Name: _____

Date: _____

Period: _____

Review - History of Astronomy

Nearly 2000 years ago a Greek Astronomer named Aristotle proposed the idea of a Geocentric Universe, placing _____ in the center of our Solar System with the moon, planets, and even the sun orbiting us. To nearly every one, this concept made perfect sense. They had all seen the sun rise in the _____, travel across the sky, and then set in the _____. Clearly, the sun was orbiting the earth. What most did not realize was that the earth was actually _____ on its axis. But to solidify his idea, Aristotle provided three pieces of evidence to prove the earth could not be moving. The first was that if you threw a ball into the air it would _____. If the earth was moving, the ball should fall to the ground at your side. Aristotle did not understand INERTIA. Secondly, he said that if the earth were moving, then there should be winds of _____ miles per hour, because at our latitude, this is how fast the earth would have to be spinning. He surely did not realize that the earth's atmosphere was attached to the surface by gravity. Finally, and laughably, he suggested that if the earth were to revolve around the sun then when a bird took to the air, it would be left behind in space. Again, a misunderstanding of gravity.

For 1500 years Aristotle's ideas held sway in all theories about the Universe, but scientists started noticing problems. Why were the orbits of some planets so weird, especially Mars which actually changes direction (retrograde motion)as it "orbits the earth"? A Polish Monk named _____ proposed a new idea. He put the sun in the center of the Solar System and called his MODEL the _____ _____ model of the Universe. This theory better fit the observations scientists had been making and was soon adopted by science across the globe.

Questions still arose about the planets, seasons, and our moon. Theories were developed, tested, and refined. Scientists noticed that planets that took longer to orbit the sun were _____ from the sun. Instead of miles, they measured these distances in AUs (_____) which is 93 million miles or the average distance from the _____ to the _____.

Scientists looked closely at the composition of the known planets and found that the four inner planets (_____ _____, _____, _____, _____) were all rocky and small, while the four outer planets (_____, _____ _____, _____, _____) were all gas giants. The difference they noticed was with their _____ (measured in grams/centimeter ^{3}). This lead to our current theory of the formation of the Solar System which says that after a supernova of a star much more massive than our sun. a cloud of debris called a _____ formed in space. Gravity from a passing star or Black Hole put this cloud into motion. Like a whirlpool in a river, the _____ formed at the center of the cloud and planets were formed in little eddies or disturbances throughout the cloud. The more _____ material was pulled closer to the star and explains why the rocky planets are close to the sun. The less _____ gasses and liquids formed into the gas giant planets _____ from the sun.

Pluto did not fit easily into either of these two categories. Its size and composition meant it was more like the __ _____ planets, but its location far from the sun should have made it more like the _____ _____ . Because of this, the discovery of more "planets" like Ceres and Eris, and the fact that Pluto's moon, Charon, does not orbit Pluto, but a point in space between the two of them, scientists

decided to reclassify Pluto as a _____ planet. There are now five of these in our Solar System.

As science improves its understanding of the Solar System, are ability to notice and explain patterns improves. Living here in Connecticut, we all observe the changes of the seasons. Back on September 23 we experienced the first day of fall called the _____ _____ which had daytime and nighttime hours of _____ length. If we had been lucky enough to be on the _____ _____ (0^o Latitude)on that day, we would have seen the sun pass directly overhead. This coming December, we will experience the _____ _____ or the first day of winter. On this date, the nighttime will be _____ than the daylight hours. This is because the sun has appeared to move south and is directly over the Tropic of _____ _____. Those people in Argentina experience their longest daylight hours and they call this day the First day of Summer. They are so backwards, or our we?

We know that the changing of the seasons and apparent location of the sun above earth is because of the earth's _____ on its axis. With the sun low in the sky in December we get a lower density of sunlight in Connecticut and so the average daily temperatures are _____ than they are in other seasons. When the sun appears higher in the sky, like in the summer, the sunlight is hitting Connecticut more _____ _____ and causes _____ daytime temperatures. And so the seasons are a result of the earth's tilt and not its distance to the sun which remains fairly constant year round at about _____ miles or 1 AU.

The pattern we notice in the moon is that as the moon goes from New to Full, the _____ side of the moon is lite up by the sun, but as the moon WANES, the right side grows _____ each day until we reach another New Moon _____ days after the previous New Moon. New Moons cause some interesting events here on earth. Although the orbit of the moon is inclined at 5^o, occasionally the New moon will be directly between the _____ and earth causing the _____ or dark shadow of the moon to fall on the earth and thereby create a total _____ eclipse. The next one of these will be visible here in Connecticut on August 21st, 2017. Partial eclipses occur when the lighter shadow or _____ _____ falls on the earth.

The New Moon also effects the tides. Although we have two high and two low tides every day, on the New Moon, the difference between the high and low tides is _____ than normal and so we call these special tides _____ tides, which have nothing to do with the seasons. These tides also occur during the _____ Moon when the moon is on the _____side of the earth than the sun. When the moon is oriented 90^o to the earth-sun line we experience both _____ _____ moons and _____ moons. These moons give us special tides called _____ tides, where the difference between high and low tides is _____.

Astronomy is perhaps the oldest of all sciences. Since the caveman times, people have been noticing the patterns caused by the moon, seasons, and the path of the stars and planets across the sky. Science looks closely at these patterns to help us better understand how the Universe formed and continues to change.