Investigating Stars Name:____Block:____________

FYI: How Are Stars, Planets, & Moons Different? **E1:R2**

1. Read FYI: *How Are Stars, Planets, and Moons Different from Each Other?*

   As you read use the spaces below to write down any information you find especially interesting. Also define the bold terms used in the text. If you run across any other words that you don't know the meaning of, write those down and ask your teacher to help you with them.

Word/Term	Definition
Nebulae	**Nebulae** are _____________ of _________ and __________.
Nuclear Fusion	In **nuclear fusion** _________ atoms under tremendous _____________ and ________________ form ____________ atoms.
Brown dwarf	**Brown dwarfs** don't have enough ________ to become a full-fledged star. They are objects that are ______ and thus difficult to observe.
Planet	Leftover _______ and ________ can collect to form **planets** that ___________ around their _________ star.
Moon	Other condensed clumps of matter that orbit a __________ are called **moons.**
Extra space for additional words or interesting information.	

1. What did our Sun look like before it became a star?

2. Why can nuclear fusion occur in the core of a star, but not in the cores of planets and moons?

FYI How Are Stars, Planets, and Moons Different from Each Other?

When we look up into the night sky, we see many types of objects. Some clearly appear unique, such as Earth's moon, but it may be hard to tell others apart. When viewed through a telescope, these objects exhibit very different features that enable astronomers to learn much more about them.

Figure 1-3: Artist's drawing of a star forming from a cloud of gas and dust that condenses over time inside a larger cloud called a nebula. Other clumps of matter form planets that will orbit the central star.

Stars are spheres of hot, glowing gas. They form inside clouds of gas and dust, called **nebulae**, that are light-years across in size. Occasionally, such clouds are jolted by the explosion of a nearby star or by a collision with a similar cloud. The resulting violent shock wave causes parts of the cloud to clump into smaller clouds, which then begin to collapse under their own gravity and increase in mass as they attract even more hydrogen and helium gas from their surroundings. Inside each clump, the intense gravitational force creates a very dense core where atoms constantly collide, generating high temperatures.

Figure 1-4: Photograph of Phobos, one of two moons of Mars. Phobos is rocky and pitted with craters. It is a small moon—measuring only 28 km x 20 km.

If a clump's initial mass is large enough, the temperature in the core eventually will reach 10 million degrees K, and the process of **nuclear fusion** begins. In nuclear fusion, small atoms under tremendous temperature and pressure form larger atoms. Inside our sun, for example, four hydrogen atoms fuse together to form one helium atom. Nuclear fusion releases considerable amounts of energy, and part of that energy eventually leaves the sun as the visible light and infrared (heat) energy that is received here on Earth. When a clump is less than 10% the mass of our sun, usually expressed as > 0.1 solar mass, it does not have enough mass to initiate fusion in its core, so it will not become a full-fledged star. A clump with mass between 0.01 and 0.1 solar mass will form a **brown dwarf**—a cool sub-stellar object that is dim, and thus difficult to observe.

As stars begin to take shape, leftover gas and dust form a disk around a star. Smaller clumps of matter collect and become **planets** that revolve around their host star. Jupiter, like the sun, is composed primarily of hydrogen and helium. But with a mass of about a thousandth of the sun, it is classified as a planet. Planets, like Jupiter, will never be able to produce their own energy through fusion. A **moon** is another type of clump of matter, one that orbits a planet. Some moons are larger than some planets. Titan (a moon of Saturn) and Ganymede (a moon of Jupiter), the two biggest moons in our solar system, are both larger than the planet Mercury. Pluto, discovered as a planet in 1930 and reclassified as a dwarf planet in 2006, is, according to our latest estimates, much smaller than Earth's moon. Smaller moons are usually irregular in shape, while larger moons are spherical. The amount of mass at the time of a moon's formation determines its final shape.

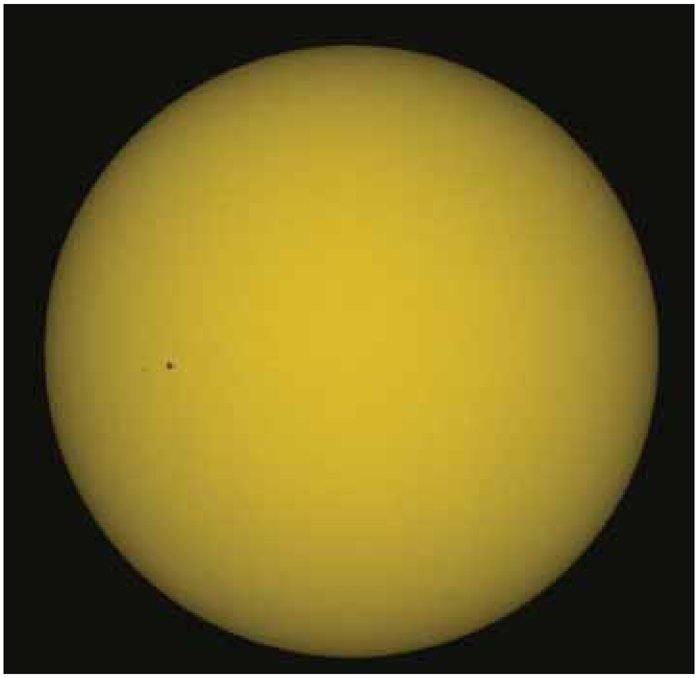

Figure 1-2: Image of the sun. Our sun is a small yellow star. Other stars can be much smaller or larger than the sun.