**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 physics  Maths – geometry   * Maths – trigonometry * ICT – using digital tools |
| **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 | |
| **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. |
| **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? |