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| **Ancient Greek mathematics** | | | |
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| Working with scale to produce a drawing | | | |
| **Subject(s):** Design and Technology, Maths  **Approx time:** 1 hour |  | | **Key words / Topics:**   * scale * reduction * map * proportional * ratio * plan * convention |
| **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: ⚠ | | | |
| **Suggested learning outcomes** |  | |  |
| * To understand scale and how it is used. * To be able to draw something to scale. | | | |
| **Introduction** |  | |  |
| This is one of a set of resources designed to allow learners to use practical methods to support the delivery of key topics within design and technology and maths. This resource is based on scale drawing and understanding the concepts of reducing to fit on a sheet of paper.  This activity is inspired by the achievements of ancient Greece and how these have affected the modern world. It introduces the concept of scale and for what it is used. The main activity involves making an accurate scale drawing of the learner’s classroom at a designated scale. | | | |
| **Purpose of this activity**  In this activity learners will discover how to create a scale drawing of an object using ancient Greek mathematics. They will transpose shapes to gain the understanding of the task before applying to the main activity.  This activity could be used as a main lesson activity, to introduce the concept of scale or to teach learners about how the ancient Greeks have affected life in the modern world. | | | |
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| **Activity** |  | | **Teacher notes** |
| **Introduction (10 minutes)**  Teacher to introduce the activity, using maths principles from ancient Greece to measure everyday objects and to reduce that size proportionally.  **What is Scale? (20-30 minutes)**  Teacher to explain what is meant by scale, using the  St Georges flag size reduction – scale 1:2 – in the presentation.  Learners to use the activity sheet to produce scale drawings of a simple shape.  **Try this… (Mapping Maisie’s Room) (20-30 minutes)**  Learners explore the maths needed to work out the sizes of lines to draw with guidance from teacher.  Learners then apply the calculated sizes to create a scaled version of Maisie’s bedroom plan.  **Now do this… (Mapping the classroom) (40-60 minutes)**  Learners to measure the classroom and produce a scale drawing (plan). |  | | Useful to have examples of scale drawings, objects or even people drawn to set scale. For example, maps could be used to show a vast area of land represented at a different scale to fit onto paper.  **Scale drawing activity**  Print the activity sheet and distribute to the learners.  **Try this…**  Discussion may be needed on how to work out how long each line is, and how this relates to the stated scale. This is covered by the ‘If you need some help…’ slide.  **Now do this…**  Discussion may be needed on how and why conventions are used for features such as the door and windows. |
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| **Differentiation** |  | |  |
| **Basic** |  | | **Extension** |
| * Provide learners with partially completed drawings for the scale drawing activity, Maisie’s bedroom and the classroom. * Supply learners with a ‘cheat sheet’ for the mathematics calculations needed. |  | | * Add plan views of furniture to the classroom layout. |
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| **Resources** |  | | **Required files** icon-docicon-pdficon-ppt |
| * Ruler. * Pencil. * Worksheet. * Calculator. |  | | icon-ppt Ancient Greek mathematics presentation  icon-doc Ancient Greek mathematics scale handout |
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| **Additional websites** |  | |  |
| * Scale drawing <https://www.youtube.com/watch?v=JD49hIqxfdM> * Brain Pop scale drawing <https://www.youtube.com/watch?v=f0AG0sFdlww> * Relating scale drawings to ratios and rates <https://www.youtube.com/watch?v=72ZKaJyoLZM> | | | |
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| **Related activities (to build a full lesson)** |  | |  |
| **Starters** (Options)   * Show a map of Great Britain or the town that the learners live in. Who would use this? Why is it drawn to a scale? Why not full size? How big would the sheet of paper be if it were full size? | | **Extension** (Options)   * Add plan views of furniture to the classroom layout. * Draw the outside of the school to scale.   **Plenary**   * Learners to discuss what would happen if the scale of the room was changed to other set sizes – 1:10, 1:1000, 1:5000? | |
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| **The engineering context** film |
| Drawing accurately to scale, and being able to shift between scales, is a fundamental skill of architectural drawing and spatial design. |

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| **Curriculum links** | |
| **England: National Curriculum**  Maths KS2   * Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates. | **Northern Ireland Curriculum**  Maths KS2   * Understand and use scale in the context of simple maps and drawings. * Appreciate important ideas about measurement, including the continuous nature of measurement and the need for appropriate accuracy. |
| **Scotland: Curriculum for Excellence**  Mathematics   * I can use the common units of measure, convert between related units of the metric system and carry out calculations when solving problems. * MNU 2-11b. | **Wales: National Curriculum**  Maths KS2   * Share objects in a given ratio, e.g. red blocks and blue blocks in a ratio of 1:2. |
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| **Assessment opportunities** |
| Summative teacher assessment of the finished worksheet and scale drawing. |