Education and Outreach

# OOrange CREST Awardrange CREST Award

## Science Investigation: What causes eclipses? – Student Guidance

When you built a model of the phases of the Moon, your model might have suggested to you that we should expect to observe a solar eclipse and lunar eclipse every cycle of the Moon.

But lunar eclipses occur occasionally, and solar eclipses are very rare. Why? What can you change about your model to make it more accurately represent the frequency of eclipses?

### Aim

In this investigation, you will work in a group to design, test, and refine a model of an eclipse. This activity might help you to understand what is happening when we experience eclipses and deepen your understandings of the phases of the Moon, too.

### Inquiry question

Why do we observe eclipses only infrequently?

### Fair testing

A scientific experiment must be a fair test. That means that in the experiment, only one variable is changed, at least one is measured or observed, and as much as possible, all other variables are kept the same. How will you ensure your testing of your model is fair?

Answer these questions in your science journal or notebook.

What will you change? This is called the independent variable.

What will you measure or observe? This is called the dependent variable.

How will you make sure everything else is the same? These are variables you will try to control. List the controlled variables.

### Prediction

What do you expect will happen in your model as the independent variable changes? What is your reason for this prediction? Record your ideas in your science journal or notebook.

### Equipment

* Darkened room
* Globe(s) or ball(s) to represent Earth or the Moon
* Light source (torch or lamp)
* Means of recording observations – pencil and paper or camera

### Procedure

Read these steps and make sure everyone in your group understands them before you begin.

1. Working in a group, use the available equipment in designing, testing, and refining a model of an eclipse, changing only your independent variable.
2. Record observations of the relative positions of Earth, Sun and Moon. How frequently do you observe eclipses in your model?

### Results

Include drawings or photos in your science notes to show the relative position of the Sun, Earth and Moon when you observe an eclipse, and how frequently you observe an eclipse using your model?

### Discussion

Use these questions to prepare an explanation of your results with your group. Record your explanation in your science journal or notebook.

* What happened to the frequency of observed eclipses when you changed the independent variable?
* Why do you think this is?
* Was your prediction supported by your findings? How?

Share your findings with your class. Discuss the findings of all the groups with your class. Try to come to a class consensus regarding the causes of eclipses.

### Going Further

Why do we observe eclipses only infrequently? Respond to this question in your science journal or notebook.

### Conclusion

What causes an eclipse? Respond to this question in your science journal or notebook.

### Evaluating your investigation

Answer these questions in your science journal or notebook.

How accurately did your model represent the occurrence of an eclipse?

How could you improve your model?

What challenged you in this investigation?

How well did your team work together? How could you improve your capability to collaborate with others?

What did you learn from this investigation about eclipses, or about other phenomena related to the Sun, Earth and Moon?

What are some questions for further investigation on this topic or a related topic?