

Dear Scientist,

Hi! We are researchers working on a project that deals with cosmology and we really need your help! Do you think you are up for the task? First off, we are sure you are thinking, “What is cosmology?” Well, cosmology is the study of the universe. So within this project you will be helping us collect data that deals with the Sun and Earth. We would certainly appreciate your help. This will be a wonderful opportunity to become a scientist and to explore a world beyond all the things you know here on Earth. Let us describe the project.



1. What do we want to know?

We are trying to learn new things about the universe. Most of you know that many different “objects” surround the Earth. We see these during the day and/or the night. These “objects” are the Sun, Moon, planets, and stars. To begin our exploration of the universe, we want to answer to the following questions:



- Are the Earth and Sun moving?
- Does the Earth rotate? Does the Sun rotate?
- Does the Earth move around the Sun?
- Does the Sun move around the Earth?

2. What data do we need to collect? How are we going to do the experiment?

Inspired by how researchers in ancient civilizations (many, many, many centuries ago) studied the universe, we have built for you your own personal observatory that allows you to collect data, to use your scientific knowledge, and to reason. Below is a sketch of the observatory. In order for the project to work, you must be really careful while collecting your data to make sure the whole class gets the same results, so make sure you follow these directions:

- Decide the direction in which your observatory should be facing. Take your project outside during the early morning and position the orange section towards the sun.
- The observatory has to always be in the same location. You must make sure that the observatory is not very close to any buildings, trees, or any other objects that might cast a shadow on it. (Hint: You want your observatory to be in the sunlight throughout the entire day)
- As you can see each part of the observatory is given a different color. You must make sure that the observatory is always positioned in the exact same way each time you go outside to make observations and to record your results. (The same colors of the observatory are pointing the same direction, facing the same objects each time. For example, if there is a tree near by make sure that the blue side of the board always faces towards that same tree each time you go outside.)
- Each sunny day you will need to collect data at least three times. Go out sometime during the morning, around lunchtime, and then again in the afternoon. You must record the location of the tip of the shadow on the

observatory board. If the tip of the shadow is within the center circle you record it as “close” on you data chart. If the tip of the shadow is within the second, larger circle you record the distance as “medium.” Finally, if the tip of the shadow is outside of the second, larger circle or off the board, you record the distance as “far.” You also will record which color the tip of the shadow is located. You will record your data in a table like the one included with this letter.



3. How do we make sense of all the data?

You will share your data with your classmates during the project. Each day or anytime after making observations, you will need to bring your data and plot it on the graph hanging in your classroom. At the end of the project, we will all meet and discuss what we have learned about cosmology.



We are looking forward to learning about your results from this project!
Hope you have a fun time collecting data and learning about the Sun and Earth.



Professors and students involved in the course PHYS 290M
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STANDARDS MET:

**3.1.2, 3.1.3, 3.1.4, 3.1.5, 3.2.4, 3.2.6, 3.2.7, 3.3.1, 3.3.5, 3.5.3,
3.6.1, 3.6.3, 3.6.4, 3.6.5**

4.1.3, 4.1.4, 4.3.8, 4.3.9