Short Reading Passages

Buoyant Forces

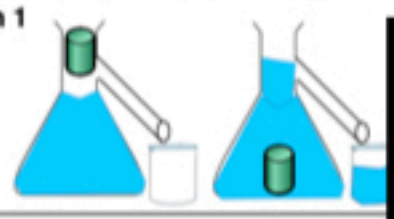
Big Idea Question: Why do objects float or sink?

Diagram 1

A beach ball will pop back up to the surface because buoyant force is pushing it up.

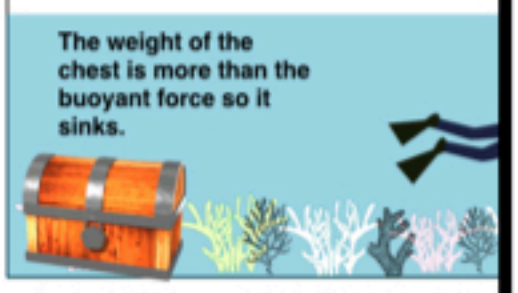
You hold a beach ball under the water and then let go, what happens? The beach ball pops back up to the surface. Why did this happen? The reason the beach ball does not stay under water is because a force is pushing it back up. This force is called buoyant force.

Diagram 1



Buoyant force is an upward force exe
buoyant force acting on an object you nee
when the object enters the water. The we
the water. This is known as Archimedes'

Diagram 1



Different fluids create different buoyant
saltiest bodies of water on Earth. The den
density of water in your swimming pool whi
makes it easier to float in the Dead Sea tha
sink depends on two factors: buoyant force
the buoyant force, then it will sink. If an ob
will float and be suspended in the liquid. In
to the top. It just hangs out in the middle.
then it will buoy up at the surface. This me
surface of the liquid (Diagram 3).

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Elastic Forces

Big Idea Question: What is the difference between tension and compression?

Diagram 1

Stretching a rubber band is an example of an elastic force.

Have you ever pulled on a rubber band and let go? After it flies through the air and you go and pick it up you will notice that it is back in its original shape. A similar thing happens when you sit on a couch. When you get up you will notice an indent of where your bottom was but in a few minutes the couch is back to normal as if you weren't even there. That is because stretching a rubber band and pushing down on a couch when you sit are types of elastic forces.

Diagram 2

Elastic forces are forces that resist a change t
forces: tension and compression. Tension force i
is stretched like in the case of the rubber band. W
force resists the stretching of the particles. As yo
particles to come back together. Other examples
hanging from the ceiling, teams pulling against ea
repelling down a mountain.

Diagram 3

The other elastic force, compression, is a push
squeezed. When you squeeze a sponge the com
particles. As you let go the compression force ca
Other examples of compression force on objects
into shapes, and a hammer hitting a nail.

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Fluid Friction / Air Resistance

Big Idea Question: Is there friction in liquids and air?

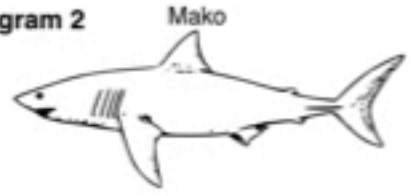
Diagram 1

Swimsuits in today's Olympics are made out of synthetic fibers which help reduce drag and increase the speed of swimmers.

The swimsuits of the first summer Olympics were made out of wool. The
different from the suits of today which are made out of synthetic fibers. Today
create less drag and help swimmers move through the water at a faster pace

Diagram 2

Mako



Hammerhead

A mako shark is more streamlined than a hammerhead shark which allows it to reach speeds up to 60 mph.

What is drag? Drag is a type of friction otherwise known as fluid friction o
resistance. It opposes the motion of an object in fluids. The fluid could be liqu
When you are swimming in a pool, if you wear your clothes you will find it more
swim. That is because your clothes produce more drag and will slow you dow
Olympic swimmers wear special swimsuits. The swimsuits are designed to re
in the water and help them swim faster. Mako sharks are specially designed f
Their body shape helps reduce drag allowing them to reach speeds up to 60 m
Hammerhead sharks on the other hand can only swim 25 mph.

Diagram 3

A parachute is designed to in
air resistance to help slow a s
down.

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Short Reading Passages

Gravity

Big Idea Question: Why do objects fall to the ground?

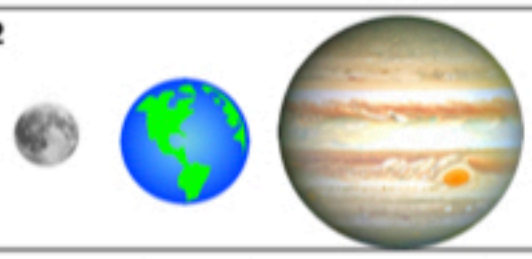
Diagram 1

As the story goes, Isaac Newton came up with the law of universal gravitation when an apple fell and hit him on the head.

You have probably heard the story of an apple falling on top of Newton's head causing him to come up with the law of universal gravitation. While that story is probably not true, he did come up with the law. What is the law of universal gravitation?

The law of universal gravitation states that anything with matter in the Universe attracts other objects of matter in the Universe to its center. Stated simply, everything with matter has gravity and gravity is a force of attraction. This means that not only does the Earth have gravity but Jupiter has gravity, you have gravity, your pencil has gravity, an ant has gravity, even a single hydrogen atom has gravity. The amount of gravity is dependent on three factors: the mass of the first object, the mass of the second object, and the distance between them.

Diagram 2



When it comes to gravity, the more massive an ob
(Diagram 2). This is why, although you are next to you
pencil, your pencil will feel the attraction of Earth's gra
if dropped and not towards you. Jupiter is much more
to fly into Jupiters atmosphere and stay there awhile, t
enough to not only pull you towards the center but cau

Diagram 3

The astronaut is closer to
than Earth so it feels the
gravitational attraction mo

The closer two objects are to each other, the stro
Neil Armstrong's walk on the moon was more of a jum
moon is less massive and has less gravity. When he j
more massive object Earth or even the Sun. This is be
smaller gravity than the Earth, the astronaut was close
goes around the Earth instead of the Sun. It is closer t
attraction of the Earths gravity more than the Sun's gra

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Friction

Big Idea Question: What effect does friction have on the motion of objects?

You are playing soccer and kick a ball at the goal but it just misses it. The ball ro
and eventually comes to a stop. Why did it stop? What slowed it down? There must
some type of force acting on it that is changing its velocity, slowing it down, and even
making it stop. This force is called friction.

Diagram 1

Friction causes the ball to slow down and eventually stop

Friction is a force that opposes the motion of objects. There are two types of fri
kinetic friction and static friction. If you have ever tried to push heavy furniture and i
move, then you have come in contact with static friction. Static friction happens whe
try to apply a force to an object to move it and it does not move. Kinetic means "mo
kinetic friction occurs when you apply a force to an object and it moves. When you
heavy furniture, the minute it starts moving is when it experiences kinetic friction(dia

Diagram 2

The man is pushing but the cabinet does not move because static friction is acting against his push

The man is pushing and the cabine
starts moving but at a slow velocity
kinetic friction

The amount of friction a substance encounters depends on how it interacts with
surface. Some substances, like sleds, slide across the surface and other substance
bikes roll across the surface. Substances that roll experience less friction than thos
slide. This is why movers use hand trucks to move furniture instead of sliding them
the floor. The wheels on the hand truck make it easier to move the items. Surfaces
smoother cause less friction than those that are rough. This is why it is easier to ru
grass than it is to run on ice. The smooth surface of the ice produces very little fricti
(diagram 3).

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Note-taking Templates

Name: _____ **Class:** _____

Topic: Gravity **Date:** _____

Big Idea Question: Why do objects fall to the ground?

Questions	Notes
What is the law of universal gravitation?	
How does mass affect gravity?	
How does distance affect gravity?	

Summary:

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Comprehension Worksheets with answer key

Friction

Define and describe:

1. What is friction? _____

2. What are the two types of friction? _____

Compare:

3. How is static friction different from kine

Identify: Are the pictures below showing

4

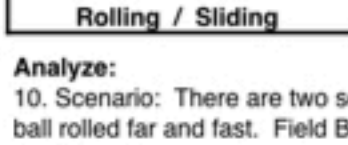
Kinetic / Static

5

Ki

Identify: Are the pictures below showing

7



Rolling / Sliding

8

Ro

Analyze:

10. Scenario: There are two soccer field
ball rolled far and fast. Field B has very
not very far.
Use your knowledge of friction to explain
the ball and explain which field you would

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Fluid Friction / Air resistance

Define and describe:

1. What is drag? _____

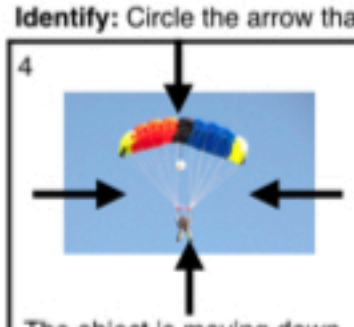
2. What is air resistance? _____

Compare:

3. How is friction in air similar to friction on land? _____

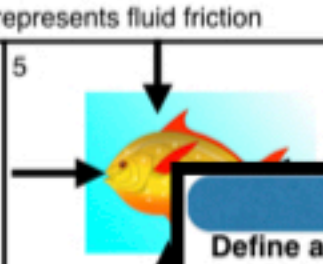
Identify: Circle the arrow that represents fluid friction

4



The object is moving down

5



The object is

6

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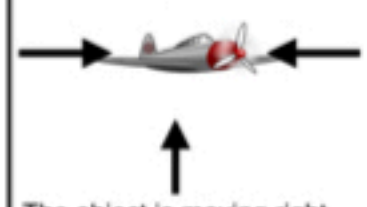

The object is moving right

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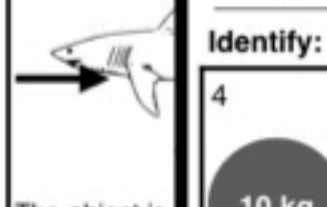
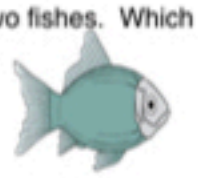


The object is

Analyze:

10. Look at the two fishes. Which fish do you



fish A

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Gravity

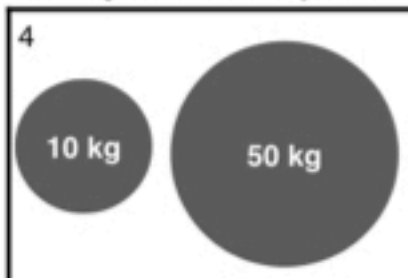
Define and describe:

1. What is gravity? _____

2. What are the three factors of gravity? _____

Identify: Circle the object has a greater pull of gravity?

4



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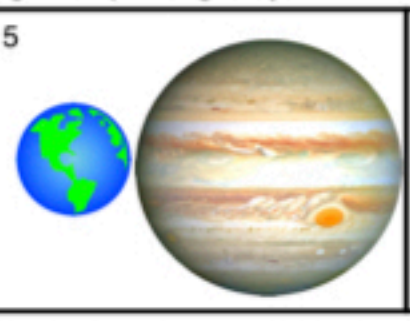

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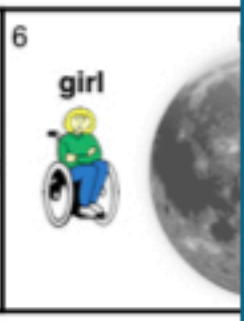
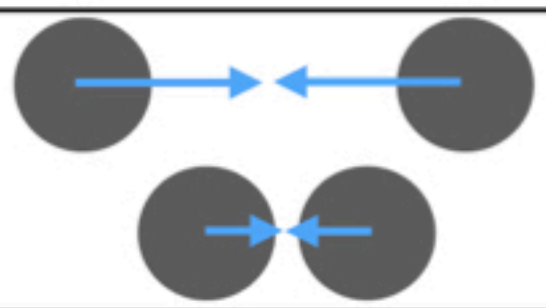


Identify: Circle the objects that have a greater gravitational attraction with each o

7



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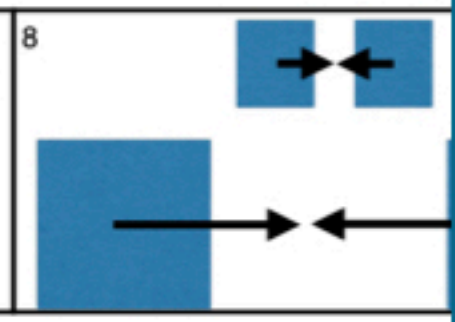

Analyze:

9. Jupiter and Saturn are large outer planets and have many moons while Earth a
small inner planets and only have a few moons. Use your knowledge of gravity t
the outer planets would have more moons than the inner planets.

Jupiter

Saturn

Earth

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Comprehension Worksheets with answer key

Elastic Force

Define and describe:

1. What is tension? _____

_____

2. What is compression? _____

_____

Compare / Contrast:

3. How are tension and compression similar and different? _____

_____

_____

_____

Identify: Does the object represent a tension force or a compression force

4 **Tension / Compression**	5 **Tension / Compression**	6 **Te**
7 **Tension / Compression**	8 **Tension / Compression**	9 **Te**

Analyze:

10. Is bungee jumping a tension force or compression force? explain

_____

_____

_____

_____

_____

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Buoyant Force

Define and describe:

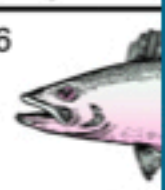
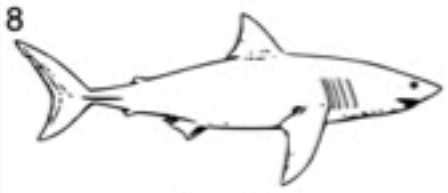
1. What is buoyant force? _____

_____

2. How do you find buoyant force? _____

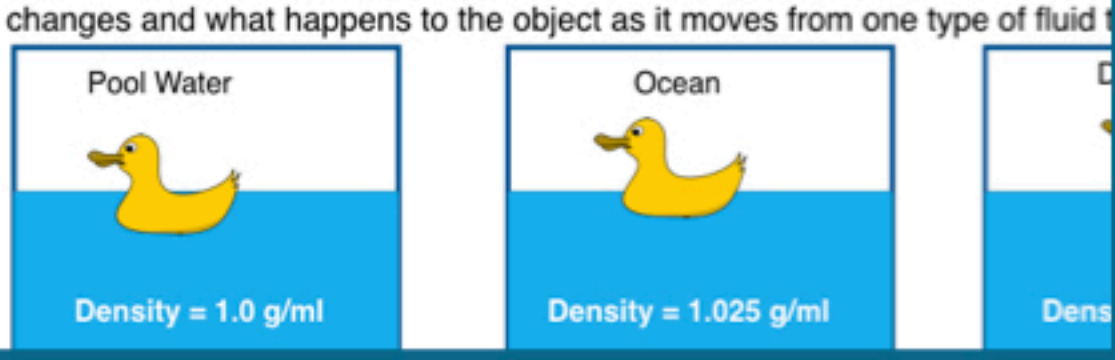
_____

Identify: What will happened to the object when it is placed in the liquid?

4 weight = 2N Buoyant Force = 12N ☐ **Sink** ☐ **Float in the middle** ☐ **Buoyed on top**	5 weight = 15N Buoyant Force = 12N ☐ **Sink** ☐ **Float in the middle** ☐ **Buoyed on top**	6  weight Buoyar ☐ **Sink** ☐ **Float in th** ☐ **Buoyed o**
7 weight = 9N Buoyant Force = 9N ☐ **Sink** ☐ **Float in the middle** ☐ **Buoyed on top**	8  weight = 12N Buoyant Force = 12N ☐ **Sink** ☐ **Float in the middle** ☐ **Buoyed on top**	9 ☐ **Sink** ☐ **Float in th** ☐ **Buoyed o**

Analyze:

10. Look at the diagram below, How does the buoyant force change as the changes and what happens to the object as it moves from one type of fluid



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Digital Version

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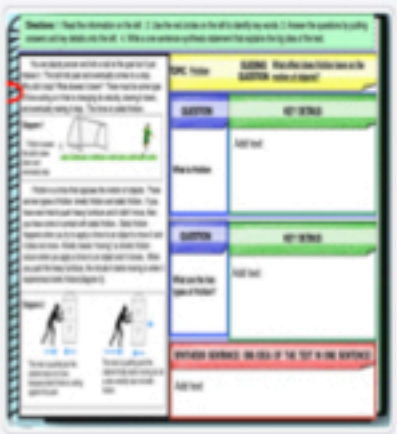

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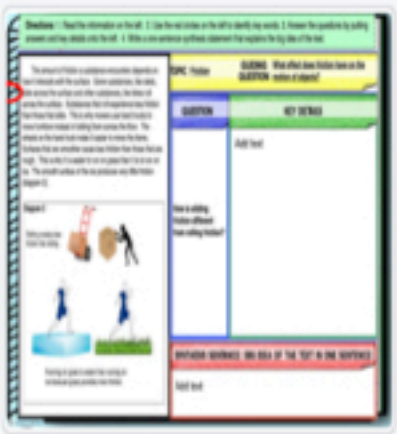

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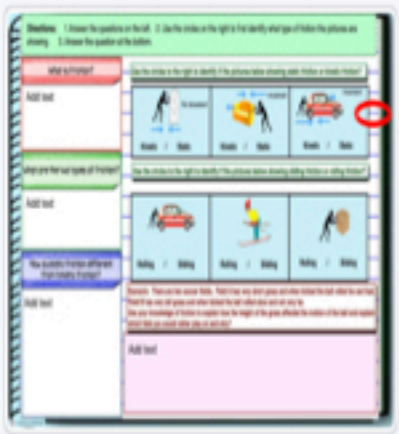

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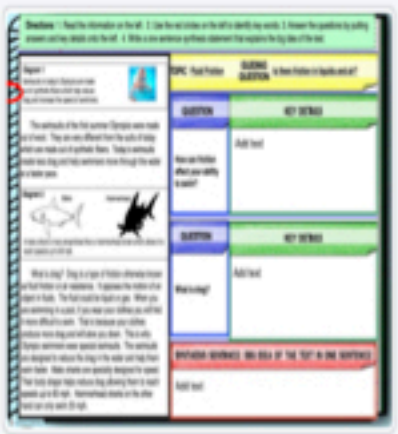

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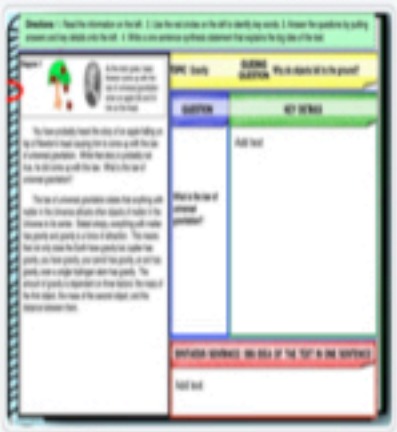

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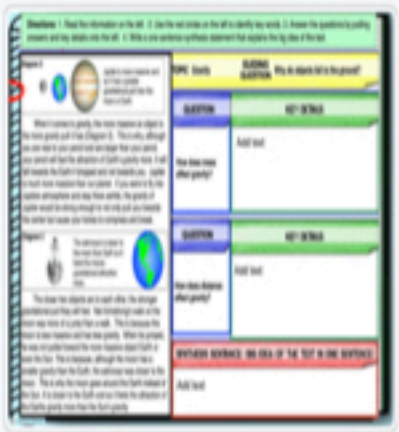

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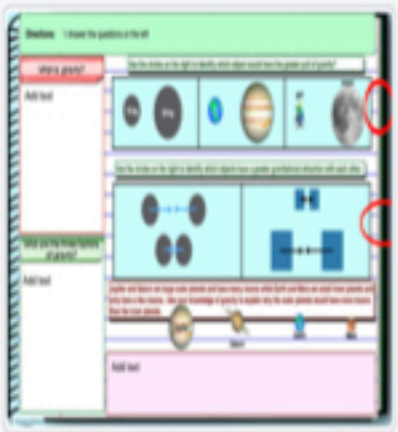

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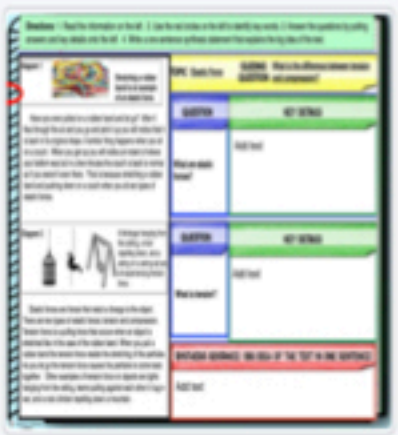

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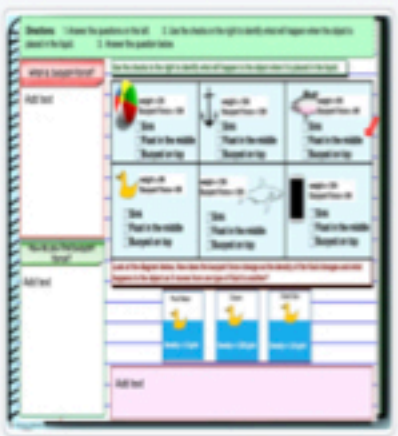

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18

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Extension Task Cards

Task 1

Why do large semi truck
have to pull over and sto
driving when there are
high winds?

Task 2

Why are astronau
able to jump high
on the moon than
Earth?

Task 3

Why do sharks float in
the middle of the
water?

Task 4

Using your knowled
of friction, explain
why they smooth th
ice before a hocke
game?

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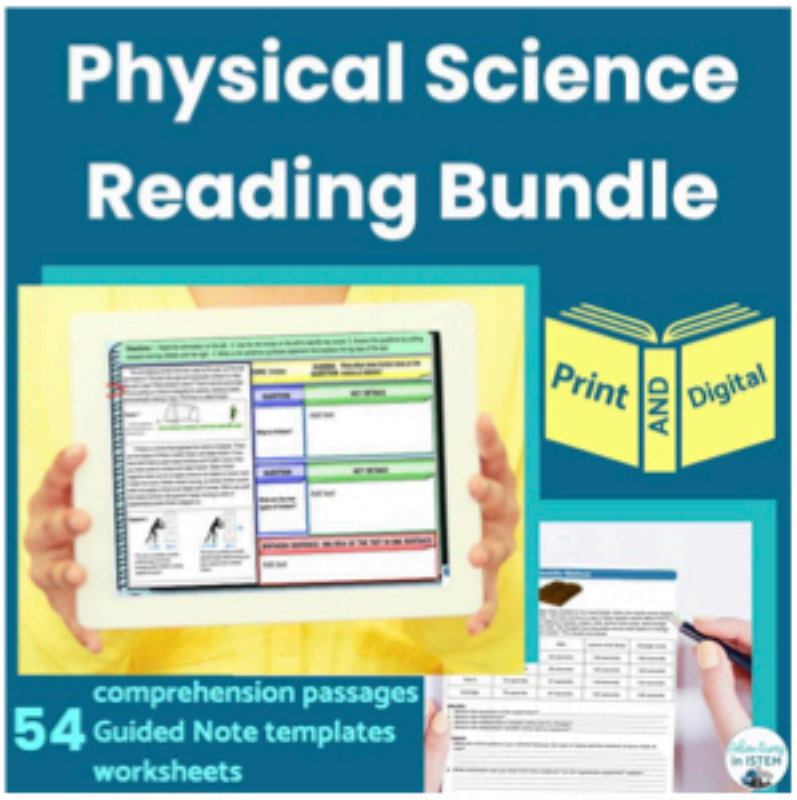
Save Money and Grab a Bundle



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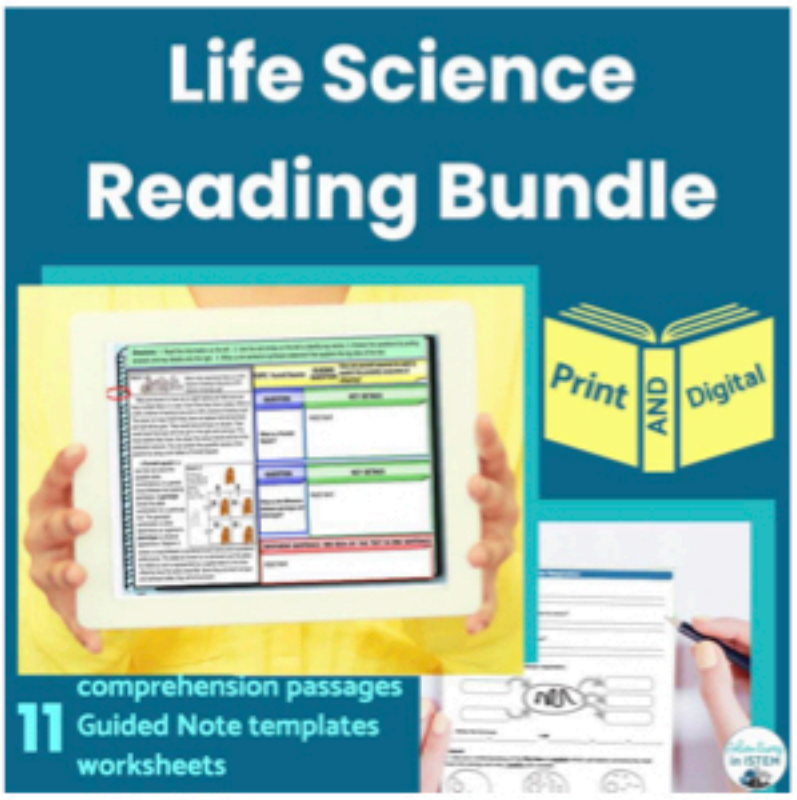
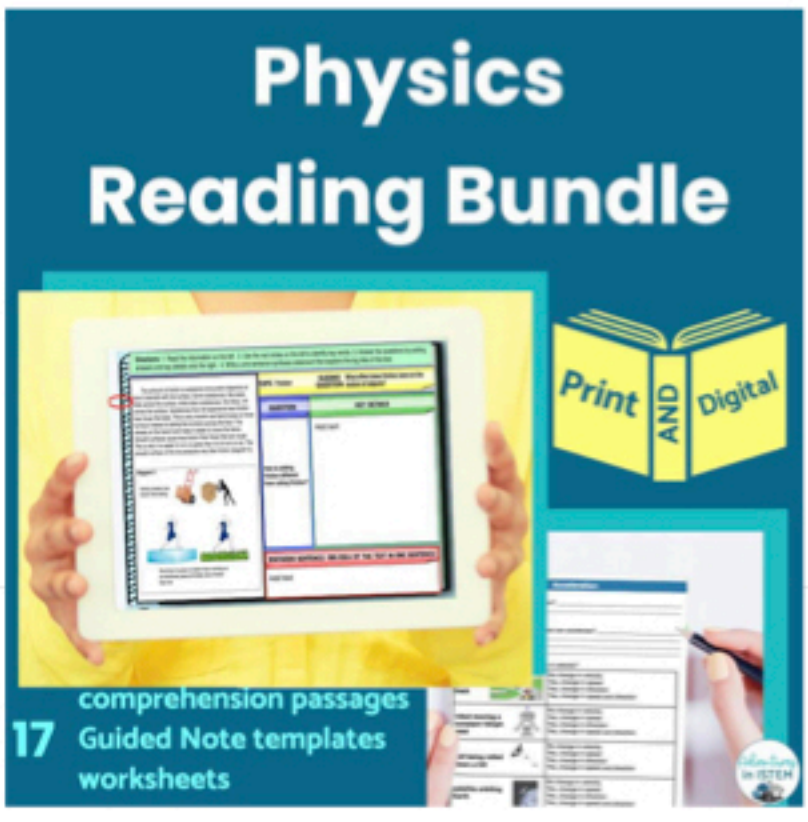
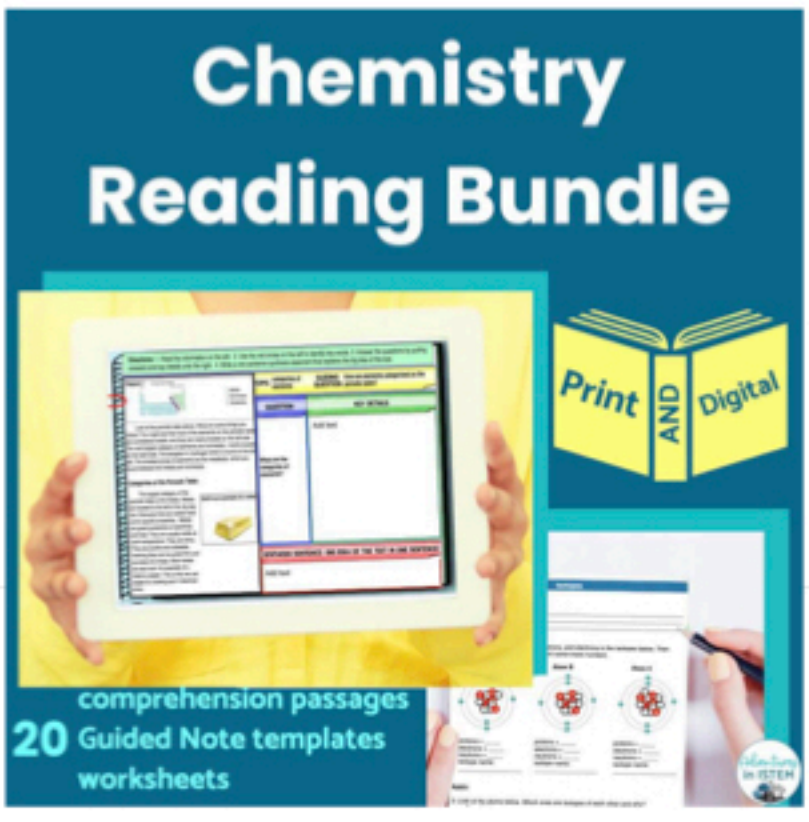
54 Comprehension passages,
note-taking templates,
worksheets



11 Comprehension passages,
note-taking templates,
worksheets covering cells,
genetics, and evolution



17 Comprehension passages,
note-taking templates,
worksheets covering forces,
motion, waves, and energy.



20 Comprehension passages,
note-taking templates,
worksheets covering matter,
chemical reactions, conservation
of energy, atoms, periodic table,

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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.

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Outer Planets Guided Reading Digital Notes

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

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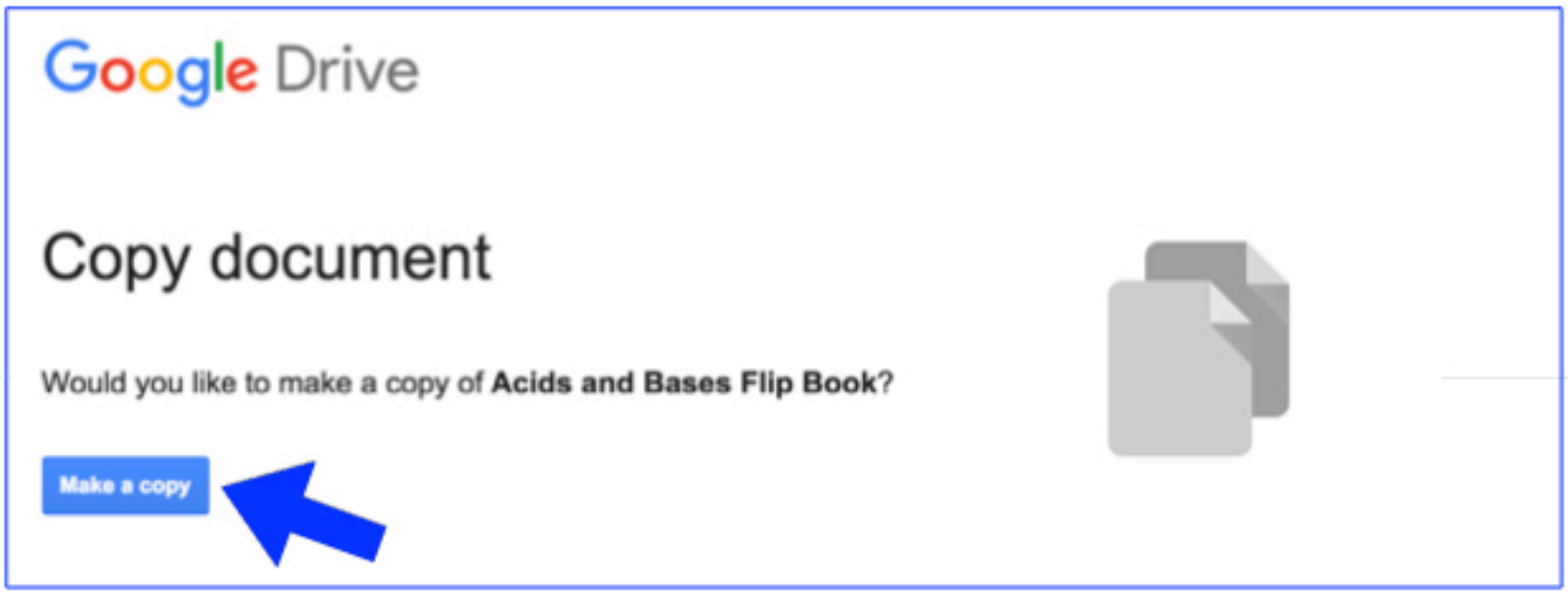

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Outer Planets

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

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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:

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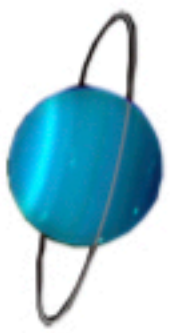
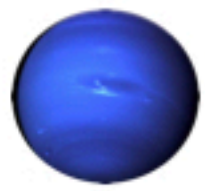
Outer Planets

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.

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Teaching STEM Through Inquiry

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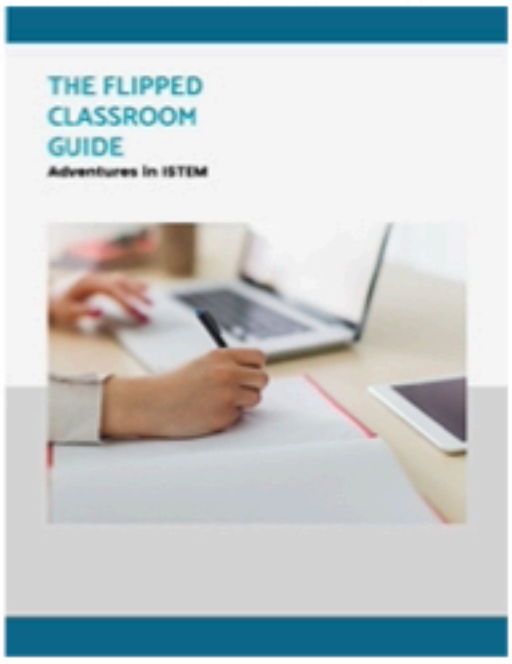

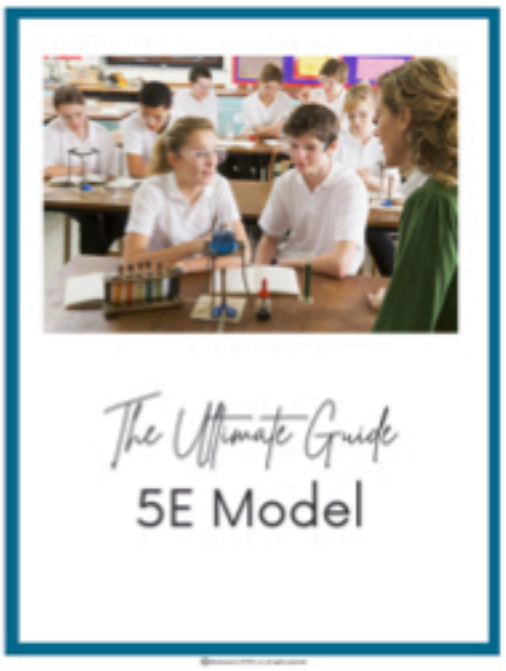

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Digital Resources

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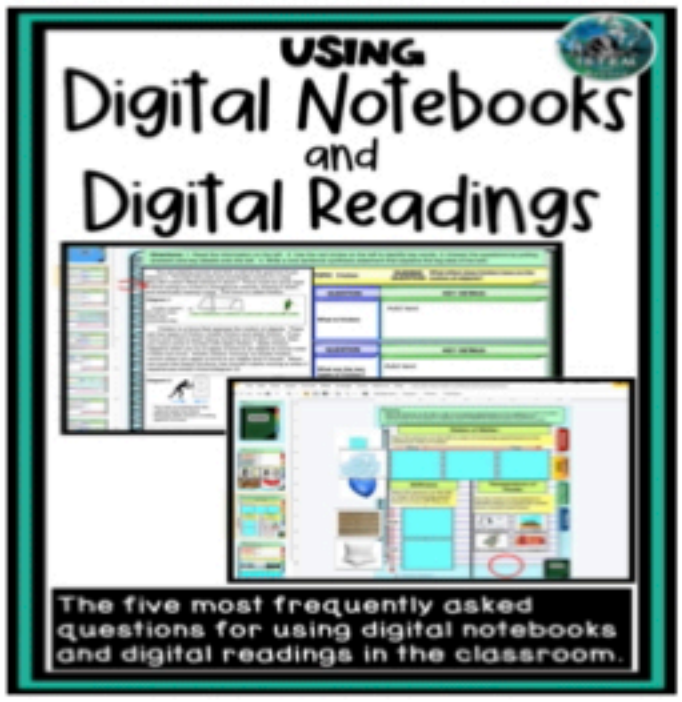

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