Name(s): _____ _____

_____ _____

Date: _____ Course/Section: _____

Grade: _____

Exoplanet Discovery

Objectives:

Using the transit model, the images of the star, and the relations for exoplanet properties, determine the radius, orbital period, and distance from the parent star of an exoplanet.

Checklist:

- ☐ **Complete the pre-lab quiz with your team (if required).**
- ☐ **Compile a list of resources you expect to use in the lab.**
- ☐ **Work with your team to complete the lab exercises and activities.**
- ☐ **Record your results and mark which resources you used.**
- ☐ **Share and discuss your results with the rest of the class.**
- ☐ **Determine if your team's answers are reasonable.**
- ☐ **Submit an observation request for next week (if required).**

Resources:

Pre-Lab Quiz

Record your group's answers to each question, along with your reasoning. These concepts will be relevant later in this lab exercise.

1.
2.
3.
4.

Part 1: Sizes of Exoplanets

1. Explain your group's method for determining the size and position of Jupiter in the classroom scale model. Record the size of the Sun object and your estimates for the scale size and position of the Jupiter object, as well as any calculations you used to reach this conclusion.

Part 2: Transit Simulation

1. Sketch a graph of the output from the photometer used in the transit demonstration. Label the plot to show where the planet is not in front of the star, traveling over the limb of the star, and completely infront of the star.

2. Make a prediction as to the result of passing a sphere that is half the diameter of the first sphere in front of the light source. How will this affect the light curve? What property of the exoplanet might be most important in determining the change?

3. Does the demonstration verify your reasoning? Record the any values from the simulation your group thinks are important.

4. Could the photometer measure the decrease in light from a ball the scale size of Jupiter? How about a Neptune- or Earth-sized ball? What does this mean for the kind of exoplanets that are likely to be discovered?

Part 3: Detecting Alien Worlds

1. Create a light curve for your exoplanet detection using MaximDL. Record the following information:

Maximum Brightness (relative to star)	
Minimum Brightness (relative to star)	
Date/Time of Eclipse Center	
Spectral Type of Parent Star	
Mass of Parent Star (assuming main sequence)	
Radius of Parent Star (assuming main sequence)	

2. Determine the radius of the exoplanet compared to its star. How can you determine the true radius of the exoplanet? Explain your procedure.

3. Look up the orbital period for your exoplanet. Determine its distance from its star using Kepler's Third Law.