**MATHEMATICS STAGE 3**

**TEACHING AND LEARNING OVERVIEW**

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| TERM: | WEEK: | STRAND: Measurement & Geometry | **SUB-STRAND**: 2D Space 1 | **WORKING MATHEMATICALLY:**  MA3-1WM & MA3-2WM |
| OUTCOMES: MA3-15MG | | **Manipulates, classifies and draws two-dimensional shapes, including equilateral, isosceles and scalene triangles, and describes their properties.** | | |
| **CONTENT:** | | **Apply the enlargement transformation to familiar two-dimensional shapes and explore the properties of the resulting image compared with the original**   * Make enlargements of two-dimensional shapes, pictures and maps, with and without the use of digital technologies * Overlay an image with a grid composed of small squares (e.g. 5 mm by 5 mm) and create an enlargement by drawing the contents of each square onto a grid composed of larger squares (e.g. 2 cm by 2 cm) * Investigate & use functions of digital technologies that allow shapes & images to be enlarged without losing the relative proportions of the image * Compare representations of shapes, pictures and maps in different sizes, e.g. student drawings enlarged on a photocopier * Measure an interval on an original representation and its enlargement to determine how many times larger than the original the enlargement is | | |
| ASSESSMENT FOR LEARNING (PRE-ASSESSMENT) | | **Enlargement Task:** Students enlarge six geometric shapes of their choice to twice their original size, and present their results and reasoning used in their constructions to the class. | | |
| WARM UP / DRILL | | **Transformation Sort:** Students determine and list transformation types as they appear on Cards.  **PowerPoint Presentation:** Definitions with visual support. | | |
| TENS ACTIVITYNEWMAN’S PROBLEMINVESTIGATION | | Aiden uses a map with a scale of 1cm = 50m. He measures the distance between two points on the map. The distance that Aiden measures on the map is 8.5cm. Work out the actual distance between the two points. Give your answer in metres.  A rectangle has an area of 14cm2. A second rectangle is similar to the first but has dimensions three times bigger.  What is the area of the second rectangle? | | |
| QUALITY TEACHING ELEMENTS | | **INTELLECTUAL QUALITY** | **QUALITY LEARNING ENVIRONMENT** | **SIGNIFICANCE** |
| * Deep knowledge * Deep understanding * Problematic knowledge * Higher-order thinking * Metalanguage * Substantive communication | * Explicit quality criteria * Engagement * High expectations * Social support * Students’ self-regulation * Student direction | * Background knowledge * Cultural knowledge * Knowledge integration * Inclusivity * Connectedness * Narrative |
| RESOURCES | | geometric shapes, visual presentation (animated transformations: enlargements & reductions), grid paper of different dimension, grid book, isometric paper, rulers, video on constructing enlargements (as referenced), Internet access, island map, enlargement drawings and graphics program with shapes function | | |

**TEACHING AND LEARNING EXPERIENCES**

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| WHOLE CLASS INSTRUCTION MODELLED ACTIVITIES | GUIDED & INDEPENDENT ACTIVITIES | |
| * **Explicitly communicate lesson outcomes and expectations of work quality.** * **Define and Reinforce metalanguage** used in the unit; enlarge, enlargement, reduce, reduction, equal, scale, grid, dimensions, floor plan, original, copy, double, three times, four times etc. * **Demonstration Video** – Present enlargement demonstration to familiarise students with Activity 1.   <http://www.youtube.com/watch?v=L_CrnXdHhLA>   * **Explicitly teach** the concept of scale**.** * Scale: A drawing that shows relative sizes, where they have been reduced or enlarged by a certain amount (called the scale). * The scale is shown as the real length in the drawing, then a colon (:), then the corresponding length of the copy.   *Example*: If a drawing has a scale of "1:10", anything with the size of "1" would be drawn with a size of "10." Therefore, 150mm would be multiplied by 10 to make the new size 1500mm. | LEARNING SEQUENCERemediationS2 or Early S3 | * **Grid Enlargements:** Students use grid activities below to enlarge drawings of rainforest animals. |
| LEARNING SEQUENCES3   http://makemathmore.com/members/wp-content/uploads/2011/03/dreamroom.png | * **Grid Paper Enlargements and Reductions:** Students watch demonstration video to the left and repeat the lesson using 1cm grid paper to enlarge the image to three times its original size. Students then repeat this activity to enlarge and reduce a variety of regular and irregular 2D shapes and images. * Students experiment by reducing and enlarging cartoon characters or team logos using grid paper of different sizes. i.e. 50mm, 1cm, 2cm etc. Examples can be found at   <http://thehelpfulartteacher.blogspot.com.au/2012/03/how-to-create-and-use-drawing-grid.html>   * **Bedroom Floor Plan:** Students design the floor plan of their dream bedroom using computer technology using shapes and grouping functions. When using shapes, students experiment with enlargement and reduction whilst maintaining their relative proportions. Once the plan is complete, they use the snap to grid function to enlarge the bedroom using 1:2 scale. * **Mapping Task:** Students use scale to reduce an A3 sized map of an island (with grid overlay) to A4 size while maintaining relative proportions. * **Isometric Design**: Students use 2D shapes to design and create an object (e.g. car, house, train etc.) on isometric paper. They then create a 1:2 enlargement / reduction of their design. Discuss the need for the inclusion of dimensions divisible by two. |
| LEARNING SEQUENCEExtensionEarly S4 | * Scale factor**Scale Factors:** Students complete enlargement transformation activities, and express scale in ratios and fractions. See attached examples on the left. * **Perspective Drawings:** Students form enlargements / reductions of 2D shapes   usingrays from a vanishing point (centre of enlargement). See website below.  <http://www.bbc.co.uk/bitesize/ks3/maths/shape_space/transformations2/revision/3/>   * **Enlargement Quiz:** Students determine the areas of enlargement copies using scale factors.   <https://www.mangahigh.com/en-gb/maths_games/shape/transformations/enlargement_on_a_grid> |
| **EVALUATION & REFLECTION** | **Student Engagement:** **Achievement of Outcomes:**  **Resources:** **Follow up:** |