

7-9: REMOTE MATHS

EDITION 4

NUMBER AND ALGEBRA

Mathematical language: Operations, Fibonacci sequence, term, algebraic, equation, pattern, simultaneous.

TASK 1: MAGIC NUMBERS MYSTERIOUS WORLD OF MATHS

Watch this video: <https://www.youtube.com/watch?v=cyvDG8qjt-M>

- Organise a debate 'Were numbers discovered or invented?' Write a persuasive argument taking one or the other point of view.
- Investigate the mathematical patterns of the nautilus shell. If you have access to a nautilus shell take measurements of the inner chamber and centre to the outer rim as demonstrated by Hannah Fry. Do this in a couple of places and compare the ratios. Do your measurements agree with those of Hannah Fry?

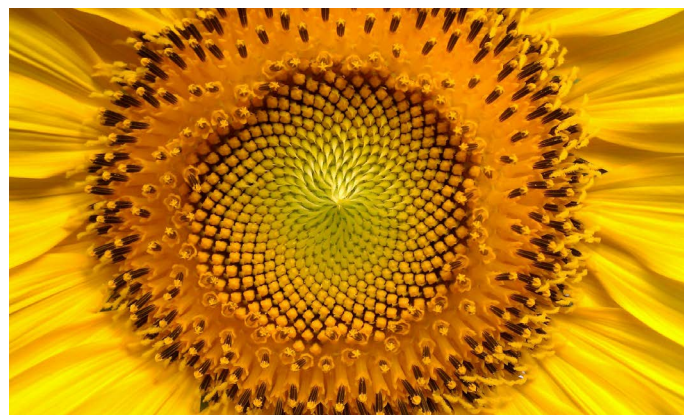
TASK 2: FIBONACCI SEQUENCE

Write the first 10 terms (numbers) in the Fibonacci Sequence.

- Describe the pattern in your own words.
- Can you write this algebraically?

Enabling prompt: start from the 3rd term

- Ignoring the first term (1) and assume the first terms are 1 and 2. Notice that each term is about one and a half times the value of the previous term. What happens to the ratio of between a term and its preceding term as you go further along the sequence?



The Fibonacci sequence has been observed a lot in nature, such as the arrangement of petals on a flower.

- Find some common garden flowers whose number of petals follows the Fibonacci sequence. Draw or take a photo of what you found.
- Find out about the botanical phenomenon known as phyllotaxis. Find examples, draw and describe them.

EDITION 4: NUMBER AND ALGEBRA (CONT.)

TASK 3: FINDING AN EQUATION(S) - DOGS OR CHICKENS?

In the farmyard I saw some chickens and some dogs. I counted 25 heads and 78 legs.

- How many dogs were there?
- How many chickens were there?
- Demonstrate your solution using at least 3 different strategies/ways.
- Can you show your solution algebraically?

Enabling prompt: to show the solution algebraically, pick any two letters to represent the number of chickens and the number of dogs. For example d = number of dogs, c = number of chickens.

Extending prompt: Can you write two equations to represent this information? Use these equations simultaneously to solve the problem.

TASK 4: ALWAYS SOMETIMES NEVER

Select Always, Sometimes or Never to make each of these statements true:

- x^2 is *always/sometimes/never* greater than or equal to x
- The following equation is *always/sometimes/never* true: $(x + y)^2 = x^2 + y^2$

Explain your thinking.

Rephrase the statement so that it is either always or never true.

TASK 5: HANDSHAKES

When 9 judges of the Supreme Court meet each day, each shakes the hand of every other judge.

- If each judge shakes hands exactly once with each of the other judges, how many handshakes take place?
- Which strategy did you use?
- Is there a more efficient way to work it out?
- Explain your reasoning.

Extending prompt: How can you determine the number of handshakes for a large group of judges? If we don't know the number of judges, we can just call the number ' n '.

MEASUREMENT

Mathematical language: Perimeter, circumference, diameter, length, measure, locate, ratio.

TASK 1: CIRCUMFERENCE AND DIAMETER

Materials: A piece of string, ruler, various cylindrical objects (eg. tin of baked beans, vegemite jar)

Task: Use the string to measure (1) the diameter and (2) circumference for each object from a selection of cylindrical objects you have at home.

- Use the ruler to measure this (string) length.
- Use a table like the one below (with as many rows as will be required) to record your results

Things to consider when measuring the diameter and circumference:

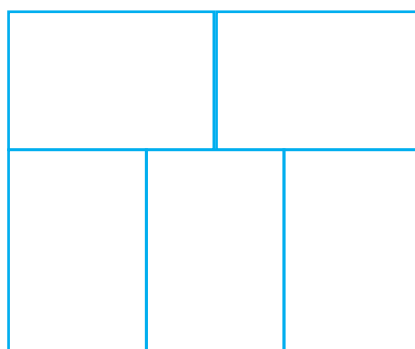
- How will you locate the centre of each circle when measuring the diameter?
- Do you have to use the same metric unit (mm, cm, m) for circumference(C) and diameter (D) when finding the ratio of the 'circumference to diameter'?
- What have you noticed about the length of the 'circumference compared to the length of the diameter'?

Object	Circumference (C)	Diameter (D)	Ratio of circumference to diameter (C:D) $\frac{\text{circumference}}{\text{diameter}} = \frac{C}{D}$

TASK 2: AREA AND PERIMETER

The figure shows 5 identical rectangles. The total area covered is 270cm².

- What is the perimeter of the figure?



EDITION 4: MEASUREMENT (CONT.)

TASK 3: ALWAYS SOMETIMES NEVER

Select Always, Sometimes or Never to make each of these statements true:

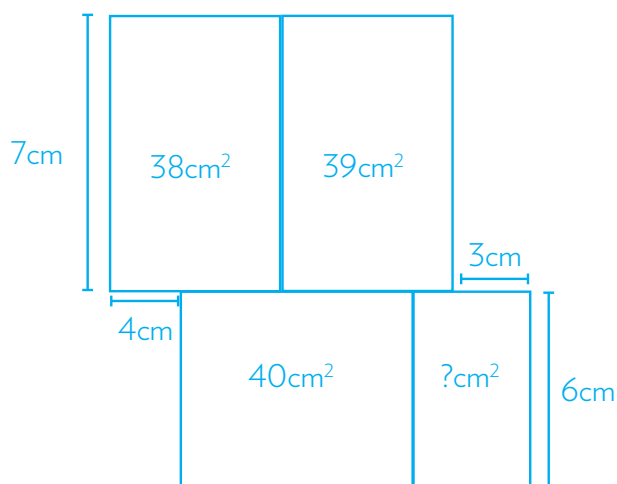
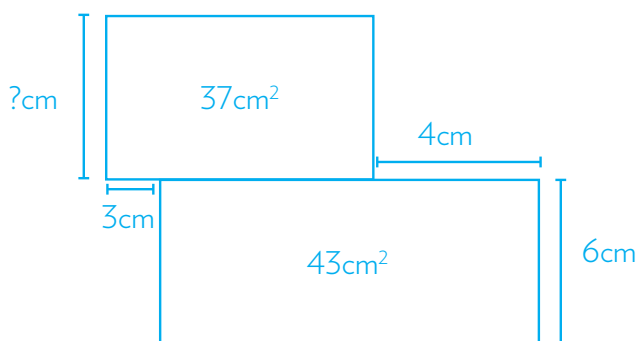
- If the perimeter of a shape increases, the area *always/sometimes/never* increases?
- When you cut a piece off a shape, you *always/sometimes/never* reduce its area and perimeter.

Explain your thinking.

Rephrase the statement so that it is either always or never true.

TASK 4: MENSEKI AREA PUZZLES

Without using decimals or fractions anywhere in your working, find the unknown value in the following:



MATHS APP OF THE WEEK: THE DANCE OF GEOMETRY



This app contains a number of geometric challenges, for example finding a side length or an area which is part of a composite shape. It is presented as a game, with varying levels of difficulty.

iOS: <https://apps.apple.com/au/app/the-dance-of-geometry/id1100531300>

Cost: Free

Look out for more tasks next week!