**MATHEMATICS STAGE 3**

**TEACHING AND LEARNING OVERVIEW**

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| TERM: | WEEK: | STRAND: Measurement & Geometry | **SUB-STRAND:** 2D Space 2 | **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:** | | **Investigate the diagonals of two-dimensional shapes**   * Identify and name ‘diagonals’ of convex two-dimensional shapes * Recognise the endpoints of the diagonals of a shape as the vertices of the shape * Determine and draw all the diagonals of convex two-dimensional shapes * Compare and describe diagonals of different convex two-dimensional shapes * Use measurement to determine which of the special quadrilaterals have diagonals that are equal in length * Determine whether any of the diagonals of a particular shape are also lines (axes) of symmetry of the shape | | |
| ASSESSMENT FOR LEARNING (PRE-ASSESSMENT) | | **Worksheet:** Draw in all the diagonals on a 2D shape. | | |
| WARM UP / DRILL | | **Pegboard Diagonals** - Give students peg boards and elastic bands and ask them to make a 2D shape (e.g. a square, pentagon, etc.). Draw the same shape on the board so students have an example to model off. Ask them to add in all the diagonals they can find using the elastic bands. | | |
| TENS ACTIVITYNEWMAN’S PROBLEMINVESTIGATION | | Ben draws a heptagon. He wants to add in diagonals for the shape. How many diagonals can he draw in total? | | |
| 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 | | A4 paper, worksheets, 2D shapes proformas, pegboards, pegs elastic bands and board | | |

**TEACHING AND LEARNING EXPERIENCES**

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| WHOLE CLASS INSTRUCTION MODELLED ACTIVITIES | GUIDED & INDEPENDENT ACTIVITIES | |
| Explicitly communicate lesson outcomes and work quality.  * **Define and reinforce metalanguage used in the unit**. *Students should be able to communicate using the following language*: Teach and Review the definition and meaning of a diagonal.   <http://www.mathsisfun.com/geometry/polygons-diagonals.html>   * **Diagonals on 2D Shapes:** Model examples of diagonals drawn on various 2D shapes on the board. * **Art lesson**: Students are given an A4 page with an octagon on it. Using a ruler they draw all of the diagonals onto the octagon with different coloured textas/pencils. | LEARNING SEQUENCERemediationS2 or Early S3 | * **Diagonal Definition:** Write up the definition of diagonals in students workbooks. * **2D Shapes & Their Diagonals:** Students work with a partner to find out how many diagonals various 2D shapes have. |
| LEARNING SEQUENCES3 | * **Diagonal Definition:** Write up the definition of diagonals in students’ workbooks. * **2D Shape Investigation:** Set up stations around the room with various 2D shapes at each station. Get students to work in pairs and write down on an answer sheet how many diagonals they think each shape has. Allow them 5 minutes at each station to work out their answers. * **Worksheet:** Give students a worksheet with various 2D shapes on it and (working with a partner) get them to draw on as many different diagonals as they can find. Use *2D shapes* worksheet. * Explore 2D shape diagonals using the online resource: <http://www.edjameson.com/math/modules/geometry/DIY62Dsh.swf> * Students works in pairs to draw the diagonals on the 2D shapes. Use Diagonals on *2D shapes* worksheet. * **Assessment:** Students draw diagonals onto various 2D shapes. Use *Colour 2D shapes* worksheet. |
| LEARNING SEQUENCEExtensionLate S3 or Early S4 | * **Diagonals Formula:** Teach students the formula for working out how many diagonals a shape will have and get them to use the formula to find the number of diagonals for various 2D shapes.The number of diagonals of an n-sided polygon is: n(n − 3) / 2   *Examples: a square has 4(4−3)/2 = 4×1/2 = 2 diagonals*  *an octagon has 8(8−3)/2 = 8×5/2 = 20 diagonal*  <http://www.mathsisfun.com/geometry/polygons-diagonals.html> |
| **EVALUATION & REFLECTION** | **Student Engagement: Achievement of Outcomes:**  **Resources: Follow Up:** |