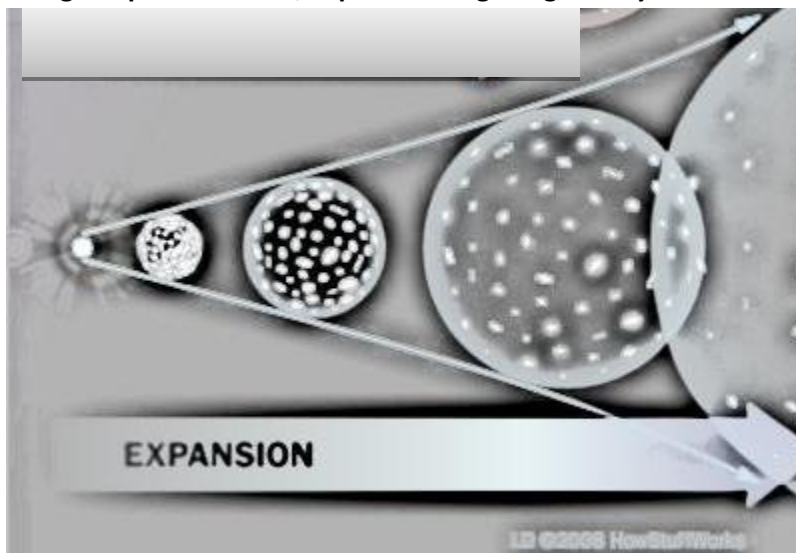


Astronomy Study Guide Answer Key



Section 1: The Universe

1. Cosmology is the study of how the universe is arranged.
2. Identify the type of cosmology
 - a. The sun is the center of the "Universe" Heliocentric
 - b. The Earth is the center of the "Universe" Geocentric
3. The two most abundant gases in the universe are:
 - a. Hydrogen and Lithium
 - b. Helium and Beryllium
 - c. Hydrogen and Helium
 - d. Nitrogen and Oxygen
4. Which gas is the most abundant? Hydrogen
5. Using the picture below, explain the Big Bang Theory.



All matter and energy were at one time compressed into a very small space. The compressed matter exploded outward releasing all of the matter and energy that makes up the expanding universe.

Section 2: Life Cycle of Stars

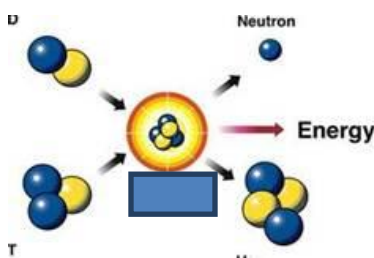
1. Using the word / phrase bank, fill-in the missing information throughout the chart on the next page

nuclear fusion	explosion	massive	fusion
dust	gravity	remains	friction
supernova	gas	dead star	Black Dwarf
supergiant	adds stuff (accretes)	fusion	core of a white dwarf
supernova	most stars belong here	Red Giant	fusion
Pre-Main Sequence	glows		

2. Using the chart on the next page, answer the following questions.

- a. What is a young star called before fusion begins? Begins as a protostar and as matter stops accreting it becomes a pre-main sequence star
- b. What is a star called after fusion begins? Main Sequence Star
- c. How is light and heat generated in a protostar? Friction
- d. How is light and heat generated in a pre-main sequence star? Fusion
- e. What is the most influential factor in the life and death of a star? Mass

3. The picture shows 2 lighter atoms fusing to make 1 heavier atom. This process, by which stars make their energy, is known as?

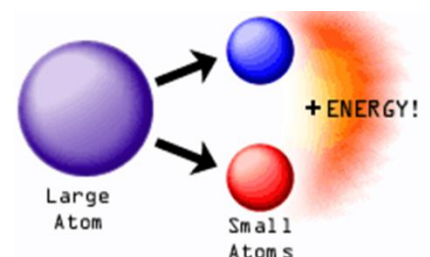


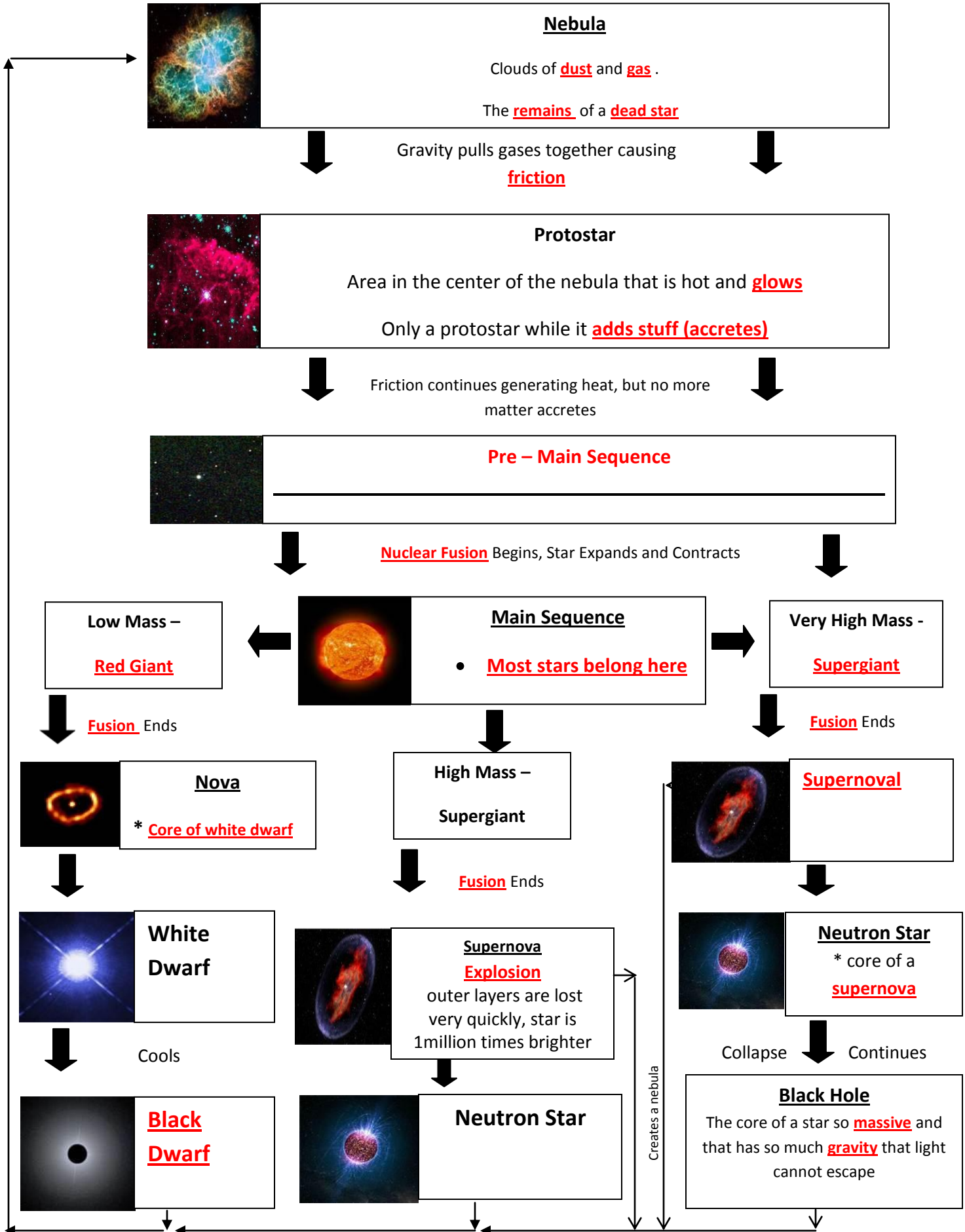
A. nuclear fission

B. nuclear fusion

4. Stars are burning. Is this statement true or false? False

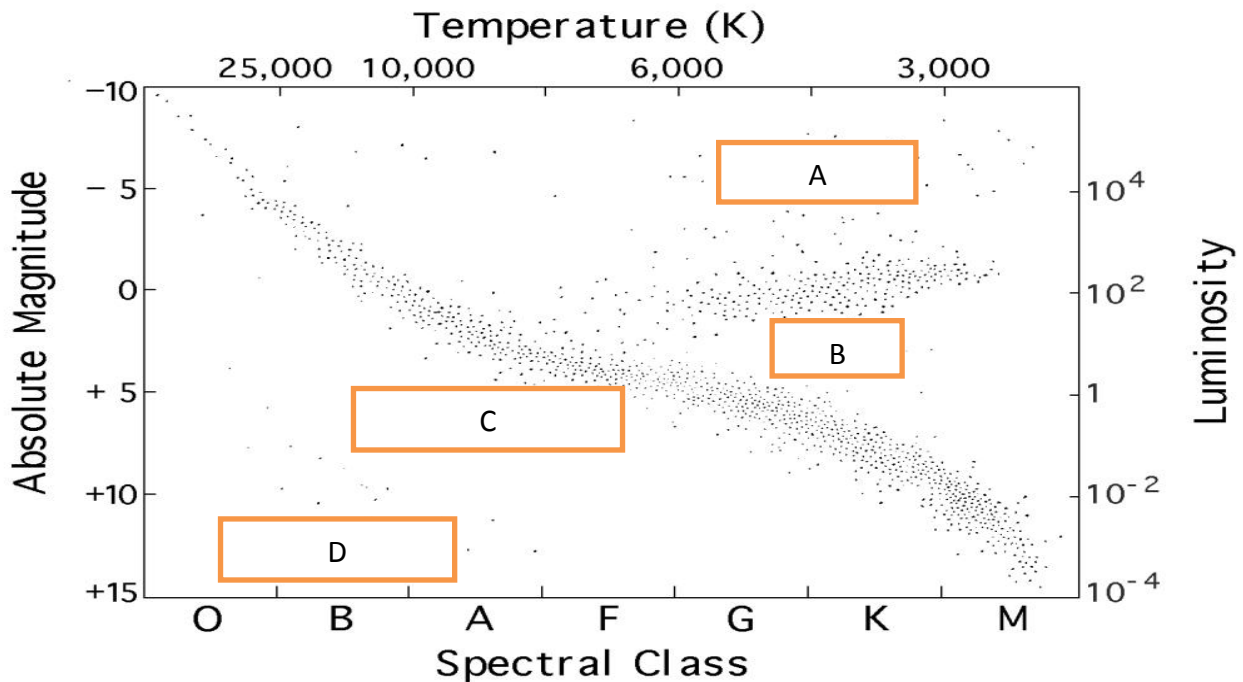
5. The picture to the right shows 1 heavy atom splitting to make 2 lighter atoms. This process, by which power plants make their energy, is known as? Nuclear Fission





Section 3: Hertzsprung-Russell Diagram

1. What type of information can you get from a Hertzsprung-Russell Diagram?
 - a. The age of the star and the surface temperature of the star
 - b. How far through the star's life cycle it is and the surface temperature of the star
 - c. The age of the star and how far through the star's life cycle it is
2. Using the following Hertzsprung-Russell Diagram, answer the questions that follow:



- a. What group of stars would be located at Letter A? Supergiants
- b. What size would stars in the lower left hand corner (D) be? Dwarf stars
- c. To which group (letter) would the sun belong to? C Name the group: Main Sequence
- d. A star located at letter A would have a (hot / cool) temperature and (would be / would not be) bright.
- e. How do we know that stars in group A are the furthest along in their life cycle?
Size, generally, as stars move through their life cycle, they get bigger
- f. Where would a hot star be located on a Hertzsprung-Russell Diagram?
Letter D – Dwarf stars – very hot, but dim
- g. You can tell how old a star is on a Hertzsprung-Russell Diagram.
 - i. True
 - ii. False

3. What is absolute magnitude?
 - a. The brightness of a star as though all stars are the same distance from Earth
 - b. The brightness of a star as we see it from Earth
 - c. The brightness of a star as we see it from space

4. Explain apparent magnitude. **The brightness of a star as seen from Earth; *hotter the star, the more light it gives off**

5. If a star is very bright as it appears from Earth, what can you conclude about absolute magnitude and apparent magnitude?

Absolute Magnitude = lower #

Apparent Magnitude - It is very big; it is very hot; or it is close to Earth

6. How are absolute and apparent magnitude useful to astronomers?

Absolute: comparing brightness Apparent: mapping the sky

Section 4: The Sun

1. How do granules move energy from the core of the Sun?
 - a. Hydrogen gas rises and falls in individual pockets which is known as convection
 - b. Hydrogen gas is exerted by explosions in the core
 - c. Oxygen is pushed out from the core of the sun through solar flares

2. What are Solar Flares?
 - a. Holes in the surface of the Sun made by the surface hitting its magnetic field
 - b. High energy portions of the sun that are lost into space by increased nuclear fusion in certain areas
 - c. The outermost layer of the sun.

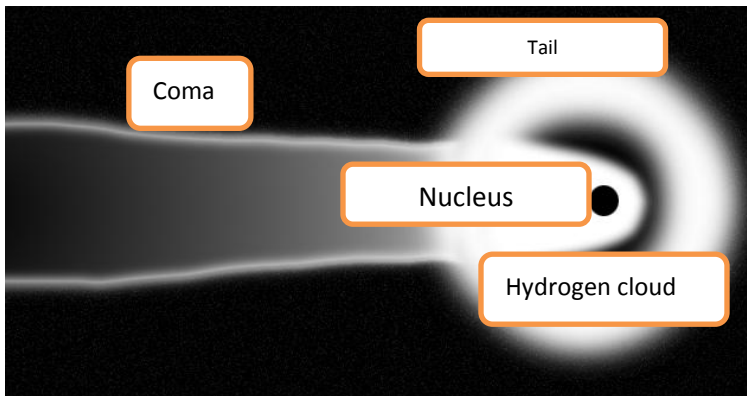
3. What kind of star is the sun? Main Sequence

Section 5: Solar System

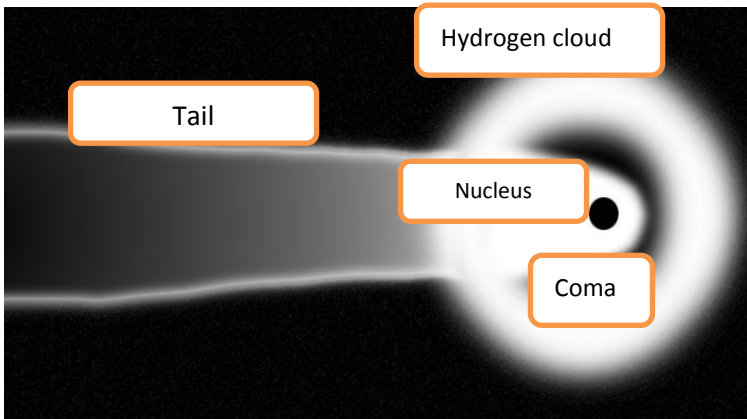
1. What is the asteroid belt?
 - a. **Area of space between Mars and Jupiter filled with rocky debris.**
 - b. The area of space that makes up the outer edge of a black hole
 - c. The area of space where stars begin to form

2. Where is the asteroid belt located?
 - a. Between Jupiter and Saturn
 - b. Between the sun and Mercury
 - c. **Between Mars and Jupiter**
 - d. At the outer edge of a black hole

3. Which drawing is a correctly labeled representation of a comet?



Incorrect



Correct

4. Where do comets originate?
 - a. Asteroid Belt
 - b. **Kuiper Belt**
 - c. Nebular Belt
 - d. Planetary Belt

5. What is the difference between a comet and a meteoroid?

A comet has an orbit; A meteoroid does not...it just floats through space

6. Fill in the chart with the appropriate information about each object

Meteor	Meteoroid	Meteorite
<ul style="list-style-type: none"> ■ The light created as a meteoroid <u>passes through a planets' atmosphere.</u> ■ Also called "Shooting Stars." ■ 5-15 can be seen nightly. ■ ~ 100 million enter the Earth's atmosphere daily ■ Add several tons to the Earth every day ■ When many enter at once it is called a meteor shower. (generally from a comets' tail) 	<ul style="list-style-type: none"> ■ Rocky fragment <u>floating through space</u> ■ Large as a boulder or small as a grain of sand ■ Has no orbit 	<ul style="list-style-type: none"> ■ Meteor that <u>strikes a planet's surface</u> ■ Made of stone or iron or a mixture of both (weigh several ounces to 35 tons) ■ Most are found in Antarctica

7. Explain gravity's role in the formation of the solar system. Be specific!

The gravitational pull from the sun pulls inner planets, which are lower in mass, close together because they are closer to the sun. Therefore, more gravity is pulling on them. The outer planets are further away from the sun, therefore there is less gravitational pull which causes the planets to be spread out.

Section 6: Telescopes

1. Complete the chart on telescopes

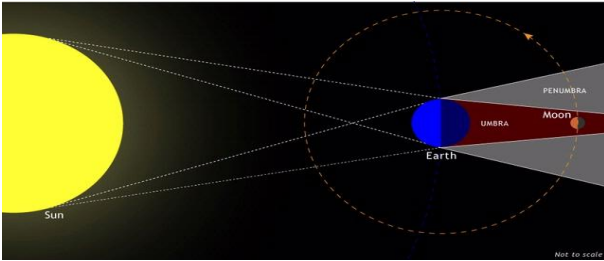
Name:	Refracting	Reflecting	Radio	Infrared
Type:	Optical telescope	Optical Telescope	XXXXXXXXXX	XXXXXXXXXX
What does it use to work?	lenses	mirrors	Satellite dishes	
What do they collect / detect?	Visible light	Visible light	Radio Waves	Heat

2. Of the two optical telescopes, which gives you the clearest image? Why?

Reflecting. Reflecting telescopes have less error because light never passes through glass.

3. Explain the importance of the Hubble Space and the Spitzer Space Telescopes with regards to images they send back to Earth. **The Hubble Space and Spitzer Space Telescopes are in orbit around Earth allowing for clearer images than we can obtain from ground based telescopes. The image is clearer due to space telescopes have to get through less atmosphere.**

Section 7: Eclipses



1. What type of eclipse is depicted to the left?
Explain how you know.

Lunar: the Moon is passing into Earth's Umbra which causes the sun to be blocked out by the Moon and the earth's shadow to appear on the Moon.

2. What is the umbra?

- a. Part of an eclipse; an area where only part of the light is blocked
- b. Part of an eclipse; an area where light is completely blocked
- c. Full Shadow
- d. Partial Shadow
- e. Both A and C
- f. Both B and D

This is my mistake. The answer should be B and C

3. What is a solar eclipse?

- a. When the moon gets between Earth and the sun, and the moon casts a shadow over Earth.
- b. When the Moon passes directly behind the Earth into its umbra

4. What is the penumbra?

- a. Part of an eclipse; an area where only part of the light is blocked
- b. Part of an eclipse; an area where light is completely blocked
- c. Full Shadow
- d. Partial Shadow
- e. Both B and C
- f. Both A and D

5. How does the location and size of the umbra and penumbra change from a lunar to solar eclipse?

Location: One is on the moon and one is on the Earth; Umbra of Earth larger than Moon

Section 8: Planets

1. This planet is the 2nd largest in the solar system. It is the least dense planet. It releases more energy than it receives from the Sun. This planet's rings are made of small ice covered rocks.
 - a. Saturn
 - b. Uranus
 - c. Jupiter
2. This planet appears blue. It has an almost horizontal axis of rotation because of an object impacting it. Its moons are named after characters from Pope and Shakespeare. It is the 3rd largest planet.
 - a. Saturn
 - b. Uranus
 - c. Jupiter
3. This planet has an odd orbit that doesn't clear debris and it lacks a gravitational pull. This planet is actually a dwarf planetoid.
 - a. Mars
 - b. Earth
 - c. Pluto
4. This planet has the largest volcano in the solar system. Its atmosphere contained oxygen that was used to oxidize the surface. It has polar ice caps of frozen carbon dioxide.
 - a. Saturn
 - b. Mercury
 - c. Mars
5. This object has a composition like that of Earth's. It rotates at the same rate as Earth. It has no atmosphere and a very cratered surface. The surface also contains two areas, the Lunar Maria and the Lunar Highlands.
 - a. Venus
 - b. Moon
 - c. Earth
6. This is the largest planet in the solar system. Its cyclonic storm is called the Great Red Spot. It is composed mainly of gas and liquid metallic hydrogen. It has a rocky core 10-15 times the size of Earth. It has small faint rings. It is as large as a planet can be.
 - a. Saturn
 - b. Mercury
 - c. Jupiter

7. Venus has a very (low / **high**) surface temperature. Explain why. **The thick atmosphere traps in heat**

8. When astronomers talk about Mercury having the greatest temperature extremes, what do they mean?

It is very hot where the sun's light can reach, but it is very cold where the sun does not reach

9. Explain why Mars is no longer considered to be very similar to Earth.

The atmosphere on Mars is very thin and it becomes extremely cold at night; oxygen is being removed from the surface and trapped in the atmosphere; Mars cannot block excess radiation due to the thin atmosphere

10. What is regolith?

Lunar soil and pulverized rock