RAFT IDEAS

**Topics:** Earth's Rotation, Sun's Apparent Daily Motion

**Materials List**

- ✓ Hemisphere or hemisphere shaped bowl, transparent
- ✓ Sheet of paper
- ✓ Tape
- ✓ Permanent marker
- ✓ Magnetic compass
- ✓ Optional: Transparent plastic wrap

This activity can be used to teach:
Common Core Math Standards:

- Problem Solving and Reasoning (Mathematical Practices Grades 3-8)

Next Generation Science Standards:

- Patterns of the sun and of daylight (Grade 1, Earth/Space Science 1-1, 1-2)
- Daily change in shadows (Grade 5, Earth and Space Science 1-2)
- Earth Sun Moon System (Middle School, Earth and Space Science 1-1)
- Science & Engineering Practices (Next Generation Science Standards: Grades 1-8)

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# Solar Path Across the Sky

## Tracing the Sun's Daily Movement across the Sky

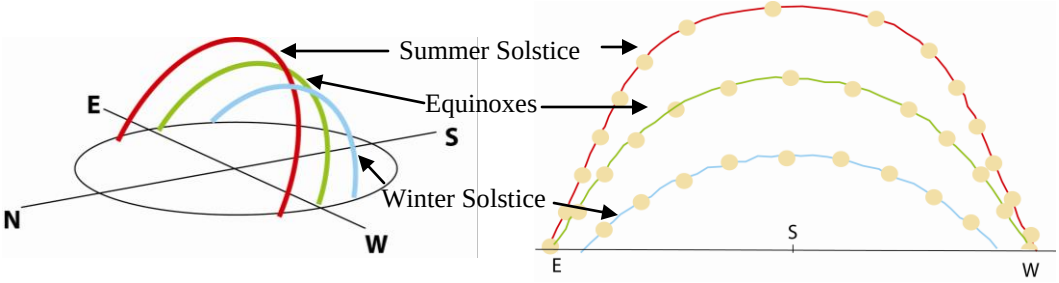


Chart the Sun's daily path across the sky using simple materials.

### Assembly

1. Make an "X" in the middle of a sheet of paper for a target.
2. Place the hemisphere or bowl upside down on the paper with the middle of the hemisphere centered above the "X". Tape the hemisphere to the paper.
3. Mark N (North), E (East), S (South), and W (West) on the sides of the paper.
4. If there is an indentation in the middle part of the bowl, carefully place a piece of transparent plastic food wrap over the indentation to create a smooth surface.

### To Do and Notice

1. Place the paper on the ground; use a compass or other technique to have the "N" point to north. As data will be taken over the course of the day and school year, mark the location and/or take measurements from a fixed landmark to assure identical placement for future data recording.
2. **Carefully** bring the **tip** of a permanent marker to the surface of the hemisphere, so that the **shadow** of the tip is aligned with the center of the "X". Make a dot.
3. Repeat step 2 throughout the day every 60 to 90 minutes. Take one measurement close to noon (or 1 PM if on daylight savings time).
4. Note the **path** and direction of the sequence of dots across the hemisphere. What is the cause of this path? How is the path related to the Sun's movement?
5. Take measurements every 1 to 3 months throughout the school year - label the date and/or use a different color pen each time. How does the path of the Sun through the sky vary over the course of the year?

### The Science Behind the Activity

Earth's rotation on its axis causes the Sun to appear to rise in the east and move across the sky in a predictable path. Due to Earth's revolution (orbit) about the Sun, this path changes its angle with respect to the horizon throughout the year. A set of data taken throughout the school year will illustrate these changes due to Earth's revolution. Collecting the data in a scientific fashion and relating the data to observations of the seasons and the days' lengths will give students a deeper understanding of the effects of the Earth's motion on their day-to-day lives. The solar path varies with latitude as well as the time of year. When designing buildings, parks, and placing solar panels, the solar path at a specific location is considered.

### Web Resources (Visit www.raft.net/raft-idea?isid=518 for more resources!)

- Sun Position Calculator - http://sunposition.info/sunposition/spc/locations.php
- Simulator - http://astro.unl.edu/naap/motion1/animations/seasons_ecliptic.html
- Sun Path Diagrams-http://astro.unl.edu/naap/motion3/animations/sunmotions.html http://academy.autodesk.com/library/building-science/reading-sun-path-diagrams & http://academy.autodesk.com/library/building-science/solar-position

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