Azimuth and Horizons

In the next few activities, your students will explore changes in sunrise and moonrise positions over long periods of time. To prepare, they must become familiar with the system of describing the position of something on the horizon in terms of horizontal angle measurements, called "degrees of azimuth."

Materials

For each student:

- 1 Compass Directions Diagram (master on next page)

Preparation

Prepare a master for photocopying Compass Directions Diagrams, by first making two photocopies of the diagrams on page 2, and then pasting them onto a single sheet of paper. From your master, make enough photocopies so that each of your students has a Compass Directions Diagram.

In Class

1. Explain to your students that they will be marking sunrise and moonrise positions.

   You will be using exact measurements of sunrise and moonrise positions obtained from a "computer planetarium." But in order to understand those measurements, you need to become familiar with measuring positions along the horizon in "degrees of azimuth." There are 360° of azimuth around the entire horizon.

2. Hand out a Compass Directions worksheet to each student.

   Draw a circle on the chalkboard.

   You are looking down on your viewing position. Notice that only three directions are marked: N, SW, and WNW.

   What does the "N" stand for? [North.]

   Have the students mark the abbreviations of the other "cardinal" directions (East, South, and West) on their worksheets. Mark E, S, and W on the appropriate spots on your chalkboard circle after the students have marked their papers.

3. Ask:

   What does the "SW" stand for? [Southwest.]

   Have them mark the abbreviations of the other three midpoint directions (Southeast, Northwest, and Northeast) on their worksheets. Mark SE, NW, and NE on your chalkboard circle after the students have marked their worksheets.

4. Ask:

   What does the "WNW" stand for? [West Northwest, or halfway between West and Northwest.]

   Have the students mark the abbreviations of the other 7 directions (North Northwest, North Northeast, East Northeast, East Southeast, South Southeast, South Southwest, West Southwest, and West Northwest) on their worksheets. Mark NNW, NNE, ENE, ESE, SSE, SSW, WSW, and WNW on your chalkboard circle after the students have marked their worksheets.

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5. Ask:

How many arc degrees are in a complete circle? [360˚.]

To measure exactly where something is on the horizon, we measure its azimuth in degrees, with zero degrees defined as due North and increasing values going clockwise around the circle. For example, the azimuth of North is 0°.

What is the azimuth of South? [180˚] Of East? [90˚]

In even more precise measurements, each degree can be subdivided into 60 minutes.

Have your students write in the azimuth below each respective direction on their Compass Directions Diagrams and confirm their answers with a class review when they are finished.