YuMi Deadly Maths

Year 6 Teacher Resource:

MG – Fencing the yard

Prepared by the YuMi Deadly Centre
Faculty of Education, QUT

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ACKNOWLEDGEMENT

We acknowledge the traditional owners and custodians of the lands
in which the mathematics ideas for this resource were developed,
refined and presented in professional development sessions.

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

ydc.qut.edu.au

Year 6 Measurement and Geometry

Fencing the yard

Learning goal	Students will review and calculate perimeters and areas of rectangles.
Content description	Measurement and Geometry – Using units of measurement • Solve problems involving the comparison of lengths and areas using appropriate units (ACMMG137)
Big idea	Measurement – interpretation vs construction
Resources	Trundle wheels, sheets of newspaper, Maths Mat, elastics, velour strips knotted into 12 units 30 cm long, geoboards, rubber bands, centimetre graph paper, coloured pencils

Reality

Local knowledge

Look for objects that have perimeter and area in the classroom, e.g. desk, table, ruler, book cover, chair seat, door, classroom.

Prior experience

Check students' knowledge of the terms *perimeter* and *area*: trace the perimeter, the edge or boundary around a shape; rub hand over the area or space contained within or inside the boundary/perimeter of a shape. *Perimeter refers to a length – one dimension; area refers to a plane/flat shape with two dimensions*.

Kinaesthetic

Perimeter: Walk around the perimeter/boundary of the undercover area, classroom block, garden bed. *How is the length of the perimeter of these shapes calculated?* Two students could bring a trundle wheel, one to measure the length of each of the four sides and the other to measure the total length. Compare to see the links.

Area: Students take sheets of newspaper and start at one side to lay them over the floor of the undercover area, spare classroom, library, so that there are no gaps or overlaps and the total floor is covered. Start at one side and lay in rows. Note that an array is being formed.

Abstraction

Body

Using elastics of different colours, students make as many regular shapes as they can that contain 18 squares (18 × 1; 9 × 2; 6 × 3). *Which shape has the greatest perimeter? Why?* [The 18 × 1 rectangle has all its squares with at least two sides on the boundary (edge, perimeter), whereas 9 × 2 has squares with only one side on the boundary and 6 × 3 has some squares with no sides on the boundary.]

Reverse: Using the velour strips knotted into 12 units each 30 cm long, students make as many regular shapes as possible that are 12 units long – that is, the perimeter of the shapes is 12 units (rectangles 5 × 1, 4 × 2; square 3 × 3; triangle 3 × 4 × 5). *All these shapes have the same perimeter of 12 units. Which shape has the greatest area? Count the squares* (≥ ½ in the count; ≤ ½ out of the count).

Hand

Students make the shapes on the geoboard that have an area of 18 squares (square units). Calculate and record on paper the perimeter of each of the shapes that have been made with an area of 18 square units, e.g.


Perimeter: L 18 units, W 1 unit = 38 units; Area = 18 square units


Perimeter: L 9 units, W 2 units = 22 units; Area = 18 square units


Perimeter: L 6 units, W 3 units = 18 units; Area = 18 square units

Students make shapes on geoboard that have a perimeter of 12 units. Calculate and record the area of shapes as above.

Mind	*Close your eyes and see the house where you live. Start at the gate (or imaginary gate if you don't have one) and walk around the fence of your house yard (or imaginary fence if you don't have one). As you go think of how many steps you are taking to walk around the perimeter of your block of land. Imagine you have a big swimming pool in your backyard. Think of the space it takes up in your backyard. How much area is left for playing soccer?*
Creativity	On graph paper, students make creative shapes (regular, rectangles, squares, triangles, irregular) that have an area of 36 square centimetres.

Mathematics

Language/ symbols	length, width, perimeter, area, square centimetre, square metre
Practice	1. Draw a T shape, an L shape, a long thin rectangle shape and a square shape of 16 squares. What are the perimeters? 2. Draw shapes with perimeter of 16 cm. What are the areas? 3. On grid paper, construct a rectangle that has an area of 10 squares and a perimeter of 22 cm.
Connections	Explore relation to addition and subtraction.

Reflection

Validation	Students predict the shape that has the most area for a given perimeter and explain why a square house might be cheaper.
Application/ problems	Provide applications and problems for students to apply to different real-world contexts independently; e.g. *Design a classroom block with eight classes that would give the greatest area for the least cost. Include the measurements. How do you justify that your plan will meet the conditions? What happens when both sides of a rectangle are doubled? What happens when one side of a rectangle is doubled? What happens when one side of a rectangle is halved?*
Extension	**Flexibility**. Show different ways of representing the same area or perimeter. **Reversing**. Students are able to move between acting out perimeter and area ↔ writing perimeter and area number sentences ↔ starting with perimeter and going to area and vice versa, starting from and moving between any given point. **Generalising**. *The perimeter is the total of the lengths of a shape's edges or boundary. Perimeter is one dimensional, measured in units, centimetres, metres etc. The area is the number of square units that are needed to cover the surface of a shape. Area is two dimensional, measured in square units, square centimetres, square metres etc.* **Changing parameters**. *What 3D shape has the biggest volume for the smallest surface area? Why do we have to worry about babies in hot/cold weather?*

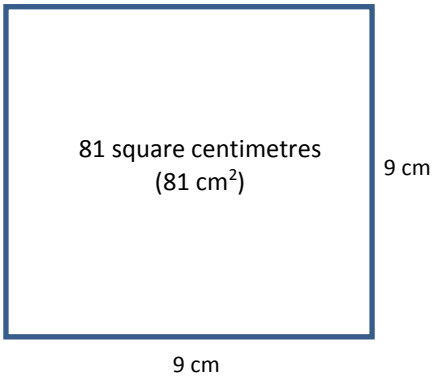
Teacher's notes

- Area: The abbreviation **cm² (cm × cm)** is said, "**square centimetres**" NOT "centimetres squared", as illustrated below. The first diagram shows 9 square centimetres (each one of the nine being a square centimetre), whereas the second diagram shows a length of 9 cm that has been squared (giving 9 cm × 9 cm = 81 cm²).

"9 square centimetres"

9 square centimetres
(9 cm^2)

"9 centimetres squared"



- 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.