

Me and My Shadow

A Very Personalized Shadow Stick



Bob Riddle
Starwalk, Inc.
<http://currentsky.com>
starwalk@currentsky.com

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Materials Needed:

At least two students
About 10 feet of string
Protractor, or copy from pattern (page 4) fastened to cardboard
Sunny day

A shadow stick is any vertical straight object that casts a shadow. Shadow sticks can be telephone poles, flagpoles, or even a person. A shadow stick can be used to observe the apparent motions of the Sun throughout the day much in the same manner that the gnomon on a sundial is used to tell time by. However a shadow stick is not as reliable for determining time as the sundial.

In the morning a shadow stick casts a long shadow toward the western horizon. At mid-day, when the Sun is highest in the sky, and due south, (north in the southern hemisphere) the shadow is at its shortest, and points toward north (south in the southern hemisphere). During the afternoon or evening, as the Sun sets, the shadow once again casts a long shadow, but this time in the direction of the eastern horizon.

As the Earth revolves around the Sun, the Sun's mid-day altitude changes. During the summer it is highest, and during the winter it is lowest (in either hemisphere). Measuring the midday altitude every so often (about every other week) throughout the year will show the range of the Sun's apparent movement with respect to the Earth's equator, and your 'local' horizon. This apparent movement is a result of the Earth's axial tilt of 23.5°, which in turn is the amount the Sun moves north or south relative to the Earth's equator.

The Sun's height above the horizon is called altitude, and the altitude of the Sun varies throughout the day as well as throughout the year. The method for determining the Sun's altitude is a process in which a model is made that allows for measuring the angle the Sun is above the horizon. To measure the Sun's altitude, at any time of the day, a triangle that represents the altitude of the Sun may be easily constructed.

Follow these directions to construct the triangle:

One student should stand so that a shadow is cast across the ground. The second student should be positioned at the end of the shadow cast by the first student.

Hold one end the string on the top of the first student's head.

Stretch the string to the end of the shadow and have the second student hold the string in place.

Use a protractor to measure the angle between the string and the ground and record this information in the data table.

