

Answers to questions posed by a 7<sup>th</sup> grader.

> What company do you work for?

That is not as simple a question as you might think. Most of the time I work directly for George Mason University. However, while at George Mason University I have also held contracts with numerous federal, state and local government agencies. For example, I work for NASA Jet Propulsion Laboratory at times, giving talks to school children and the public.

> What is your position in that company?

I am the George Mason University Observatory Director, and an Associate Professor of Physics and Astronomy.

> What do you normally do in your job?

Teaching courses in physics and astronomy, and all the duties that entails, is just one portion of what I do at the university. I am also responsible for the daily operations of the George Mason University Observatory. That includes making sure that all the astronomical equipment is working properly, and when an instrument fails, I have to make sure that it gets repaired. I also have to schedule the time that students and faculty get to use the telescope in the observatory. I also write articles and books, for both the public and for professional astronomers as well.

> What technology do you use?

I utilize whatever technology is available, to do the task at hand. Right now I am using a computer to compose this response to your questions. I have also used computers to analyze data. I have made use of what some people call artificial intelligence, specifically artificial neural networks to analyze data. I use computers to generate graphics to display my analysis. I use computers to help in doing the mathematical calculations for my work. I also use specialized equipment for the telescope, such as spectroscopes, photometers, filters, amplifiers, image processors, and many other instruments.

> What skills do you need to have to be an astronomer?

I, like most astronomers, have many skills. When needed I need to utilize mathematics, mechanics, electronics, engineering, and other similar skills. Some are technical, and some are just simple skills such as proper cleaning of lenses.

> Do you know of any recent discoveries in astronomy?

Yes, there have been many. Almost daily there are discoveries in astronomy, I guess that is one of the reasons I enjoy it so much. While the most recent discoveries may have to do with planets orbiting stars other than our Sun, and, black holes, I post discoveries almost daily on my Twitter feed. I am @AstroBioProf on Twitter.

> What are some current things being studied in astronomy?

Everything in the universe is being studied today. From black holes in galaxies so very far away, to planets similar to the Earth in size and mass.

> Have you ever discovered something new like a star or a planet?

Discovering a new star is not common; however, discovering a new planet orbiting another star, has become very common. I have not spent my career looking for new stars, a nova or supernova, nor a planet, in our Solar System or any other.

> If you discover something, do you get to name it?

The official naming authority in astronomy is the International Astronomical Union, or IAU. They allow discoverers of planets and asteroids to make suggestions, but the IAU has the final say. Only if you discover a new comet do you get to name the comet what you wish (within limits).

> How do you think this field will change over time?

This field, as all science fields do, changes continuously. Every day we make new discoveries which add to the volume of information gathered by astronomers. Sometimes we have to modify an older discovery, but most times we just add to the information about such discoveries.

> What is the most interesting thing you have found or learned about while working in this field?

Actually, it is the absence of something for which I am best known. I was a graduate student working on the data relayed to Earth from the Viking Lander on Mars. We determined that there was no evidence of any organic molecules within the soil samples taken at the Viking Lander sites. An absence of organic molecules is evidence to support the view that there is no life on the surface of Mars.

> How often do you actually go out and look through a telescope?

The only times we actually look through a telescope ourselves is when we have public observing sessions at the observatory. Otherwise, we sit in a comfortable control room and instruct the telescope to look where we wish to look, and gather information about the object using different instrumental attachments. In fact, most of the time we just analyze data from telescopes and instruments that are located far away, and even in space itself.

> What skills do you actually use a lot in astronomy (ex: math, communication)?

Yes we utilize a lot of mathematics in astronomy; although, these days we typically have the computers do the mathematics. We also have to have good communications skills, both oral and written in order to inform the community about our observations; and, to communicate our findings to the general public.

> What are some fields that are closely tied to astronomy?

Every other field of science is tied to astronomy in some manner. Some say that physics is most closely tied to astronomy; however, as I study and teach astrobiology I find that biology, chemistry, engineering, geology, history, mathematics, philosophy, physics, psychology, sociology, and zoology, are all tied to astronomy.

I hope my answers have helped you in your endeavor to comprehend the life of an astronomer.