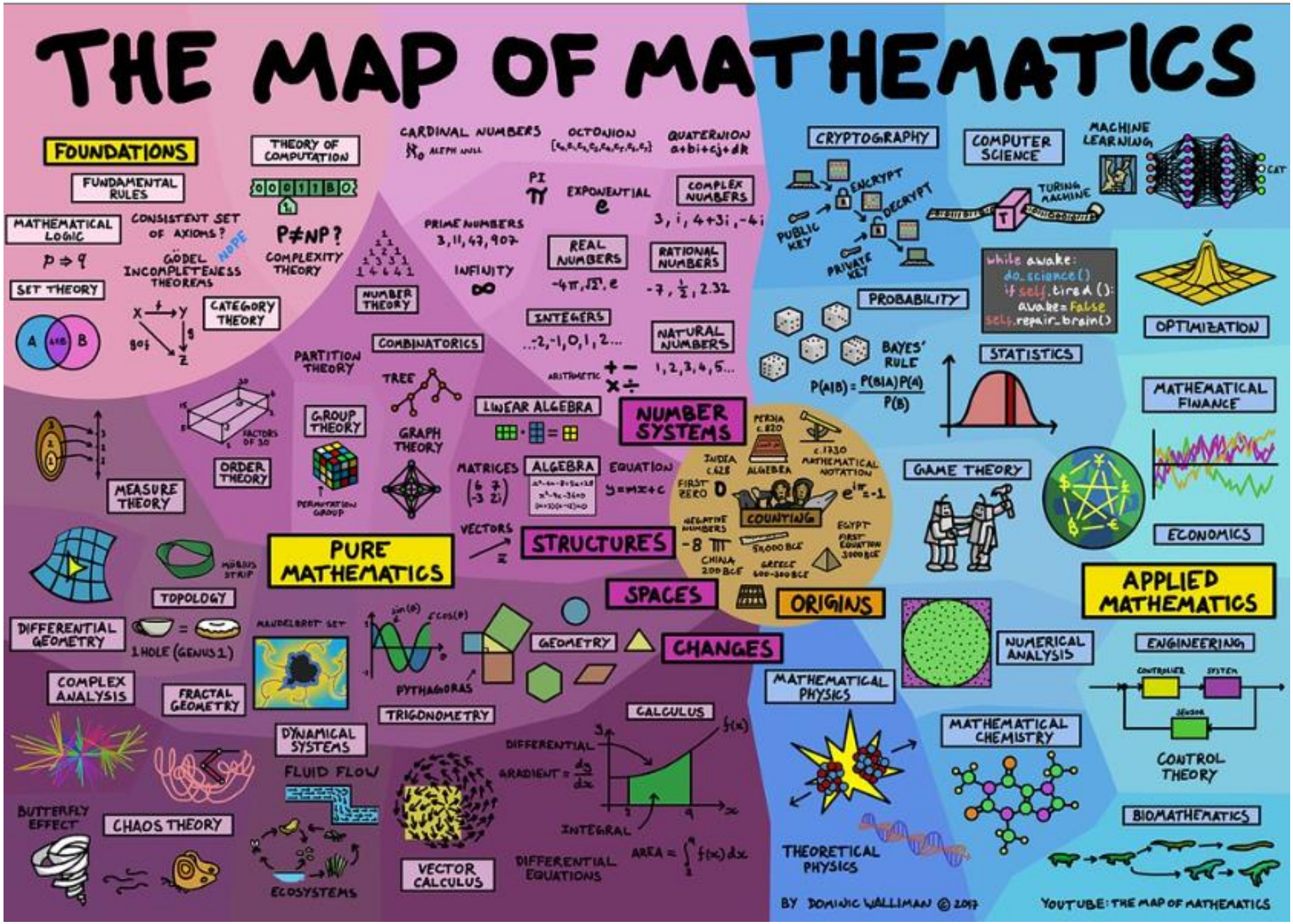
THE MAP OF MATHEMATICS
FOUNDATIONS
FUNDAMENTAL RULES
MATHEMATICAL LOGIC
P ⇒ Q
SET THEORY
A B
CONSISTENT SET OF AXIOMS?
GÖDEL INCOMPLETENESS THEOREMS
NOPE
CATEGORY THEORY
THEORY OF COMPUTATION
P≠NP?
COMPLEXITY THEORY
CARDINAL NUMBERS
ALEPH NULL
OCTONION
QUATERNION
a+bi+cj+dk
PI
EXPONENTIAL
COMPLEX NUMBERS
3, i, 4+3i, -4i
PRIME NUMBERS
3, 11, 47, 907
INFINITY
REAL NUMBERS
RATIONAL NUMBERS
-7, 1/2, 2.32
NUMBER THEORY
INTEGERS
...-2, -1, 0, 1, 2...
NATURAL NUMBERS
1, 2, 3, 4, 5...
ARITHMETIC
COMBINATORICS
PARTITION THEORY
TREE
GROUP THEORY
GRAPH THEORY
LINEAR ALGEBRA
NUMBER SYSTEMS
FACTORS OF 30
ORDER THEORY
MEASURE THEORY
PERMUTATION GROUP
MATRICES
ALGEBRA
EQUATION
y=mx+c
INDIA c.628
ALGEBRA
PERSIA c.820
c.1730 MATHEMATICAL NOTATION
FIRST ZERO
COUNTING
NEGATIVE NUMBERS
-8
CHINA 200 BCE
30,000 BCE
EGYPT FIRST EQUATION 3000 BCE
GREECE 600-300 BCE
ORIGINS
PURE MATHEMATICS
VECTORS
STRUCTURES
SPACES
CHANGES
MÖBIUS STRIP
TOPOLOGY
DIFFERENTIAL GEOMETRY
1 HOLE (GENUS 1)
MANDELBROT SET
COMPLEX ANALYSIS
FRACTAL GEOMETRY
PYTHAGORAS
GEOMETRY
TRIGONOMETRY
DYNAMICAL SYSTEMS
FLUID FLOW
BUTTERFLY EFFECT
CHAOS THEORY
ECOSYSTEMS
VECTOR CALCULUS
CALCULUS
DIFFERENTIAL
GRADIENT = dy/dx
INTEGRAL
AREA = ∫f(x)dx
DIFFERENTIAL EQUATIONS
CRYPTOGRAPHY
ENCRYPT
DECRYPT
PUBLIC KEY
PRIVATE KEY
COMPUTER SCIENCE
TURING MACHINE
MACHINE LEARNING
CAT
while awake:
do_science()
if self.tired():
awake = False
self.repair_brain()
PROBABILITY
BAYES' RULE
P(A|B) = P(B|A)P(A) / P(B)
STATISTICS
OPTIMIZATION
GAME THEORY
MATHEMATICAL FINANCE
ECONOMICS
APPLIED MATHEMATICS
NUMERICAL ANALYSIS
ENGINEERING
CONTROLLER
SYSTEM
SENSOR
CONTROL THEORY
MATHEMATICAL PHYSICS
MATHEMATICAL CHEMISTRY
BIOMATHEMATICS
THEORETICAL PHYSICS
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YOUTUBE: THE MAP OF MATHEMATICS

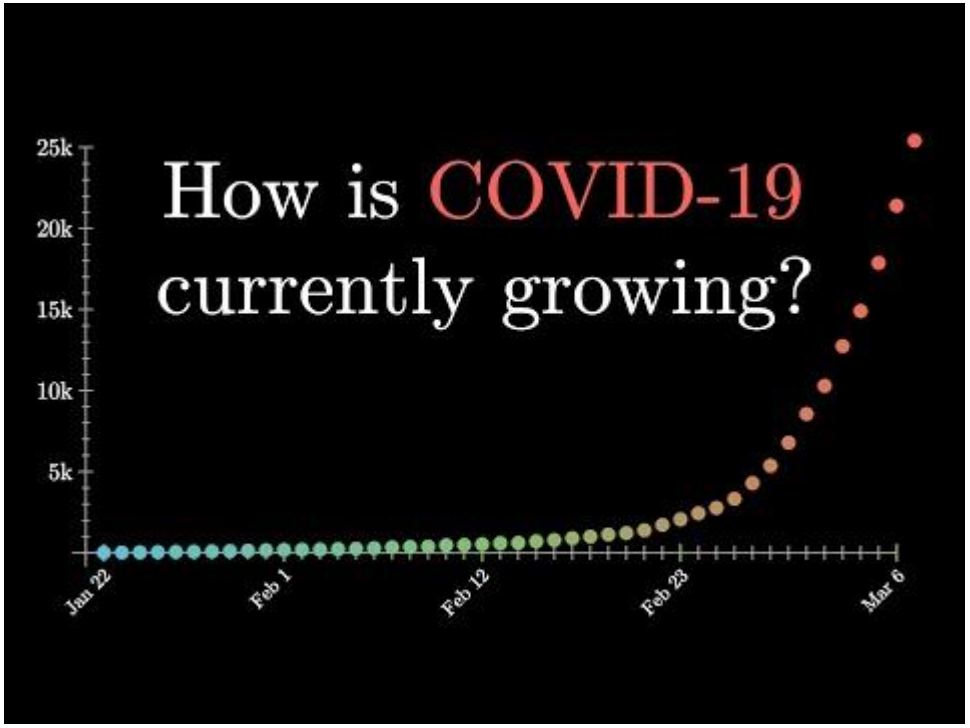
Exponential Growth and Epidemics

Firstly, something very very topical!

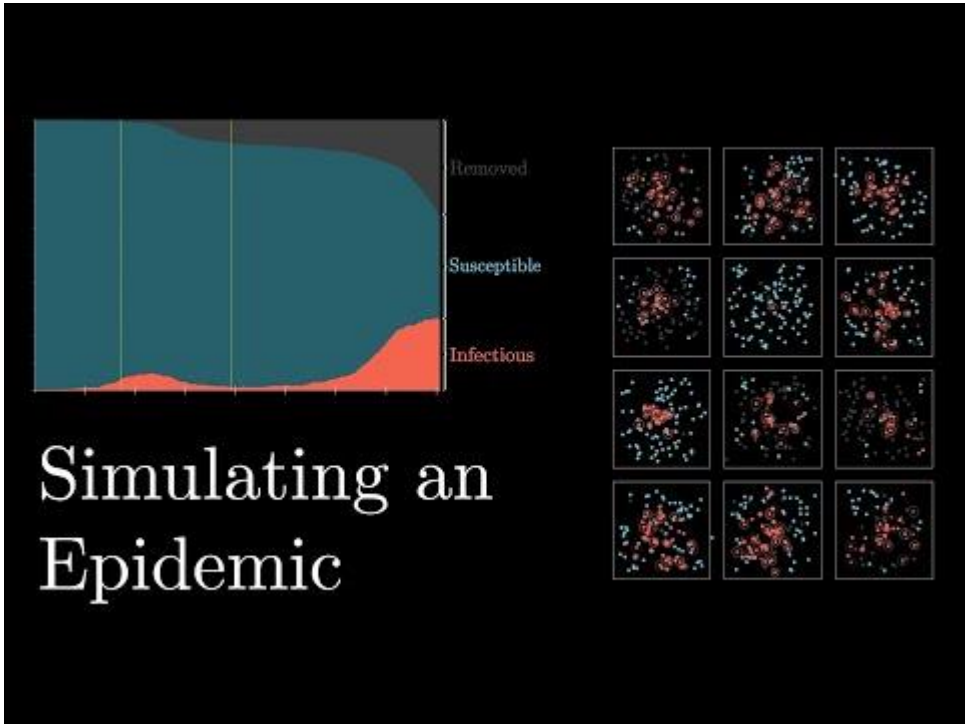
In year 2maths we will learn about exponential relationships and how we can look at their strengths using a logarithmic scale. Have a look at these videos which shows this concept applied to the COVID-19 outbreak.

Think of all the graphs you have seen on the news: some are very very dodgy but others are using a logarithmic scale, can you find some good examples of this?

Click on the image to play the video, link below too in case this does not work.



https://www.youtube.com/watch?v=Kas0tIxDvrg



https://www.youtube.com/watch?v=gxAaO2rsdIs

Completing the cube

Multiply out the expression $(x+2)^3$

Use your answer to solve: $x^3+6x^2+12x=19$ and $x^3+6x^2+12x+7=0$

Let's try another one:

By first multiplying out $(x-3)^3$ solve the equation $x^3-9x^2+27x-91=0$

What expression do you think you need to multiply out to give the first two terms x^3-15x … …

Use your answer to solve $x^3-15x^2+75x-105=0$

Solve these equations: $x^3+3x^2+3x-6=0$ and $x^3+12x^2+147x+384=0$

This technique is pretty limited as it only works for expansions whose $x^3, x^2\ and\ x$ terms all correspond

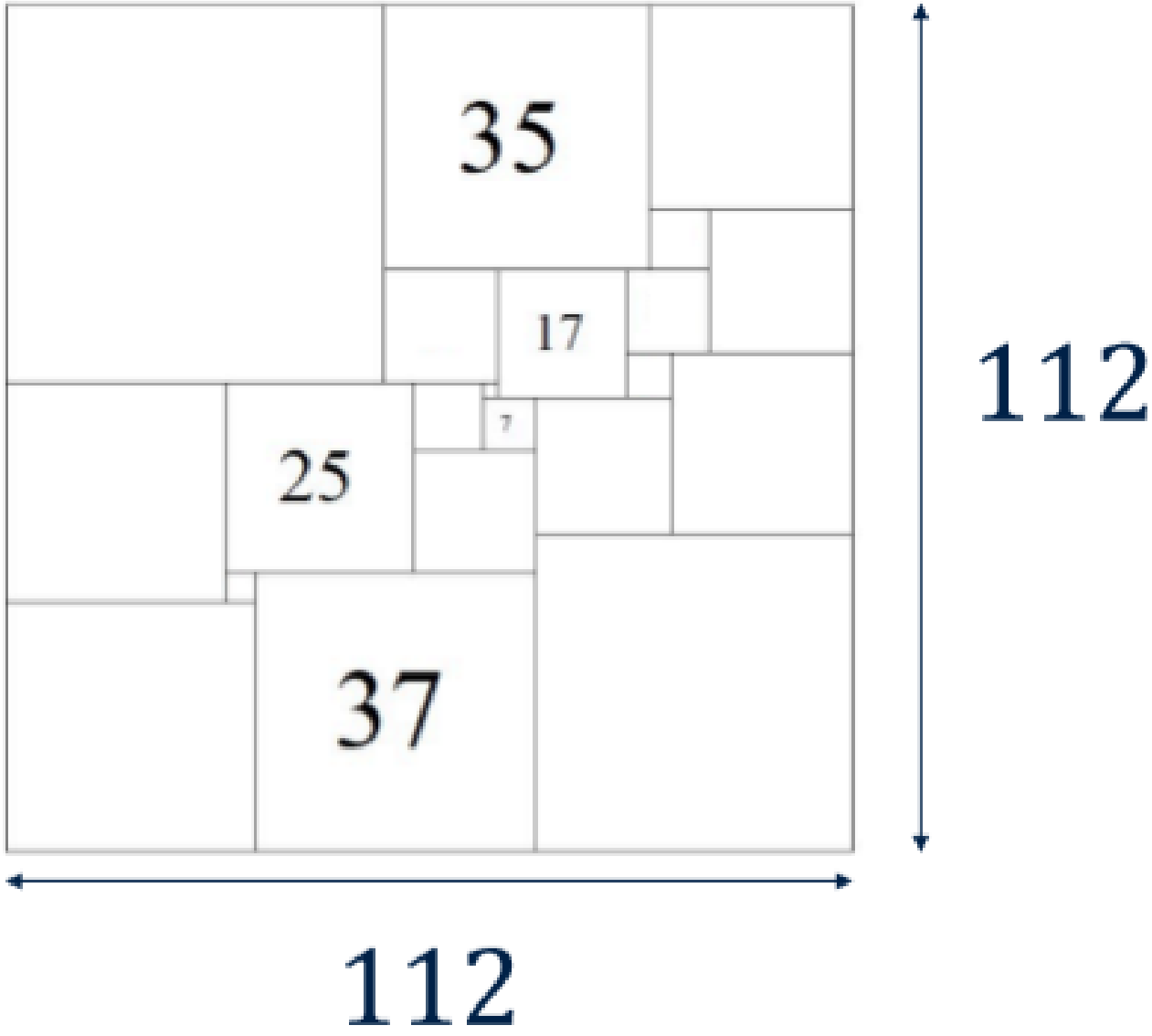
The work on solving cubic equations is a fascinating episode in history leading to a life-long feud between two 16th Century Mathematicians Niccolò Tartaglia and Gerolamo Cardarno. Why not investigate this further?

Squared Squares

Numbers in the squares are the SIDE LENGTH of the square they're in

The square they create has side length 112

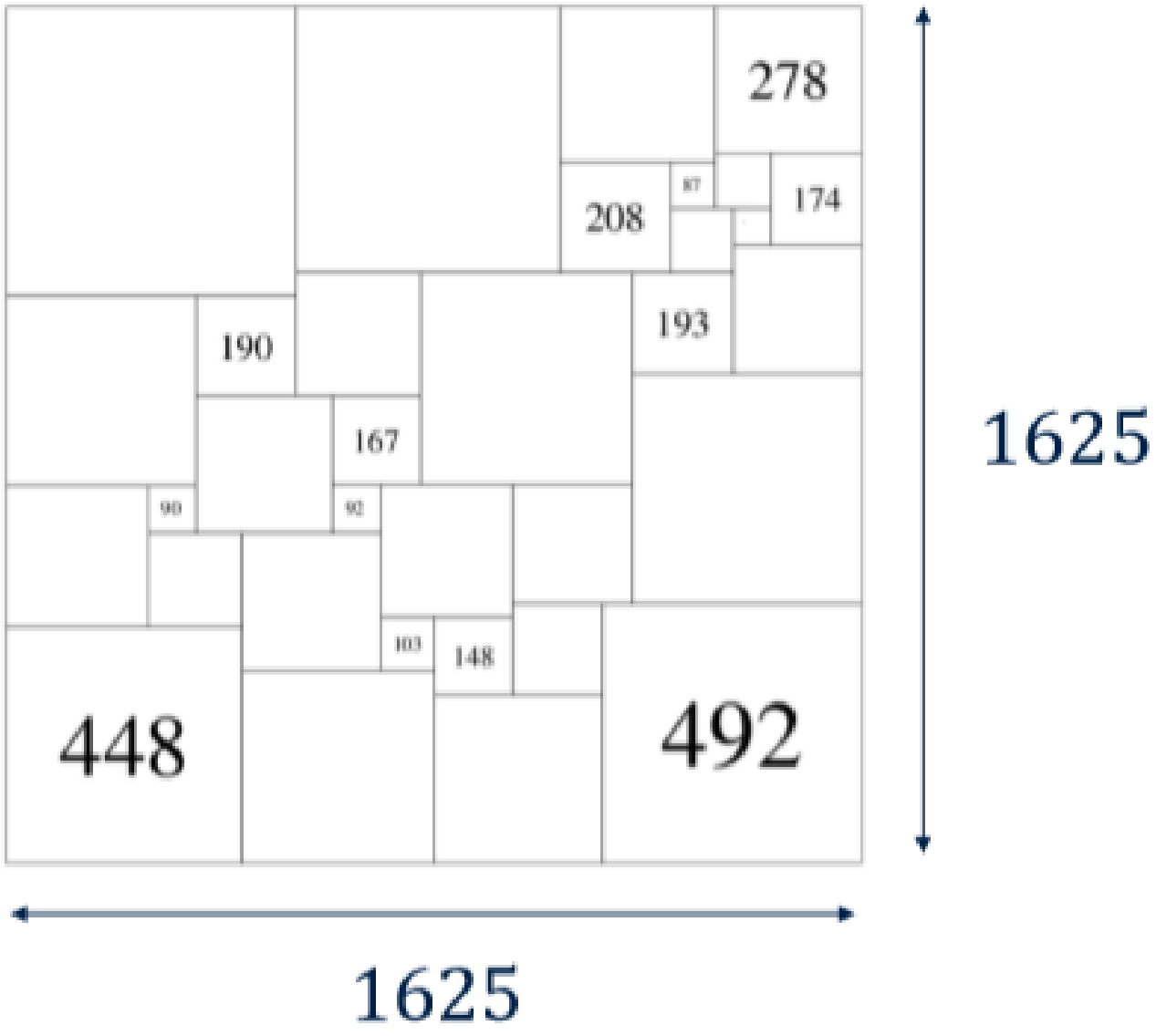
Deduce all the missing square sizes



Credit to AMSP transition materials

Numbers are the SIDE LENGTH of the square they're in.

Deduce all the missing square sizes

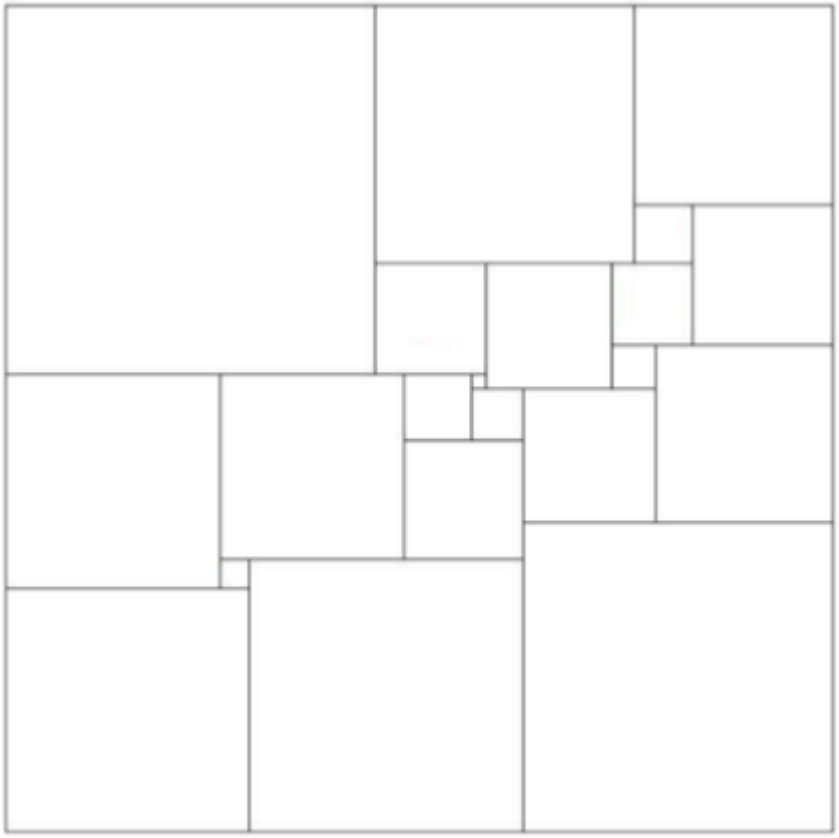


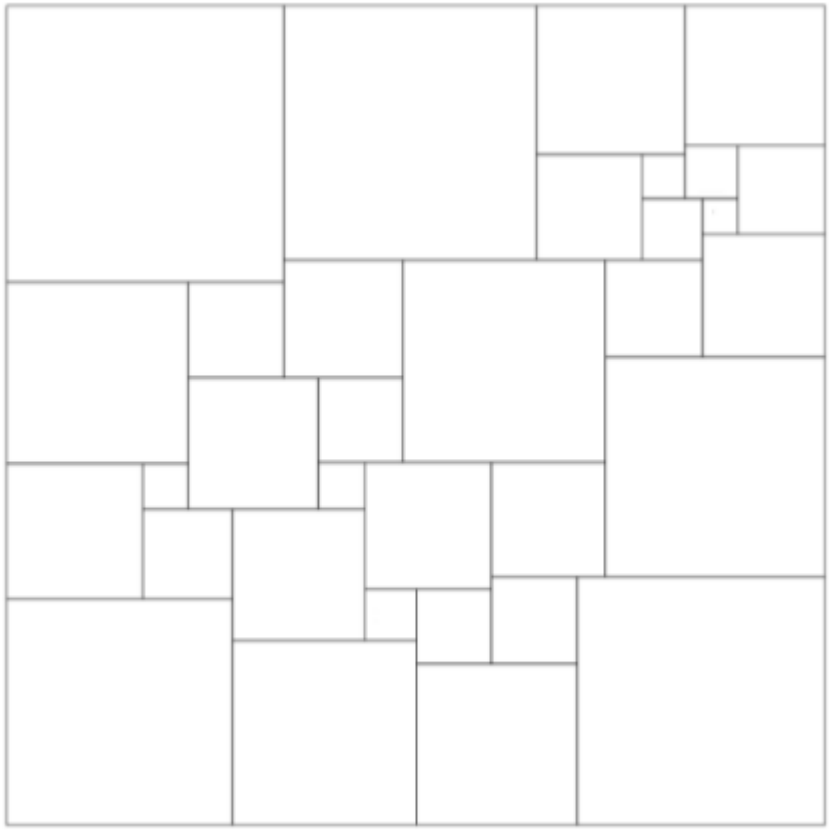
Click on the picture to learn about square squares

https://www.youtube.com/watch?v=NoRjwZomUK0&feature=youtu.be

The four-colour theorem

Colour the Squared Squares below using only four colours so that no two touching squares are the same colour





Answers can be found here:

https://www.think-maths.co.uk/sites/default/files/2020-02/Squared%20Square%20Solutions.pdf

Learn more about the four-colour map theorem here

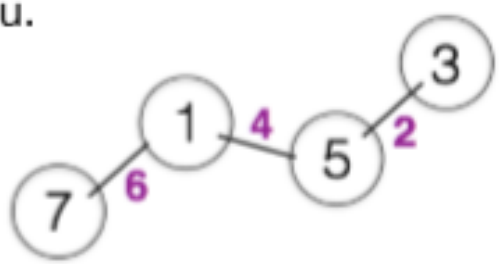
Click the picture to play – link below in case it doesn't work!

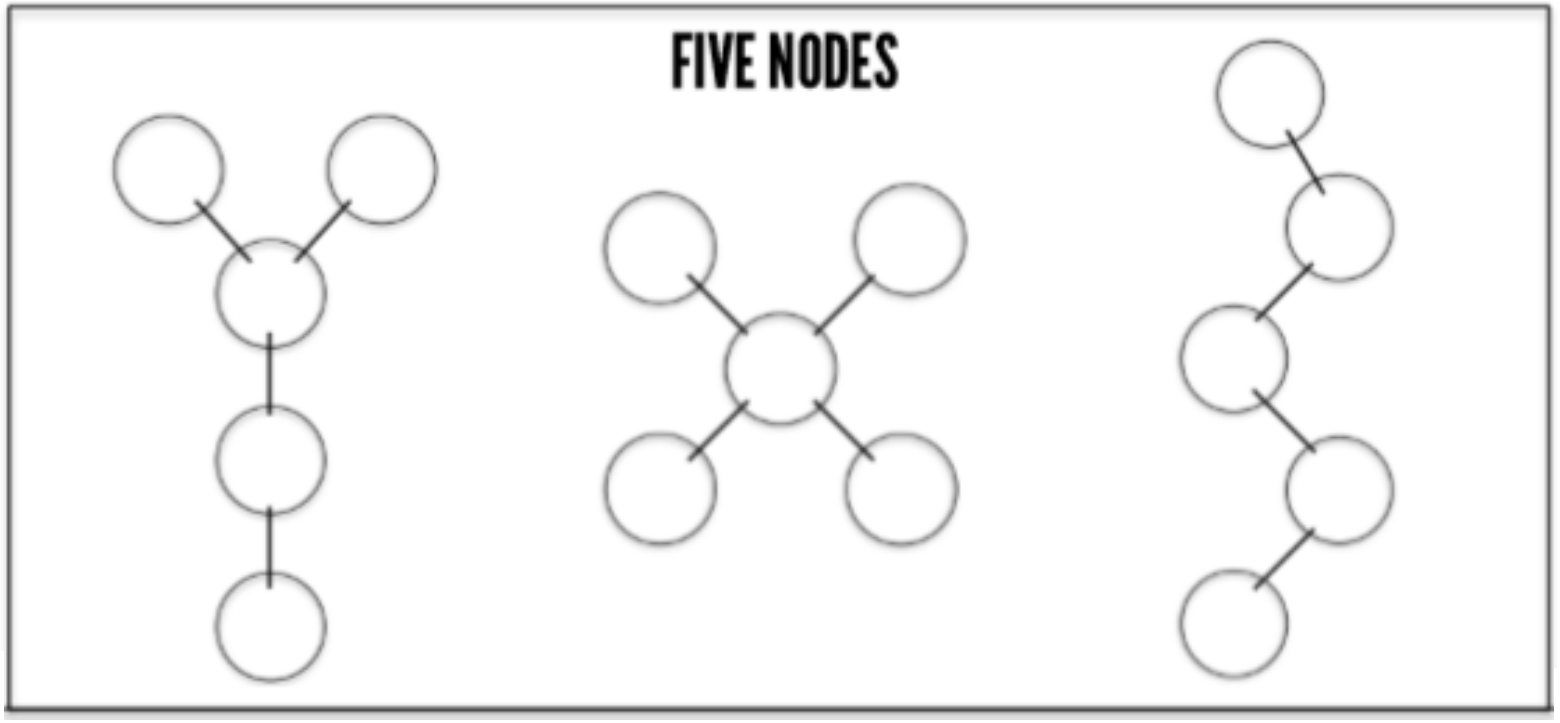
https://www.youtube.com/watch?v=NgbK43jB4rQ&feature=youtu.be

Credit to AMSP transition materials

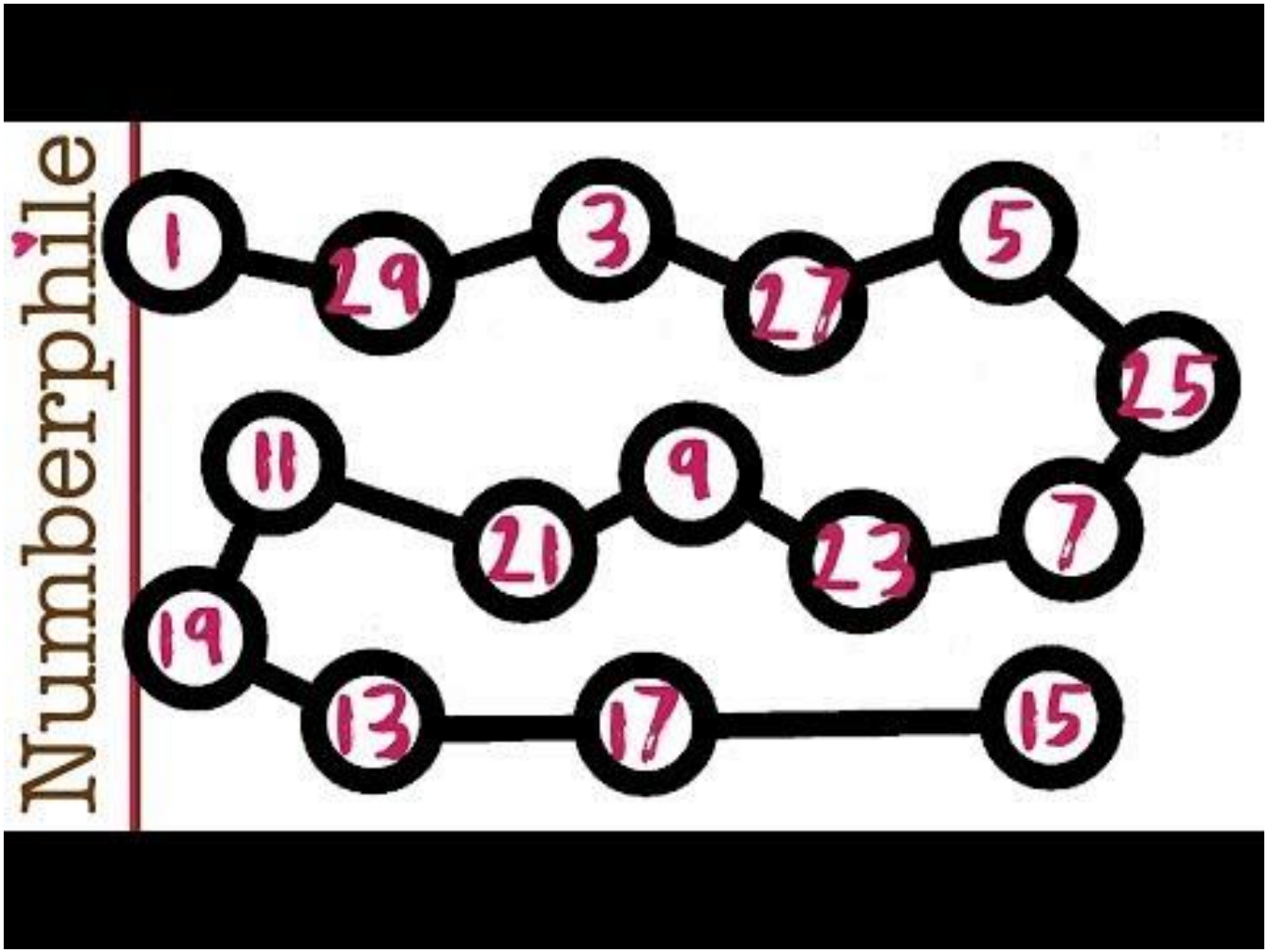
Graceful trees

In each tree, put consecutive odd numbers in the nodes (circles) so that the **differences** between the pairs of adjacent numbers are **all different**. The first has been done for you.



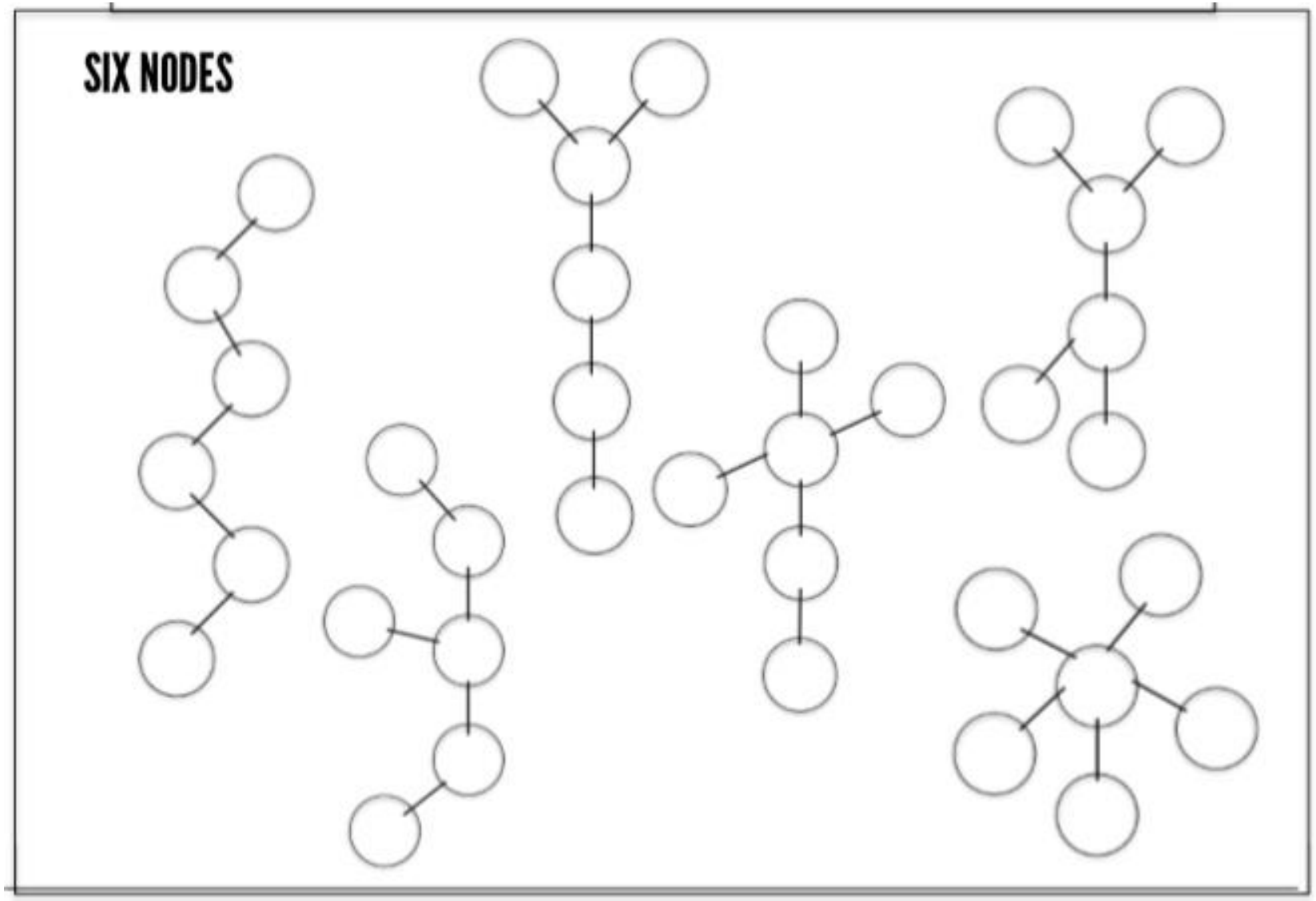


Click on the picture to play or the link below if it doesn't work



https://www.youtube.com/watch?v=v5KWzOOhZrw&feature=youtu.be

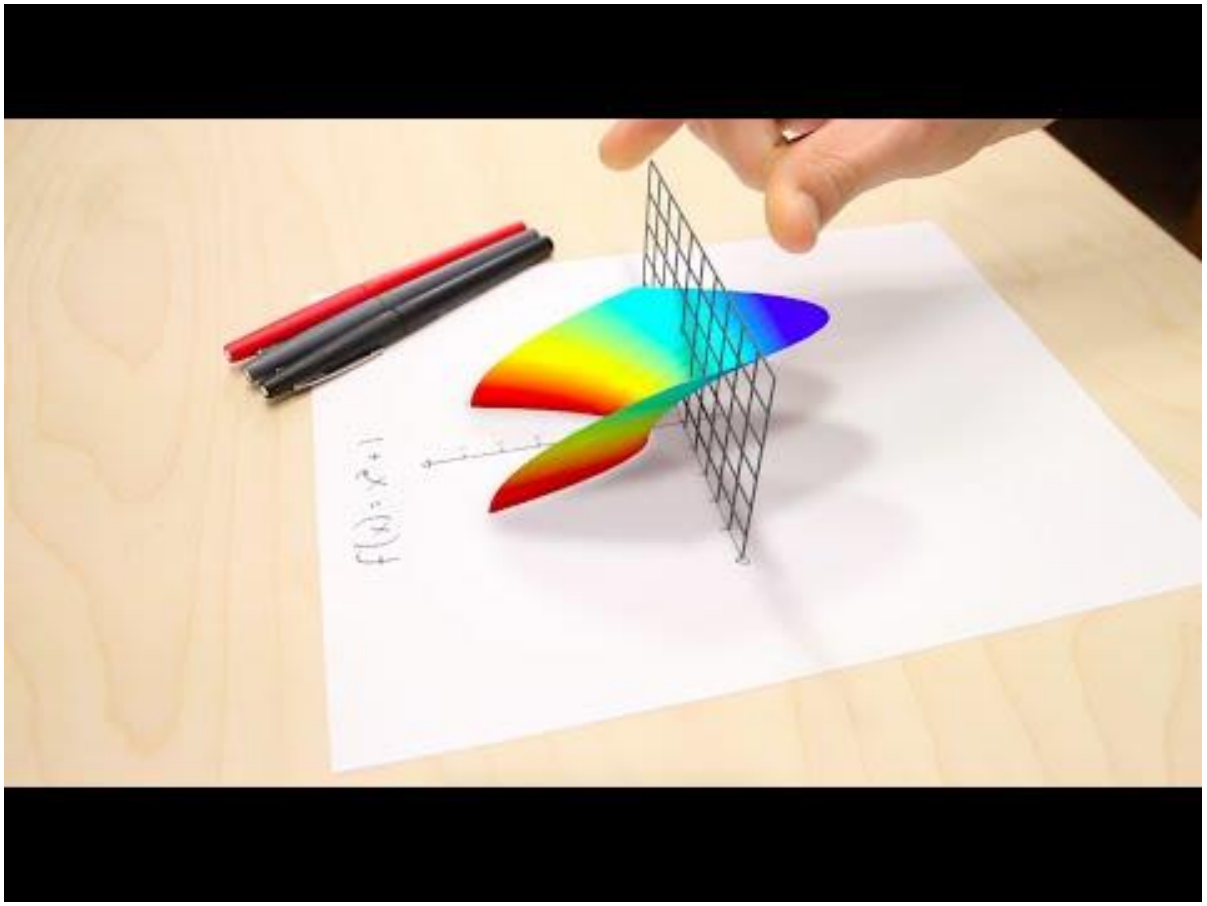
Can you do six nodes?



Can you do more?

And finally, for those of you interested in further maths watch this

Imaginary numbers are real!



There are more parts to this series should you be interested

https://www.youtube.com/watch?v=T647CGsuOVU&feature=youtu.be