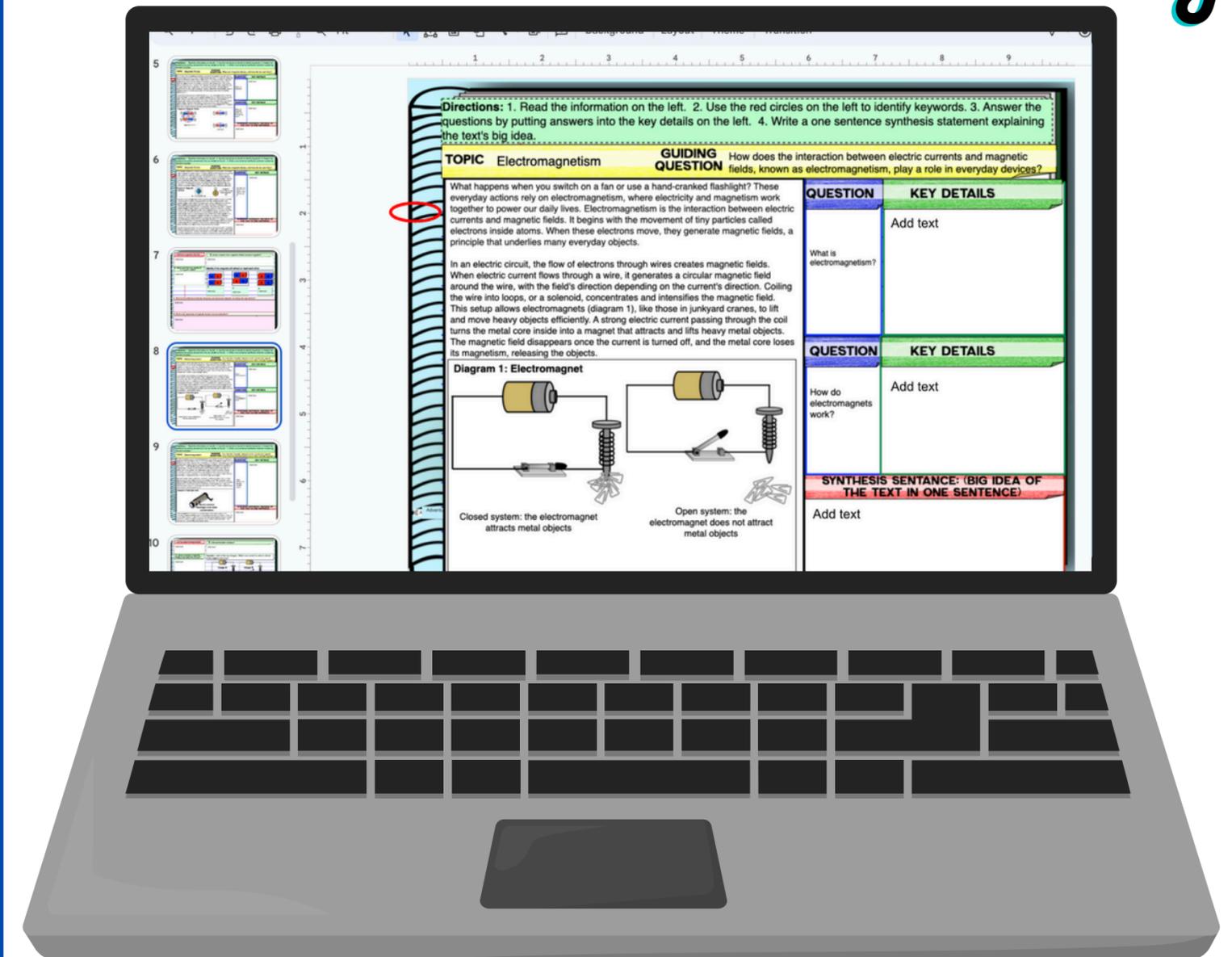
"This was a wonderful and engaging resource. My students were able to take a lot from it, and I loved how easy it was to prep it out." - Christine

Resource *includes*

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

ELECTRIC AND MAGNETIC FORCES

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ELECTRIC AND MAGNETIC FORCES

Science Reading

Electromagnetism

What happens when you switch on a fan or use a hand-cranked flashlight? These everyday actions rely on electromagnetism, where electricity and magnetism work together to power our daily lives. Electromagnetism is the interaction between electric currents and magnetic fields. It begins with the movement of tiny particles called electrons inside atoms. When these electrons move, they generate magnetic fields, a principle that underlies many everyday objects.

In an electric circuit, the flow of electrons through wires creates magnetic fields. When electric current flows through a wire, it generates a circular magnetic field around the wire, with the field's direction depending on the current's direction. Coiling the wire into loops, or a solenoid, concentrates and intensifies the magnetic field. This setup allows electromagnets (diagram 1), like those in junkyard cranes, to lift and move heavy objects efficiently. A strong electric current passing through a coil turns the coil into a magnet that attracts and lifts heavy metal objects. The magnetic field disappears when the current is turned off, and the metal core loses its magnetism, releasing the objects.

Diagram 1: Electromagnet



Closed system: the electromagnet attracts metal objects

Another fascinating aspect of electromagnetism is our ability to vary the strength of the magnets. By adjusting the number of wire loops or the amount of electric current, we can vary the strength of the magnets. This technique is used in devices like door locks, as electromagnets can be switched on or off to lock or unlock the door. Electromagnets also play a crucial role in creating motion and generating electricity. Electric motors convert electricity into motion, as seen in electric fans, where motors spin the blades to create a breeze. Wind turbines harness the wind's power to generate electricity. This ability to manipulate and control electromagnetism is key to many modern technologies.

Michael Faraday made a significant discovery in electromagnetism: when electric current flows through wires, it can induce an electric current. This principle is used in hand-cranked flashlights (diagram 2). When you turn the handle, it moves a magnet inside a coil, which generates electricity to power the flashlight bulb. These are essential tools to have during emergencies, especially in a location with no power source.

Diagram 2: Flashlight radio



Hand crank flashlight and radio combination

Electromagnetism surrounds us, enabling many modern technologies. From power to generating electricity and creating motion, it's a force that has opened up new ways to harness electricity, leading to endless possibilities. As we continue to explore, we'll uncover even more exciting ways to use it daily.

Class: _____
Date: _____

Notes

Electric forces, and how do we use them?

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Topics Included

Electric Forces

Magnetic Forces

Electromagnetism

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:

1. 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
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

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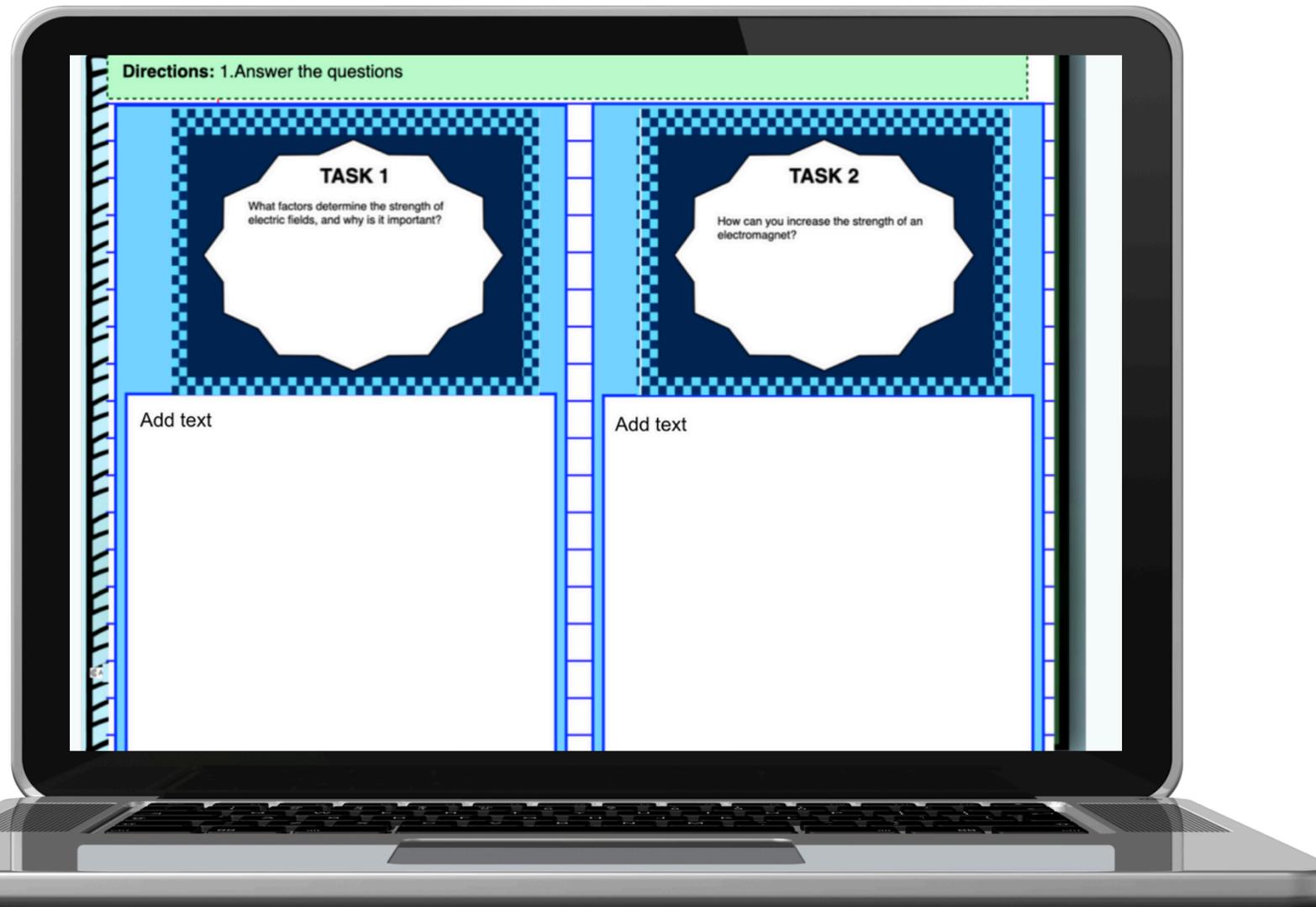
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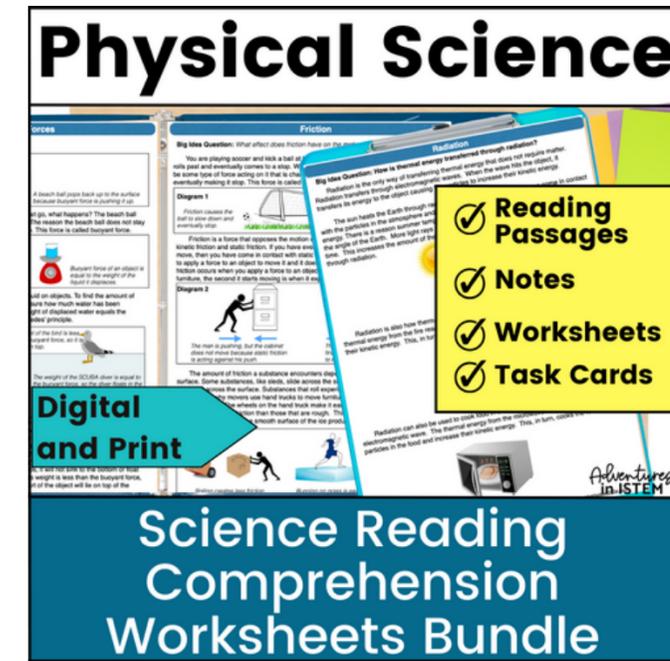
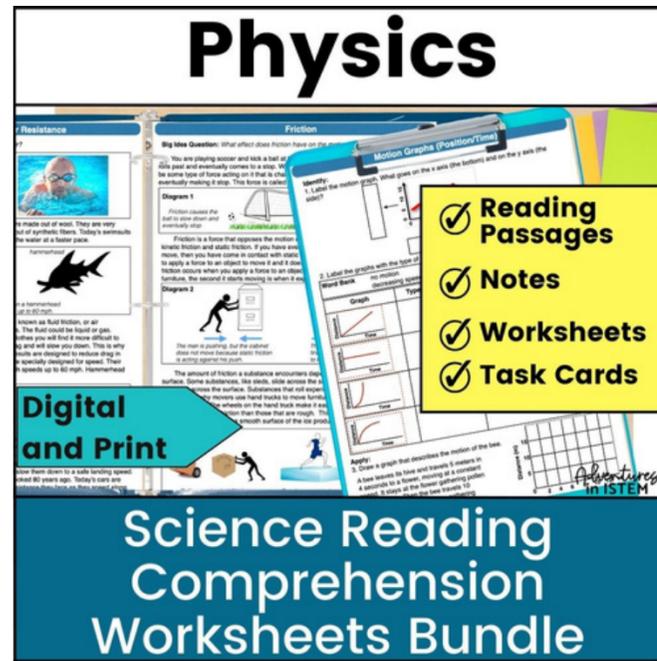
4. Use with your class

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 a Bundle



Space Science Reading Comprehension Passages Topics Covered:

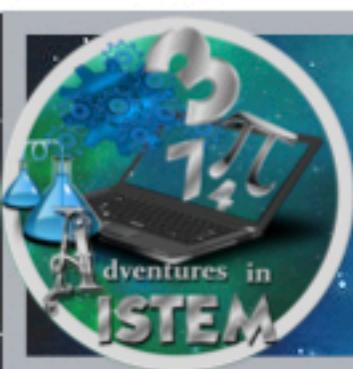
- Speed
- Velocity
- Acceleration
- Types of Forces
- Newton's Laws
- Waves
- Energy

Physical Science Reading Comprehension Passages Units Covered:

- Chemistry
- Matter
- Force
- Motion
- Energy
- Waves

“ My students and I loved this resource. It really helped enhanced their learning and gave us some different options while learning about space. - Julie C. ”

“ I have incorporated these into my regular lessons and could not be more pleased. They are thorough, engaging and fun. I am very pleased with this purchase.- Rahim ”



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:

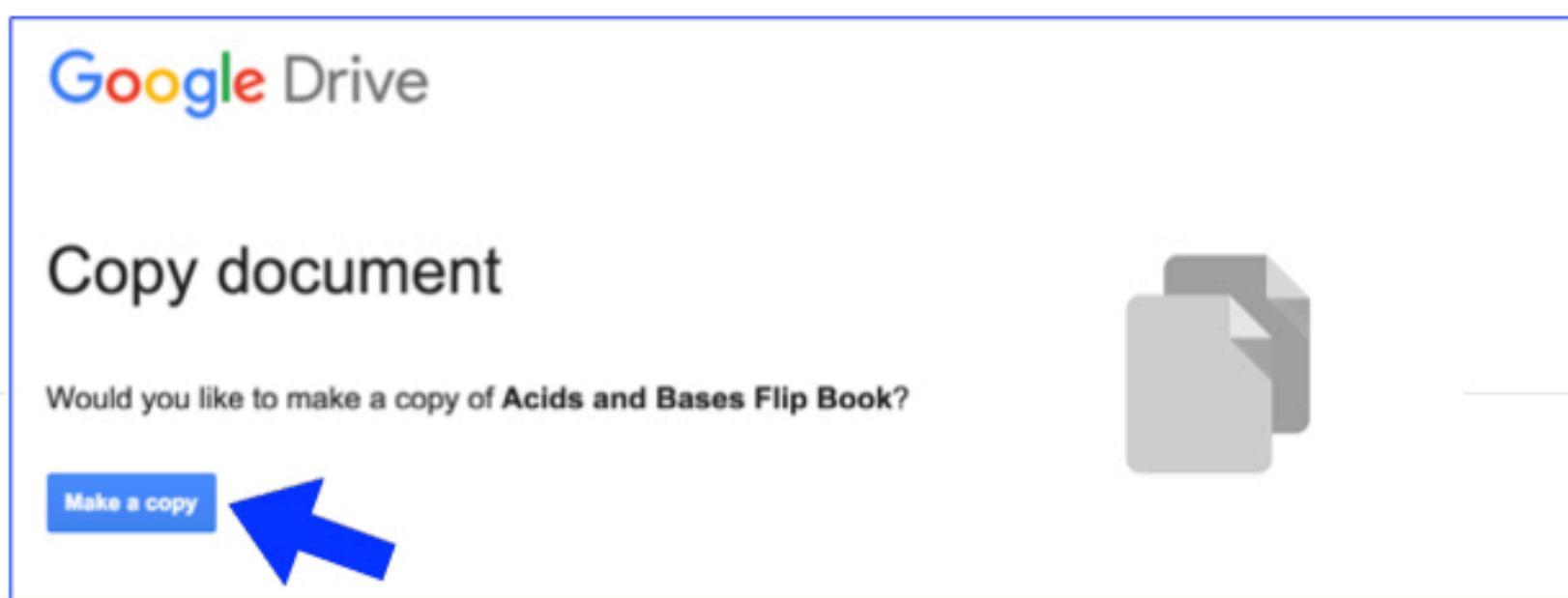
1. Download link for the Google Resource by clicking on the titles in the red box

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 know 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).

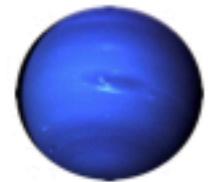
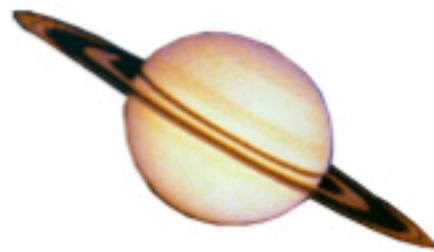
				
Distance from Sun	5 AU	9 AU	19 AU	30 AU
Rotation (day/night)	9 hours	10 hours	17 hours	16 hours
Revolution (year)	11 Earth years	29 Earth years	83 Earth years	163 Earth years
Diameter (size)	142,984 km	120,536 km	51,118 km	49,528 km
Density	1.33 g/cm ³	0.69 g/cm ³	1.27 g/cm ³	1.64 g/cm ³
Gravity	236%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

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?

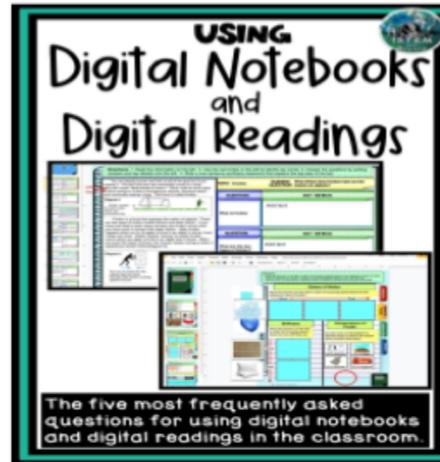
3. Why do you think the characteristic you choose in question 2 has more influence on the number of planetary satellites than the other characteristics? Explain.

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



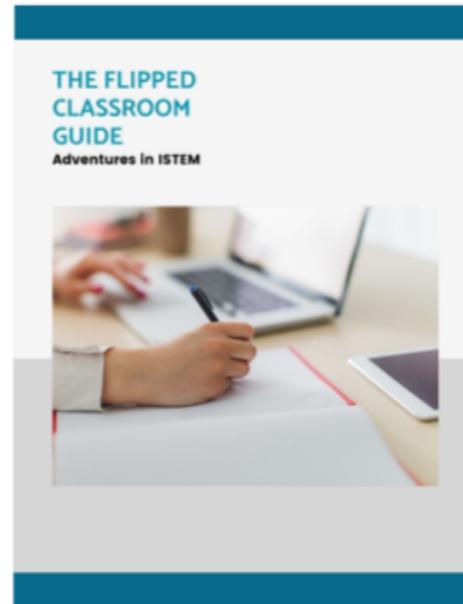
Thank You

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.

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Grab the free guides (flipped classroom guide / 5E model guide) to help empower students and then receive weekly tips, strategies, ideas, and freebies delivered right to your inbox.



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