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| **Tree trunk circumference** | | | |
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| Measuring the circumference of tree trunks and working out their age | | | |
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| **Stay safe** | | | |
| Whether you are a scientist researching a new medicine or an engineer solving climate change, safety always comes first. An adult must always be around and supervising when doing this activity. You are responsible for:    • ensuring that any equipment used for this activity is in good working condition  • behaving sensibly and following any safety instructions so as not to hurt or injure yourself or others    Please note that in the absence of any negligence or other breach of duty by us, this activity is carried out at your own risk. It is important to take extra care at the stages marked with this symbol: ⚠ | | | |
| **Subject(s):** Mathematics, Science  **Approx time:** 40 - 60 minutes |  | | **Key words / Topics:**   * Circumference * Measurement * SI units * Tape measure * Tree * Trunk |
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| **Suggested learning outcomes** | | | |
| * To measure the circumference of a tree. * To calculate the age of a tree using its circumference. * To communicate measurements using appropriate SI units. | | | |
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| **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 focuses on measuring the circumference of a tree trunk and using this information to calculate its age.  Trees are an important part of our natural environment. We can use our maths and science knowledge to better understand them and hence the environment around us! | | | |
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| **Purpose of this activity** | | | |
| In this activity learners will measure the circumference of a tree trunk. They will use this information and their number skills to calculate the age of the tree in years. They will then repeat this for other trees and discuss their results as a class.  This activity could be used as a main lesson activity, to teach learners how to collect data through measurement and to use number skills in a practical context. It could also be used as one of several activities within a wider scheme of learning focussing on the use of maths and science to understand the natural environment. | | | |
| **Activity** ⚠ |  | | **Teacher notes** |
| **Introduction and preparation to go outside (15-20 minutes)**  Teacher to explain that learners are going to go outside and measure the circumference of a tree in order to calculate its age. Show teacher presentation explaining how to do this. Learners to collect clipboards and put on coats etc. so that they are ready to go outside.  **Measuring the circumference of a tree (15-20 minutes)**  Learners to go outside and each identify a tree that they are going to measure. Teacher to demonstrate how to measure the circumference of a tree using a tape measure and the following instructions:   * Place the end of the measuring tape (0 mm) at the base of the trunk. * Measure upwards to find the point where the trunk is roughly 1500 mm high. * At the point where the trunk is roughly 1500 mm high, place the end of the measuring tape (0 mm) at any point on the trunk. * Wrap the measuring tape around the trunk, holding the end in place. * At the point where the tape meets the end again, read the measurement in mm. This is the circumference of the tree.   Learners to then measure the circumference of the tree that they have identified. Learners to write their results using the clipboard that they have taken outside with them.  **Working out the age of the tree (10-15 minutes)**  Teacher to explain and/or recap how to work out the age of the tree:  Age of tree in years = Circumference in mm / 25  Learners to calculate the age of their tree and record the results on their clipboard.  Discuss the results as a class – are the trees in this environment relatively old or young? What does this tell us about the environment where the trees are located? |  | | This activity could be done as individuals 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.  **Measuring the circumference of a tree**  Trees can be identified and measured in and around the school grounds as available. Appropriate safeguarding checks and risk assessments will need to be put in place by the teacher depending on where the measuring of the trees takes place.  In the UK the circumference of a tree is measured at a height of 1.5 metres, or 1500 mm. This value varies slightly in different countries.  Taking the measurements may need two learners working as a pair or group of three, one holding the end of the tape in place, the other wrapping around and taking the reading, optionally with a third recording the measurement. The measuring tape must be kept straight and level to give an accurate reading. The teacher should demonstrate how to do this correctly in advance.  **Working out the age of the tree**  Slides 2-4 could be repeated for a number of different trees, with the results compared against each other.  The teacher may wish to show an example calculation in advance of learners completing this for themselves, e.g. if a tree has a circumference of 500 mm then then the age would be 500 / 25 = 20 years. |
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| **Differentiation** |  | |  |
| **Basic** |  | | **Extension** |
| Take learners through the process step by step prior to leaving the classroom. For example, measuring a column or other cylindrical object and performing the calculations.  Provide learners with pre-prepared circumference measurements to practice calculating the ages of the trees. |  | | Calculate the ages of several different trees and work out the mean average of the data set.  Convert the values measured in mm into cm and m.  Identify the main parts of a tree and explain their function. |
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| **Resources** ⚠ |  | | **Required files** icon-docicon-pdficon-ppt |
| * Access to an outside area with trees * Measuring tape * Clipboards * Calculators |  | | Tree trunk circumference presentation |
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| **Additional websites** |  | |  |
| * **Monumental trees – How to measure tree circumference:** Explanation with diagrams showing how to measure the circumference of different trees. [https://www.monumentaltrees.com/en/content/measuringcircumference/](https://www.monumentaltrees.com/en/content/measuringgirth/) * **Tree-guide – Tree age calculator:** Online calculator for working out the age of different types of tree. <http://www.tree-guide.com/tree-age-calculator> * **Bitesize class clips - The lifecycle and inhabitants of an oak tree:** Videos showing how an oak tree ages and changes through the seasons. <https://www.bbc.co.uk/bitesize/clips/z6bvr82> | | | |
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| **Related activities (to build a full lesson)** |  | |  |
| **Starters** (Options)   * Discuss the importance of trees to the natural environment. * Discuss how maths techniques can be used to find out more about the natural environment. | | **Extension** (Options)   * Calculate the ages of several different trees and work out the mean average of the data set. * Identify the main parts of a tree and explain their function. * Convert the values measured in mm into cm and m. * ACTIVITY – Leaf it!   **Plenary**   * Compare the ages of the different trees measured as a class. * Discuss the meaning of the results gathered – are the trees relatively old or young? What does this tell us about the environment where the trees are located? | |

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| **The Engineering Context** film |
| * Engineers are required to use mathematics knowledge and skills regularly as part of their everyday job. It is therefore essential that they have a good grasp of basic concepts, such as taking and interpreting measurements. * Environmental engineers are tasked with improving the quality of the natural environment around them. The more they understand about this, the better they can do their jobs. |

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| **Curriculum links** | |
| **England: National Curriculum**  Mathematics  KS2 Year 3 Measurement:   * measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)   KS2 Year 6 Geometry:   * illustrate and name parts of circles, including radius, diameter and circumference.   Science  KS2 Year 2 Plants:   * observe and describe how seeds and bulbs grow into mature plants. | **Northern Ireland Curriculum**  KS2 Numeracy across the curriculum – the world around us:   * by interpreting statistical data and using it to solve problems using measurement, shape, space and estimation in the world around them   KS2 - Mathematics and Numeracy  Measures:   * identify understand and use the language associated with length, weight, capacity, area and time * know and use the most commonly used units to measure in purposeful contexts.   KS2 The World Around us across the curriculum – mathematics and numeracy:   * by exploring different ways of solving problems by collecting, formulating and interpreting numerical data and by exploring shape and patterns occurring naturally in the environment   KS2 – The world around us  Interdependence:   * the effect of people on the natural and built environment over time. |
| **Scotland: Curriculum for Excellence**  Numeracy and Mathematics  Measurement:   * MNU 2-11b   Sciences  Biodiversity and interdependence:   * SCN 2-02b * SCN 1-03a   Inheritance:   * SCN 2-14a | **Wales: National Curriculum**  Mathematics  KS2 - Using measuring skills:   * select and use appropriate standard units to estimate and measure length, weight/mass and capacity * measure on a ruler to the nearest mm.   Science  KS2 – Skills:   * communicate clearly by speech, writing, drawings, diagrams, charts, tables, using relevant scientific vocabulary * use standard measures and S.I. units. |
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| **Assessment opportunities** | | |
| * Oral teacher feedback whilst circumference measurements are being taken. * Teacher marking and assessment of measurements taken and age calculations. | | |
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