

# ACTIVITY 4:

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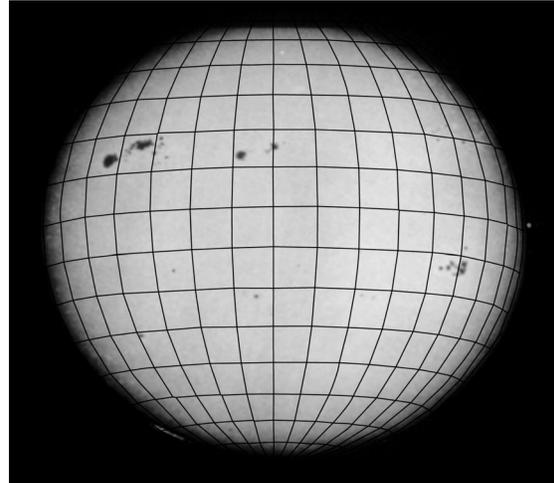
# THE SUN'S PERIOD OF ROTATION

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## Guide to Teachers

*Goal: Students will determine the Sun's period of rotation.*

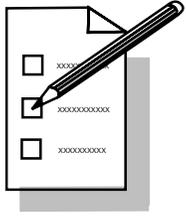


**In this activity students apply the previous lesson to the Sun, calculate its period of rotation, and reflect on what they have learned about the Sun compared to what they originally knew about the Sun at the start of Solarscapes. It functions as a REFLECT/APPLY phase in Solarscapes.**



### MATERIALS NEEDED

- One copy of the student activity, “The Sun’s Period of Rotation” (included)
- An overlay to determine solar latitude and longitude (Figure 4, included)
- Photographs of sunspots for four consecutive days (Figure 5, included)
- A photocopy of the student activity and Figures 4 and 5, preferably one copy per student
- A calculator



## Procedure:

**DISCUSS:** Open a class discussion by asking students to recall what they know about sunspots. Make a list of the information students provide. Now ask your students to recall how they can determine the **period of rotation** of an object with fixed features on its surface and discuss this procedure. Tell them (if they have not already pointed this out themselves) that sunspots appear to move across the face of the Sun over time. Have the students form groups of 4. They are to list all of the possible reasons that might be responsible for that apparent motion then share their list with the class. Four common reasons that one might expect are:

- Sunspots move across a non-rotating Sun.
- The Sun rotates.
- The Earth moves around the Sun, causing sunspots to appear to move.
- Sunspots appear and disappear in different places, appearing to move.

Ask students to think about these explanations and to try to devise ways in which one could distinguish among the possibilities.

**EXPLORE:** Hand out the worksheets to the students, who will work in groups of three to calculate the solar rotation period. Students are to answer the questions individually as homework.

**REFLECT:** Student groups report their calculated **periods of rotation**. The Sunspot Motion Table is shown on page 3. It displays the measurements and calculations which should approximate those of your students. If one (or more) groups ended up with significantly incorrect results (the correct answer is about 26 days), ask them to go back and review their measurements and/or calculations. Discuss any remaining discrepancies between the answers with the students. Did they use the same sunspot groups? Did anyone forget to correct for Earth's orbital motion? Point out that measurement uncertainties as well as other factors (in this case the exact feature chosen) can influence the answer. Scientists often get different results, then try to figure out what is causing those differences.

**APPLY:** Ask students to discuss in their groups what they know about the Sun. Review the brainstorming list developed at the start of Solarscapes.

## Sunspot Motion Table - For Teacher Use

	Longitude of Sunspot Group	Change in Longitude (Ex: Day 2 - Day 1)	Corrected Longitude Change	Period of Rotation (Solve for "X")
Day 1	29 <sup>o</sup>			
Day 2	18 <sup>o</sup>	11 <sup>o</sup>	12 <sup>o</sup>	30 days
Day 3	3 <sup>o</sup>	15 <sup>o</sup>	16 <sup>o</sup>	22.5 days
Day 4	-10 <sup>o</sup>	13 <sup>o</sup>	14 <sup>o</sup>	25.7 days
<b>Average Rotational Period = <math>\frac{78.2}{3}</math> days = 26 Days</b>				

*NOTE: Each horizontal and vertical line on the overlay (Figure 4) represents 10<sup>o</sup> latitude or longitude, respectively. Since these lines do not show tenths of a degree, students should estimate the longitude to the nearest whole degree, then solve for "X" to the nearest tenth of a day.*

## Scoring Rubric for Activity 4: Rotation Period of the Sun

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

### Individual Assessment (goal met if student achieves a "2")

Task(s)	0	1	2	3	4
Determining the Sun's period of rotation and answering problem Questions	Student did not complete the task.	Student determines rotation period in group.	Student determines rotation period in group, and answers questions in Student Guide.	Student determines rotation period in group and correctly answers the questions in the Student Guide.	

### Group Assessment (goal met if group achieves a "2")

Task(s)	0	1	2	3	4
Determining the Sun's period of rotation	Group did not participate.	Group is not able to correctly determine the rotation period.	Group is able to correctly determine the rotation period.		

**SUGGESTED USE:** Make one copy per student; there is also room for you to add your own task and scoring criteria.