Concentric Circles

Year 3 – Mathematics
Year 4 – Mathematics

(Mathematics; Year 3, ACMMG066)
Identify symmetry in the environment

(Science, Year 3, ACSSU044)
Living things can be grouped on the basis of observable features and can be distinguished from non-living things

(Mathematics, Year 4, ACMMG088)
Compare and describe two dimensional shapes that result from combining and splitting common shapes, with and without the use of digital technologies

(Mathematics; Year 4, ACMMG091)
Create symmetrical patterns, pictures and shapes with and without digital technologies

Concentric Circles

Finding symmetry and patterns in nature

It's harder to find a perfectly straight line in nature than it is to find a circle. Circles are everywhere — in raindrops, seed pods — perfect circles are even cut by endangered Australian native leaf-cutter bees. Celebrate the circle with maths whiz Eddie Woo and our munchable maths lesson.

Equipment:

A circle made of a piece of paper, plus shapes for students if you can (optional)

A wide variety of fruit and veg including: cucumbers, mushrooms, pears, brown onions, oranges, leeks, grapes and any others you have access to

A knife and cutting board (for teacher use)

Leaves gathered from trees and shrubs in the school grounds

Paint and paper for print pattern making

Duration:

30–45 minutes

Location:

The classroom, kitchen or garden

Notes:

👁 Watch Eddie Woo Concentric Circles segment from **Episode 26 — Eddie Woo and the Fun Guys (who are actually quite serious)**

Getting started

- Introduce the concept of symmetry to students.

- Define line symmetry and radial symmetry.

- ❓ Discuss: is a circle symmetrical? How can it show both line and radial symmetry?

- Fold the piece of paper to show line symmetry and radial symmetry in the circle. Pass it around to students (they could fold their own circle shapes if time permits).

Fruit geometry

- Explore a range of fruits and vegetables to determine what sort of symmetry they contain.

- For example:

  ◇ A cucumber demonstrates line symmetry in two directions (longwise, and crosswise). It can also be cut into radial shapes, which are long wedge sticks — cucumber sticks!

  ◇ A mushroom demonstrates line symmetry when sliced from stem to cap, but not when sliced crosswise across the stem. It can, however, be cut into radial shapes that are also like wedges.

- Hand around the sliced veg. Those radial cut cucumber sticks might disappear! Fine with us.

- Ask students: What else could you cut into wedges? (Watermelon, melon, oranges, potatoes, tomatoes — even grapes would make tiny wedges!)

- Open an orange (or mandarine) and look at how the segments fit together. Are they wedges too?

- Explore radial symmetry using several of these examples. Munching allowed.

- Remind students what line symmetry is.

- Hold up a pear and ask the class which way you should cut it to demonstrate line symmetry.

- Cross-cut a brown onion across the middle (i.e. 'around the waist') and look for the concentric circles inside.

- Explain what concentric circles are (circles nested inside each other that never touch).

- Show students how to 'pop' out the segments of a halved onion. Let them handle the segments (they might want to wash hands after this lesson).

- What other fruits and vegetables would have concentric circles inside? Try slicing some of these in half: kiwi fruit, carrot, leek, chiogga (striped) beetroot, lemongrass stalks. What about Brussels sprouts? Are they arranged in concentric circles or a differ

Symmetry in nature

- Extend students' thinking about symmetry to the natural world. You could show the video of raindrops in water (creating concentric circles), share leaf shapes from the school grounds (some will be symmetrical, others, such as sickle-shaped eucalyptus leaves, will not).

◇ Raindrops into water (video clip): https://www.shutterstock.com/video/clip-8250757-raindrops-falling-on-pond-water-natural-surface

◇ Australian native plant leaf shapes: http://www.allcreativedesigns.com.au/images/designimages/leaf_shapes1.jpg

- Botanists use symmetry as one of the main indicators of whether or not two plants are in the same family (or classification). For example, the family Apiaceae (umbellifers) all have flowers that look like starbursts or little umbrellas! Here are some of them:

◇ Gardeners World — Family Apiaceae: https://www.gardenersworld.com/plants/plants-with-umbellifer-flowers/

◇ Flower symmetry: http://www.svenlandrein.com/systematiccoursepages/images/morphology/jepsonweb/images/corolla.jpg

Shaping up symmetrical patterns

- Provide cut vegetable and fruit shapes for students to use, with paint and paper, to create repeating symmetrical pattern designs.

- You may want to provide paper with lines drawn on it to indicate line or radial symmetry and challenge students to create a pattern using this type of symmetry.