

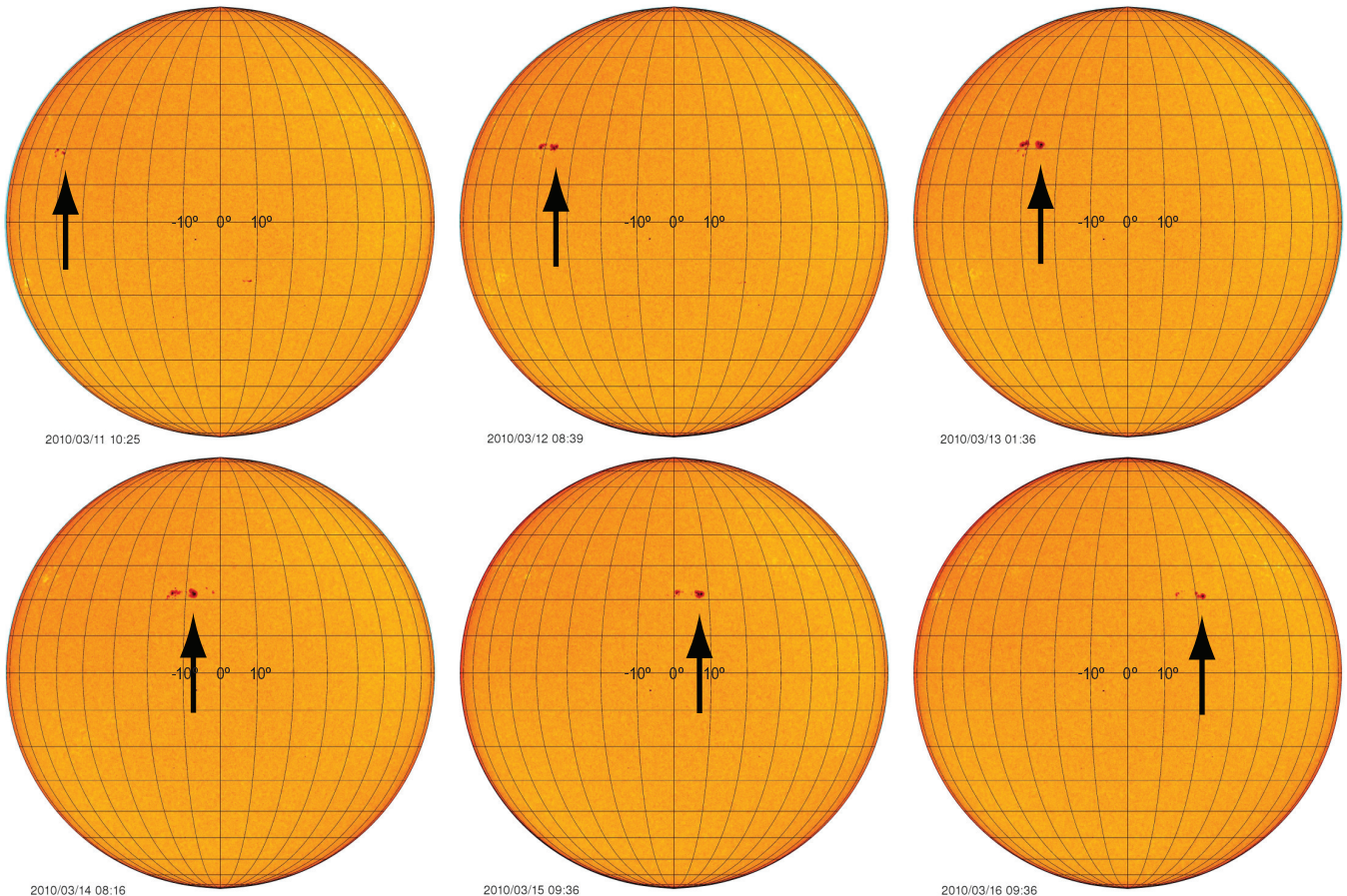


# One Rotation



The Sun has a visual indicator of activity on its surface - Sunspots. But sunspots can also be used to show that the Sun not only rotates, it rotates at different speeds between the equator and the poles.

All you have to do to measure the rotation of the Sun is watch the Sun with an appropriate solar observation tool (see GAMs "How to safely observe the Sun"), and register sunspot positions over several days, in the registry sheet included in this document.



*Sun images courtesy of SOHO, a project of international cooperation between ESA and NASA.*

In the example above, the indicated group of sunspots moved about 72 degrees in 5 days. To find a rough value for the rotation period of the Sun is just a matter of calculating:

$$\text{Period} = \frac{360^\circ \times \text{number of days}}{\text{angle of the movement}} = \frac{360^\circ \times 5 \text{ days}}{72^\circ} = 25 \text{ days}$$

Knowing the Sun's radius (about 695.000 km), you can also do a rough calculation of the Sun's rotation speed:

$$\text{Speed} = \frac{\text{angle of movement} \times \text{solar radius}}{\text{time (hours)}} = \frac{72^\circ \times 695000 \text{ km}}{5 \text{ days} \times 24 \text{ hours}} = 417000 \text{ km/h}$$

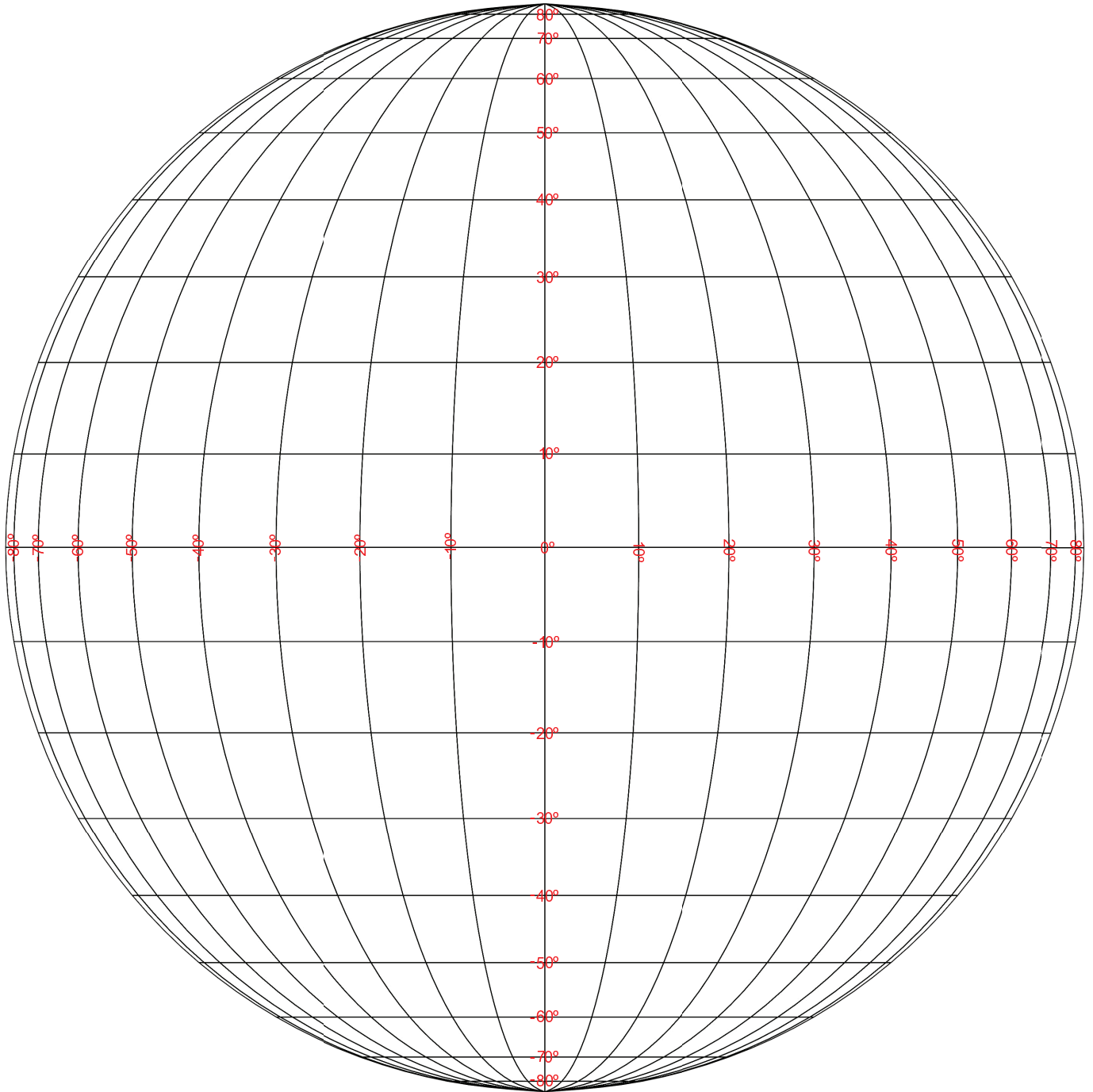
You can make the same calculation for the rotation speed of the Earth (Earth radius ~ 6380 km), and you get a speed of 95700 km/h, which means the Sun rotates 4 times faster than the Earth, but since it's much larger, takes longer to complete a full turn.

On the next page you'll find a registration sheet, where you can draw the sunspots you observe. Just remember this:

- 1 - more observations mean less error
- 2 - if a spot isn't exactly over a line, you'll have to estimate the best value (in the last of the example images above, I measured more or less 22 degrees, since it's more than 20° and less than 25°)
- 3 - don't be surprised if you don't find exactly the same values as above, because the Sun rotates at different speeds from the poles to the equator.

# One Rotation

Registry sheet



Name: \_\_\_\_\_

Location: \_\_\_\_\_

Dates: \_\_\_\_\_ (dd/mm - dd/mm)

