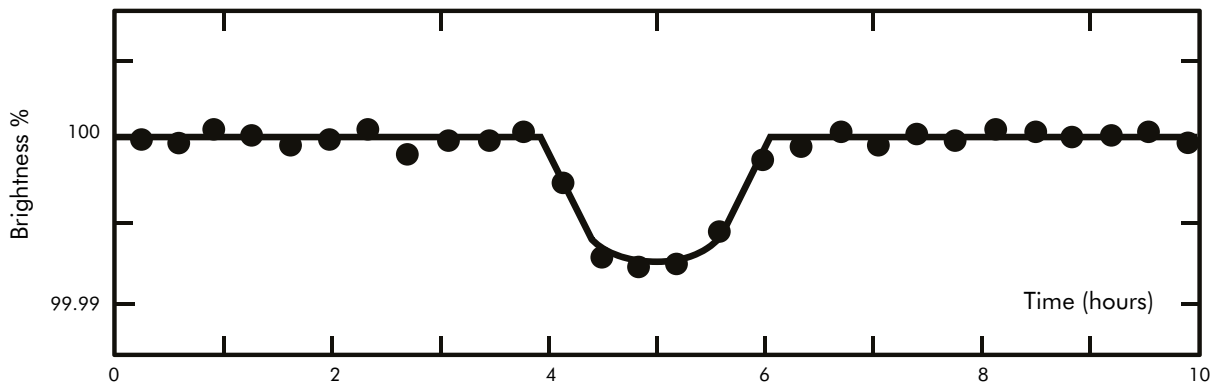EX**O**PLANET
PHYSICS

FINDING EXOPLANETS: THE TRANSIT METHOD

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 (an event known as a transit), 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.

The light-curve for an exoplanet called Kepler-444f. Each point on the curve was plotted by taking the average of many measurements.

In this activity you will build a model of an exoplanet orbiting a star to investigate how scientists use a transit to detect exoplanets.

What you'll need:

- Lamp
- Polystyrene balls
- Skewers
- Computer with webcam and Light-Grapher software

What you need to do:

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

2. Measure the brightness of your star using Light-Grapher software on the computer (your teacher will show you how to do this).

3. Use the Light-Grapher software to capture the light-curve of your star as your planet orbits. Can you produce results similar to the light-curve above?

4. Think about how varying the size and speed of the exoplanet might affect the shape of the graph. On the worksheet sketch light-curves for a faster and bigger exoplanet; also think of one more variable to test.

**IOP** Institute of Physics

EX PLANET PHYSICS

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.
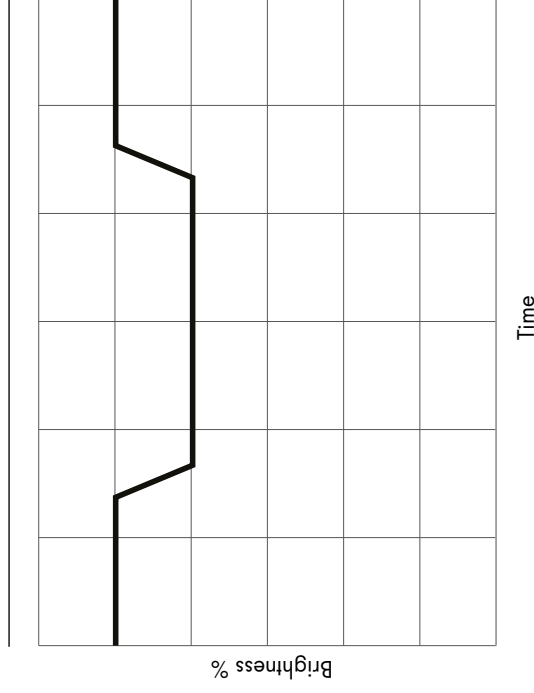
Light curve for a
faster exoplanet

Brightness %

Time
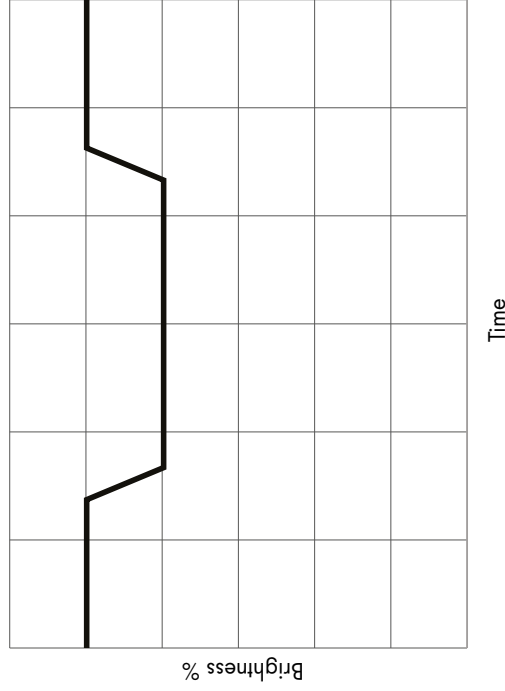
Light curve for a
bigger exoplanet

Brightness %

Time

Light curve for

Brightness %

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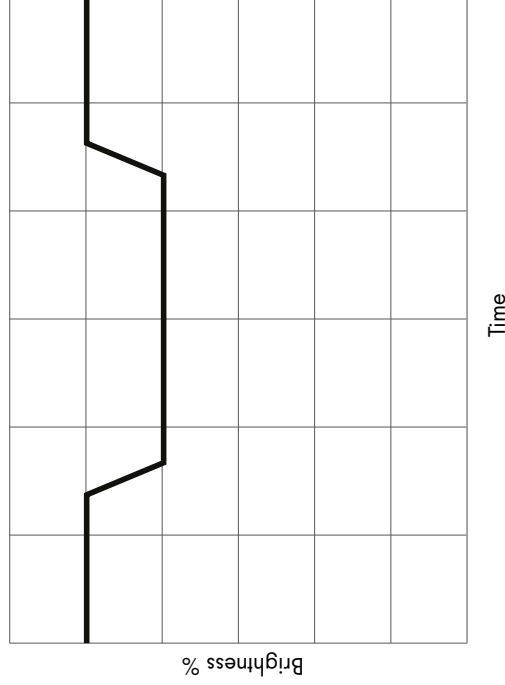
Once you have made all your predictions use your model to test them. Were the results as you expected?

Taking it further The transit method is just one technique that astronomers use to search for exoplanets. Use the internet to find other ways of detecting exoplanets.