

Rotation vs. Revolution

Lesson Overview

Students will observe flash animations of a celestial body rotating and revolving, side by side. They will discuss and make observations as a small group, and will write an explanatory paragraph as an individual to support their claim.

Standards Addressed

- SC 2005 8-4.4 Explain the motions of Earth and the Moon and the effects of these motions as they orbit the Sun (including day, year, phases of the Moon, eclipses, and tides).
- SC 2014 8.E.4B.4 Develop and use models to explain how motions within the Sun-Earth-Moon system cause Earth phenomena (including day and year, moon phases, solar and lunar eclipses, and tides.)
- NGSS MS-ESS 1-1 Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.

Disciplinary Literacy Best Practices

Predict-Observe-Explain
Proof Paragraph
Graphic Organizers

Lesson Plan

Time Required: One 60-minute Class Periods

Disciplinary Vocabulary:

rotation, revolution, moon, planet, tides, eclipses, seasons, moon phases

Materials Needed:

Student sheet with graphic organizers, room for writing and rubric for assessment.

- Student research guide sheet.
- Classroom timer. <http://www.online-stopwatch.com/classroom-timers/>
- Internet Access for researching phenomenon (iPods, iPads, chrome books, etc.)
- Notebook file to administer lesson. (Animations are included here, Smart Notebook Software is required to open.)
- An example of a computer flash animations for students to observe is linked below.
An example of rotation is linked below.

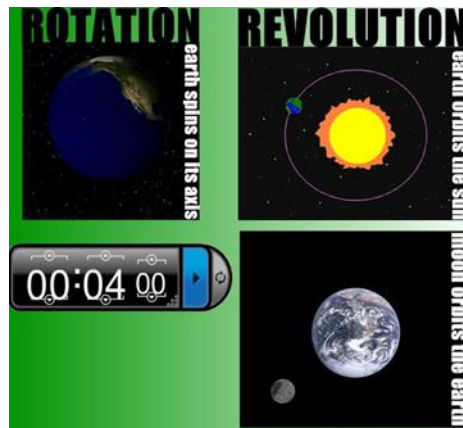
[http://commons.wikimedia.org/wiki/File:Rotating_earth_\(large\).gif](http://commons.wikimedia.org/wiki/File:Rotating_earth_(large).gif)

Assessment:

Proof Paragraph and Rubric; Teacher observation of conversations and research

Engage

- Students will observe the first slide of the file and complete Step 1 of the graphic organizer. They will have a small time frame (5 min) to do this as an individual task prior to class discussion of their observations and a brief explanation of the steps to follow.



- Students will discuss and make notes in Step 2 of the graphic organizers during a small time frame (7 minutes) to make predictions. The teacher should guide them through the first box, then move about the room to observe and guide group discussions.
- Students will individually complete step 3 of the graphic organizer to clarify the direction of their research.

Explore

- Students will use the internet to research the many effects of celestial motions. They will follow guiding questions, locate reliable resources, and obtain accurate diagrams to learn more about the phenomenon experienced on the planet as a result of these motions.
- Students will use the largest amount of class time here, but teachers should account for the final portion to take 10 minutes to complete.
- See Internet Research handout.

Explain

- Students will complete the Step 5 of the graphic organizer. This should be written as a proof paragraph.

Lesson Reflection

This lesson serves as an excellent opportunity for students to be introduced to the many effects that are results of the motion of celestial bodies. It can also be reworked to be used as an assessment at the end of the unit when used without the research element.

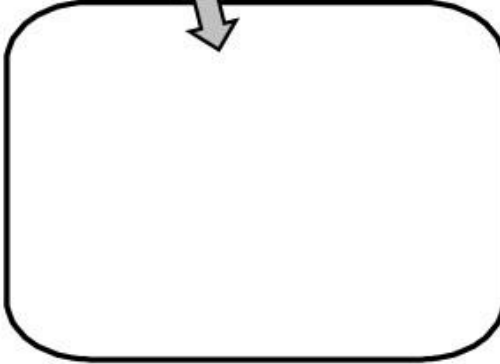
Lesson Author:

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Name:

Step 1: Exploration: Complete the boxes below. Use the animations on the Smart board for help. **(4 minutes)**

Draw the earth
rotating on its axis.



Draw the moon revolving
around the earth.



Draw the earth revolving
around the sun.



Step 2: Predict: Refer to the MOTIONS that are being animated on the Smart board to complete the following items. You may discuss your predictions with those at your table. Answer by writing the motion's description in the boxes. For example, "earth spins on its axis" or "earth orbits the sun" or "moon orbits the earth." **(7 minutes)**

Which motion causes Earth's oceans to have high and low tides?

Which motion causes Earth to have day and night?

Which motion causes Earth to have seasons?

Which motion causes solar and lunar eclipses?

Which motion causes Earth to have years?

Which motion causes the moon to change shape in our sky?

Step 3: Explain: Choose the prediction your group is most confident about. In the spaces below, explain how that motion causes that effect. **(4 minutes)**

The diagram consists of three rounded rectangular boxes arranged horizontally. The first box on the left is labeled "MOTION:". The second box in the middle is labeled "EFFECT:". The third box on the right is labeled "EXPLAIN:". A gray arrow points from the right side of the "MOTION:" box to the left side of the "EFFECT:" box. Another gray arrow points from the right side of the "EFFECT:" box to the left side of the "EXPLAIN:" box.

Step 4: Research: Sign out an iPod and complete the research paper located on top of the iPod cart. **(20 minutes)**

Step 5: Exit Slip: In the box below, respond to one of the prompts on the Smart board. **(10 minutes)**

Prompt you are answering:

Your answer:

Your explanation:

Internet Research

1. Find a diagram that explains why the Earth has day and night. Draw that diagram below. Be sure to include the sun.

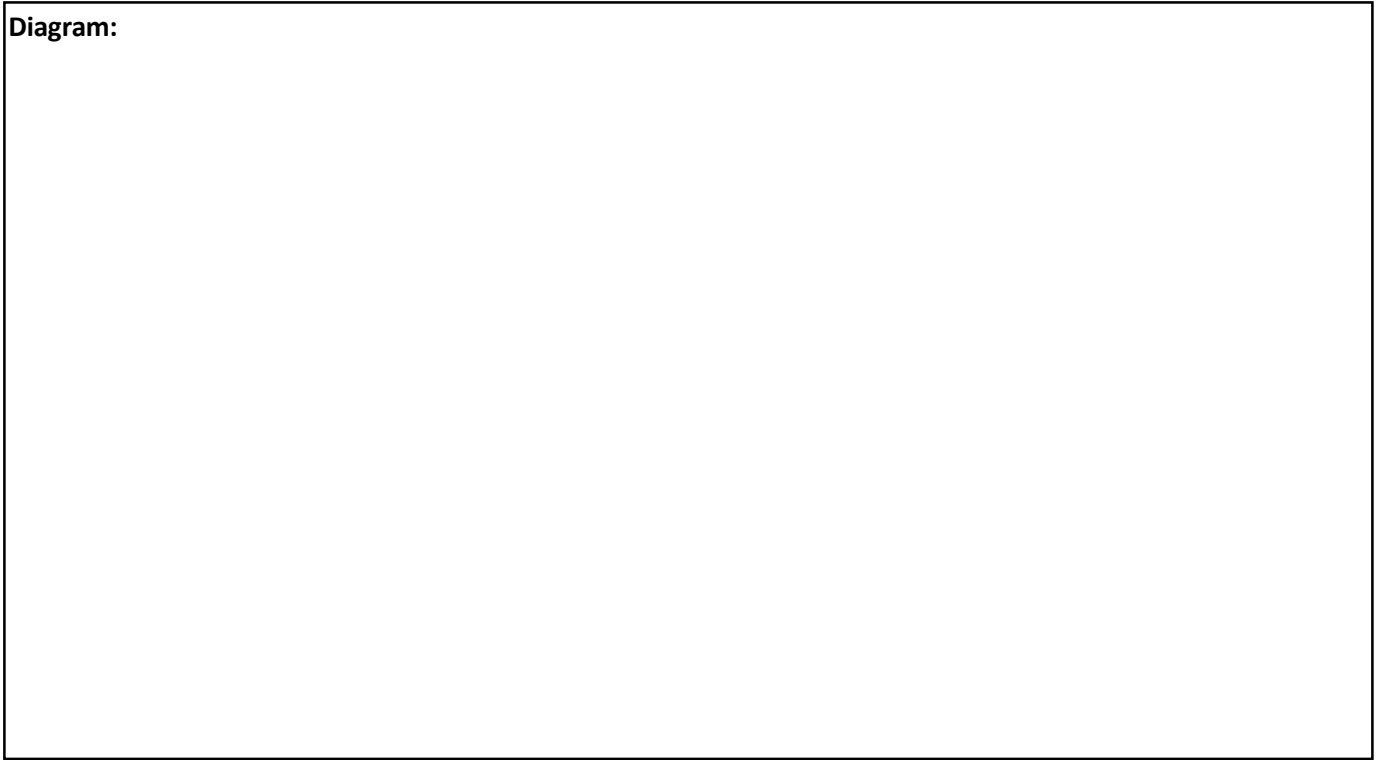
Diagram:



2. Go back to the box above and fill in a one or two sentence explanation that tells why the Earth has day and night.

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3. Find a diagram that explains why the Earth's oceans have high and low tides. Draw that diagram below.

Diagram:



4. Go back to the box above and fill in a one or two sentence explanation that tells why high and low tides occur on Earth.
5. Why does the moon appear to change shape in our sky? In other words, why do we have moon phases?

6. In the boxes below, diagram a solar and lunar eclipse.

Solar Eclipse:

Lunar Eclipse:

7. What is the difference between a solar and lunar eclipse?
8. What MOTION causes eclipses?

9. You can create one diagram that explains why Earth has seasons and years. Draw that diagram below.

10. How many days does it take the Earth to orbit the sun? _____ how many days are in one year? _____