



The Transit Method

Discovering Exoplanets!

Classroom Activity

Material List:

- Lamp
- Polystyrene balls (varied sizes)
- Bamboo barbecue skewers (~30cm)
- Webcam
- Laptop with Light Grapher software

Outline

Exoplanets are too small and far away to see directly, even with the most powerful telescopes. So how can astronomers detect them? When an exoplanet passes in front of its star it blocks some of the star's light. For a short time, the star's brightness decreases. So, if astronomers detect that a star's brightness decreases and then increases again, they can deduce that there is a planet orbiting the star.

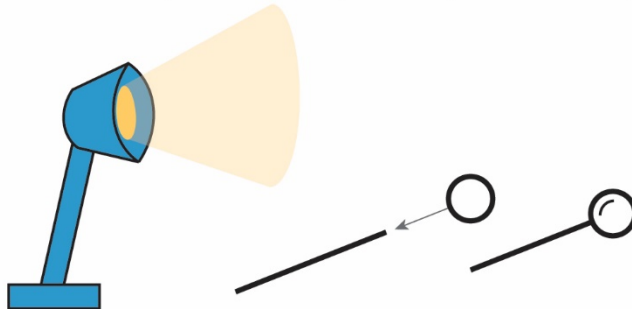
In this activity you will investigate how scientists use a transit to detect exoplanets.

Procedure:

- Complete the activity in groups of 2 to 4

1

Set up your lamp and place a polystyrene ball at the end of a skewer, these will represent your star and your planet.



Online Observatory: onlineobservatory.eu

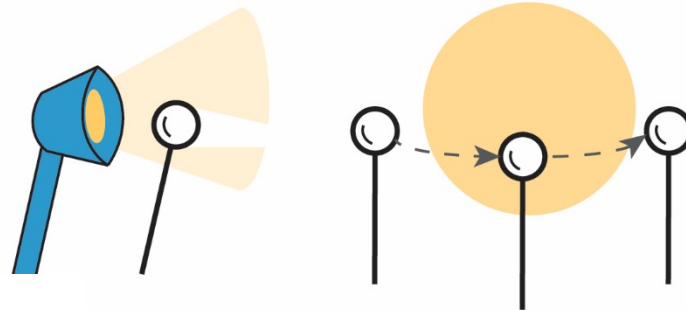
The online observatory collaboration consists of the following partners:

Baldone Observatory, Brorfelde Observatory, Cardiff University, Harestua Solar Observatory, Helsinki Observatory



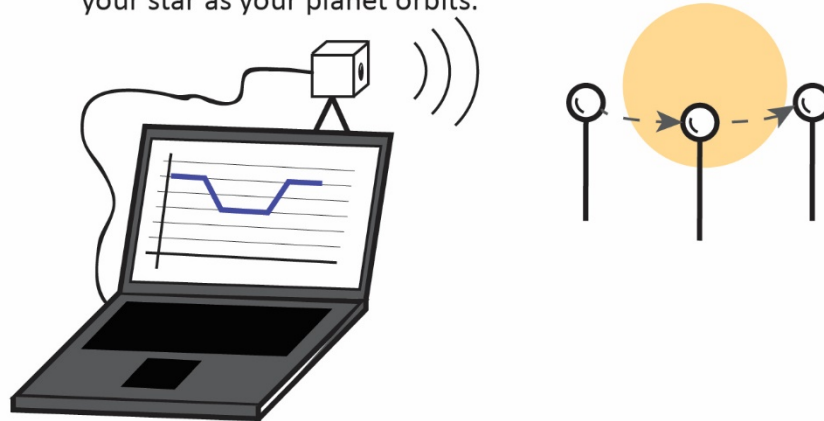
2

Using the lamp, decide how to model the transit of a planet as it orbits around the star.



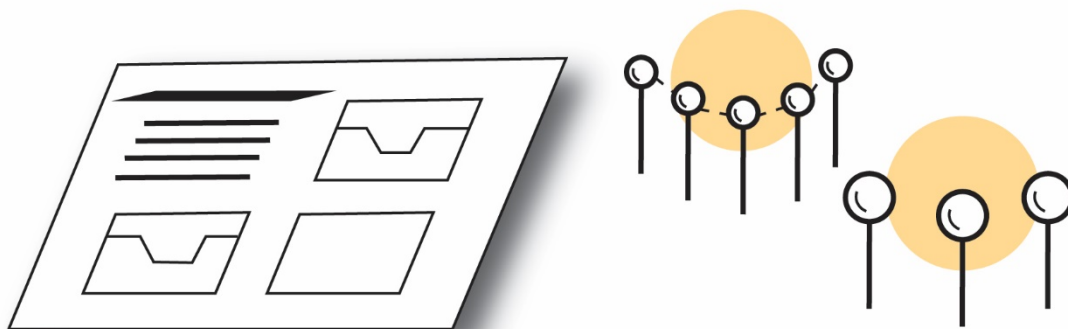
3

Measure the brightness of your star using Light Grapher software on the computer (your teacher will show you how to do this). Use the software to plot the light-curve of your star as your planet orbits.



4

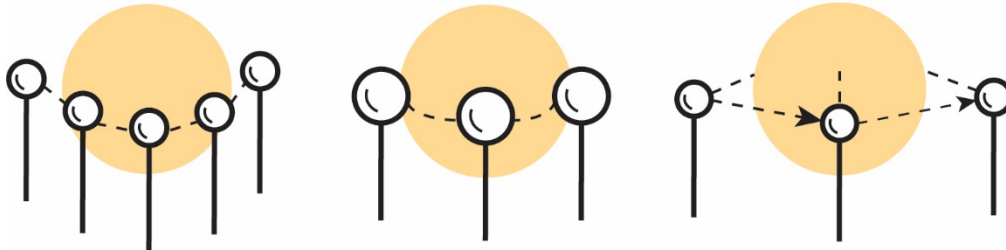
On the worksheet, on the last page, sketch light-curves for a faster and bigger exoplanet; also think of one more variable to test.





5

Now test your predictions, with a variety of sizes, speeds and distances, seeing how they affect the shape of the light curve.



Assessment:

- How does a larger planet effect the light-curve?
- How does the speed a planet orbits at effect the light-curve?
- How does the planets orbit angle and distance effect the light-curve?

Further Resources:



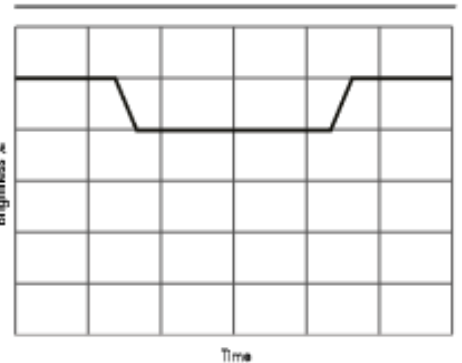
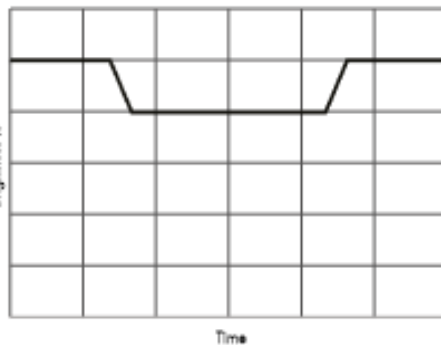
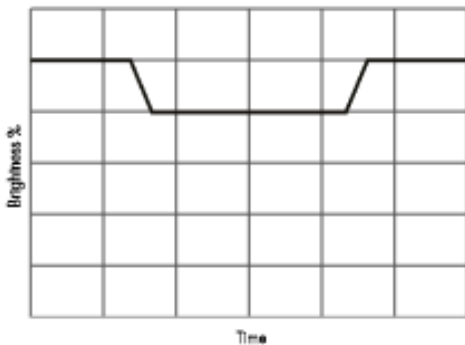
THE TRANSIT METHOD: MAKING PREDICTIONS

Three copies of the same light curve are shown below. Make predictions about how the shape will change by drawing curves for a faster planet and a bigger planet. Think of one more variable to test and sketch a curve for this change on light curve C.

Light curve for a faster exoplanet

Light curve for a bigger exoplanet

Light curve for



Once you have made all your predictions use your model to test them. Were the results as you expected?

Reference materials from: https://www.iop.org/education/teacher/resources/exoplanet_physics/file_65609.pdf