Stellar, solar, and lunar demonstrators

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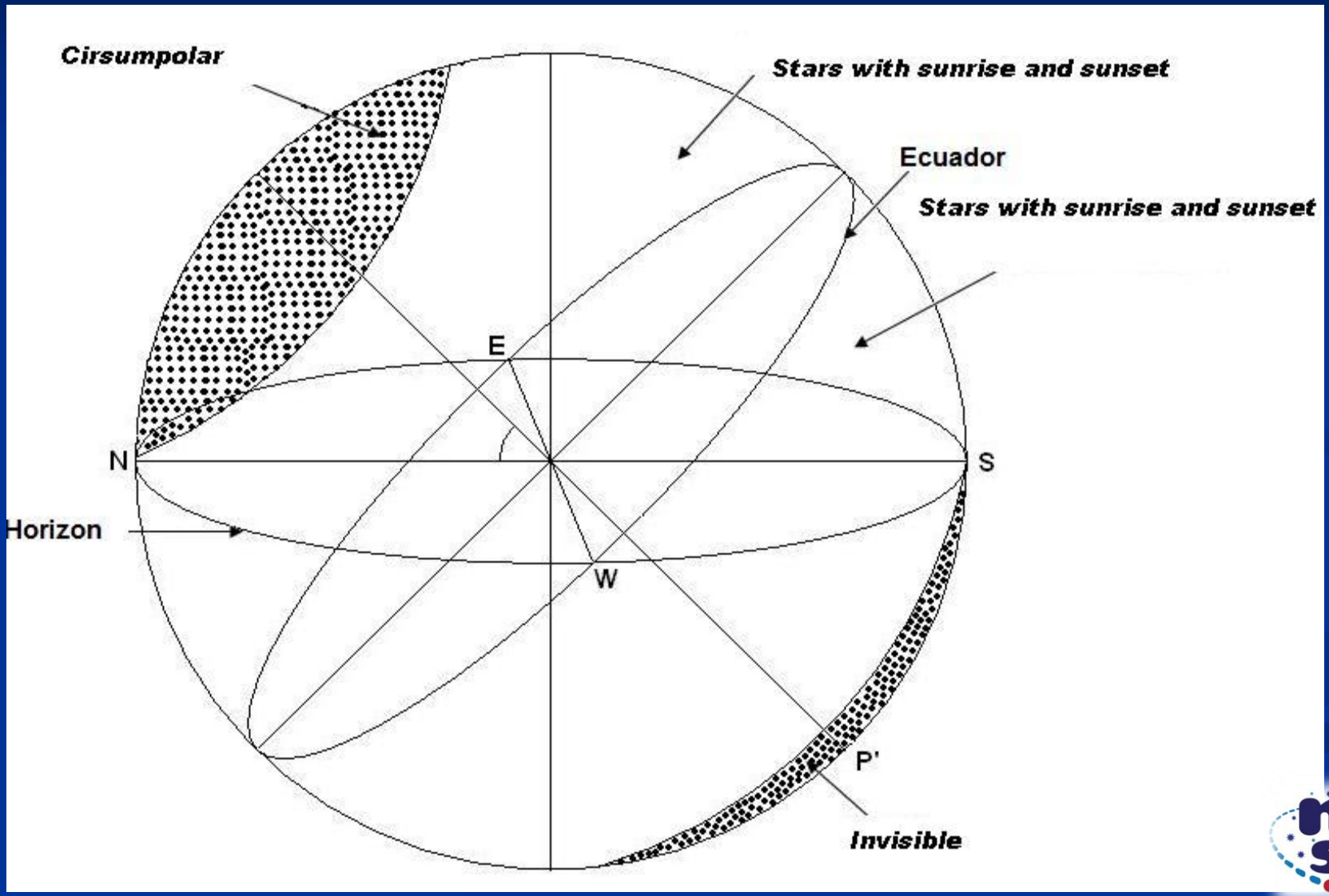
Goals

- Understand the apparent motions of stars as seen from different latitudes.
- Understand the apparent motions of the Sun as seen from different latitudes.
- Understand the Moon's movement and shapes as seen from different latitudes

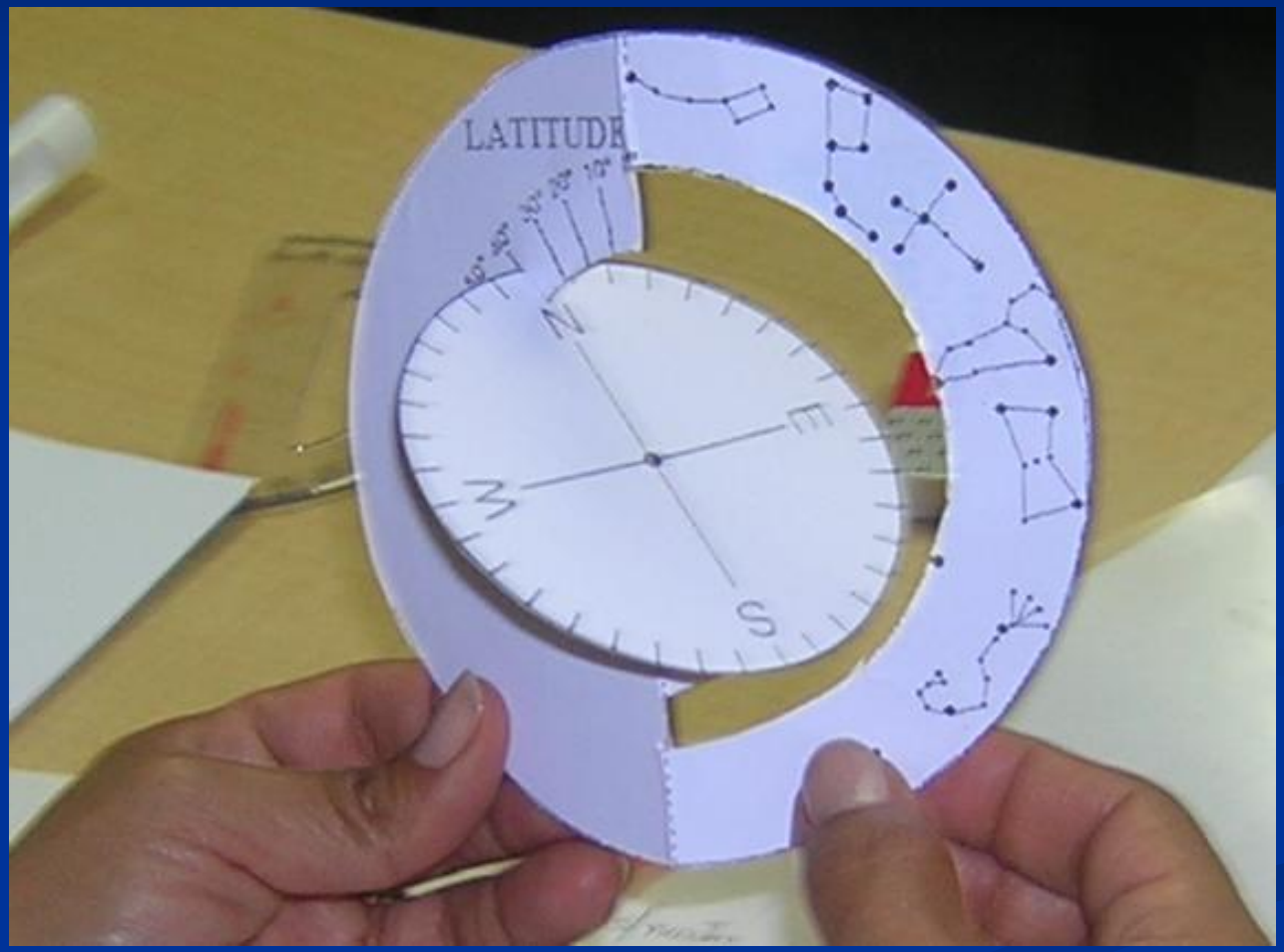
Stellar demonstrator for showing:

- Paths of the stars in the sky
- Circumpolar stars, stars that rise and set, stars that don't rise or set
- Travel anywhere if you know the latitude
- (You can build a simulator for each location)

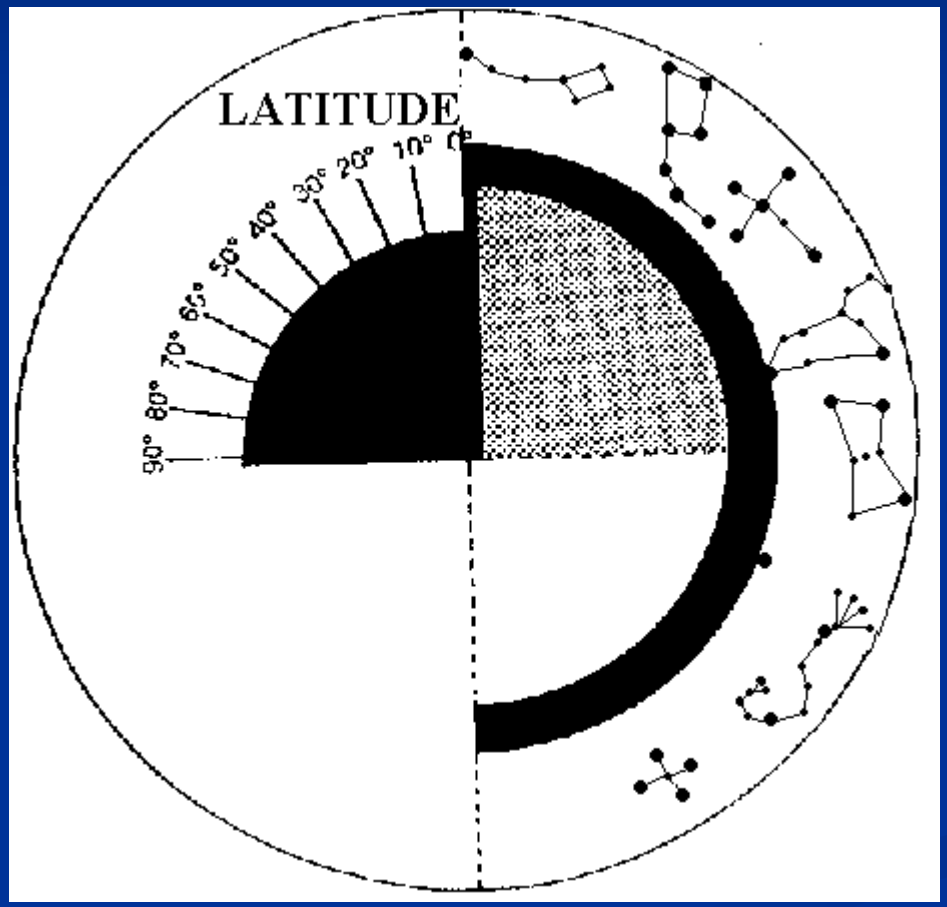
circumpolar / stars that rise & set/stars that don't rise or set

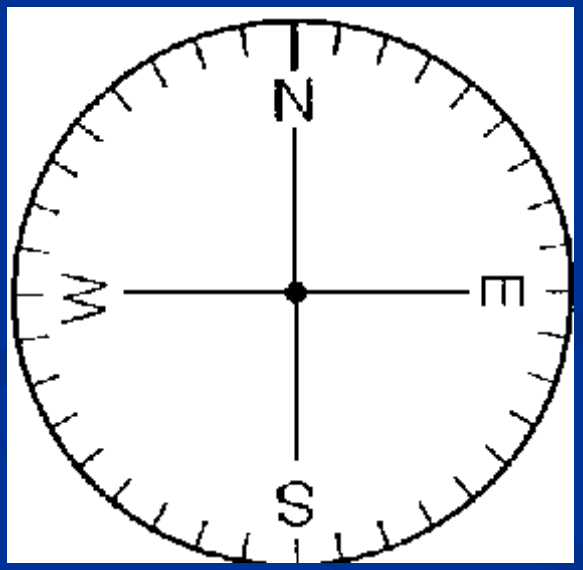


Stellar demonstrator

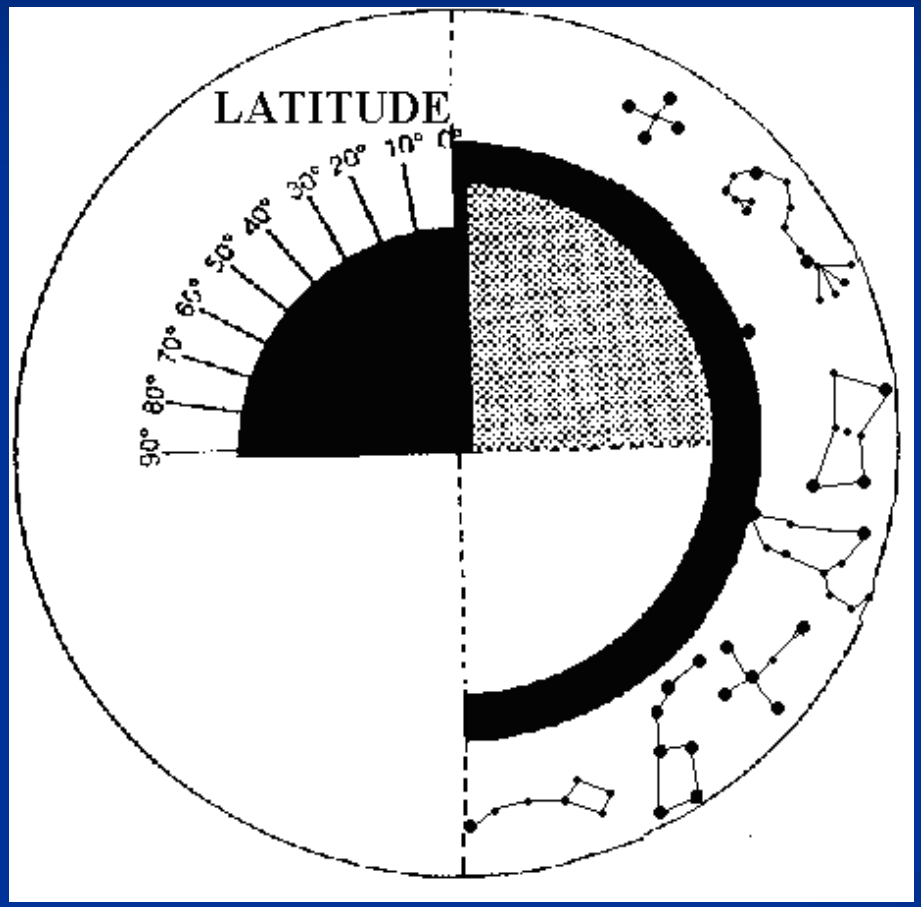


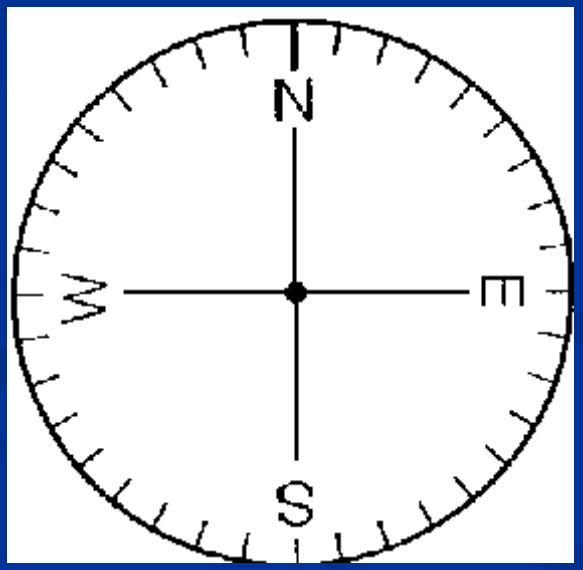
Stellar demonstrator for Northern Hemisphere



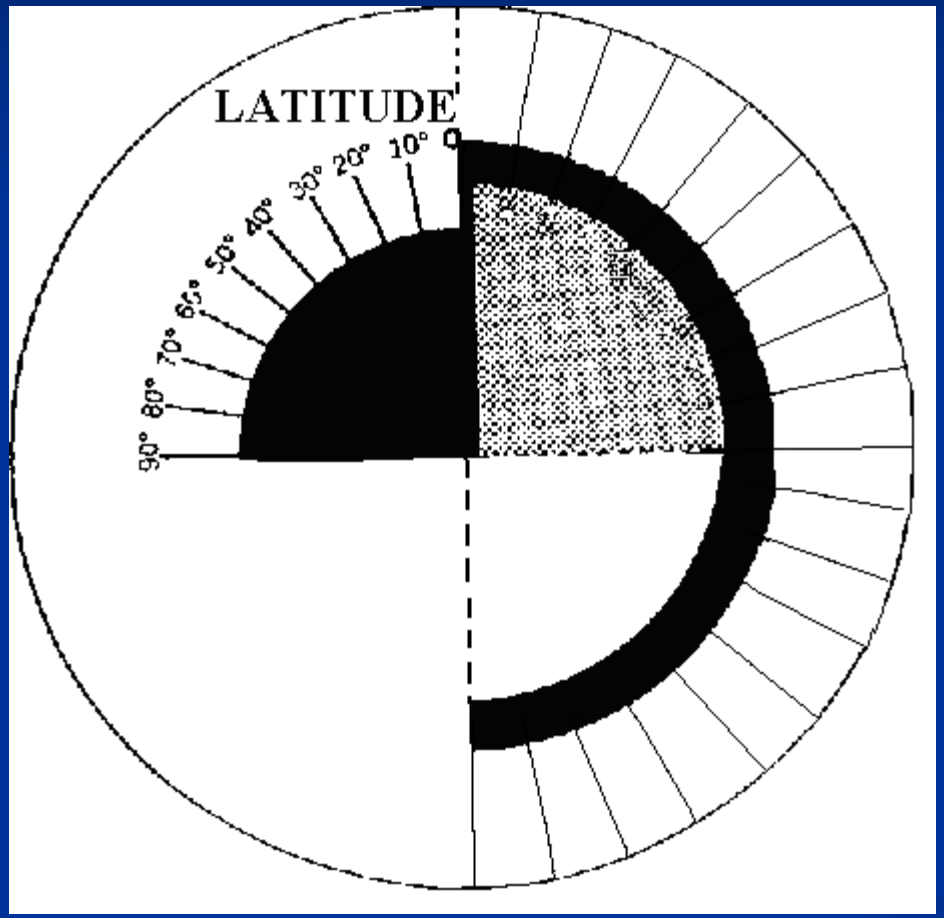


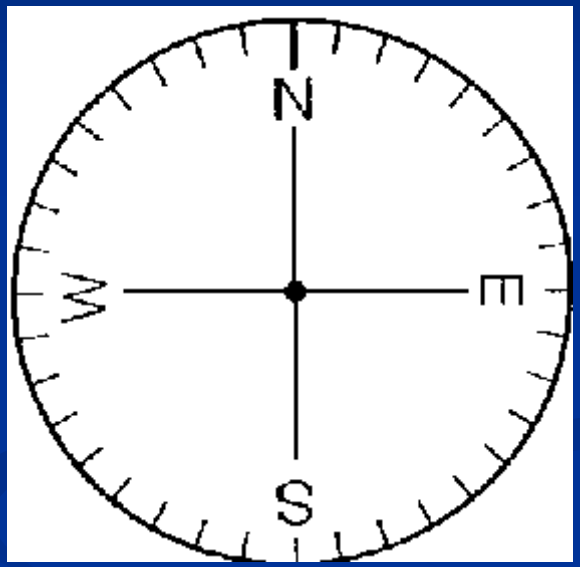
Stellar demonstrator for Southern Hemisphere





blank stellar demonstrator
(add desired constellations)

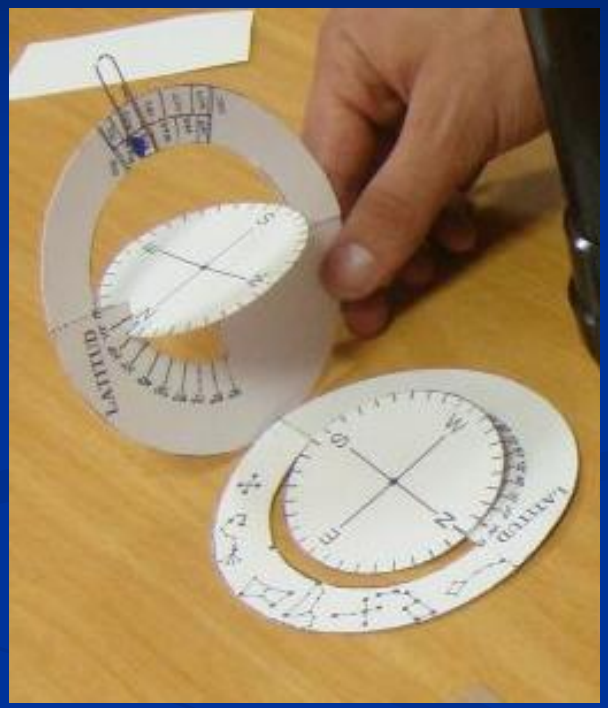




- Spring
- Summer
- Autumn
- Winter
- Or each month

Construction

- All explanations are given for construction depending on:
- Northern hemisphere
- Southern hemisphere



Building instructions step 1

- Make a photocopy on heavy-weight paper
- Cut both pieces (big one and small one) along the continuous line
- Remove the black areas
- Fold the main piece along the straight dotted line.

Building instructions step 2

- Cut a small notch above the "N" (northern hemisphere) in the horizon disk *or the "S" (southern hemisphere) in the horizon disk*
- Glue the North-East quadrant (northern hemisphere) of the horizon disk onto the grey quadrant of the main piece. The "W" point must match up with latitude 90º,

or the South-West quadrant (southern hemisphere) of the horizon disk onto the grey quadrant of the main piece. The "E" point must match up with latitude 90º.

Try to be careful in this operation because the accuracy of model depends on the correct alignment of the two parts.

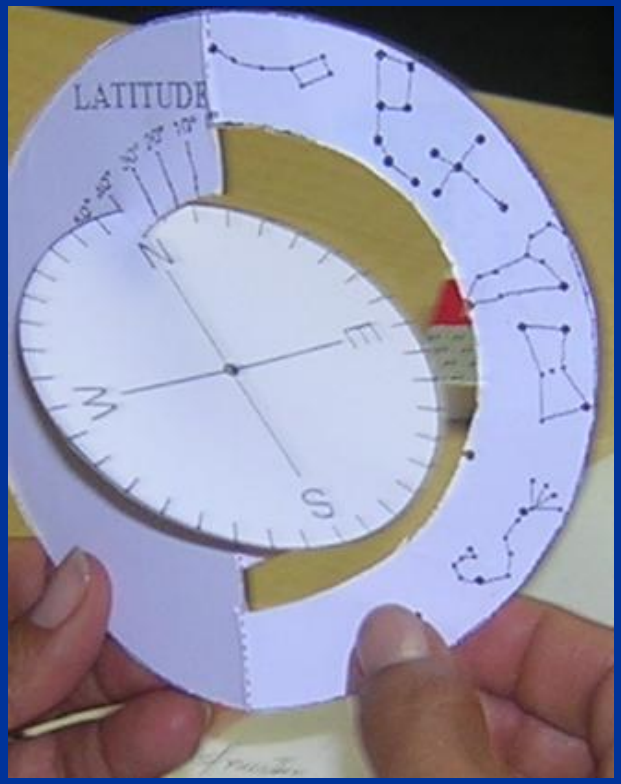
Building instructions step 3

- Fit the incision "N" (northern hemisphere) in the quadrant over the degrees of latitude

or the incision "S" (southern hemisphere) in the quadrant over the degrees of latitude

- Hold the horizon disk perpendicular to the latitude degrees
- Begin to use by setting it for any desired latitude…

Tilts of stellar paths



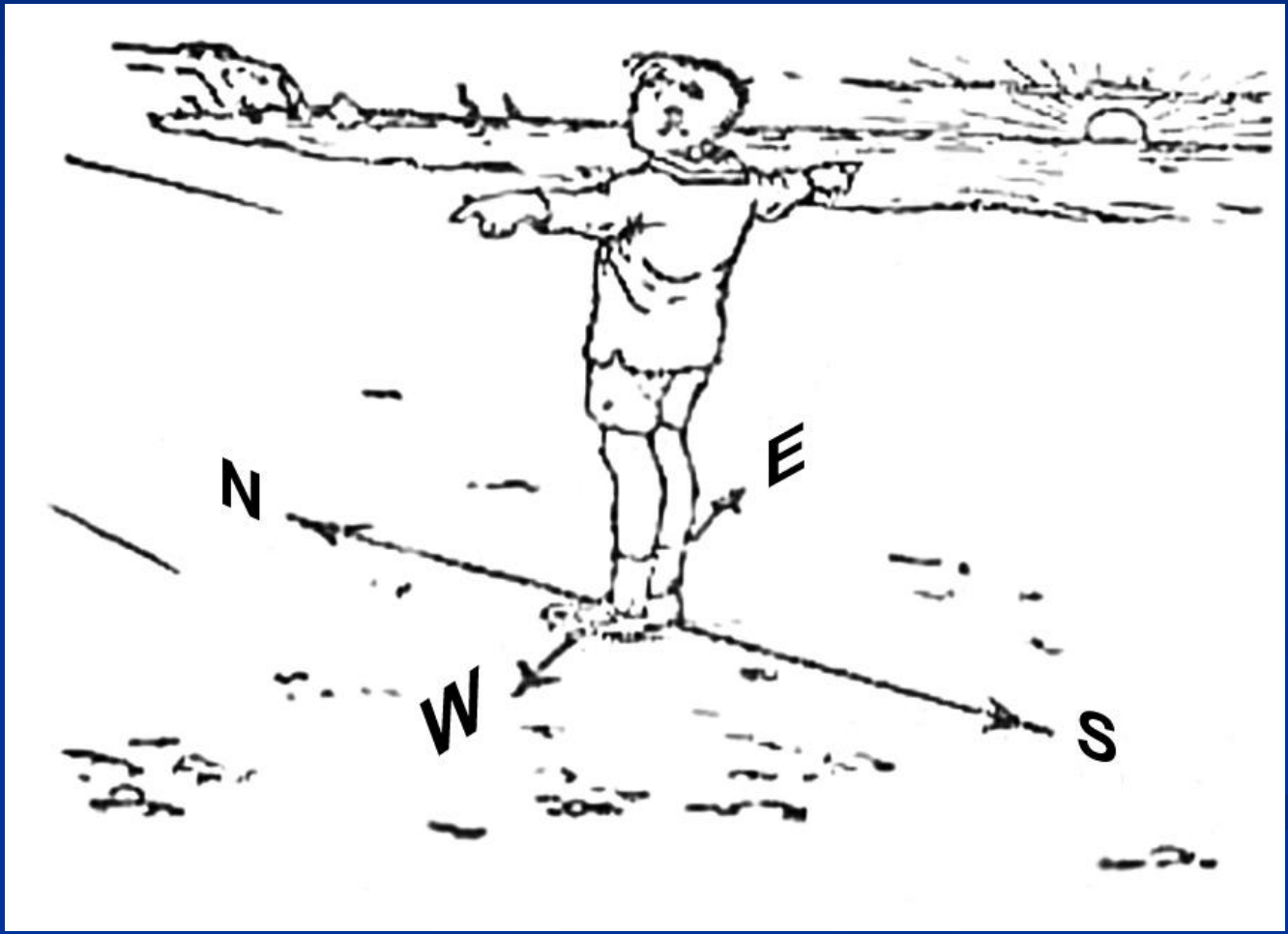
Lat 70º
Enontekiö
Finland

Lat 41º
Montseny
Spain

Lat 23º
Matehuala
Mexico

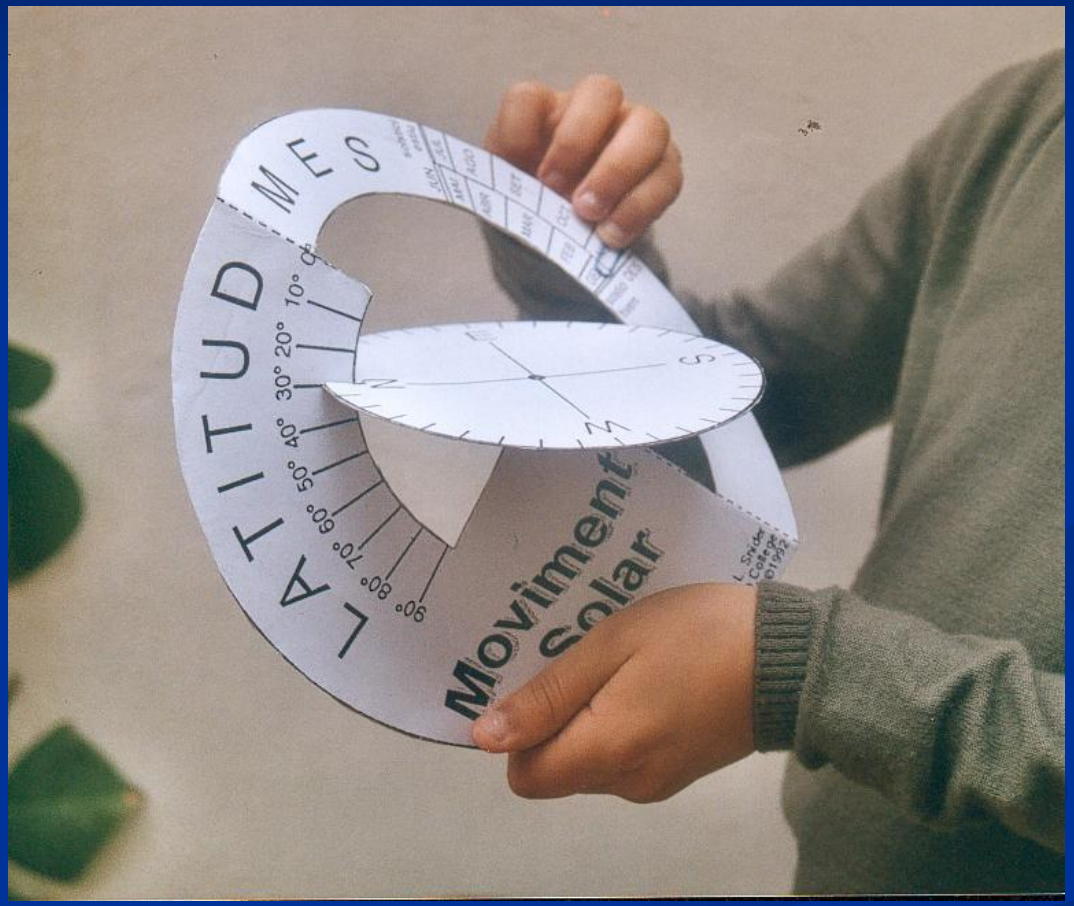
Where is sunrise?

Is this picture correct?



The sunrise is always due East and the sunset is always due West. Is this correct?

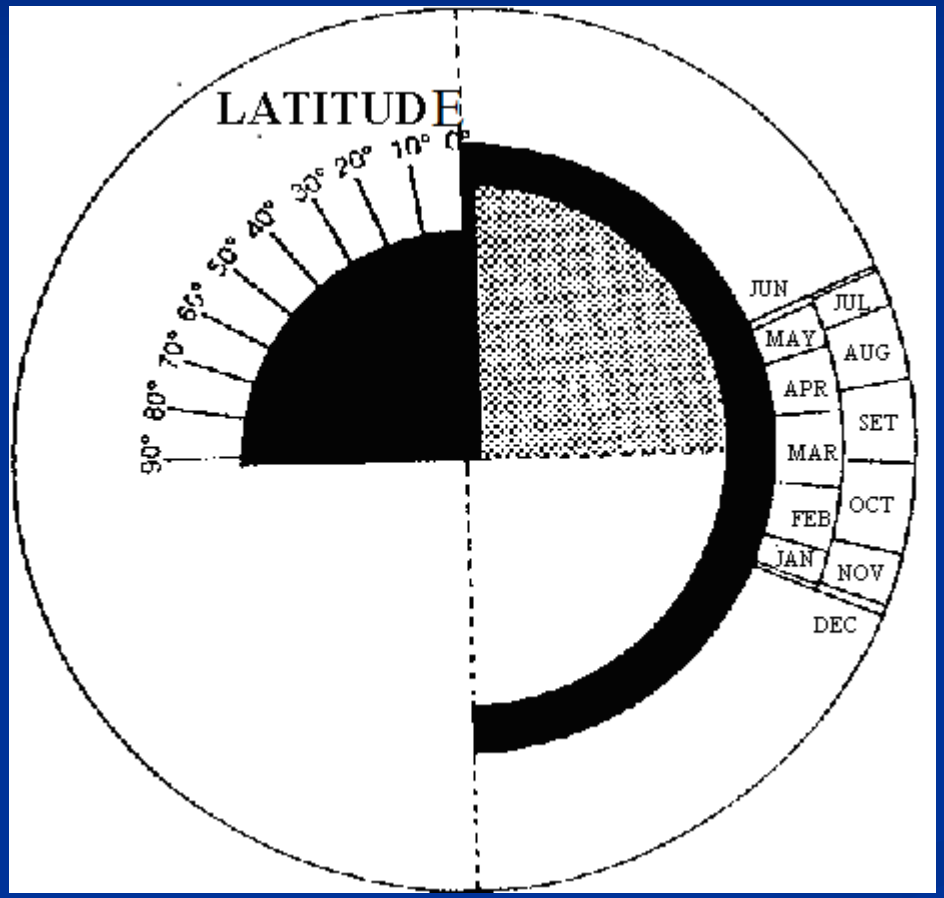
…with another demonstrator

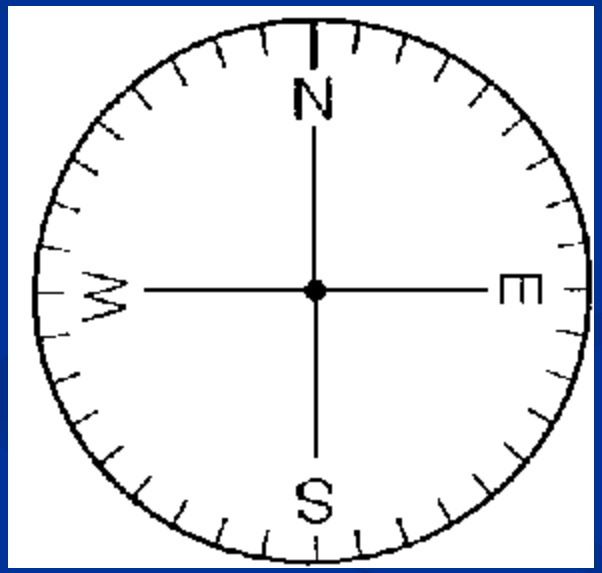


Solar demonstrator for showing:

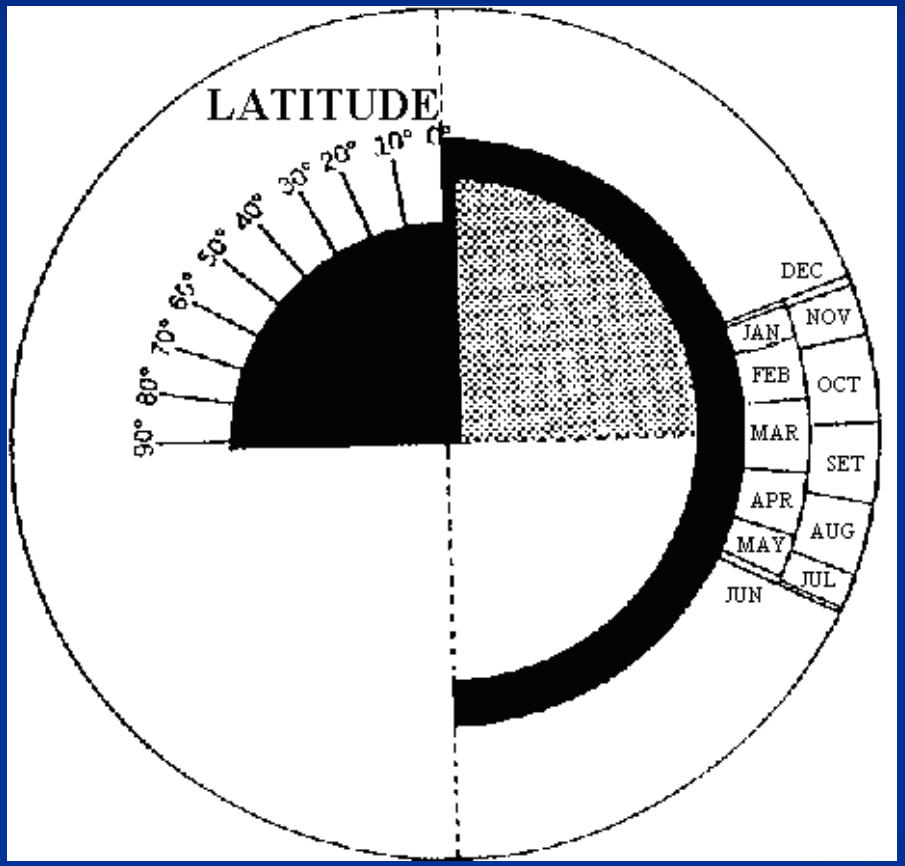
- Daytime solar path
- Annual motion of the sun
- Study risings and settings
- Midnight Sun
- Travel anywhere if you know the latitude

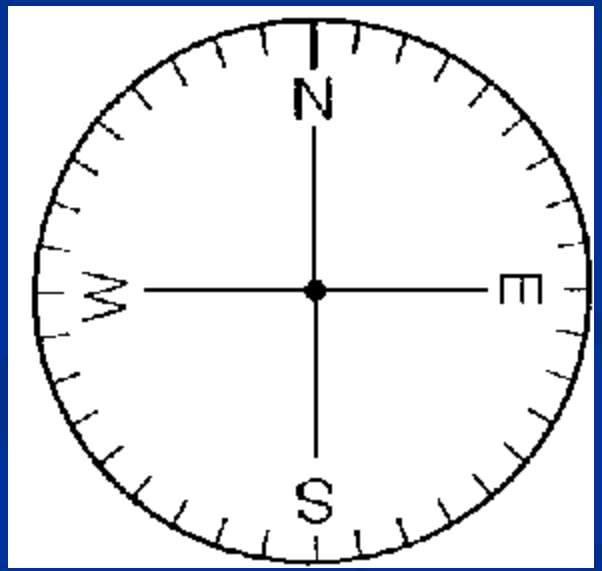
Solar demonstrator
Northern hemisphere



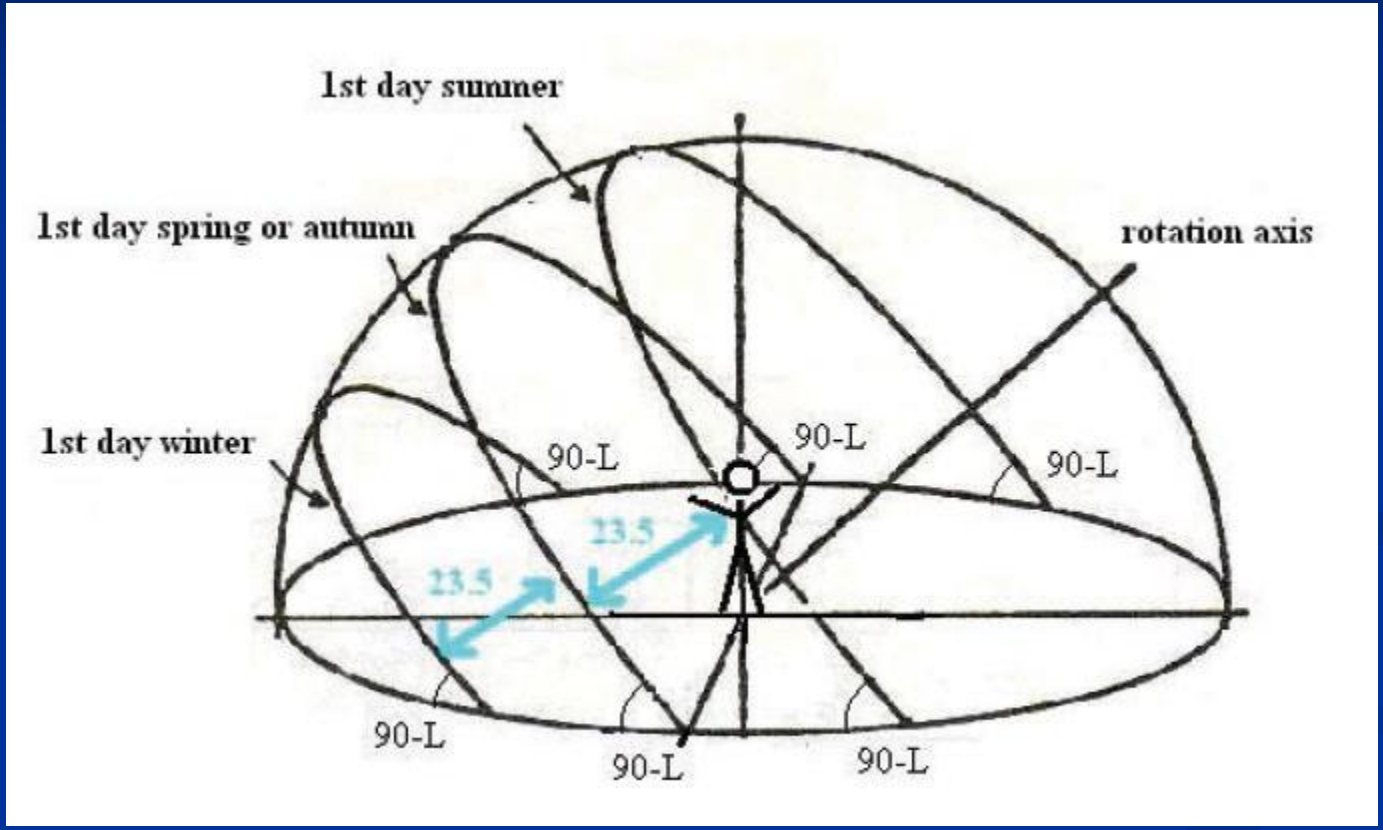


Solar demonstrator
Southern hemisphere

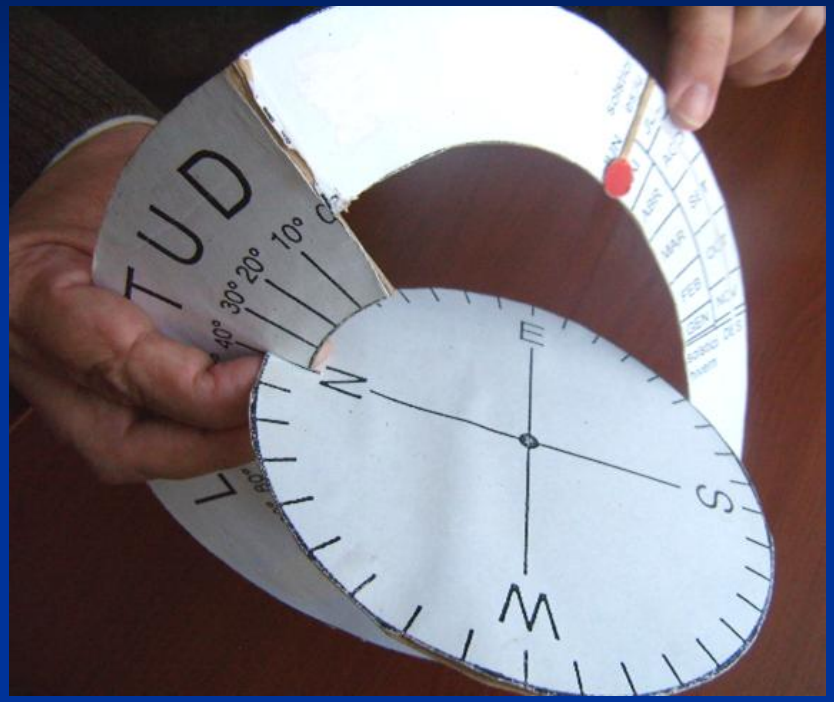


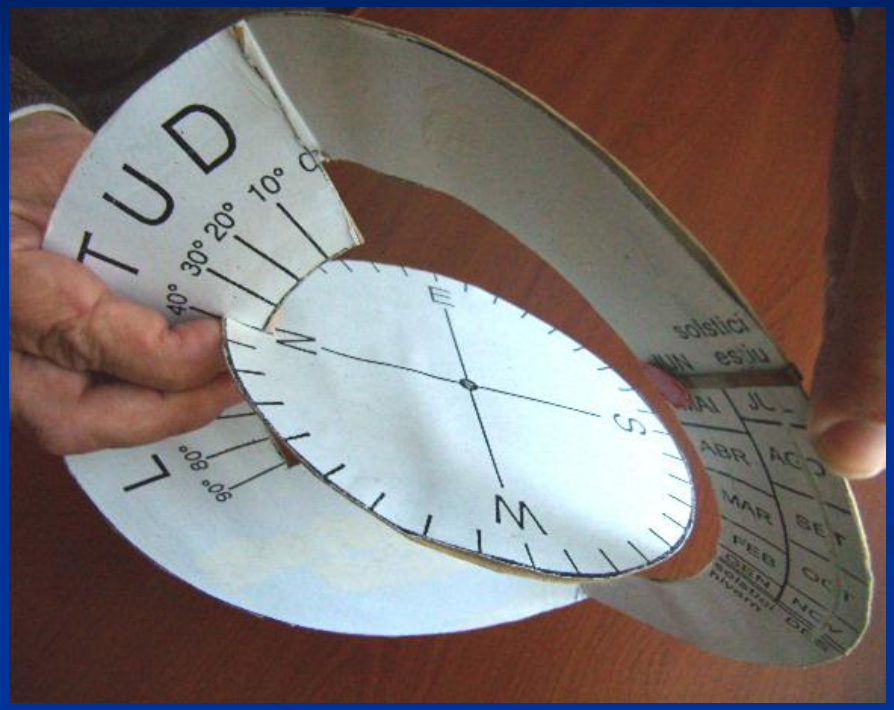


Solar motions



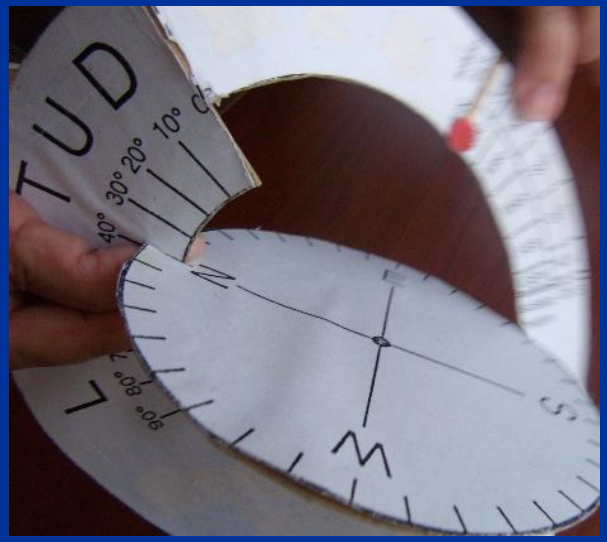
Sun's path





- Place "N" at proper latitude
- Place marker at proper date
- Move date "arm" to show sun's path throughout a day
- Note positions of rise/set

Slope of the Sun's path



Lat 70º
Enontekiö
Finland

Lat 40º
Gandía
Spain

Lat 5º
Ladrillero
Colombia

Height of the solar path

Summer and Winter in Norway

Sunrises/sunsets in different places

Riga, Latvia

Barcelona, España

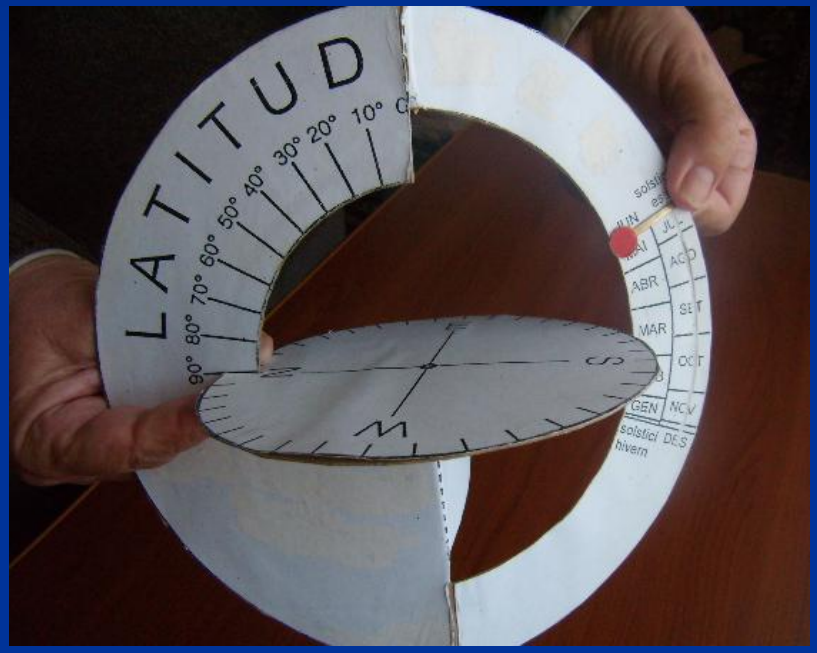
Popayán, Colombia

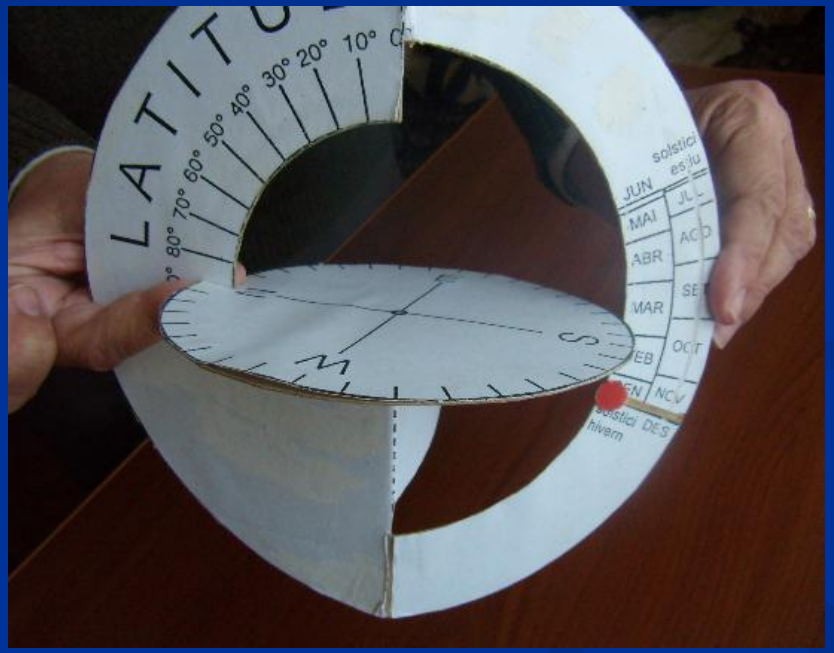
winter

spring
autumn

summer

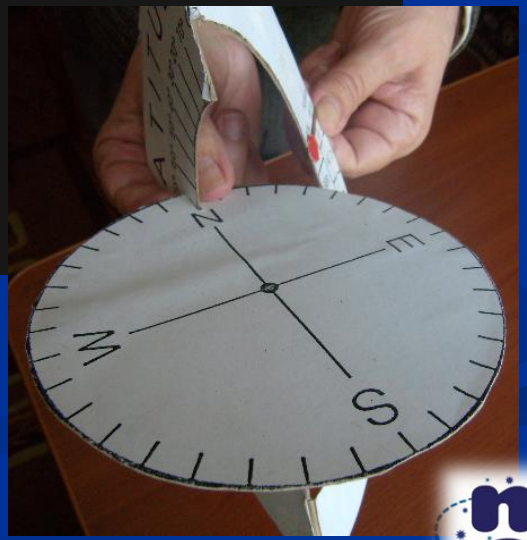
Polar summer and winter





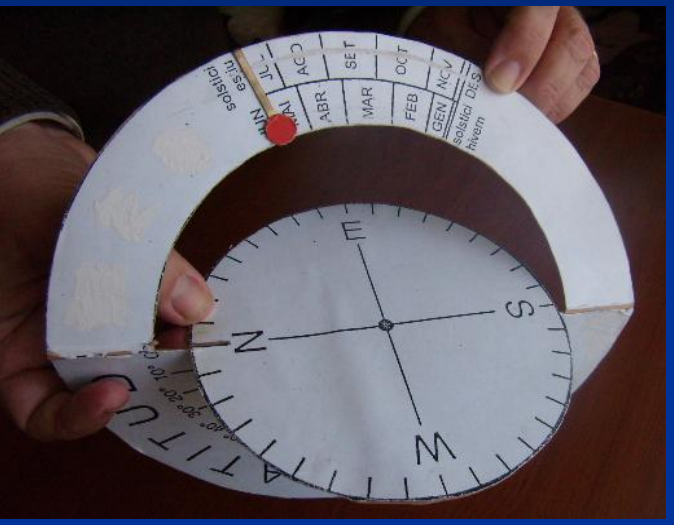
At the poles, the sun is above the horizon for half a year and below it for half a year.

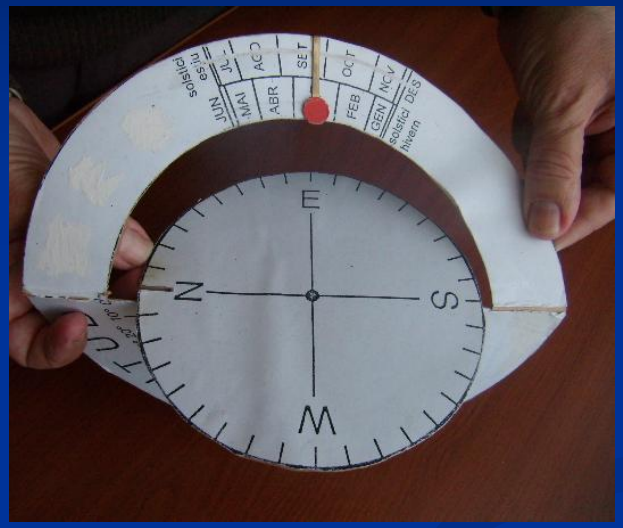
Midnight Sun

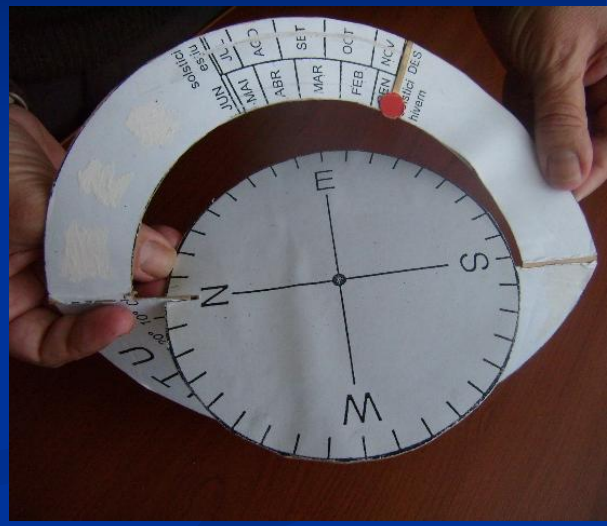


The Sun goes down until it passes the meridian and then begins to rise rather than set below the horizon

“Seasons at the equator”

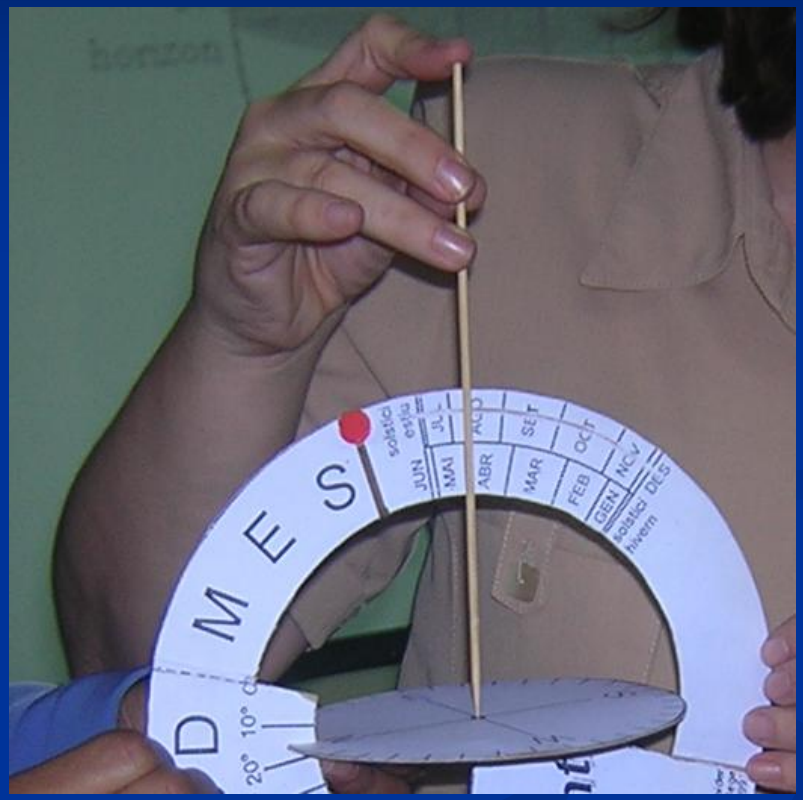






The solar path is always almost perpendicular to the horizon and its length is almost the same throughout the year

Sun at the zenith



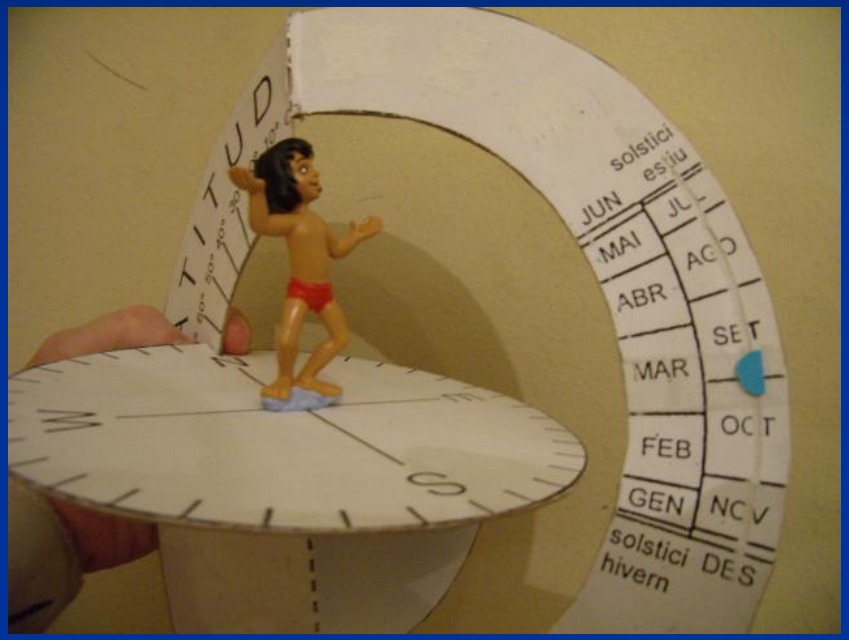
At solar noon, the shadow is on your feet.

Lunar demonstrator

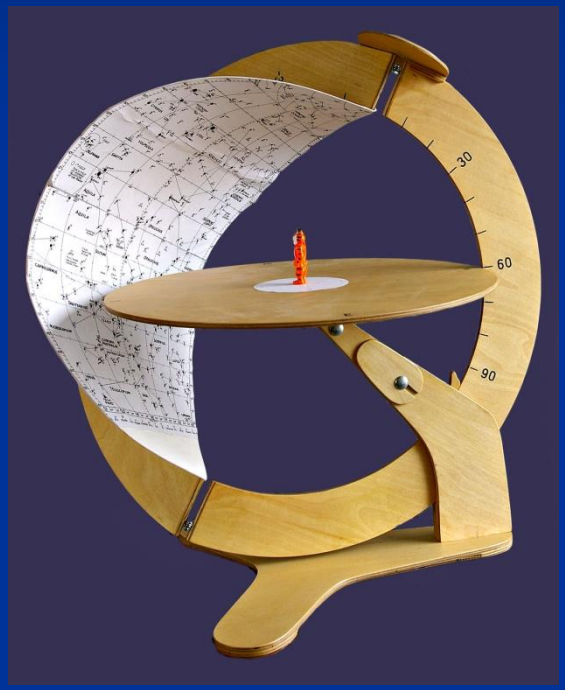
- Why the Moon smiles in some places?

Why yes or no….

Lunar demonstrator



XXL demonstrators



Thank you very much
for your attention!