

## A brief guide to solving problems with the astrolabe

Note: This guide is best followed alongside the PowerPoint presentation 'Solving problems with the astrolabe'.

### 1. Using the astrolabe to observe the altitude of a celestial object

- The astrolabe can be used as an instrument for measuring the altitude (height) of the sun or a star in the sky.
- Hang the astrolabe in a vertical position by suspending it from the ring.
- Rotate the alidade (the rotating indicator on the back of the instrument) until the sights are aligned with the object being observed (**WARNING: NEVER look directly at the sun**). In the case of the sun, the spot of light cast by the fore-sight can be aligned with the hole in the rear sight without looking directly at the sun.
- The angle of altitude can be read off the scale around the rim of the astrolabe.

### 2. Calculating the times of sunrise and sunset

- On the back of the astrolabe, align the alidade with the chosen date on the civil calendar scale and read off the matching date on the adjacent Zodiac calendar scale.
- On the front of the astrolabe, align the rule with the Zodiac date on the ecliptic circle (the circular ring on the rete). This marks the position of the sun in relation to the stars at this time of year.
- Rotate the rule and rete together until the point of intersection (where the rule crosses the Zodiac scale) just crosses the horizon line on the left hand side of the instrument (the eastern horizon).
- Read the time of sunrise on the outer time scale.
- To determine the time of sunset, rotate clockwise to a similar position on the western horizon (on the right hand side of the astrolabe).

### 3. Estimating the time by the sun (solar time)

- Measure the altitude of the sun using the alidade on the back of the astrolabe – see above (**WARNING: NEVER look directly at the sun**).
- Find the position of the sun in the Zodiac on the back of the astrolabe by lining up the alidade with the date on the civil calendar and reading off the date on the Zodiac calendar.
- On the front of the astrolabe, move the rule so that it crosses the ecliptic circle on the rete at the correct date on the Zodiac scale.
- Then move the point of intersection (where the rule crosses the Zodiac scale) so that it is over the correct altitude line on the tympan.
- Read the solar time off the scale on the outer rim. There are two possible times – one in the morning, and one in the afternoon, that will correspond to the same altitude. For morning, use the altitude line on the left hand side of the astrolabe, and for the afternoon use the right hand side.

- Note that the astrolabe gives an estimate of **local time** (like a sundial), which will vary from place to place according to longitude.

#### **4. Determining the altitude of the sun by the date and time**

- Align the rule with the Zodiac date on the ecliptic circle on the rete (as above).
- Rotate the rule and rete together until the rule points to the (local) time on the rim.
- The altitude of the sun can be found from the altitude lines on the tympan nearest to the point of intersection between the rule and the ecliptic circle.

#### **5. Determining the positions of the stars in the heavens**

- Align the rule with the correct zodiac date on the ecliptic circle.
- Rotate the rule and the rete together until the rule is pointing to the time of observation.
- The positions (altitude and azimuth) of the stars marked on the rete (the star pointers) can then be read off the markings (the almucantors for altitude which are the concentric rings, and the azimuths for positions east or west of the meridian line) on the tympan.

#### **Further information**

Further information and a guide to using an astrolabe can be found in the online exhibition on the museum's website at

<http://www.mhs.ox.ac.uk/astrolabe/>