

Extraordinary Exoplanets

Your group's challenge is explore one exoplanet's set of data. First you should find out if there actually is an exoplanet in your data set. Then you want to think about what your exoplanet is like. Is it orbiting edge on from Earth's point of view or is it grazing its star? How big is your exoplanet? How close is your exoplanet to its star? How far from Earth is your exoplanet? What do you think its surface is like? Use the online Laboratory for the Study of Exoplanets to answer these questions.

Your project involves: Data Analysis, Conclusions & Assumptions, Publication, Presentation & Reflection

Data Analysis – Use telescope images and the online Laboratory for the Study of Exoplanets

1. Use the Image Lab (online) to create a light curve for your exoplanet. Each member of the group must participate in this portion.
2. Complete Task 1 & 2 in the Data Lab (online). Record your numbers for the brightness and dip levels. These will help you determine other aspects of your exoplanet besides the transit.
3. Use the handout *Create a First Portrait of Your Planet* to determine the following for your exoplanet:
 - a. *How big is your planet?*
 - b. *Is the planet's orbit tilted, as seen from Earth?*
 - c. *How close is your planet to its star?*
 - d. *How far is your planet from Earth?*
4. *Determine where in the sky your exoplanet's star is located – what constellation is it in, where in the constellation is it located, how far from Earth is it*

Conclusions & Assumptions – Use the online Laboratory for the Study of Exoplanets to visualize your exoplanet.

1. Use the Visualization Lab (online) to create a visual representation of your exoplanet. Show aspects of your exoplanet that are based on your data analysis and others which are based on your assumptions.

Publication - Create a pdf with the following information. This will be printed as a poster (20" x 22") that your group will present to the class. The poster can be created as a slide in powerpoint and saved as pdf or you can use another graphics program you are familiar with. The poster PDF file is due Friday, February 24, 2017.

1. Introduction
2. Methodology
3. Screen shot of your brightness curve.
4. Written description of your brightness curve.
5. Screen shot of your exoplanet's visualization, both of (1) the orbit and (2) the planet.
6. Create a detailed written description of your exoplanet. Identify which aspects of your exoplanet are based on your data analysis and which are based on your assumptions.

Presentation – Your group will present your research in a poster session. You will take turns staying at your poster to answer questions or going around to look at other posters. This is where you will look for similarities and differences between your star/exoplanet and that of another group (make

sure you record the other group's names!) The poster session will be Tuesday 2/28/17. Your presentation should include the following:

- a. An explanation of your light curve – is there evidence for an exoplanet transit, how confident you are in the data
- b. *How big is your planet & how did you calculate the relative size*
- c. *Is the planet's orbit tilted, as seen from Earth & how do you know*
- d. *How close is your planet to its star & how did you calculate the distance*
- e. *How far is your planet from Earth & how did you calculate the distance*

Reflection – Each team member must write his or her own reflection. This reflection is an exploration of your learning experience during this project. The following four points should be covered in your reflection. Think about what you did, what you learned, what questions you had and/or have during all aspects of the project. The typed reflection is due 3/6/17

- *To make connections*

Reflective writing helps you develop and clarify the connections between what you already know and what you are learning or what you learned during this project, between theory and practice and between what you are doing and how and why you do it. What connections have you made between the information or experiences in this project and what you knew before or what you see or hear outside of this project?

- *To examine your learning processes*

Reflective writing encourages you to consider and comment on your learning experiences— not only WHAT you've learned, but HOW you did so. What did you learn? What do you think of how you learned it?

- *To clarify what you are learning*

Reflecting helps you to clarify what you have studied, integrate new knowledge with previous knowledge, and identify the questions you have and what you have yet to learn. What did you learn and what new or still unanswered questions do you have?

- *To reflect on mistakes and successes*

Reflecting on mistakes can help you avoid repeating them and reflecting on your discoveries helps identify successful principles to use again. What was successful, what needs work?

- *To draw comparisons between your exoplanet and that of at least one other group*

How is your exoplanet similar to and different from the exoplanet orbiting a different star? Choose a poster from at least one other group and list 2 similarities and/or differences and what they mean about the two planets

What is reflective writing?

Reflective writing is:	Reflective writing is not:
<ul style="list-style-type: none"> - your response to experiences, opinions, events or new information - your response to thoughts and feelings - a way of thinking to explore your learning - an opportunity to gain self-knowledge - a way to achieve clarity and better understanding of what you are learning - a chance to develop and reinforce writing skills - a way of making meaning out of what you study 	<ul style="list-style-type: none"> - just conveying information, instruction or argument - pure description, though there may be descriptive elements - straightforward decision or judgment (e.g. about whether something is right or wrong, good or bad) - simple problem-solving - a summary of course notes - a standard school essay

Rubric Extraordinary Exoplanets

Exoplanet Name _____

Name:

Poster & Presentation

	Possible Points	Earned Points
Introduction: introduce us to your star and planet!	3	
Methodology: how did you find out what you know?	3	
Brightness Curve	5	
Written Description of Brightness Curve	3	
Visualization Orbit Planet	3 3	
Detailed Written Exoplanet Description Relative Size Tilt of orbit Size of orbit Distance from Earth	3 3 3 3	
Reflection (including comparison with another group's exoplanet)	8	

Total = / 40