Just like the Earth, the Sun rotates. In this exercise you will determine the time it takes the Sun to complete one full turn around its axis; this time span is called the solar rotation period. The analysis is based on the apparent motion of sunspots. In the same way Galilei and others discovered the solar rotation in the 17'th century.

The solar images used here have been observed by the satellite SOHO at daily intervals in 2002. Each image contains a grid showing the heliographic latitude and longitude as measured from the center of the visible solar disk (*helios* is the greek word for the Sun). The additional transparent grid is drawn in 5° steps, it allows measurements with a precision of about 1°.

In the images you can see that the evolution of sunspots is quite diverse and often complicated; three long-lived and isolated sunspots A, B and C have been selected for this exercise. In the following, you can analyze the movements of one of them.

1. Choose a spot that you want to analyze: **A** **B** **C**

2. Measure the position of "your" spot for all available dates. Write down its precise heliographic latitude and longitude in the table below.

Date	Latitude	Longitude	Longitude difference to preceeding day

average: ______ ° per day

3. For all measurements, determine the longitude difference to the preceeding day, if available. Calculate the average of these values. This is the angular velocity of sunspots moving over the solar disk, i.e. the number of degrees they move per day.

4. Which value of the solar rotation period results from your measurements?

SOHO orbits the Sun (just as the Earth) during a year, i.e. about 365 days. SOHO's orbital motion has the same sense as the solar rotation. Actually, this introduces a small error into our measurement: The Sun rotates with a *slightly* different period than determined above. Does it rotate faster or slower? How much does the true value deviate from our measurement?

In case you you want to take another look at the images later on, you can find them at `http:\\sohowww.estec.esa.nl`, look for – classroom – activities. The sunspot group appearing on June 23 at -15° latitude and about 10° longitude nicely illustrates the fast evolution of some sunspots.