***Unit V Lesson I: “Jupiter”***

***Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

***S.W.B.A.T.***

* **Identify the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ characteristics of the planet Jupiter**
* **Describe/understand/ identify the processes that affect Jupiter’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* **Discuss \_\_\_\_\_\_\_\_\_\_\_\_\_\_ missions to Jupiter**

***Physical Data***

* **\_\_\_\_th planet from the Sun; 5.2 AU**
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of all the planets**
* **71,500 km equatorial radius or about \_\_\_\_\_ Earths (in diameter)**
* **\_\_\_\_\_\_\_\_\_\_ once in about 10 hours (equatorial region: 1 day = 10 hours)**
* **One Jupiter \_\_\_\_\_\_\_\_\_\_\_\_ = 12 Earth years**
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_ about 3 degrees**
* **Average cloud top \_\_\_\_\_\_\_\_\_\_\_\_\_\_ minus 270 degrees Fahrenheit**
* **Four \_\_\_\_\_\_\_\_\_\_\_\_\_\_ moons; \_\_\_\_\_ total natural satellites**
* **Has 2.4 times the \_\_\_\_\_\_\_\_\_\_\_ of all the other planets combined**
* **Known as a “\_\_\_\_\_\_\_\_\_\_\_\_\_\_”**
* **Produces more \_\_\_\_\_\_\_\_\_\_\_\_\_\_ than it receives from the Sun**
* **“Great Red Spot” cloud-top \_\_\_\_\_\_\_\_\_\_\_\_\_\_-like feature (visible in small telescopes)**
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_ magnetic field extending past Saturn’s orbit**
* **Has a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ system**

***Composition & Structure***

* **\_\_\_\_\_ % hydrogen; 7% helium with \_\_\_\_\_\_\_\_\_\_\_\_\_\_ gases (methane; water vapor etc.)**
* **Temperatures \_\_\_\_\_\_\_\_\_\_\_\_\_\_ below the cloud tops towards the \_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* **May contain a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ core 12 times Earth’s mass**
* **Core surrounded by liquid \_\_\_\_\_\_\_\_\_\_\_\_\_\_ hydrogen**
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_ hydrogen surrounds the liquid**
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bands move up to 240 mph**
* **Different colors indicate different \_\_\_\_\_\_\_\_\_\_\_\_\_\_ make-up**
* **Huge thunderstorms & \_\_\_\_\_\_\_\_\_\_\_\_\_\_-like features**
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is common**

***Moons***

* **Four \_\_\_\_\_\_\_\_\_\_\_\_\_\_moons – *Io, Europa, Ganymede & Callisto***
* **Each moon is about as large or \_\_\_\_\_\_\_\_\_\_\_\_\_\_ than Earth’s single moon**
* **All orbit Jupiter *synchronously* like Earth’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* ***Io* – (\_\_\_\_\_\_\_\_\_\_\_\_\_\_) known as the “pizza moon”**
* **Most \_\_\_\_\_\_\_\_\_\_\_\_\_\_(known) active body in the solar system**
* **Over 400 active \_\_\_\_\_\_\_\_\_\_\_\_\_\_!**
* **Io’s surface is constantly being \_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* **Volcanoes are caused by a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ gravitational “tug of war” between Jupiter and Io’s outer sister \_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* ***Europa* – known as the “\_\_\_\_\_\_\_\_\_ ball” moon**
* **Extremely smooth surface; very little \_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* **Europa’s surface has a 1-10km thick crust of \_\_\_\_\_\_\_\_\_\_**
* **Ice covers a large liquid-salty \_\_\_\_\_\_\_\_\_\_\_\_\_**
* **Ocean is probably heated \_\_\_\_\_\_\_\_\_\_\_\_\_\_ by the gravity “tug-of-war”**
* ***Ganymede* – largest moon in the solar system - larger than \_\_\_\_\_\_\_\_\_\_\_\_\_\_!**
* **Craters, ridges, valleys & a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ small ocean may exist under or near it’s icy/rocky \_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* ***Callisto* – (outer most) ancient \_\_\_\_\_\_\_\_\_\_\_\_\_\_ cratered icy/rocky surface about 200 km thick**
* **An \_\_\_\_\_\_\_\_\_\_\_\_\_\_ may also exist under the crust**
* ***Valhalla* - \_\_\_\_\_\_\_\_\_\_\_\_\_\_ impact basin in the Solar System**

***Missions***

* **“Fly By’s” : *Pioneer 1 & 2* (1970’s); \_\_\_\_\_\_\_\_\_\_\_\_\_\_ *1 & 2* (1979)**
* ***Ulysses* (1992); \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (2000); *New Horizons* (2007)**
* **Each took pictures & gathered \_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* ***Galileo* (1995) orbited Jupiter for ­­­­\_\_\_\_\_ years**
* **Intentionally \_\_\_\_\_\_\_\_\_\_\_\_\_\_ into Jupiter to gather more atmospheric data**
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mission is the spacecraft *Juno* (Jupiter Polar Orbiter) which arrived in \_\_\_\_\_\_\_**
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *Clipper* – mission currently planned to determine if \_\_\_\_\_\_\_\_\_\_\_\_ may have conditions for life**

***Class Assignment:***

***Unit V Lesson I: “Jupiter”***

***Answer Page***

***S.W.B.A.T.***

* **Identify the physical characteristics of the planet Jupiter**
* **Describe/understand/ identify the processes that affect Jupiter’s moons**
* **Discuss spacecraft missions to Jupiter**

***Physical Data***

* **5th planet from the Sun; 5.2 AU**
* **Largest of all the planets**
* **71,500 km equatorial radius or about 11 Earths (in diameter)**
* **Spins once in about 10 hours (equatorial region: 1 day = 10 hours)**
* **One Jupiter year = 12 Earth years**
* **Tilted about 3 degrees**
* **Average cloud top temperature minus 270 degrees Fahrenheit**
* **Four major moons; 63 total natural satellites**
* **Has 2.4 times the mass of all the other planets combined**
* **Known as a “failed star”**
* **Produces more heat than it receives from the Sun**
* **“Great Red Spot” cloud-top hurricane-like feature (visible in small telescopes)**
* **Strongest magnetic field extending past Saturn’s orbit**
* **Has a ring system**

***Composition & Structure***

* **93% hydrogen; 7% helium with trace gases (methane; water vapor etc.)**
* **Temperatures increase below the cloud tops towards the core**
* **May contain a rocky core 12 times Earth’s mass**
* **Core surrounded by liquid metallic hydrogen**
* **Gaseous hydrogen surrounds the liquid**
* **Cloud bands move up to 240 mph**
* **Different colors indicate different chemical make-up**
* **Huge thunderstorms & hurricane-like features**
* **Lightning is common**

***Moons***

* **Four major moons – *Io, Europa, Ganymede & Callisto***
* **Each moon is about as large or larger than Earth’s single moon**
* **All orbit Jupiter *synchronously* like Earth’s Moon**
* ***Io* – (closest) known as the “pizza moon”**
* **Most volcanically (known) active body in the solar system**
* **Over 400 active volcanoes!**
* **Io’s surface is constantly being resurfaced**
* **Volcanoes are caused by a constant gravitational “tug of war” between Jupiter and Io’s outer sister moons**
* ***Europa* – known as the “cue ball” moon**
* **Extremely smooth surface; very little cratering**
* **Europa’s surface has a 1-10km thick crust of ice**
* **Ice covers a large liquid-salty ocean**
* **Ocean is probably heated internally by the gravity “tug-of-war”**
* ***Ganymede* – largest moon in the solar system - larger than Mercury!**
* **Craters, ridges, valleys & a possible small ocean may exist under or near it’s icy/rocky surface**
* ***Callisto* – (outer most) ancient heavily cratered surface about 200 km thick**
* **An ocean may also exist under the crust**
* ***Valhalla* - largest impact basin in the Solar System**

***Missions***

* **“Fly By’s” : *Pioneer 1 & 2* (1970’s); *Voyagers 1 & 2* (1979)**
* ***Ulysses* (1992); *Cassini* (2000); *New Horizons* (2007)**
* **Each took pictures & gathered data**
* ***Galileo* (1995) orbited Jupiter for 8 years**
* **Intentionally crashed into Jupiter to gather more atmospheric data**
* **Current mission is the spacecraft *Juno* (Jupiter Polar Orbiter) which arrived in 2016**
* ***Europa* *Clipper* – mission currently planned to determine if Europa may have conditions for life**

***Classwork Assignment:***