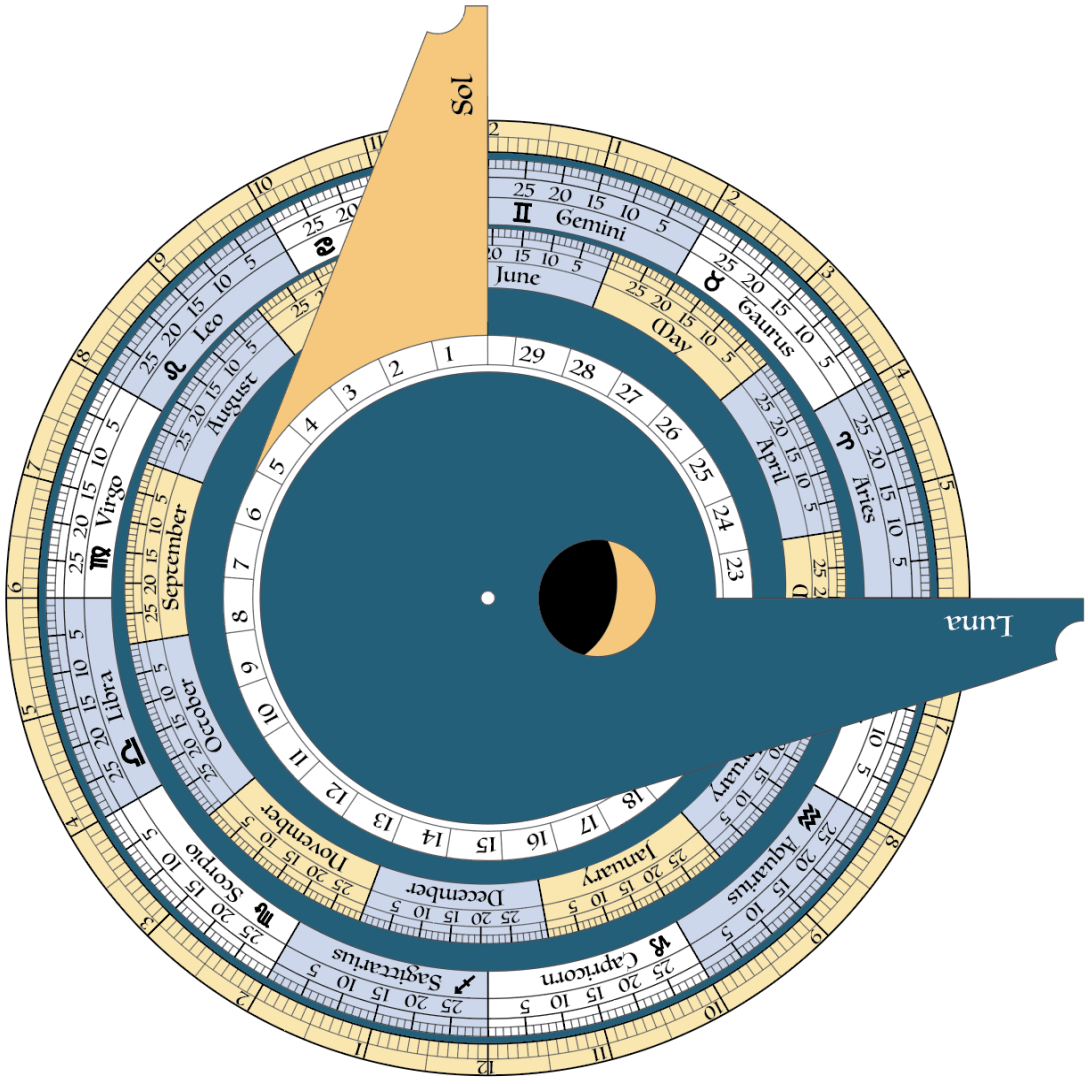
Lunar Volvelle

A volvelle is an analog computer made up of overlapping, rotating discs used to turn complex calculations into easy graphical transformations. This is a lunar volvelle, used to solve an array of problems relating to the position of the moon relative to the sun. Throughout the early modern era, lunar volvelles were printed and bound into books, embedded in other instruments like sundials, and produced as standalone instruments. The lunar volvelle is particularly useful when it is paired with other instruments, often able to boost their functionality. For example, when paired with an astrolabe, the lunar volvelle can add the moon's position and motion to the ecliptic. When paired with certain sundials, it can allow them to tell the time in moonlight.

Assembling the volvelle:

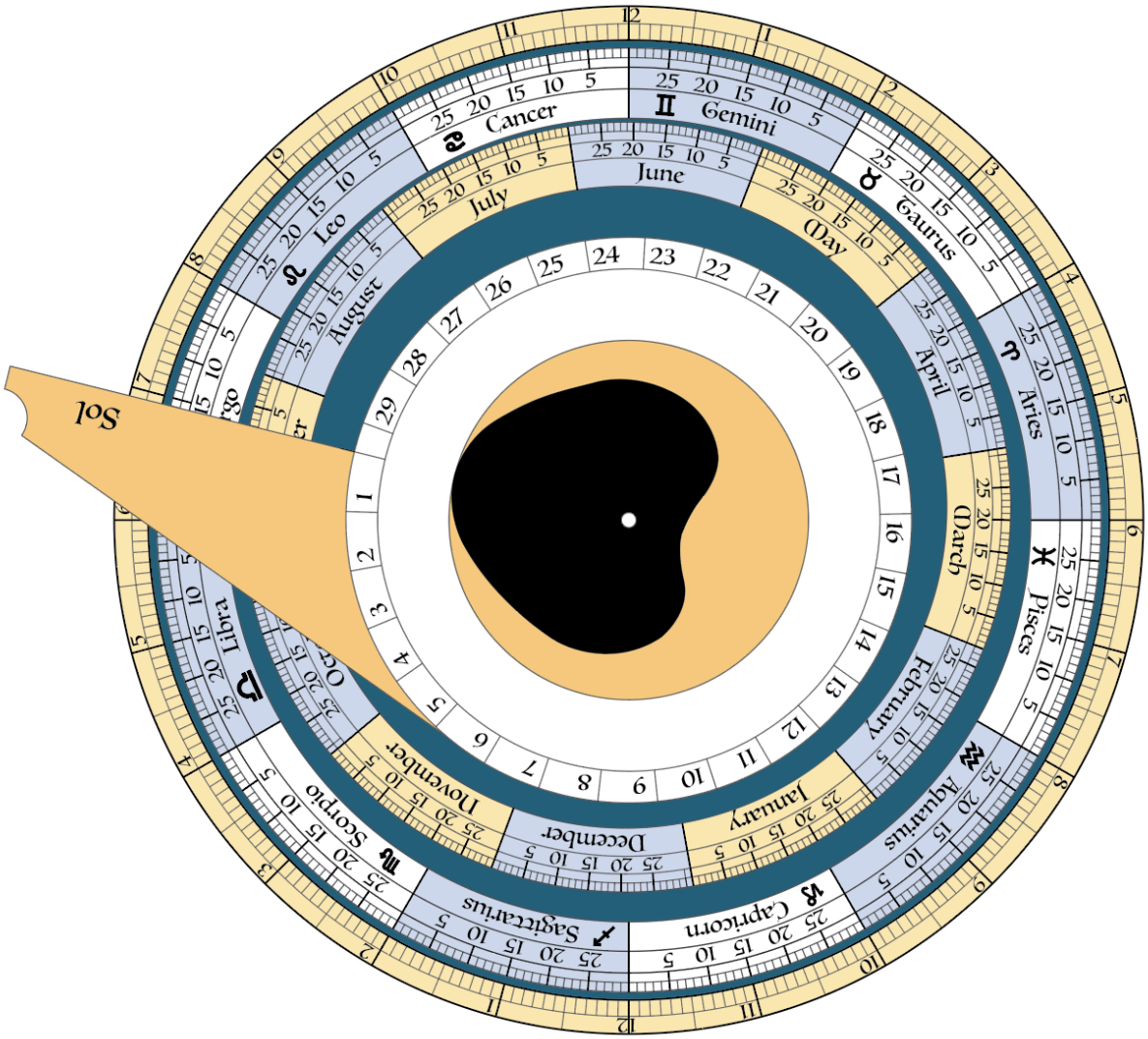
The image below shows the completed volvelle and can act as a guide for your assembly. Once each component has been cut out with a hole punched through its center, they can be secured together in this configuration using a brass fastener. In order of assembly, from back to front, the components proceed as follows: calendar scale solar index, lunar index.



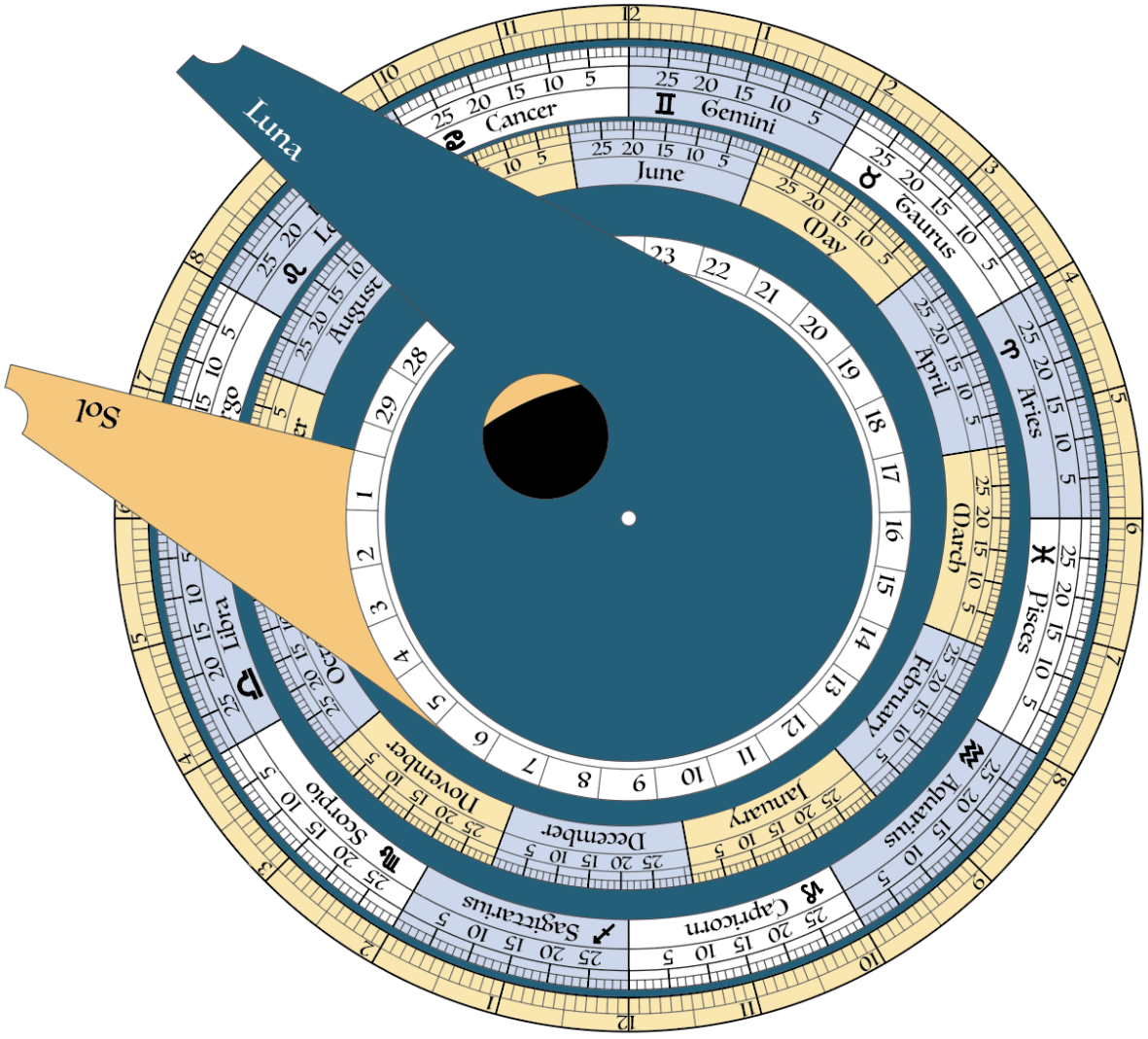
Using the volvelle: Identifying the moon's position in the ecliptic

Step 1: set the solar index to the current date.

In the example shown below, the solar index is set to September 8th.



Step 2: set the lunar index to the lunar age (number of days since the last new moon). The lunar age scale is printed around the solar index.
If you don't know the current lunar age, it can be found here:
https://calcometry.com/lunar-age-calculator.
In the example shown below, 27 days have passed since the last new moon.



Reading the volvelle:
In this orientation, the lunar volvelle can tell us:

1. The ecliptic position of the sun (read from the solar index along the zodiac scale).
2. The ecliptic position of the moon (read from the lunar index along the zodiac scale).
3. The approximate appearance of the moon's phase (seen through the lunar index's window).

With the ecliptic position of the moon known, this value can be taken over to an astrolabe and plotted on its ecliptic. Rotation of the rete can then model not just the motion of the sun and stars as usual, but also the moon.

The calendar date indicated by the lunar index also shows the date on which the sun's arc is most similar to the moon's on the day of calculation. In the example above, the moon's arc (in terms of its rising and setting azimuth and culmination) *roughly* coincides with the arc of the sun on August 7th.

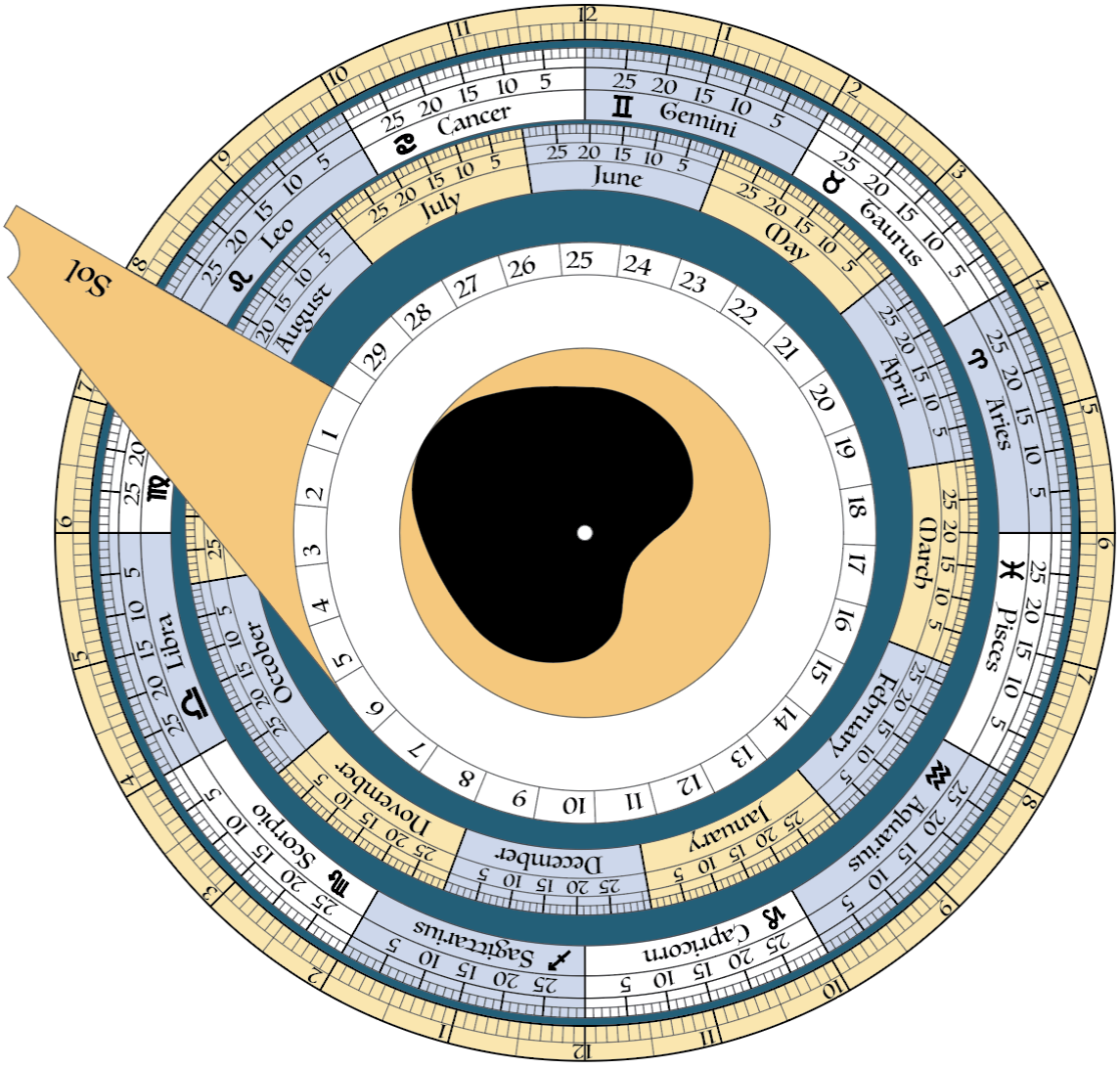
As a further example, if a full moon occurs near the summer solstice, the arc of that moon approximates the arc of the sun at the winter solstice, as the moon is opposite it in the ecliptic. Because the moon does not consistently sit precisely in the plane of the ecliptic, this is only approximate and can at times be several degrees off.

Using the volvelle: Converting a sundial into a moondial

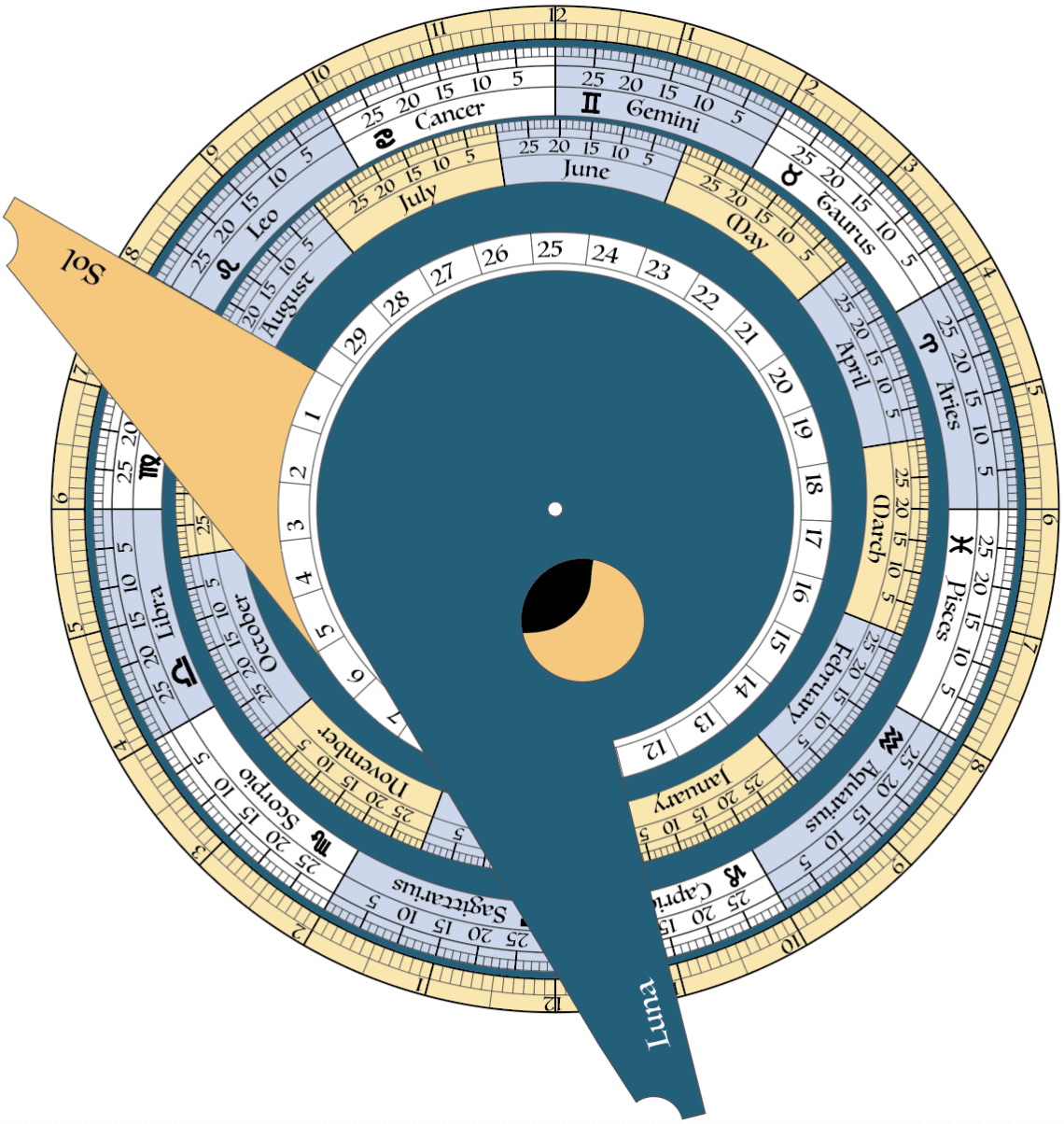
(note: this method only works with hour-angle dials. Altitude dials cannot be made to find solar time in this way)

Step 1: using the light of a bright enough moon, read the time shown by a sundial.

Set the solar index to the time read (note that noon faces up on the volvelle).
In the example shown below, the solar index is set to 8:00 am.

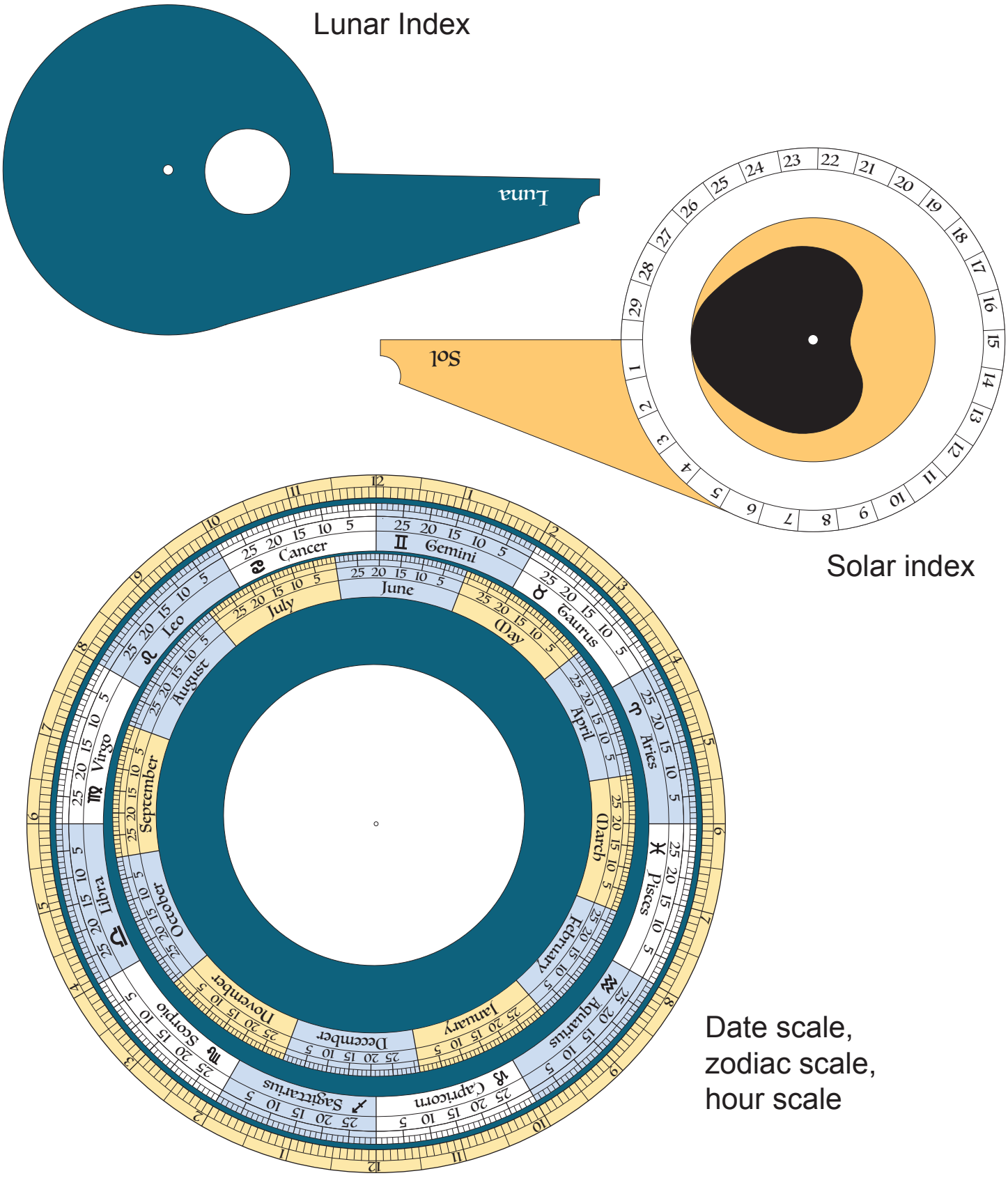


Step 2: set the lunar index to the lunar age.
In the example shown below, 11 days have passed since the last new moon, and the moon is a waxing gibbous.



Reading the volvelle:
In this orientation, the lunar index displays the approximate solar time.
In the example above, it would be approximately 11:05 pm when the moonlit sundial shows 8:00 am.

Any time output will be local solar time. For precise results, refer to the conversion guide found here https://www.bcgnomonics.com/localapparenttime.



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