YuMi Deadly Maths

Year 2 Teacher Resource:
MG – Shape search

Prepared by the YuMi Deadly Centre
Faculty of Education, QUT

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ACKNOWLEDGEMENT

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Prepared by the YuMi Deadly Centre
Queensland University of Technology
Kelvin Grove, Queensland, 4059

ydc.qut.edu.au

Year 2   Measurement and Geometry

Shape search

Learning goal	Students will identify a variety of four-sided shapes and describe the features of square, rectangle, rhombus and kite.
Content description	Measurement and Geometry – Shape • Describe and draw two-dimensional shapes, with and without digital technologies (ACMMG042)
Big idea	Geometry – 2D shapes – interpretation
Resources	Maths Mat, elastics, Large four-sided shapes, clipboard, pencils, geoboard, rubber bands, grid paper

Reality

Local knowledge	Bring objects from home or from local flora/fauna to discuss shapes. *What shapes have corners? How are corners made? Where are some four-sided shapes in our classroom? What names do we give to shapes that have four sides?* [rectangle, square, rhombus, kite, quadrilateral] Look for quadrilaterals in the immediate environment.
Prior experience	Look at the sides of different shapes and discuss. Then check properties of triangles (three sides and three corners). Check students' knowledge of squares and rectangles.
Kinaesthetic	Shape hunt for quadrilaterals in classroom and outside environment. Emphasise the properties of quadrilaterals: four sides and four corners. Students record all the quadrilaterals they find. Teacher reinforces properties on the walk.

Abstraction

Body	Use the mat and students' bodies to make four-sided shapes (irregular, square, rectangle, rhombus and kite). Talk about these shapes having four sides and four angles in general and then specifically (squares have four equal sides and four square angles; rectangles have two pairs of opposite sides equal and four square angles; rhombuses have four equal sides and look like a square pushed out of shape; kites have two equal short sides that come to a point and two equal long sides that come to a sharp point). Place some large four-sided shapes on the mat or ground and have students walk around the outside of the shapes, counting the sides, then walking inside the shapes counting the angles. Teacher directs groups of four students with four elastics to make as many different types of shapes that have four sides as they can. Share. Teacher directs students with elastics to make the following quadrilaterals on the Maths Mat: trapezoid, rectangle, square, rhombus, kite. Describe properties: • A quadrilateral has four sides and four corners with no special properties about its sides or corners. • A rectangle is a quadrilateral that has four sides – two long straight sides the same distance apart, two short straight sides the same distance apart and four square corners. • A square is a special rectangle because its four sides are all the same size (equal), the opposite sides are the same distance apart and it has four square corners. • A rhombus has four equal sides like a square that has been pushed over so that its four corners aren't square corners. • A kite has four sides – two short equal sides at the top and two long equal sides at the bottom that make it look like a diamond. None of its four corners are square. • *What makes them all quadrilaterals?* [They have four sides and four corners.]

In groups of four, students take one elastic per group and walk a few steps apart. *What shape has been made? How do you know it's a quadrilateral?* Stress the properties. *A quadrilateral has four sides and four corners.* Name the sides, e.g. *From Jane to Anne, from Anne to Mary, from Mary to Sue and from Sue back to Jane.* Name the corners, e.g. *One corner is where Jane stands and others are where Anne, Mary and Sue stand*. Make as many different quadrilaterals as you can. Clarify that not all quadrilaterals have straight sides, some quadrilaterals have curved sides. Make some quadrilaterals with just straight sides and others with some curved sides. Teacher directs students to make special quadrilaterals: a rectangle, square, rhombus, kite. Compare similarities and differences. *What makes them all quadrilaterals? What must all quadrilaterals have?* [State the properties.]

Hand   Students make as many as quadrilaterals they can using the geoboard and rubber bands. In pairs, they describe their quadrilaterals.

Teacher directs students to make a rectangle, square, rhombus, kite on the geoboard. Reverse: *Make a quadrilateral that has ...* [give properties of the various four-sided shapes].

Students draw the four-sided shapes on grid paper and record their names.

Mind   Students make stories about various quadrilaterals, e.g. *I am thinking of a wall in my bedroom that has two long straight sides the same distance apart, two short straight sides the same distance apart and four square corners.* Visualise various quadrilaterals nominated by students or the teacher. *With your eyes closed, draw a quadrilateral, a rectangle, square, rhombus, kite, on the desk, on the back of the student next to you, in the air.*

Creativity   Students cut out the shapes of as many different quadrilaterals as they can and make a picture using all these shapes.

Mathematics

Language/ symbols   triangle, square, rectangle, kite, rhombus, three-sided, four-sided, shape, sides, straight, curved, corners, two-dimensional

Practice
1. Students cut out various types of paper quadrilaterals, rectangle, square, rhombus, kite, paste them in their books and name them.
2. Give the properties of a special quadrilateral, e.g. four equal sides and four square corners and ask students to draw that quadrilateral and name it.
3. Students make different pictures with paper rectangles, squares, rhombuses and kites and put them around the classroom walls.
4. Make a class chart of the different quadrilateral shapes found in the inside/outside environment.
5. Digital activities: http://www.mathsisfun.com/quadrilaterals.html; http://au.ixl.com/math/

Connections   Connect to 2D shapes with 5/6/8 sides and corners equal to number of sides.

Reflection

Validation   Students locate shapes in their world that form a quadrilateral, e.g. the school oval or quadrangle, their bedroom, the classroom, sheets of paper they draw on.

Application/ problems   Provide applications and problems for students to apply to different contexts independently, e.g. use sticks to construct a rectangle, square, rhombus; construct kites with pre-measured and pre-cut lengths of drinking straws connected with pipe-cleaners as joiners.

Extension   **Flexibility**. Students are able to identify/make as many differently shaped quadrilaterals as possible and state why they are all quadrilaterals. Discuss what's the same and what's different. Include quadrilaterals that have curved sides.

Reversing. Provide examples that start at any point and go to all other parts, e.g. kite: story (*I am thinking of a shape that will fly in the sky*) ↔ model of kite ↔ properties ↔ drawing/making kite. Repeat for other quadrilaterals.

Generalising. *There are many types of 2D quadrilaterals, some have special properties, but all 2D shapes that have four sides, straight or curved, four corners and are closed are in the set of quadrilaterals. Number the internal corners of quadrilaterals, cut them off and join them together to show that the sum of the angles = 360°.*

Changing parameters. Students translate, rotate and flip their quadrilaterals to view the different images. Explore 3D shapes that have a base that is a quadrilateral, e.g. shoe box, cube.

Teacher's notes

- Emphasise the properties of all quadrilaterals and explore the similarities and differences of special quadrilaterals.

- Describe rectangles as having two pairs of opposite sides equal as this can then be applied to the properties of a square. A square can then be described as a special type of rectangle – one whose both pairs of opposite sides are equal. Avoid saying a rectangle has two long sides and two short sides as this cannot be applied to a square.

- Students need to be taught the skill of visualising: closing their eyes and seeing pictures in their minds, making mental images; e.g. show a picture of a kookaburra, students look at it, remove the picture, students then close their eyes and see the picture in their mind; then make a mental picture of a different bird.

- Suggestions in Local Knowledge are only a guide. It is very important that examples in Reality are taken from the local environment that have significance to the local culture and come from the students' experience of their local environment.

- Useful websites for resources: www.rrr.edu.au; https://www.qcaa.qld.edu.au/3035.html

- Explicit teaching that **aligns with students' understanding** is part of every section of the RAMR cycle and has particular emphasis in the Mathematics section. The RAMR cycle is not always linear but may necessitate revisiting the previous stage/s at any given point.

- Reflection on the concept may happen at any stage of the RAMR cycle to reinforce the concept being taught. Validation, Application, and the last two parts of Extension should not be undertaken until students have mastered the mathematical concept as students need the foundation in order to be able to validate, apply, generalise and change parameters.