Astronomy 101U Skylab #1 – "Did You See It?"

Introduction: This lab involves watching for meteors, or falling stars, hence the title. As you perform the observations, it's something you're bound to hear. No astronomical equipment is required for this lab. The only skill required is the ability to stay awake and enthused all night.

Equipment: You'll need:

- a sleeping bag or a warm blanket (something to lie down on and something to cover yourself with if it is cold),
- a star map you can write on (like photocopies of the inside covers of the text, though it would be better to get copies with white sky instead of black sky),
- a flashlight (preferably with a red cover or sock on it so it isn't too bright),
- warm clothing,
- food and drink (optional, but highly recommended),
- a friend or lab partner (to keep you awake, but keep your mind on the lab!).

Time Required: One entire night. You can see meteors any night (a typical rate is 5-10 per hour), but try to avoid the lunar phases from first quarter to third quarter when moonlight most interferes. The best times of the spring in which to do this lab will be April 21 (Lyrids) and May 4 (Eta Aquarids). Any time within two or three days of these dates (with the best viewing on those dates themselves) would be exceptionally good (3-10 times the number of meteors, at least).

What To Do: The first and foremost requirement for a successful night is a clear and dark sky. That obviously rules out Seattle, so find a field at least 20 miles away from any urban concentration. The area around Carnation (to the East), for example, is very suitable.

Make yourself as comfortable as possible. Sleeping bags, pillows, blankets, and lounge chairs work well. Assuming you have more than one person, each should select a portion of the sky as his or her domain. If the moon or city lights "pollute" a portion of the sky, concentrate your efforts elsewhere.

Observing is simple. After sighting a meteor, simply record the time at which it was observed and the position and direction in which it traveled. Learning some constellations will of course aid in recording the location of each meteor. Mark the meteor trails directly on one of your copies of the star charts. Don't be discouraged if you don't see many meteors at the beginning of the night; the rate of meteors is usually lowest early in the night (something to think about and/or talk about to keep you awake is why that is) and increases to a peak a couple of hours before dawn. You will also probably spot several artificial earth satellites. These are starlike objects which take only a couple minutes to move from one horizon to another. Make a record of them, as well as of any other phenomena of interest such as very bright or colored meteors, clouds obscuring the sky, the aurora, etc.

Questions:

(1) Make a graph of the number of meteors you observed in each hour of the night. During which hours did you see the most?

(2) Explain why you would expect to see the most meteors later in the night, toward dawn. There are a lot of reasons you could probably come up with, but there is a real scientific explanation for this that is not related to observer fatigue.

(3) Was there any preferred direction of travel for the meteors you saw? Turn in your map (or a copy of your group's map) for this question.

(4) Did the meteors seem to originate from any particular place in the sky? Explain why meteor showers are named the way they are.

(5) List at least four errors that could have affected your results, state which type of error each is (random or systematic), and state whether and how it could be reduced or eliminated.