

ACTIVITY 7

The Disappearing Sun

Student Objective:

I can develop a model of the Earth-sun-moon system to explain why the sun seems to disappear.

SEP Developing and Using Models

SEP Constructing Explanations and Designing Solutions

CCC Patterns

Observing the Disappearing Sun

Watch the video of the disappearing sun.



Observations: Record your observations about the disappearing sun.

Questions: Write down two or three questions you have about the disappearing sun.

Draw an initial model that shows what you think is happening with the disappearing sun. Like all proper scientific models, your model should show the main objects in the system, such as Earth, the moon, and the sun, as well as their important properties and relationships. Your model should show:

- the positions and motion of Earth, the moon, the sun, and the observer
- the interactions with light
- the connection to the patterns observed in the video



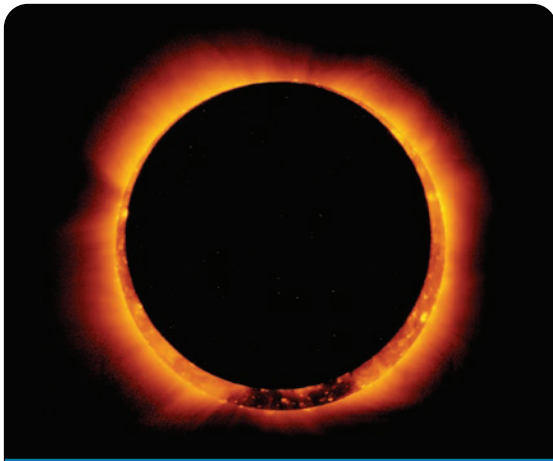
A large, empty rectangular box with rounded corners and a blue border, intended for drawing a model of the sun disappearing.

Write a few sentences that describe how the model explains the cause of the disappearing sun.

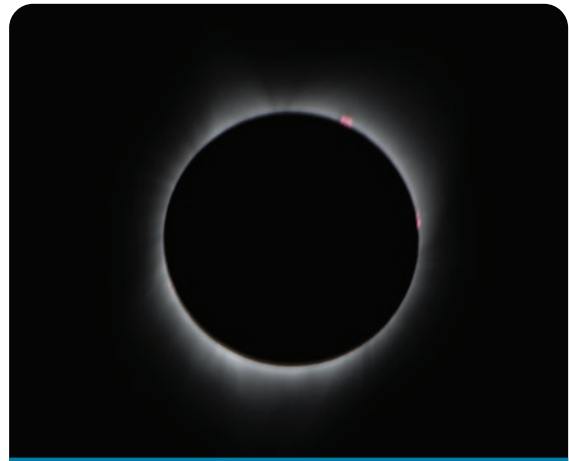
Observing Solar Eclipses

The disappearing sun is an example of a solar eclipse. The term *eclipse* is used when light from one object in the solar system is blocked to another object traveling between the observer and the source of the illumination.

Study the three images.



Total Solar Eclipse 1



Total Solar Eclipse 2



Partial Solar Eclipse

Record your observations about the pictures of various lunar and solar eclipses. What do you notice that is similar between them? What is different?

Record one new question you have about the eclipses after analyzing the images.

Interpreting Data About Solar Eclipses

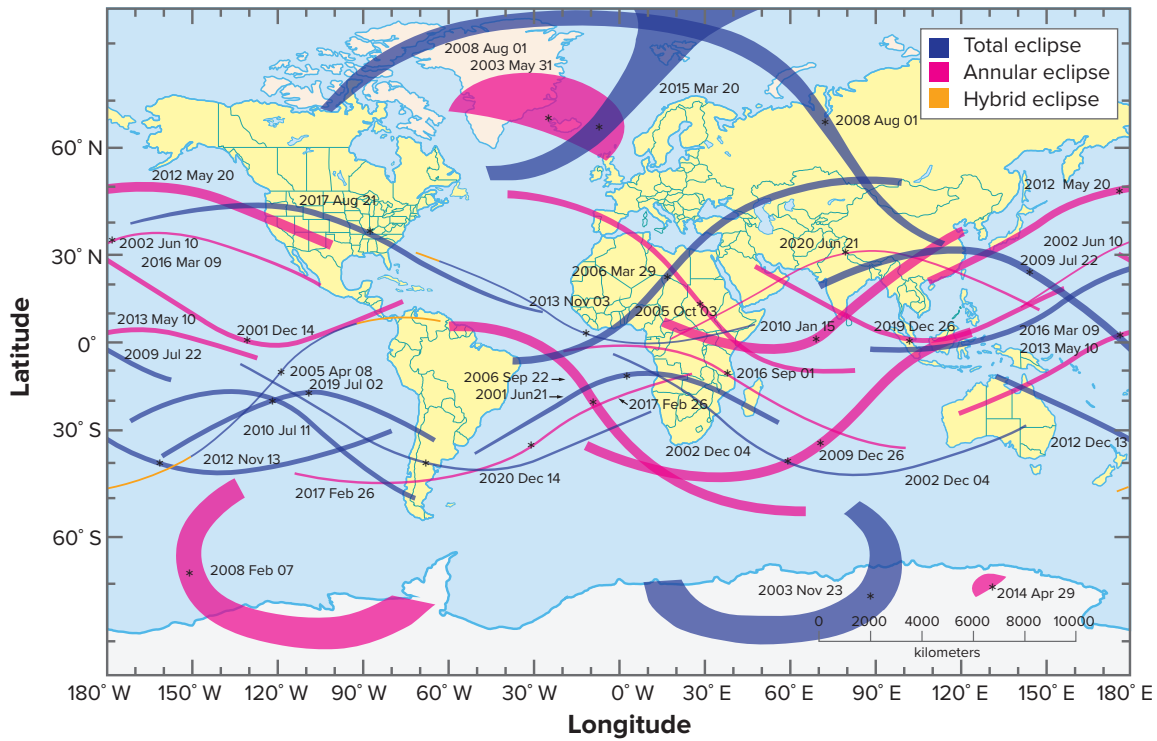
The tables that follow present the eclipses that occurred between 2015 and 2019. **Examine** the data.

Solar Eclipses (2015–2019)		
Date	Type of Solar Eclipse	Duration of Totality
Mar 20, 2015	Total	3 minutes
Sep 13, 2015	Partial	–
Mar 9, 2016	Total	4 minutes
Sep 1, 2016	Annular	3 minutes
Feb 26, 2017	Annular	1 minute
Aug 21, 2017	Total	3 minutes
Feb 15, 2018	Partial	–
Jul 13, 2018	Partial	–
Aug 11, 2018	Partial	–
Jan 6, 2019	Partial	–
Jul 2, 2019	Total	5 minutes
Dec 26, 2019	Annular	4 minutes

Record your observations about the data. **List** any patterns you notice about how often eclipses occur, what types occur, and if there is anything that does not fit the pattern.

Examine the images. These images show where the total **solar eclipses** and total lunar eclipses can be seen from Earth.

Total and Annular Solar Eclipse Paths: 2001–2020




Source: Eclipse Predictions by Fred Espenak, NASA/GSFC Emeritus

Record your observations about the data in the images. What similarities and differences do you notice?

Write any new questions you may have about the data sets based on patterns that do not fit our model.

Scoring Rubric: Analyzing and Interpreting Data

DESCRIPTOR	On Target	Making Progress	Getting Started
Temporal and Spatial Relationships: identify temporal and spatial relationships in data	accurately identify time-based and space-based relationships in graphical displays of large data sets	identify time-based or space-based relationships in graphical displays of large data sets	do not identify time-based or space-based relationships in graphical displays of large data sets

 After analyzing and discussing the data, you may have some questions that you still need evidence to answer. Use the following resources to **gather** additional evidence. After viewing each resource, **discuss** with your partner whether the information supports the other pieces of evidence you have gathered up to this point and whether the information helps answer any additional questions you generated.

Watch the video and **complete** each interactive.



Use the evidence you have collected up to this point to **refine** your Earth-sun-moon model. You may find it difficult to include all your evidence in one sketch of your model. Consider providing multiple viewpoints of your model to capture the key ideas that explain your observations of the lunar, solar, and partial eclipses.





Exchange models with another student or a group of students. **Share** feedback with one another regarding the ability of the model to depict the patterns identified for a lunar and/or solar eclipse. When providing feedback, use the following questions to discuss the accuracy and limitations of each model:

- Does your model indicate why a solar eclipse occurs?
- Does your model indicate why a solar eclipse does not occur every month?
- Does your model match the data related to the frequency of solar eclipses?
- Does your model indicate why a solar eclipse is only viewable to a small percentage of observers on Earth?

It is important to respectfully critique models for opportunities to include additional evidence and also respectfully provide suggestions for how the model can be improved. It is important for Scientists to respectfully share and receive feedback in order to refine their explanations for real-world phenomenon.

Based on the feedback from your classmates, go back and **revise** your model for why solar eclipses occur.

Write a few sentences that describe how the model explains how solar eclipses occur.

Scoring Rubric: Developing and Using Models

DESCRIPTOR	On Target	Making Progress	Getting Started
Describes Phenomenon: model describes the phenomenon/ unobservable mechanism	connects all relevant components and relationships between variables, both observable and unobservable, and includes text and diagrams	connects some relevant components and relationships between variables, either observable or unobservable, and may include text and diagrams	does not describe the relevant components and/or relationships between variables
Fits with Evidence: model uses evidence collected during the unit	fits with all the evidence collected up to that point in the unit	fits with some of the evidence collected up to that point in the unit	includes limited or no evidence
Represents Science Ideas: model includes established science ideas	represents essential science ideas and includes the crosscutting concepts to describe the phenomenon	represents some of the essential science ideas and/or the crosscutting concepts to describe the phenomenon	does not include relevant science ideas and crosscutting concepts to describe the phenomenon
Revision to Model: model has revisions based on new evidence or developing understanding	are based on additional or new evidence that include components, relationships, and/or text that improve the accuracy of the model for predicting or explaining the phenomenon	are based on additional or new evidence that include components, relationships, and/or text that do not improve the accuracy of the model for predicting or explaining the phenomenon	are not based on additional or new evidence and/or do not include components, relationships, and/or text that improve the accuracy of the model for predicting or explaining the phenomenon