Short Reading Passages

Classification of Stars

Big Idea Question: How do scientists classify stars?

When most people think of stars they think about the small twinkles of light in the sky. Many people living in big cities can't even see them. Stars, however, are extremely huge, hot, and bright spheres of gas that are so far away astronomers had to come up with a new unit of measurement. All the billions and billions of stars can be categorized by looking at three characteristics: Size, Temperature, and Brightness.

Temperature

We all learned growing up that red means hot and blue means cold. We were taught this so that we wouldn't burn ourselves with hot water. When it comes to heat it's the opposite. With stars the hottest color is Blue and the coolest color is Red. If you look at a gas stove you will notice the flame on the burners is blue. If you look at a campfire though, its flame is orange. If you try and boil water it will take a lot longer to boil the water on the campfire than it w
much cooler heat temperature than blue. You can determine
Blue stars are the hottest (above 30,000) followed by white (30
orange (5,000-3,500), and red (less than 3,500). Our Sun is a
temperature (about 6,000) compared to other stars.

Size

Our Sun looks very large to us but when compared to othe
sized star. In stars the larger the star, the shorter its life span.
roughly 4.5 billion years old and has another 4.5 billion years
stars are called Giants and Supergiants and the smallest are

Brightness

If you go outside during the day you have no problem seei
lights up everything. The opposite is true at night. When we
see is the moon and the other stars. Those stars light is so di
Sun's light on us it would be very difficult to see even the hand
brightness is due to our perspective. Scientists call how brigh
brightness or apparent magnitude. Our Sun seems to be the
us. In reality it is only a medium bright star. Its absolute brigh
scientists use to classify the stars. The absolute brightness is
were all the same distance. Think of it this way. What is brigh
Vegas? The spot light is brighter, however if someone were to
your eye, the flashlight would appear brighter because it is cl

Main Sequence Stars

Red Dwarfs ——————————> Blu

Red Orange Yellow W

Increasing in Tempera

Lifecycle of Stars

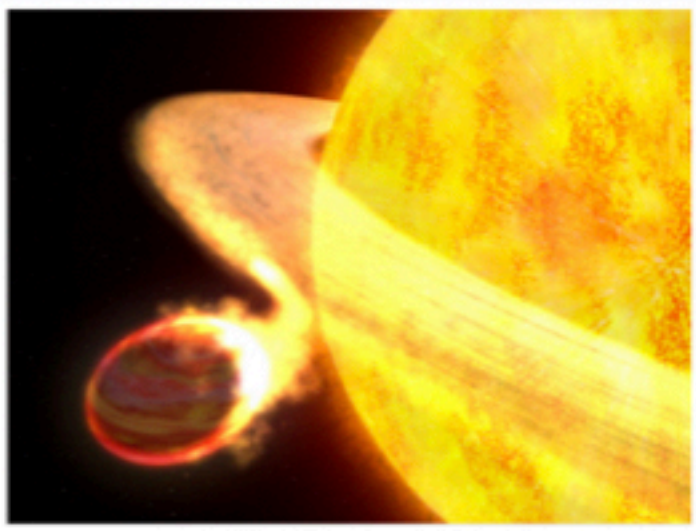


Image credit: NASA/ESA/G. Bacon

Big Idea Question: Will our Sun explode and turn into a black hole

The question that most scholars want to know is what is going to h
Sun. Will it explode? Will it turn into a black hole? Although stars are
we describe their life as a lifecycle starting with their birth and ending w
Even though all stars start the same, their endings are much different.
in a nebula, an area of gas and dust. The more gas and dust located i
the more massive the star will become. The dust and gas is pulled into
location due to gravity. Eventually the gravity becomes strong enough
spinning the nebula. As it spins it gets hotter and hotter until the tempe
hot nuclear fusion occurs and a star is born. This new star is called a
Once it becomes stable it enters its main sequence stage. It is the mas
determines how long they will live in the main sequence stage and wha
they will have.

Medium Sized Stars:

Stars like our Sun will live a long time in the main sequence stage
4.5 billion years old and it's only half way through its life. Once the hyd
run out the core of the star becomes unstable and begins to contract a
it gets bigger it cools down and turns red. It has now become a red gia
atoms that are left in the core fuse into carbon atoms. The hydrogen i
blows away and a ring is left around the core called a planetary nebula
helium is used up the star begins to die. It will collapse in on itself and
white dwarf. It will stay a white dwarf until all the energy is gone and w
life as a black dwarf.

Massive Sized Stars:

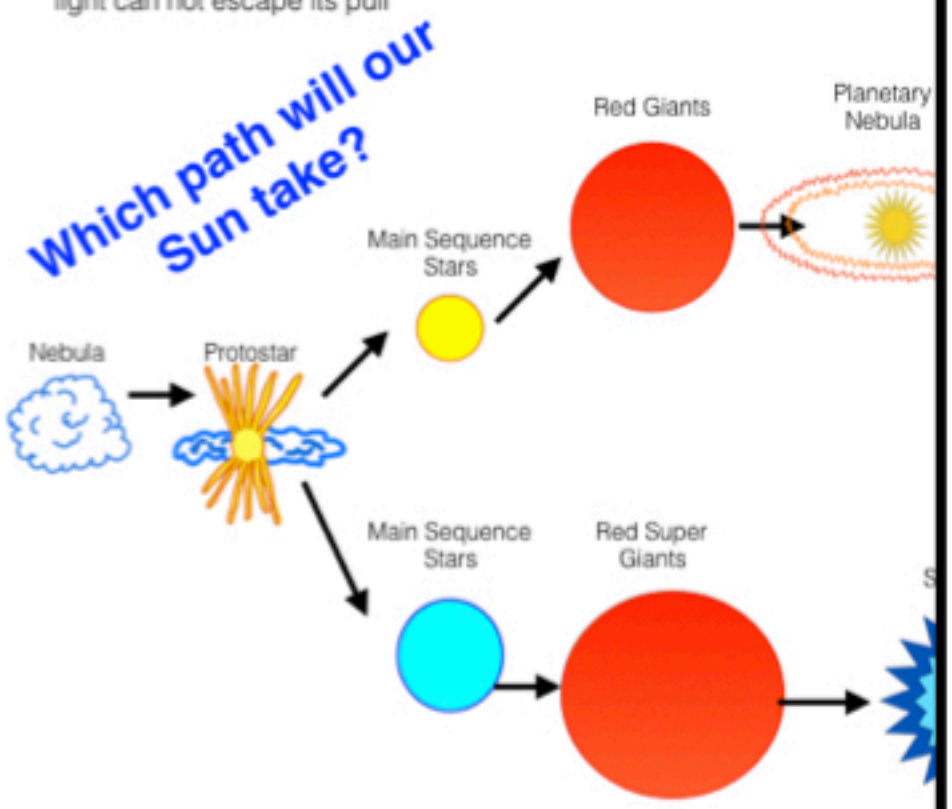
Short Reading Passages

Lifecycle of Stars

Hydrogen so fast. As they enter the red giant phase the core heats up so much that carbon is able to fuse and form oxygen, nitrogen, and iron. The energy from creating all these elements is released in a giant explosion called a supernova which can be seen in the sky for weeks. Most of these stars will have their centers collapse and contract into a small ball of neutrons. These stars are so dense that one teaspoon of matter from them would weigh 100 million metric tons. To put this into perspective the world's biggest truck can transport more than 500 metric tons of material — that's equivalent to seven fully fueled and loaded planes. If most massive stars become neutron stars, what happens to the rest? Only 0.1% of stars, those 8 or more times the mass of the Sun, will turn into a black hole. The force of gravity from a black hole is so strong its center gets crushed and not even light can escape its pull. You can't see a black hole. We can only detect them by the X-rays given off as matter falls into them.

Key Terms:

Protostar- a ball of gas and dust where nuclear fusion began due to the
Nuclear Fusion- The joining to atoms to create new atoms
Main-Sequence star- the time in a stars life when hydrogen is being cor
Red Giant- A time in the stars life when the hydrogen is used up, the cor
carbon, and the outer layers expand and cool
Planetary Nebula- a ring left around a core when the outer shell gets blo
White Dwarf- The leftover center of a red giant that is small, hot, and dir
Supernova- a giant explosion caused by the energy being released for
Neutron Star- The tiny leftover core of a supernova that spins rapidly giv
Black Hole- Caused by gravity crushing the dense center of an extreme
light can not escape its pull



Galaxies

Big Idea Question: Do galaxies have a lifecycle like stars?

As you look into the night sky, away from city lights, you can see hundr
these stars belong to our own Milky Way galaxy. A galaxy is a large group
held together through gravity. Galaxies can come in different shapes and
them by their shape and the three most common shapes are irregular, spir
Although galaxies are not born or die like stars, they do change in age. Th
upon the stars inside them. As the stars age, so does the galaxy and its s

Irregular:

Galaxies that have no definitive shape are irregular galaxies. They mig
where more stars gather together into clumps but not enough to make a sh
are the least common of the three shapes and are made up of mostly gas,
These galaxies can have as few as 10 million stars or as many as several

Spiral:

Spiral galaxies are some of the most common galaxies seen. They hav
they all have a huge bulge in the center and arms coming off of it. Our ga
spiral galaxy. In spiral galaxies the younger stars are at the end of the arm
become more massive, they gain more gravity and make their way up the
the bulge is. The bulge at the center is made up of old stars. Our star is a
so it is located in the middle of one of the arms on the Milky Way galaxy

Elliptical:

An elliptical galaxy looks like a giant star that is out of focus. It can hav
or be perfectly circular. The shape is due to the lack of dust and gas surro
dust and gas was used up billions of years ago in the creation of stars. Th

Note-taking Templates

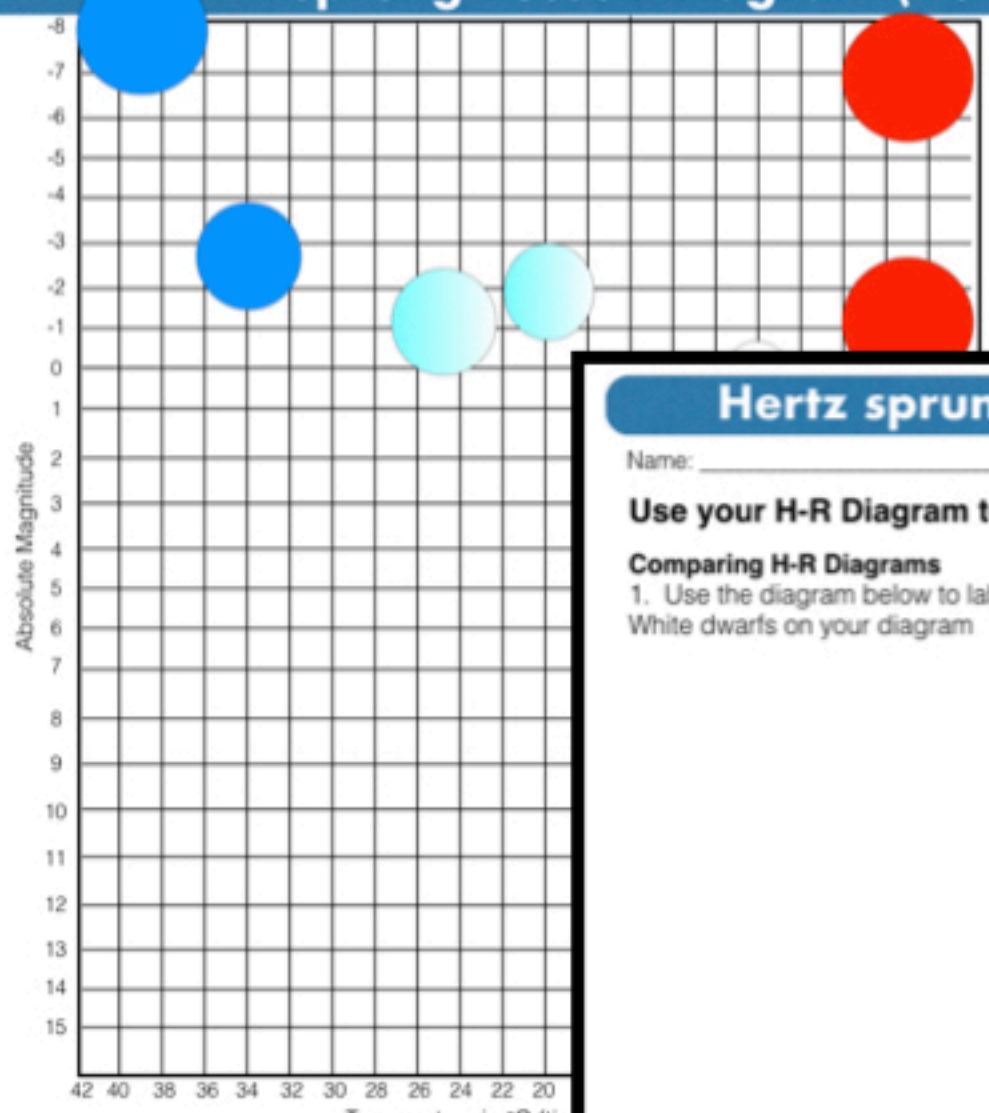
Name: _____ **Class:** _____
Topic: Galaxies **Date:** _____
Big Idea Question: Do galaxies have a lifecycle like stars?

Questions	Notes
Describe irregular galaxies.	
Describe spiral galaxies.	
Describe elliptical galaxies.	

Summary:

Comprehension Worksheets with answer key

ertz sprung-Russell Diagram (Version C



Label the stars

Identification Letter	Stars	Temperature
A	Sun	6,000
B	Sirius A	12,000
C	Epsilon Eridani	4,000
D	Zeta Eridani	40,000
E	Betelgeuse	3,500
F	Barnard's star	3,000
G	Procyon	8,000
H	Regulus	25,000
I	Spica	35,000
J	Mizar	10,000
K	Alpha Centauri B	5,000
L	Van Maanen's Star	11,000
M	Alpha Centauri A	5,500
N	Sirius B	10,000
O	Algol	20,000
P	Aldebaran	3,500

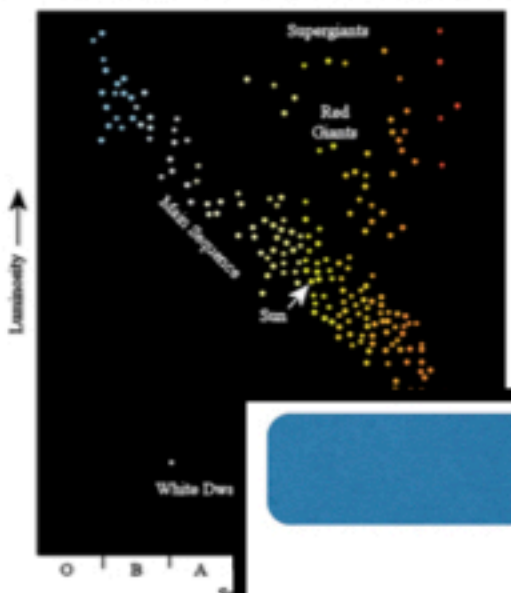
Hertz sprung-Russell Diagram (Version C)

Name: _____ Class: _____

Use your H-R Diagram to Answer the Questions

Comparing H-R Diagrams

1. Use the diagram below to label the Super Giants, Red Giants, Main Sequence, Red Dwarfs, and White dwarfs on your diagram



Using the H-R Diagram:

2. Based on your H-R diagram name a star that is cool

3. Based on your H-R diagram which star is the brighte

4. Based on your H-R diagram which star is the hottest

Comparing Stars

5. What are some similarities and Differences between
- A similarity between Regulus and Aldebaran is that t _____ which is _____.
- A difference between Regulus and is that Regulus _____. Whe _____

Looking for Patterns

6. Which color represents the hottest stars? _____

7. Which color represents the coolest stars? _____

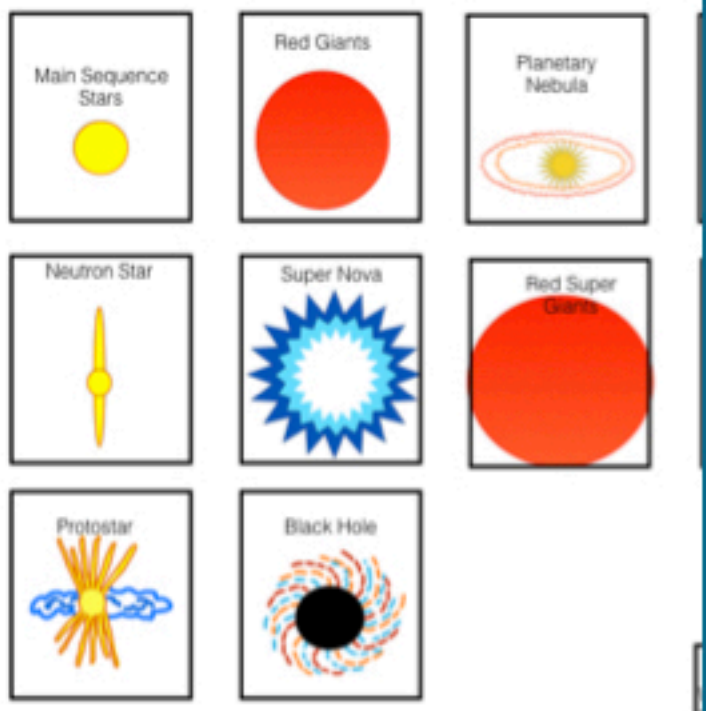
8. Where are the hottest and brightest stars found on th _____

9. Where are the coolest and dimmest stars found on th _____

Life of Sta

Directions:

1. Cut out the Star Pictures and des
2. Glue them into the appropriate s represents the life cycle of a star Sun and massive stars



What is left when all the energy from a star is gone and no light is produced

When hydrogen is used up and carbon is produced

Tiny leftover core of a supernova that spins rapidly and gives off radio waves

a ball of gas and

A time in a stars life when hydrogen is

leftover center of a

Comprehension Worksheets with answer key

Life of Stars

Name: _____

Class: _____

Massive Stars

Stars li… our Su…

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Life of Stars

Compare the life cycle of our Sun to the lifecycle of Spica, a blue giant star

Sun

Spica

Why doesn't the Sun explode and become a black hole? (explain your answer)

How will Earth be affected by our Dying Sun?

Scientists agree that in 5 billion years from now, when the Su… expand into a red giant that it will grow to roughly 256 times … be swallowed up by this expanding Sun. As the Sun gets c… the planet? Explain your answer

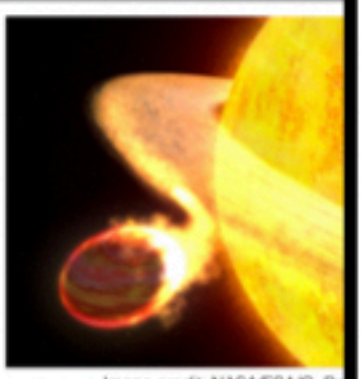

Image credit: NASA/ESA/G. Ba…

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Gal…

Ordering and Describing:

Picture	Type of Galaxy
	
	
	

Comparing: Compare an elliptical galaxy to a sp…

Elliptical

Digital Version

1 2 3 4 5

6 7 8 9 10

11 12 13

Extension Task Cards

Task 2

Explain, using details and evide
how the mass of a star affects it
cycle and determines if it will b
black dwarf, neutron star, or bl
hole?

Task 3

Use the H-R diagram to comp
stars Mizar and Sirius B. In
information about their charac
and life cycle.

Task 1

Explain, using details and evide
how can you use the H-R diagra
determine the age of a star

Task 4

Using your knowledge of ga
and stars, if we wanted to fi
black hole, which type of ga
would we investigate and wh
the galaxies should we loc

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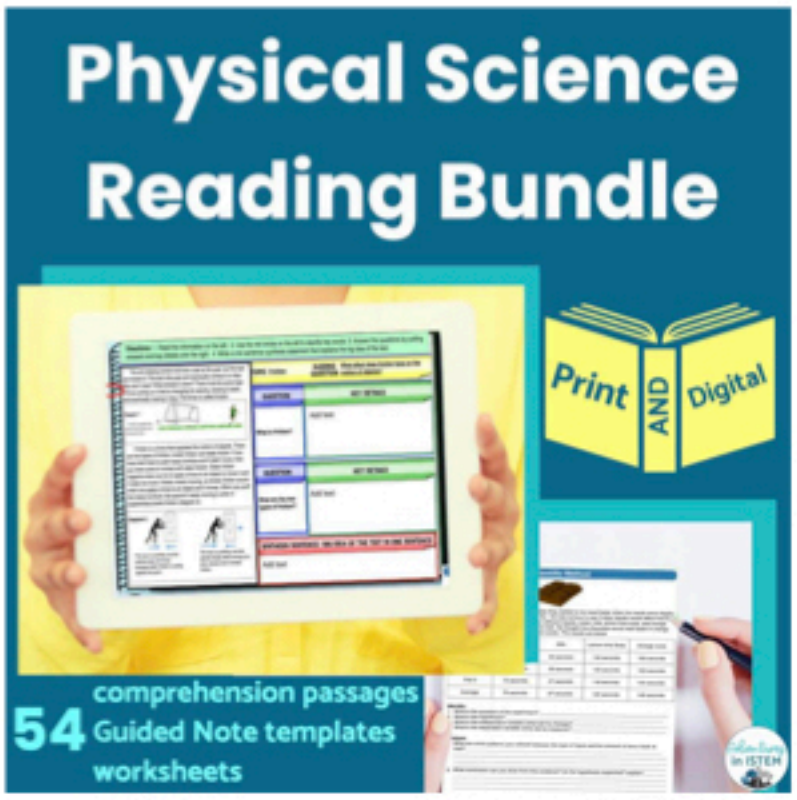

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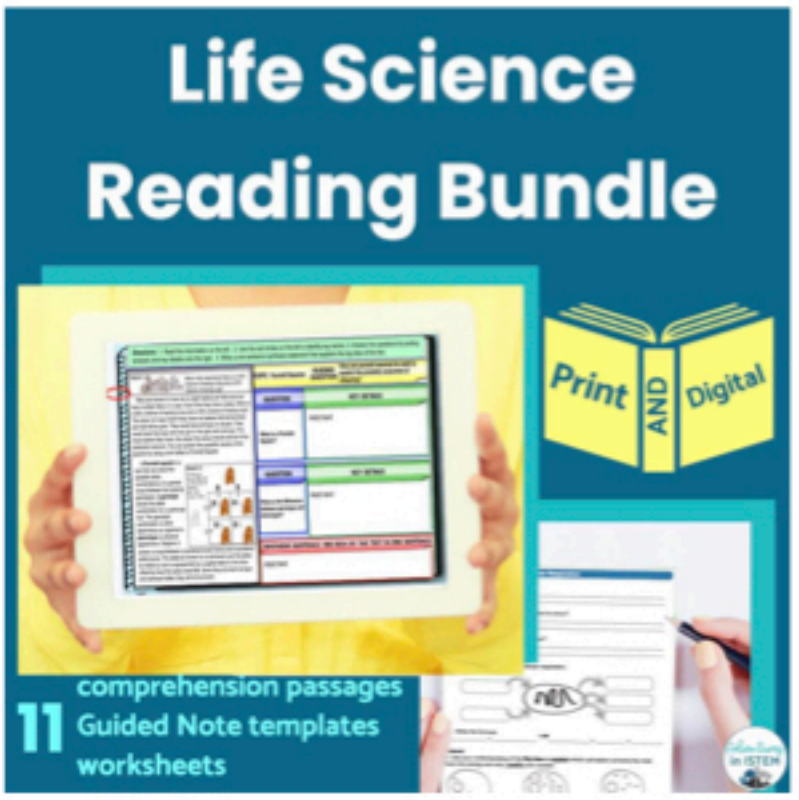

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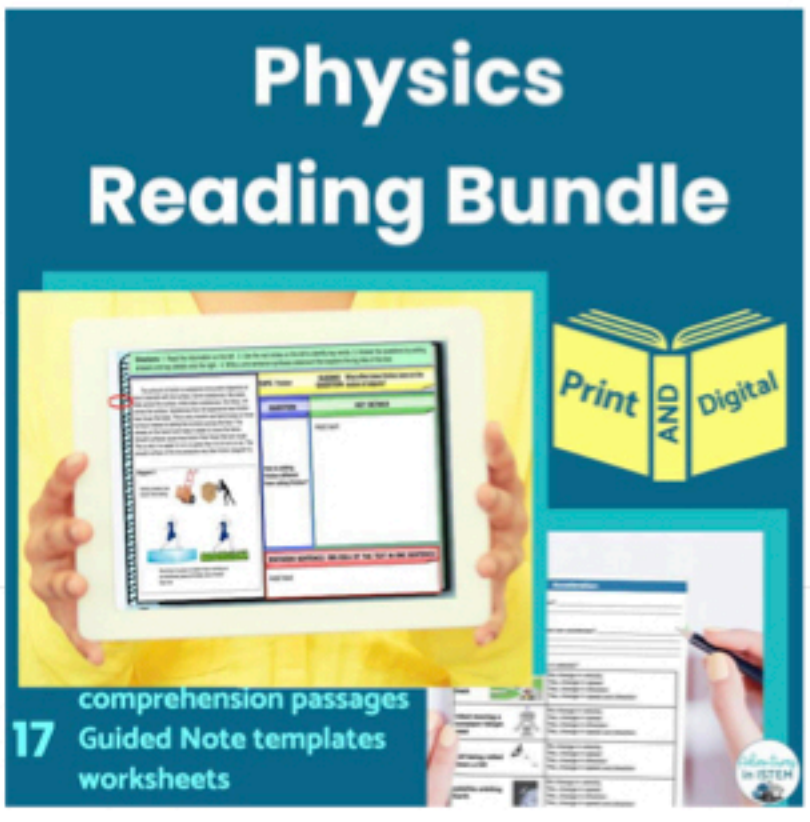

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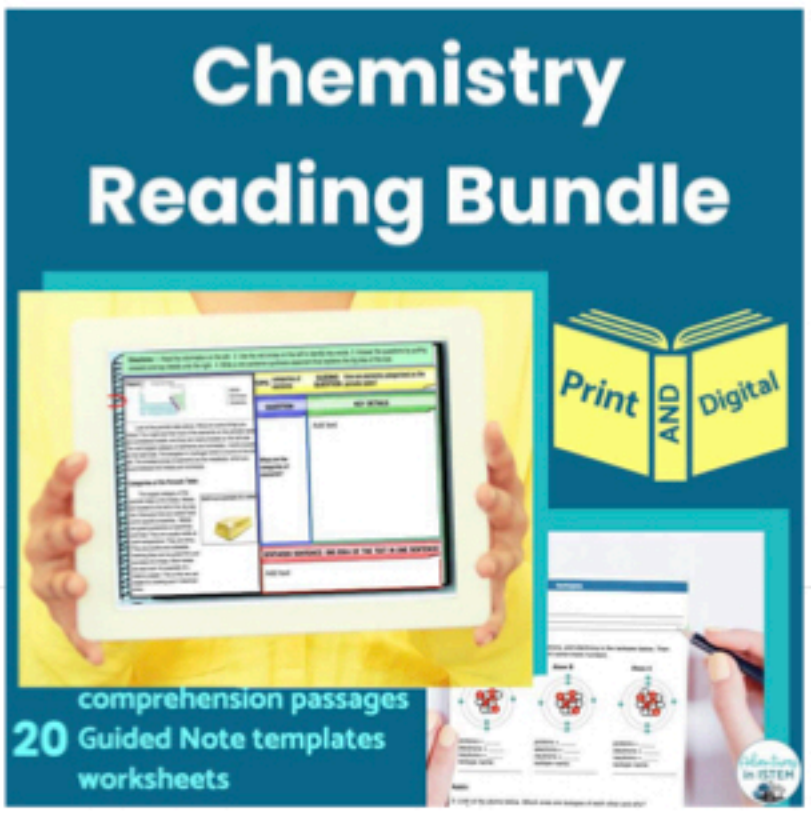

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Outer Planets Guided Reading Digital Notes

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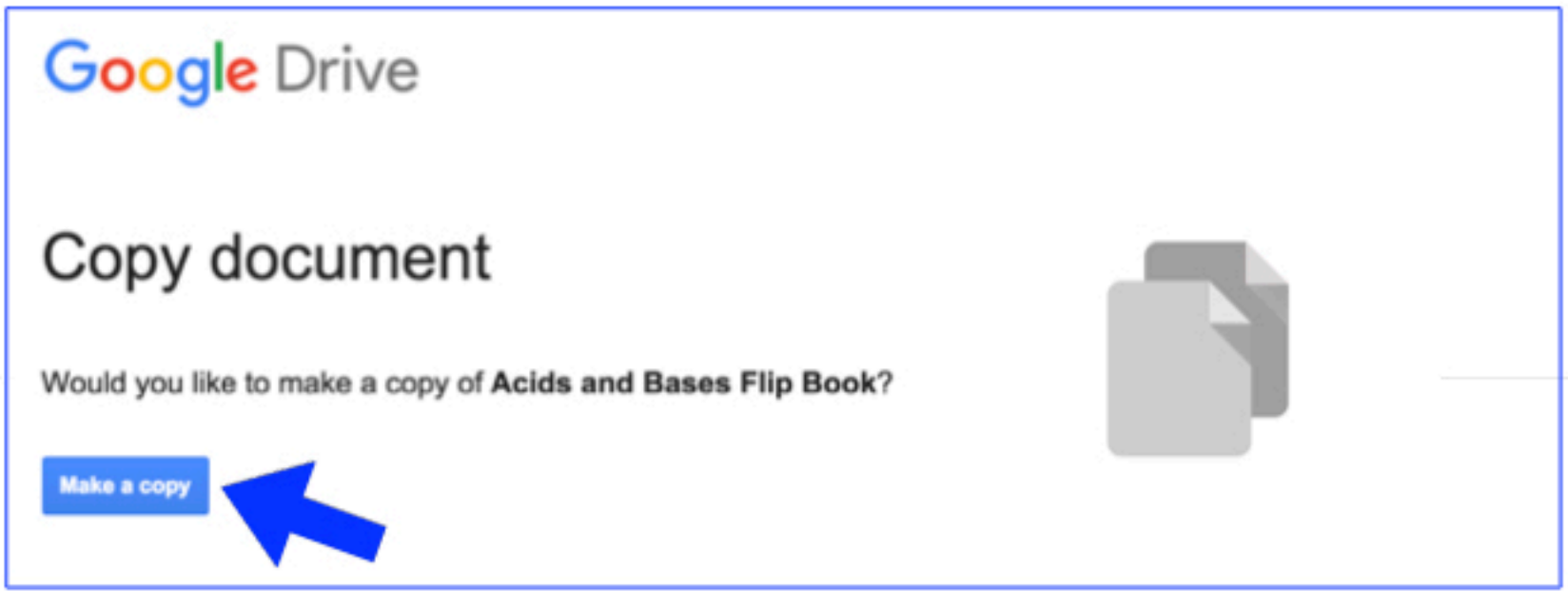

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Outer Planets

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?

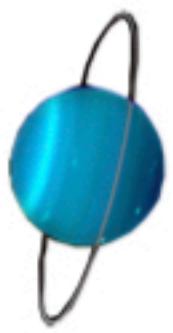
Questions	Notes
What do the outer planets have in common?	
What is a unique characteristic about each outer planet?	
Which planet is the most similar to Jupiter?	

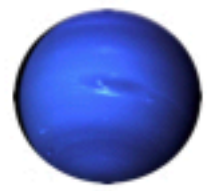
Summary:

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.

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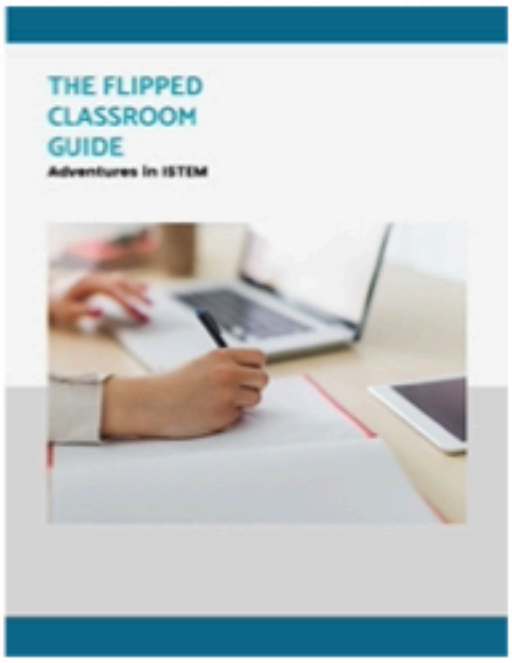

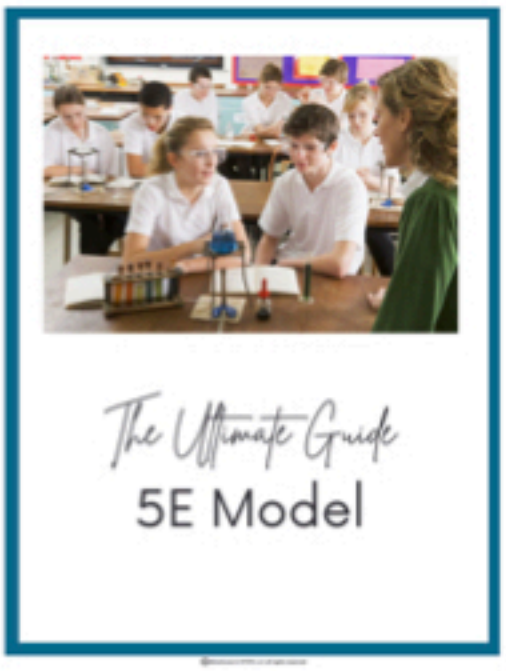

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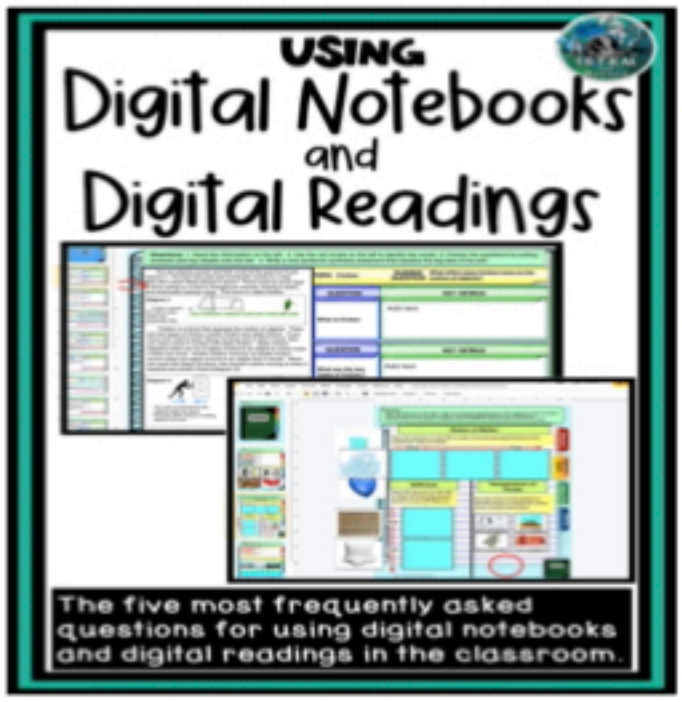

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