Rotato

Investigating Asteroid Rotation

Classroom Activity

Material List:

- Computer
- Webcam
- Light grapher software
- Torch/directional light source
- Potato (or other asteroid replicas)
- Turntable

Outline

We see asteroids because they reflect light from the Sun, but they vary in rotation, shape and size. To study them from earth we use telescopes and a method known as photometry, where the change in reflected light is measured.

By plotting the change in light over time we can measure how fast it is rotating and gain an understanding of its shape.

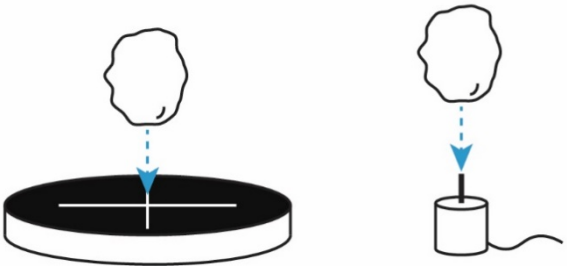
This activity will replicate what astronomers do to study asteroids, using a potato, turntable and light grapher software.

Procedure:

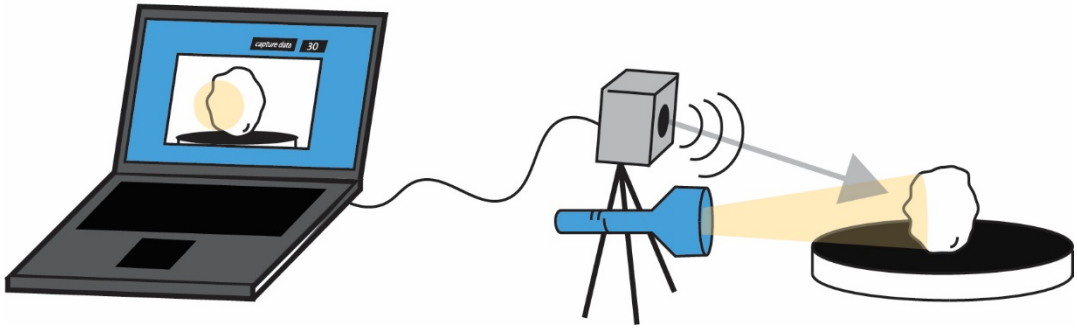
1 If it is not already installed download the light grapher software http://www.planetarium-activities.org/shows/sp/lightgrapher
(you may also need to download a flash player for windows https://www.globfx.com/downloads/swfplayer/ or Mac https://echoone.com/iswiff/)

The online observatory collaboration consists of the following partners:
Baldone Observatory, Brorfelde Observatory, Cardiff University, Harestua Solar Observatory, Helsinki Observatory

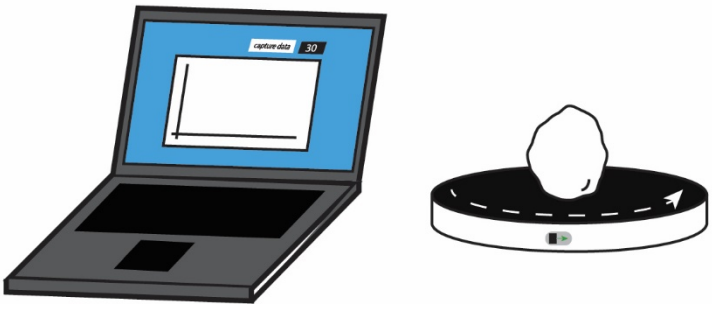
2 Set up your turntable/motor and secure the potato (or other asteroid replica) on top, in as central a position as possible.



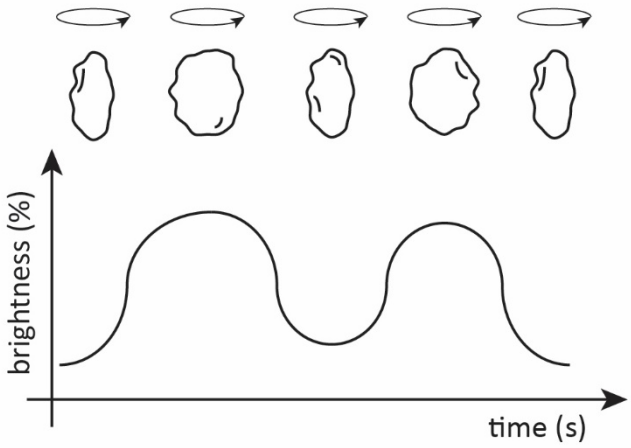
3 Point a light source and webcam at the object and try to block off as much environmental light as possible.



4 Turn the rotating device on and select 'capture data' on the light grapher software, for a period of 30 seconds.



5 Watch as the light curve appears on your graph, can you see a repeating pattern?



Assessment:

- Estimate the rotation period of your 'asteroid'
- Can you associate any features from the light curve on the 'asteroid'
- Consider different shapes, what might the light curve of a completely spherical object look like? How about an oval? Plot these on a graph and then test your predictions with the rotato.

6 Try the experiment again with different shaped objects and a variety of speeds, how are your graphs changing? Are they as predicted?

Further Activities:

Attempt the **light graph challenge** shown on the next page, additional clues can be found at under the graphs.

Can you match light curves to the astronomical objects? There are three graphs below, representing a **rotating asteroid**, an **exoplanet** and a **supernova**. Try and identify which graph corresponds to which object.

Graph A is a

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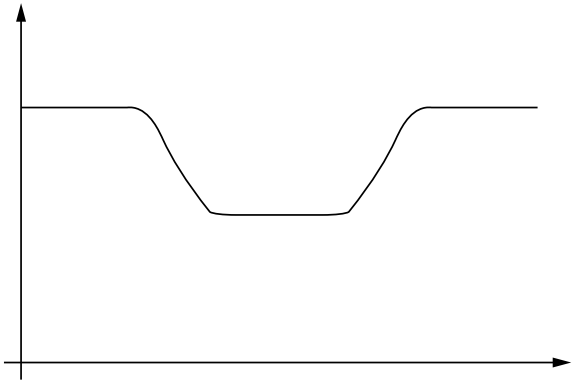

Graph B is a

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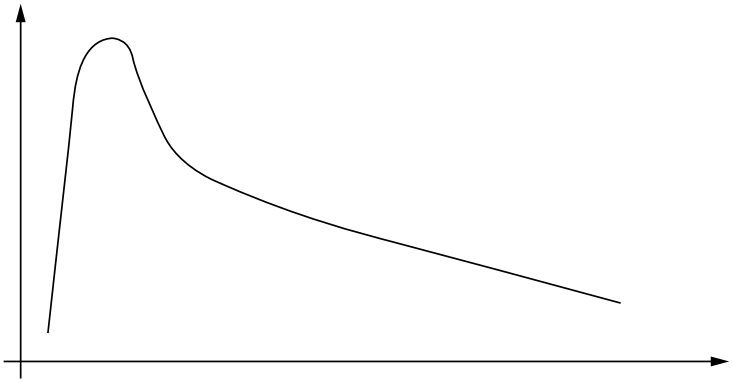

Graph C is a

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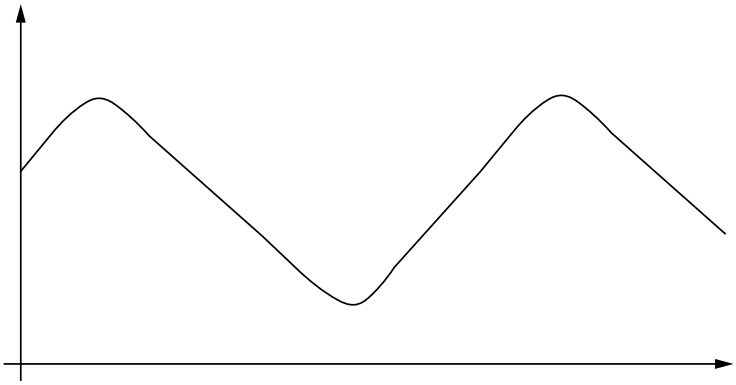

Think about what is happening to each object:

1. What happens to light that is emitted from an exploding object? Does it stay bright or fade over time?
2. As an asteroid tumbles through space, how do you think this affects the amount of light reflected off its surface?
3. As an object moves across a light source (as with a planet orbiting a star), what happens to the amount of light you can see?

Try using the internet to see what the light-curves for each object should look like.