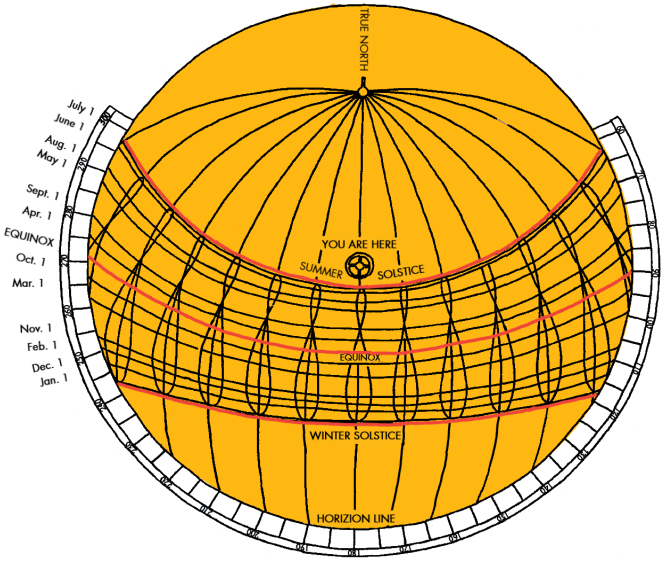
Solar Observatory

Have you ever noticed the sun does not appear to be in the same spot every day, even at the same time of day? Westcave's solar observatory shows us how the sun moves across the sky, how it changes over the course of days, months, and seasons. Throughout history, many different cultures used the sun's motion to keep track of the date, time and create calendars to know when to plant their crops and when to celebrate their holidays.

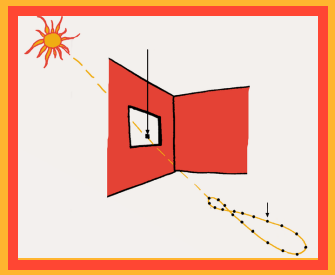


The diagram inlaid on the floor of Visitor Center is the solar observatory or a map of the apparent motion of the sun over the course of the year.

Solar Observatory

At Home Analemma Science Experiment

You can make your own analemma by recording the position of the sun in the sky at the same time of the day on different dates throughout the year.



To make your own analemma at home, find a window that sunlight shines through every day. Cut out a 3" diameter circle and tape on the window. On the floor where the light shines in lay out a poster board to draw on. Make sure you can put the board(s) in the exact same spot every time. At the exact same time of day, record the shadow your circle makes on the floor each day or once a week when it is sunny. Connect the dots and over a year's time you will create your own analemma.

Westcave Preserve
(830) 825-3442
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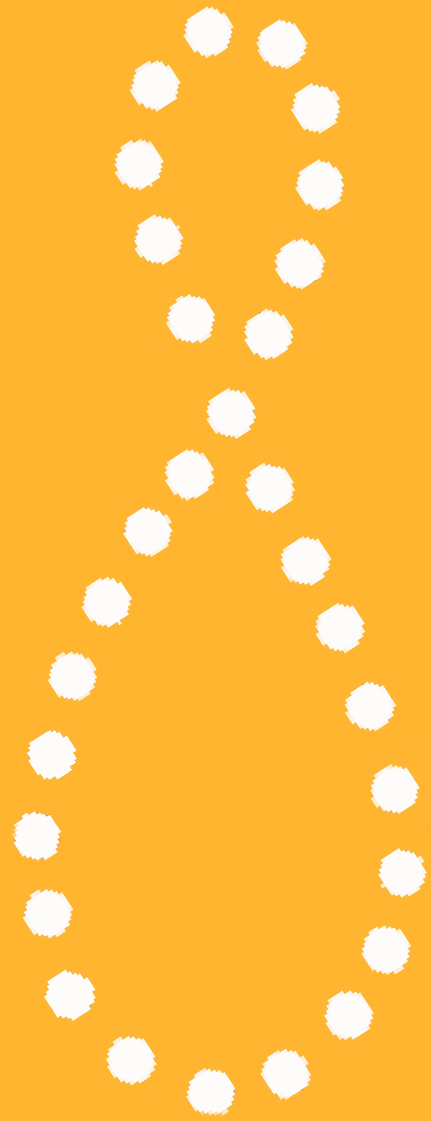


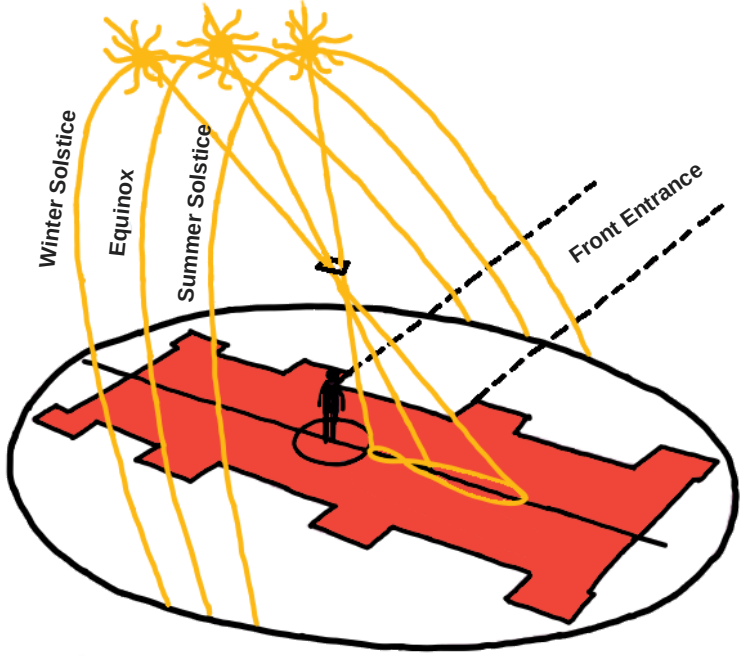
WESTCAVE
OUTDOOR DISCOVERY CENTER

What is an Analemma?

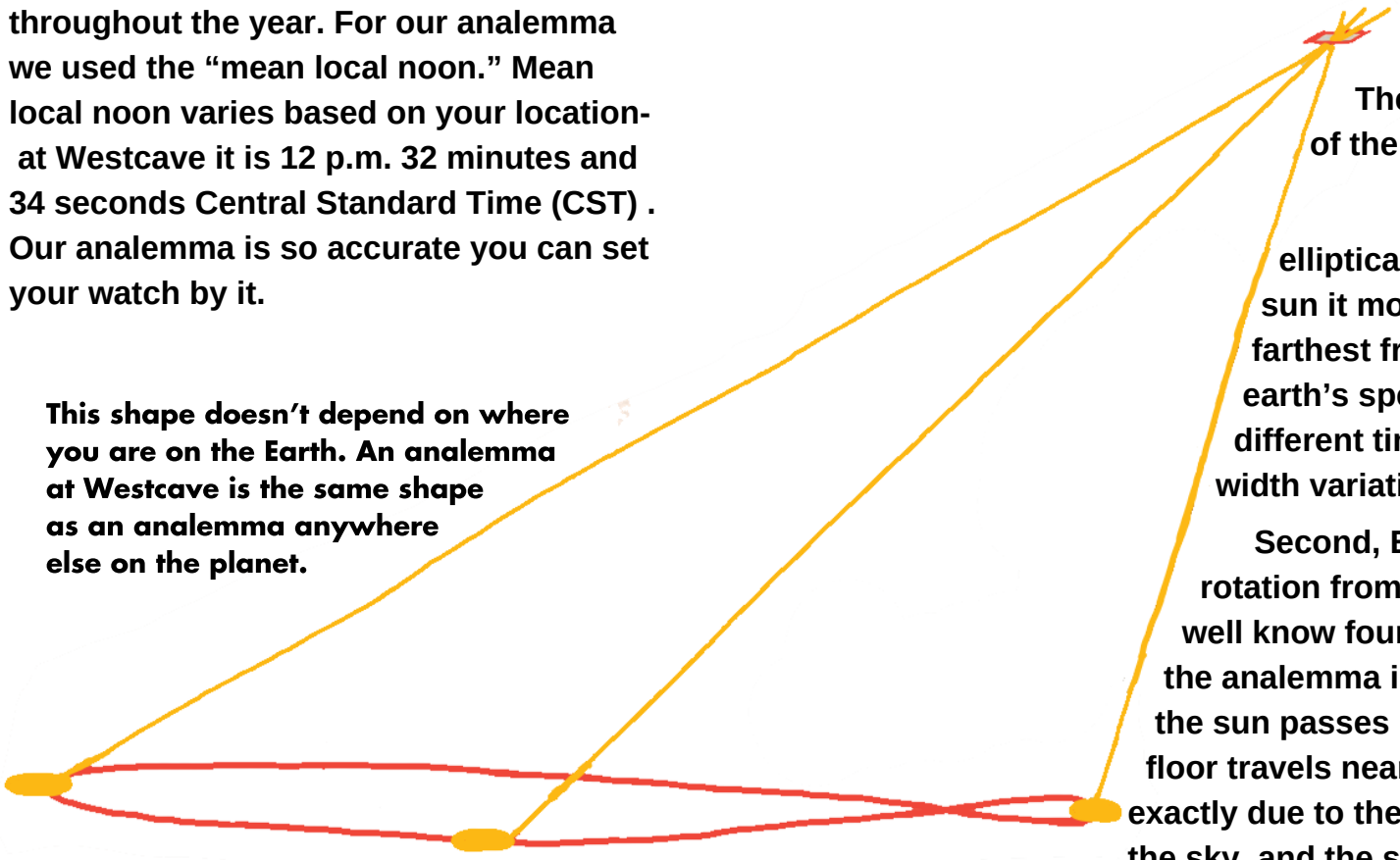
Look up- see the hole in the roof? During the middle of a clear day, the sun shines through that hole and makes a spot on the floor. The spot will move across the floor as the earth turns on its axis.

Look on the ground- see the large figure-8 shape on the floor? This is called an analemma. A Solar Analemma is a plot that shows the position of the sun in the sky (through our spot on the floor) at Westcave at the same time of the day throughout the year. For our analemma we used the "mean local noon." Mean local noon varies based on your location- at Westcave it is 12 p.m. 32 minutes and 34 seconds Central Standard Time (CST) . Our analemma is so accurate you can set your watch by it.

The diagram on the right shows the sun as it rises and sets at the summer solstice, the equinox, the winter solstice, and how it falls on the floor of the solar observatory.



This shape doesn't depend on where you are on the Earth. An analemma at Westcave is the same shape as an analemma anywhere else on the planet.



Property of the Earth

The shape of the analemma is a property of the Earth and its orbit around the sun.

First, Earth's orbit around the sun is elliptical. When the earth is the closest to the sun it moves faster in its orbit than when it is farthest from the sun. The difference in the earth's speed while in orbit around the sun at different times of the year causes the east-west width variation.

Second, Earth has a 23-degree tilt on its axis of rotation from the plane of its orbit. This causes our well know four seasons and determines the length of the analemma in the north-south direction. In summer, the sun passes nearly overhead and the spot on the floor travels nearly right under the hole, though not exactly due to the tilt. In winter, the sun travels lower in the sky, and the spot of light travels across the north end of the building, farther away from the "you are here".