Activity: Working out the relationship between distance and size for eclipses

Aim

To get children to:

- Discover that the relationship between apparent size and distance
- See how this is relevant to eclipses

Links to the National Curriculum

There are the following links to the National Curriculum (Upper key stage 2) science requirements:

- Taking measurements, taking repeated readings, looking for accuracy
- Recording data and results
- Using test results to make predictions
- Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations and a degree of trust in results
- Describe movement of the Earth, moon and other planets relative to the sun in the solar system

Required Materials and Equipment

1. Two pictures of the Sun at different scales (examples attached)

2. A picture of the Moon (again attached)

3. A way of measuring the comparative size of the Moon and Sun pictures (a moon ruler is attached as one way of doing this)

4. A long tape measure, or some cord/rope with distances marked on it.

Preparation for the Activity

1. Cut out the pictures of the Sun and Moon – ideally laminate them and put on a stick.

2. Decide what scale you are going to use. The two pictures have ratios of 5:1 and 3:1 so the distances need to be in those ratios. If you use one meter as the first distance the measuring method needs to be 5m long. So think about where to do this.

The Activity

1. You will need 5 children for each experiment:

   First child is the observer

   Second child holds Moon

   Third child holds Sun

   Fourth and Fifth are the measurers.

2. Take either one of the Suns.

The first child stands at a point.

The second stands at some distance and hold the moon into the first child's line of sight.

The third holds up the Sun at the same height as the moon and walks away from the observer and the moon holder until the observer sees that the moon fully covers the sun.

At this point the distance from the observer to the Moon is measured and then the distance from the observer to the Sun.

The size of the sun in moon-widths is then measured.

The children are asked to note the relationship and suggest what the general formula might be.

3. The experiment is then repeated but with the different sized Sun. This time measure the relationship between the moon and sun sizes first, then ask the children to guess how far away the Sun now needs to be to be covered. Repeat step 2 with the different sized sun. See if the children were correct!

Discussion

1. Explain how this relationship is the cause of solar eclipses – the Sun is very much bigger than the moon (400 times as big) but also much further away (400 times as far).

H&S

1. The only health and safety issue might be use of cords/tape measures with smaller children.

Feedback

If you have any feedback on this activity please let me know – helen.usher@rocketmail.com

3x Sun

Moon Ruler