**Solar Rotation - Lesson Plan**

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| **Title:** Solar Rotation | **Date:** |
| **Learning objective/s:*** Use digital tools
* Make accurate observations
* Apply mathematical knowledge
* Evaluate results
 | **Curriculum links:**Physics – space physicsMaths – geometry* Maths – trigonometry
* ICT – using digital tools
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| **Learning outcomes****I want evidence students can:*** Submit a data request using the SDO website
* Observe and measure the position of a sunspot over time
* Use mathematical equations and trigonometric functions to estimate the rotation period of the Sun
* Evaluate their result with respect to the true value
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| **Notes on students who have exceeded the performance expected:** | **Action to be taken:** |
| **Notes on students who did not achieve the performance expected:** | **Action to be taken:** |
| **Essential vocabulary:**Angle, rotation, solar, sunspot | **Prior mathematical knowledge:*** Using trigonometric functions on a scientific calculator.
* Algebraic formulae.
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| **Teacher resources including ICT:** * Presentation file
* Internet access
* Print outs of the Activity Sheet – 1 per student
* A ruler
 | **Students’ resources including ICT:** * Internet access
* SDO data page: <https://sdo.gsfc.nasa.gov/data/aiahmi/>
* Activity sheet
* A ruler
* A scientific calculator
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| **Organisation and class management:** | **Teaching points:** | **Notes:** |
| Starter/ Input | * Use the presentation file to carry out the ‘Sun quiz’. Ask the students to vote on the correct answer before revealing it on the next slide.
* Use the presentation file to introduce the lesson objectives, essential information, and instructions.
 | You will need to be connected to the internet to view the YouTube video of the SDO. It is also available here - <https://www.youtube.com/watch?v=mvPH_gDMarw>The video has sound and is about 5 mins long.The PowerPoint presentation notes contain additional facts and information about the sun and sunspots. |
| Main activity | * Students complete the activity independently or in small groups using the ‘Activity Worksheet’
 | Depending on the needs of your students, you may want to model locating a sunspot, measuring its position, and calculating a result. We have included some slides at the end of the presentation to facilitate this. An as alternative to using trigonometry, students could make a scale drawing and measure the angle using a protractor.  |
| Plenary/Conclusion  | * Reveal that the true value of the Sun’s rotation period is 24.7 days at the equator and around 38 days close to the north and south poles.
* Lead a discussion on why students’ answers may be different from the true answer.
 | Regions near the equator rotate faster than the regions near poles because the Sun is a ball of plasma (not solid like the Earth or Moon).You can use the following prompts during the discussion:* What possible errors could have come into play?
* What ways are there of improving the method used?
* Can students think of a different method to calculate the rotation period?
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