



LESSON PLAN

EARTH'S ORBIT AND ROTATION GRADES 3-5

SUMMARY

Students will learn about the apparent motion of the Earth, sun, stars, and planets by studying observable patterns.

DURATION

3 x 10 min outside for shadow observation (different times of day), then one 45-minute classroom period, then 3 x 10 min outside for sundial observation (different times of day).

PRE-ASSESSMENT QUESTIONS

Please see Discussion Questions located under the video. These can be discussed as a group or answered individually in student science notebooks.



ENGAGE

On a sunny day during the morning, take students outside to a parking lot or other surface you can draw on with chalk. Give each student a piece of chalk. Instruct them to draw an "x" in a location of their choosing. Then ask them to write their initials near the x. Working with a partner, have one student stand on the x with their initials, while their partner loosely traces their shadow on the ground. Then the partners should trade places. The time of day should be written inside this shadow. This process should be repeated around noon, and again later in the day.

MATERIALS

- Chalk
- Access to parking lot or playground
- Watch
- Toothpicks (at least one per group of 4 students)
- Clay
- Ball or globe
- Flashlights (at least one per group of 4 students)
- Science notebooks & pencils (1 per student)

DIY Activity Materials

- Paper plate
- Glue stick
- A bendable straw
- Tape
- A compass
- Sundial face printout (located under video)
- Sharpened pencil
- Watch



EXPLORE

After the entire Engage exercise has been completed, ask students to discuss the phenomena they observed using sunlight, shadows, and chalk. What do they think happened? Students may know, or think they know (but they may think the sun moved across the sky). Break students into small groups and give each group a flashlight, toothpick, and small piece of clay. Let them explore using these tools to model what they observed outside and attempt to construct an explanation. A sketch of their model explaining what each piece represents (flashlight represents sun, toothpick represents person, etc.), along with a written explanation of what they think is happening, should be written into their science notebooks.



EXPLAIN

Facilitate a group discussion about how and why shadows change length and direction. Some students will have will have correctly modeled this phenomena by moving the flashlight. Show students an alternative model with a toothpick stuck to a ball using clay. Have a volunteer hold the flashlight in one place and rotate the ball. Does this produce the same effect? Is the sun moving across the sky or is the Earth moving? How can we be sure?



WATCH THE *GENERATION GENIUS EARTH'S ORBIT AND ROTATION* VIDEO AS A GROUP

Then facilitate a conversation using the Discussion Questions.



ELABORATE

Use the DIY Activity to build your own sundials just like Zoë's from the video. More advanced concepts related to the motion of the Earth can be explored using the sundial as a starting point.



EVALUATE

In their science notebooks, each student should use words and/or labeled drawings to explain the motion (rotation and orbit) of the Earth in relation to the sun, and list some of the patterns that motion causes (apparent motion of sun, shadows, day and night, visibility of certain stars throughout the year).



EXTENSIONS

Research or observe which stars/constellations are visible where you live over time to create a chart showing when different constellations are visible throughout the year. Explain why we can see these different constellations in a repeating pattern (because the Earth orbits the sun once a year and the pattern repeats each year).