Short Reading Passages

Longitudinal and Transverse Waves

Big Idea Question: What is the difference between longitudinal and transverse waves?

Have you ever sat in a bounce house or on a trampoline while someone was bouncing? You are moving in an up and down motion. This type of motion is typical of transverse waves. Transverse waves are waves that travel at right angles to the direction of their motion. They look like little rollercoaster hills as they go up and down. The particles in them travel perpendicular to the direction of the wave. These type of waves can spread through solids but not liquids and gases. You can demonstrate a transverse wave using some rope. To start, tie one end of the rope to an object. Then, hold the other end of the rope. Last, move your hand up and down. The motion the rope makes represents the motion of transverse waves. You can
Some examples of transverse waves
waves.

**Diagram 1: Transverse waves mov
up and down.**

Longitudinal waves have a diffe
give you a rocking back and forth mot
direction of their motion. The waves
particles back and forth along the pat
solids, liquids, and gas. If you have e
longitudinal waves in action. As the s
resting state, the coils in the spring co
You can see a picture of longitudinal
waves would be sound waves, earthq

**Diagram 2. Longitudinal waves mo
back and forth along the path of m**

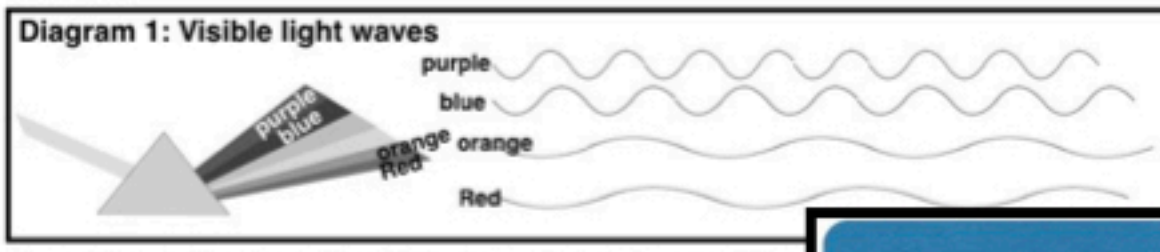
Types of Waves

Big Idea Question: What are the characteristics of the different types of waves?

There are many different types of waves. Some of them are transitional waves and some of them are longitudinal waves. Listed below are some of the main types of waves.

Visible Light Waves: One type of transverse wave is light waves. Light waves move up and down at various rates. The length of wave determines the color we see. Long wavelengths correspond to the red side of the spectrum while short wavelengths are on the blue side of the spectrum. Scientists use wavelengths when determining if objects in space are moving toward us or away from us. Those objects that are moving toward us have a blue shift while objects that are moving away from us have a red shift. This shift is one piece of evidence used to support the theory that the universe is still expanding.

Diagram 1: Visible light waves

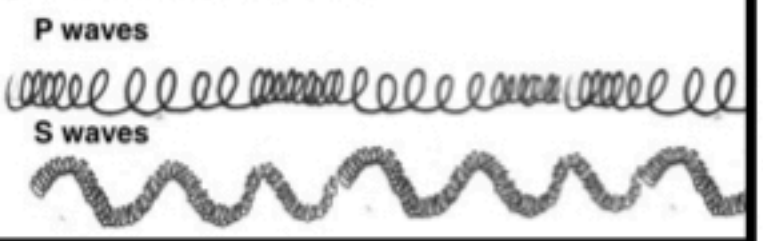


Sound Waves: One type of longitudinal wave is sound waves. When
waves through the air. The vibration can happen in many ways. You
speak. A stereo speaker vibrates when sound comes out of it. You ca
ear drum. When the sound vibrates your ear drum it goes into your i
brain. You can also feel the vibration of loud sound waves as they pe
sound correlates to the waves frequency. Low frequency gives a low
high pitch.

Diagram 2: Sound waves

Earthquake Waves: Earthquakes produce two types of body waves,
waves. Primary waves, otherwise known as P waves, travel the faste
that push and pull the rock and liquid core as they travel through ther
as S waves, are transverse waves. They can only travel through soli
perpendicular to the way the wave is traveling. Scientists used the di
S waves to determine that Earth had a liquid core. Scientists also us
way to discover the location of the Earthquakes epicenter.

Diagram 3: Earthquake waves

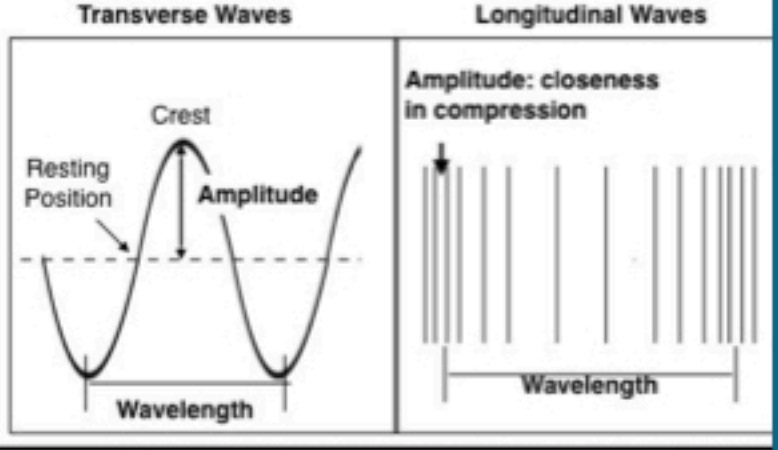


Measuring Wa

Big Idea Question: How are waves measured?

Quicksilver's in Memory of Eddie Aikau, otherw
when open ocean swells reach a minimum of 20 feet h
big wave surfing competitions in the World. It has only
in 1984 due to the wave height requirement. Surfers h
winter hoping that the conditions will be perfect for the
that today is the day. But how do they know that the c
height has reached at least 20 feet?

Diagram 1



When people measure waves they look at the
frequency(diagram 1). A waves amplitude is the distan
passes through them. In a transverse wave, the ampli
difference between the height of the crest and the rest
the greater the amplitude. So when the amplitude is 20
In a longitudinal wave, the amplitude measures the co
closer they are, the greater the amplitude. A waves wa
points on adjacent waves. The closer the points are th
waves frequency is measured by counting the number
through a point in 1 second and is measured in hertz (
passing in 1 second. The greater the number of wave

Note-taking Templates

Name: _____ **Class:** _____

Topic: measuring waves **Date:** _____

Big Idea Question: How are waves measured?

Questions	Notes
How can you find the amplitude and wavelength of a wave?	
How do you measure the frequency of a wave?	
How can you calculate the speed of a wave?	

Summary:

Comprehension Worksheets with answer key

Longitudinal and Transverse Waves

Define:

1. What are transverse waves? _____

_____

_____

2. What are longitudinal waves? _____

_____

_____

Identify: Label each picture correctly to identify if it shows a transverse wave or a longitudinal wave.

This is a _____

This is a _____

Particle movement

This is a _____ wave.

Compare: Fill in the Venn diag

Transverse W

Types of Waves

Define:

1. Visible light waves: _____

_____

_____

2. Sound waves: _____

_____

_____

3. Earthquake P waves: _____

_____

_____

4. Earthquake S waves: _____

_____

_____

Identify: Is the wave a longitudinal wave or transverse

Sound Waves Transverse / Longitudinal	
Visible Light Waves Transverse / Longitudinal	

Apply:

Scientists have discovered that our closest galaxies ha
this information and your understanding of visible light
moving toward us or away from us? explain

_____

_____

_____

_____

A tuba produces a deep, low sound while a piccolo pro
type of frequency would each of them have and why?

_____

_____

_____

Measurin

Define:

1. **Amplitude:** _____

_____

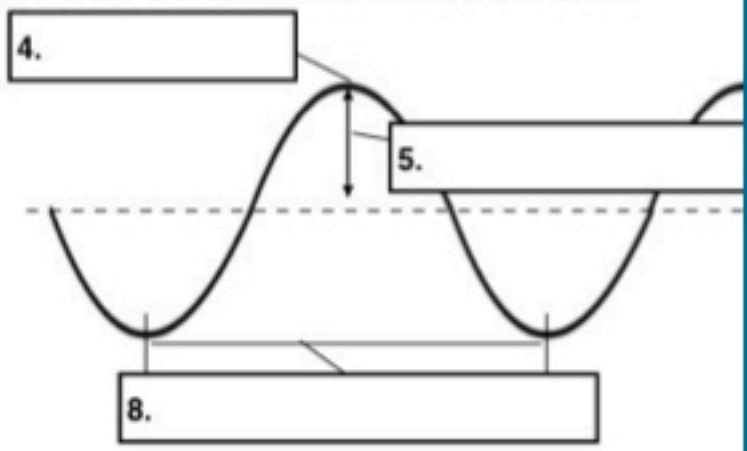
2. **Wavelength:** _____

_____

3. **Frequency:** _____

_____

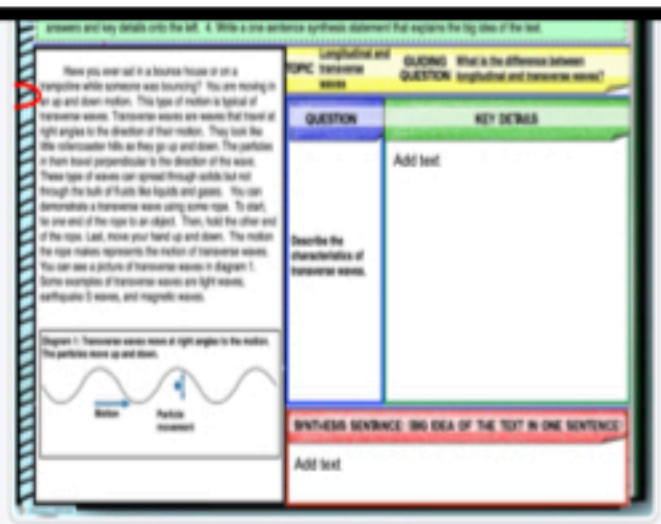
Identify the different parts of the wave



9. Order the waves in level of frequency with highest frequency.

Digital Version

1



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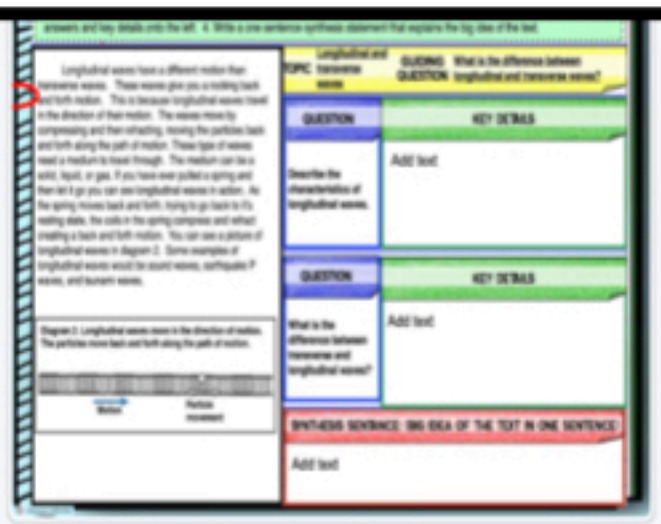

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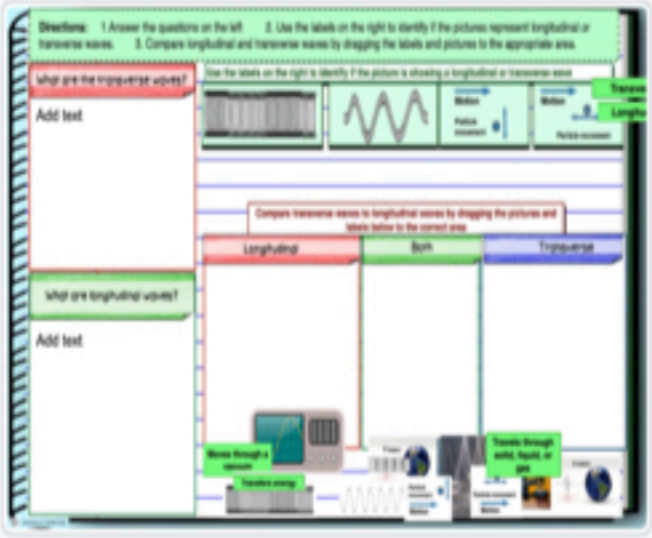

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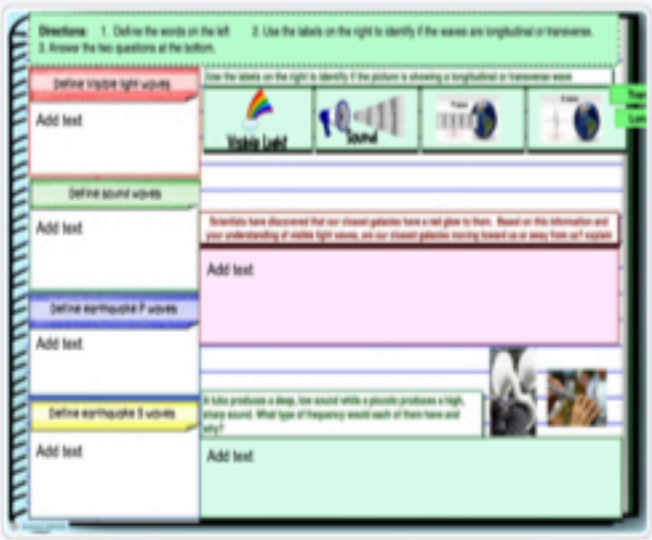

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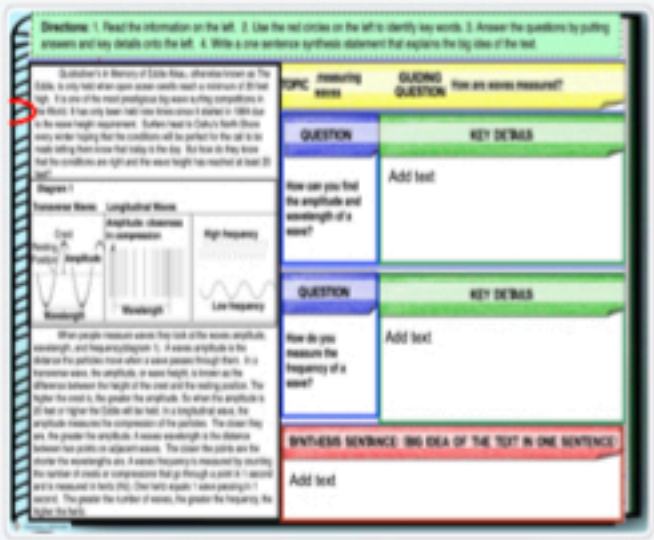

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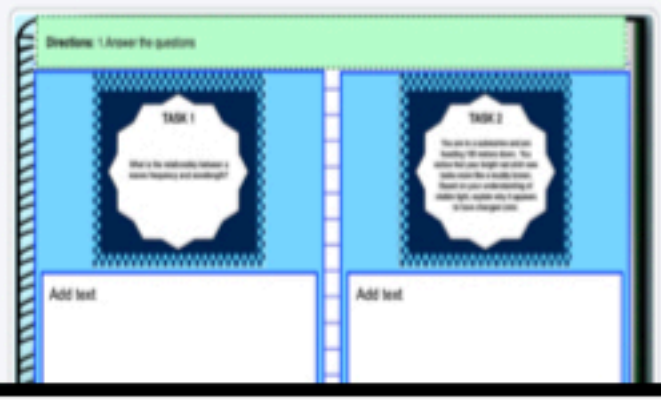

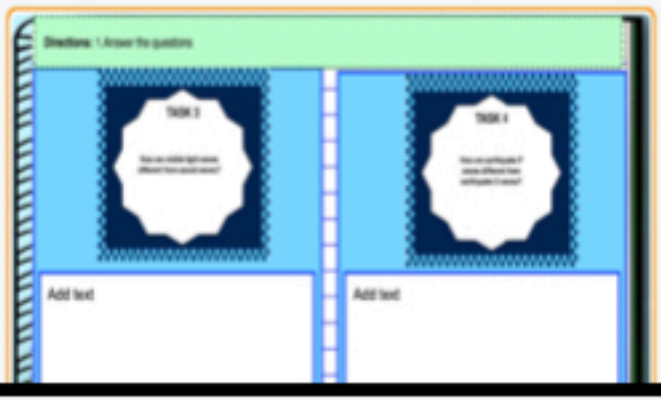

Extension Task Cards

TASK 1

What is the relationship be
waves frequency and wave

TASK 2

You are in a submarine and a
heading 100 meters down. Y
notice that your bright red shirt
looks more like a muddy brow
Based on your understanding
visible light, explain why it appe
ve changed color.

TASK 3

How are visible light w
different from sound w

TASK 4

How are earthquake P
waves different from
earthquake S waves?

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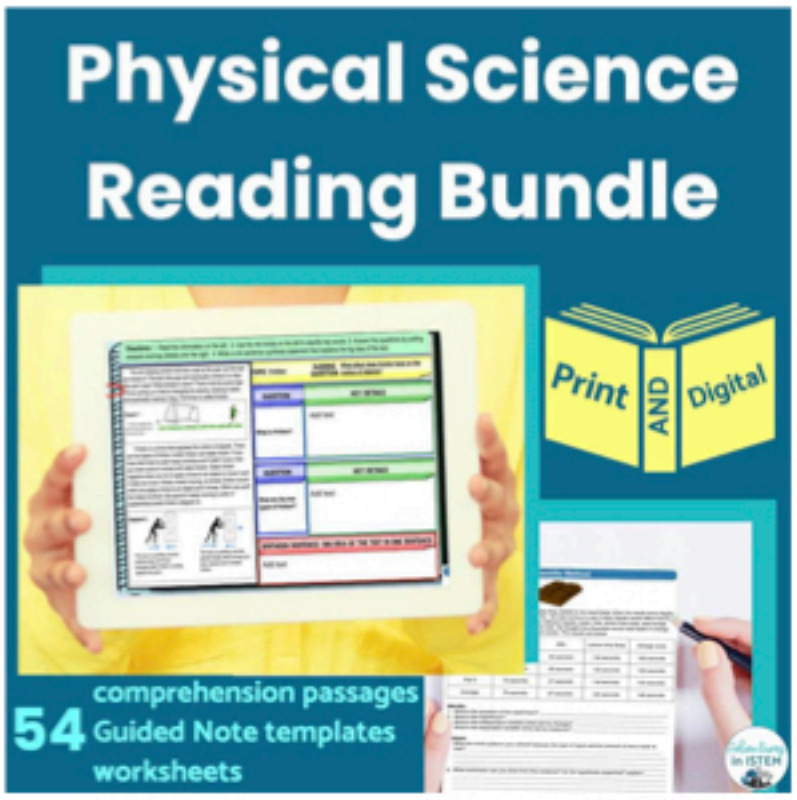

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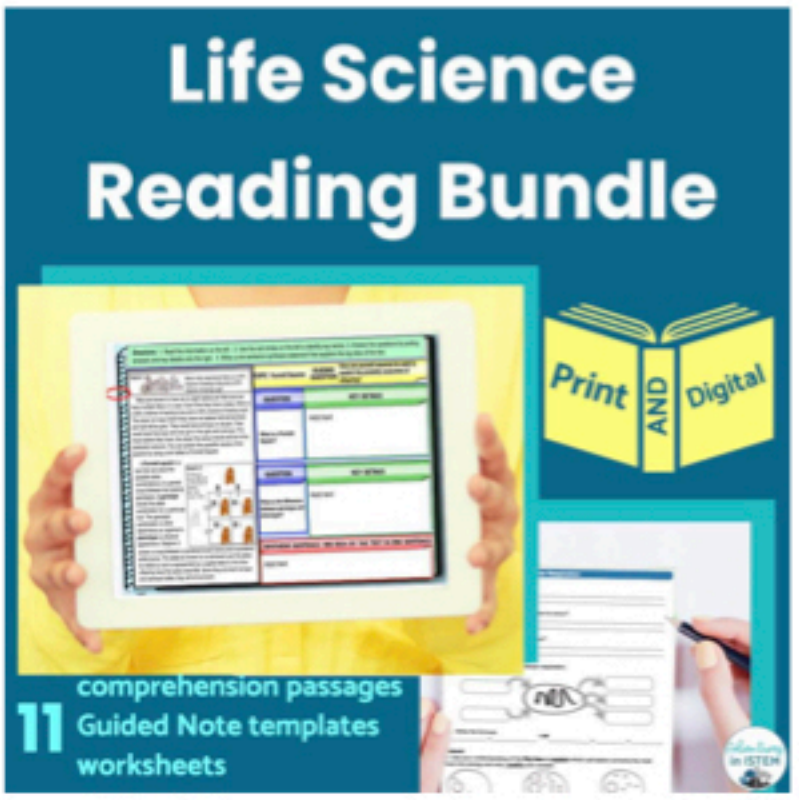

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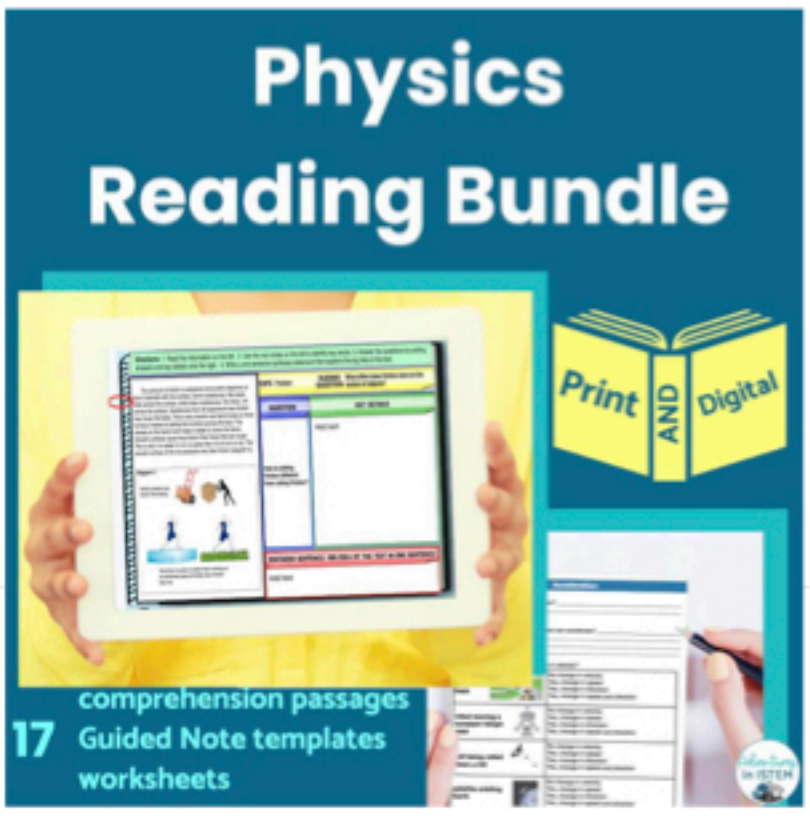

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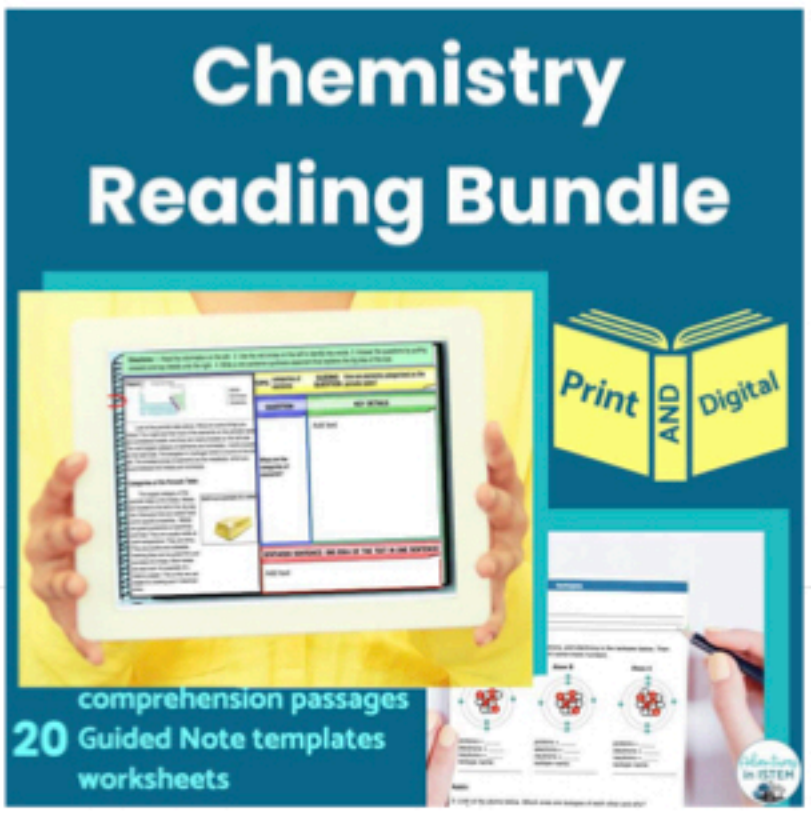

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1. Download link for the Google Resource by clicking on the titles in the red box

Outer Planets Guided Reading Digital Notes

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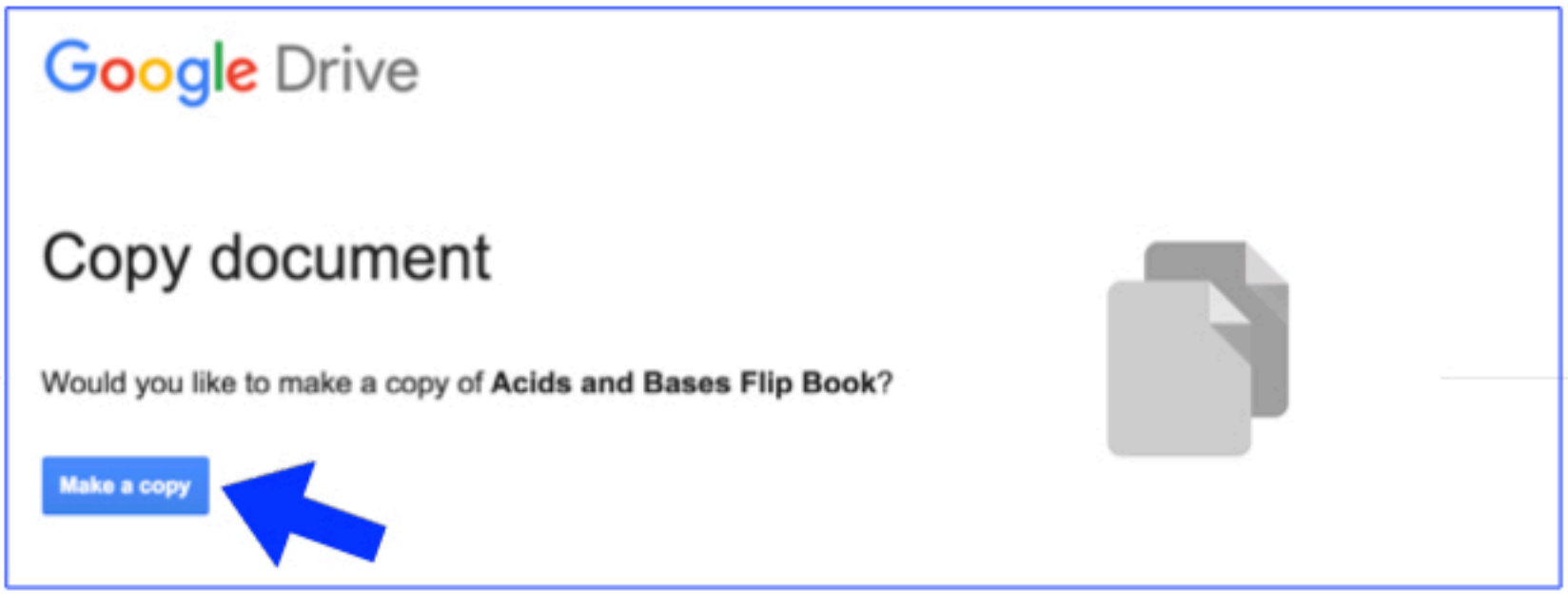

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Outer Planets

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

Name: _____ **Class:** _____

Topic: Outer Planets **Date:** _____

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

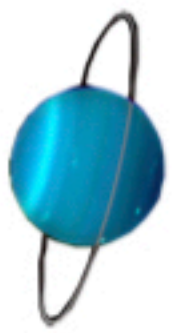
Questions	Notes
What do the outer planets have in common?	
What is a unique characteristic about each outer planet?	
Which planet is the most similar to Jupiter?	

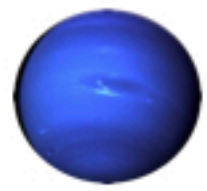
Summary:

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.

Teaching STEM Through Inquiry

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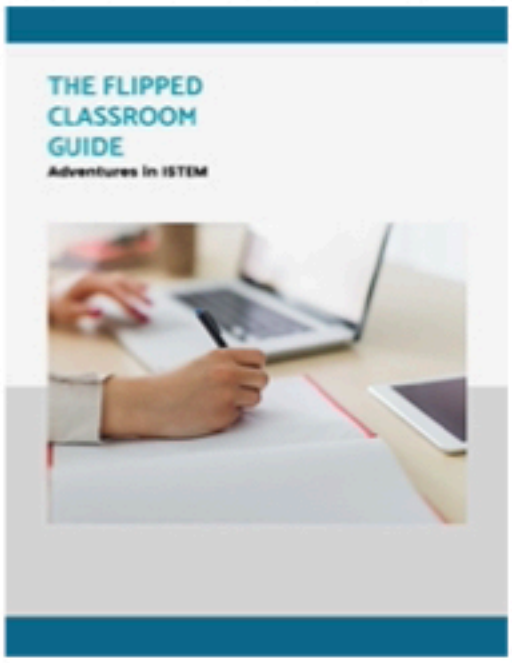

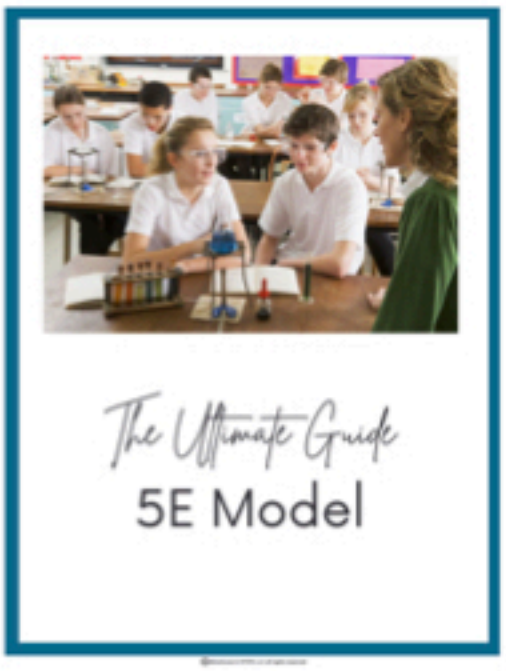

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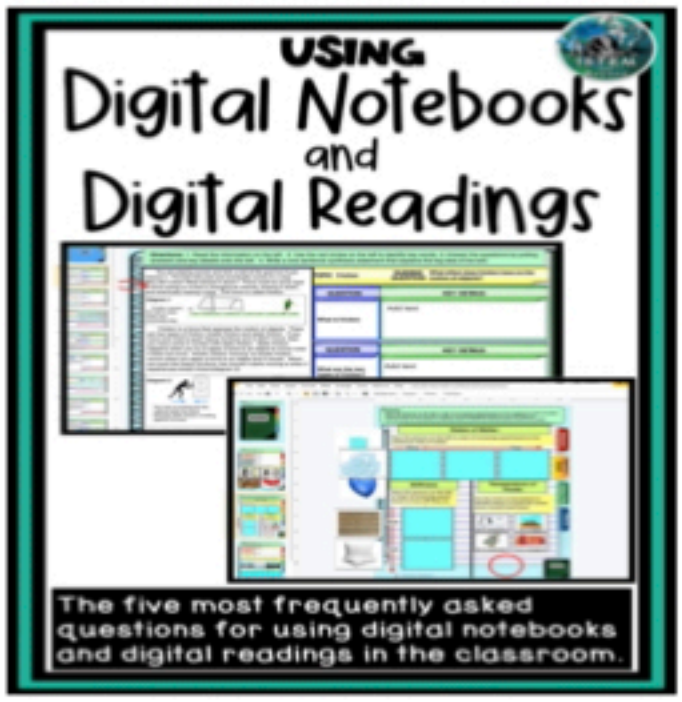

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