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| **Halloween STEM activities – Make a sundial** | | | |
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| Learn how to use the sun to tell the time by making a sundial | | | |
| **Subject(s):** Science  **Approx. time:** 20 - 40 minutes plus follow up | |  | **Key words / Topics:**   * Sundial * Sunlight * Shadow * Time * Clock * Hours |
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| **Suggested Learning Outcomes** | |  |  |
| * To be able to make a simple stick sundial and use it to tell the time. * To understand how the shadow is created with the stick blocking the sunlight. | | | |
| **Introduction** | |  |  |
| This is one of a set of resources developed to support the teaching of the primary national curriculum. They are designed to support the delivery of key topics within maths and science. This resource focusses on the making of a simple sundial what is built in the school grounds. This can be used to support learning of telling the time and to understand how light creates shadows. | | | |
| **Purpose of this activity**  In this activity learners will learn how to use the Sun to tell the time. They will make a simple stick sundial in the school area, identify where the shadow is cast every hour and mark this with a stone and chalk. The next day they can test their results to see if the sundial is accurate at telling the time.  This activity could be used as a starter or main activity to the use of light in science. It may also be used to introduce geometry, position and direction when using the stick to make a sun compass. | | | |
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| **Activity** | |  | **Teacher notes** |
| **Introduction (5-10 minutes)**  Teacher to explain that learners are going to make a sundial in the playground/outside area. They will go outside and make a sundial using a stick with stones and chalk to mark the end of the stick’s shadow every hour. Show teacher presentation explaining how to do this.  **Practical Outside Activity (10-20 minutes)**  Learners to put on coats and go outside with necessary equipment. The teacher should assist the learners to identify the location they are going to make their sundials with the following instructions:  Learners will need:   * A large straight stick * Clock * Chalk * Some stones   **Step 1:**   * Find a spot outdoors that is not sheltered from the sun * Place the stick on the ground so it is straight. * Stones or dirt could be used to keep the stick upright.   **Step 2:**   * Check the time on a clock and on each hour place a stone at the end of the shadow. * Use the chalk to write the hour on or next to the stone.   **Discussing the results of the activity (5-10 minutes)**  Discuss the results as a class – how well did it tell the time? What are the advantages and limitations of this method of telling the time? | |  | This activity could be done as pairs or in small groups.  As learners will be completing the activity outdoors, the teacher presentation could be shown in advance whilst still in the classroom or printed to use as handouts whilst outside.  **Sundial Activity**  Find an area that is directly in the sun with space to allow the class to make their sundials. Ensure that the sundials will be safe to leave overnight.  The sundial stick could be either bamboo, dowel or tightly rolled and glued paper, depending what resources are available. The stick needs to be as straight as possible to cast an accurate shadow. It could be held in place by being pushed into the ground or into a plant pot (the type with a single central hole is especially effective when inverted). Alternatively, some form of device with a stand and a pole could be used, such as a swingball or a support for a volleyball net.  A tri-square or large book can be used to check that the stick is vertical.  The stones or markers should be placed equidistantly from the stick. If a stand is used in the playground, stones may not be required and numbers could be drawn directly onto the surface with the chalk.  Throughout the day visits will need be made to mark the hours on the sundial with either small stones or chalk.  If it is not bright, a torch could be used to demonstrate how to cast a shadow, setting your own time! |
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| **Differentiation** | |  |  |
| **Basic** | |  | **Extension** |
| Sticks could be positioned in advance and a ring marked around the stick upon which the stones can be positioned. | |  | * Use the internet to find other sundial designs e.g. **WikiHow** – How to make a sundial: <https://www.wikihow.com/Make-a-Sundial> * Watch video: **YouTube** – How to make a solar compass: <https://www.youtube.com/watch?v=jtDdtFUJ4HQ> |
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| **Resources** | |  | **Required files** icon-docicon-pdficon-ppt |
| * Sticks * Stones/Pebbles * Chalk | |  | Teacher presentation – Make a sundial |
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| **Additional websites** | |  |  |
| * **BBC Bitesize** – Sun, shadows and time of day: <https://www.bbc.co.uk/bitesize/clips/z7bmyrd> * **YouTube** – How to make a solar compass: <https://www.youtube.com/watch?v=jtDdtFUJ4HQ> * **WikiHow** – How to make a sundial: <https://www.wikihow.com/Make-a-Sundial> | | | |
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| **Related activities (to build a full lesson)** | |  |  |
| **Starters** (Options)   * Watch video: **BBC Bitesize** – Sun, shadows and time of day: <https://www.bbc.co.uk/bitesize/clips/z7bmyrd> * Recap how the Earth moves around the Sun and makes shadows move. | **Extension** (Options)   * Use the internet to find other sundial designs. * Watch video: **YouTube** – How to make a solar compass: <https://www.youtube.com/watch?v=jtDdtFUJ4HQ>   **Plenary**   * Discuss the results as a class – how well did it tell the time? What are the advantages and limitations of sundials? | | |
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| **The Engineering Context** film |
| Solar engineers design and make solar energy projects from large-scale ones to home rooftop installations. They need to understand how the sun casts a shadow during the day to make sure their solar panels produce enough electricity. |
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| **Curriculum links** | |
| **England: National Curriculum**  Science  KS2 - Year 3 Light   * recognise that shadows are formed when the light from a light source is blocked by an opaque object find patterns in the way that the size of shadows change | **Northern Ireland Curriculum**  KS2 - The world around us.  Change over time   * The formation of shadows and how they change. |
| **Scotland: Curriculum for Excellence**  Forces, electricity and waves  Vibrations and waves   * SCN 2-11b | **Wales: National Curriculum**  Science  KS2 - How things work.   * how light travels and how this can be used. |
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| **Assessment opportunities** | | |
| * Informal teacher assessment of the activity through observing the task and Q&A. | | |
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