7-9: REMOTE MATHS

EDITION 10

BEAUTIFUL NUMBERS: FACTORS, PRIMES, SQUARES

Mathematical language: factors, multiples, prime, composite, square, square root, indices, index notation, expressions, ascending, billions, triangular numbers, fractals, pi (π), irrational numbers.

TASK 1: SATISFYING NUMBERS

Explore factors, multiplies, prime, and square numbers by playing the game below. Start at level one and move to more challenging levels as you refine your skills.

https://www.transum.org/software/SW/Starter_of_the_day/Students/Satisfy.asp

TASK 2: PRIME NUMBERS – THE SIEVE OF ERATOSTHENES

In this activity you will investigate the primes in the first 100 numbers. It is a method used by Eratosthenes, who was a Greek mathematician circa 276-194 BC. Work through the activity from Mathigon to explore an interactive 'Sieve of Eratosthenes' to identify all of the prime numbers below 100. Continue to investigate the distribution of primes and explore how technology can be used to check and generate primes.

https://mathigon.org/course/divisibility/primes

- Now you know the prime numbers between 0 – 100! Investigate and write down what the next 20 prime numbers after 100 are.

TASK 3: COUNTING BY... *Source Sullivan 2018*

When I count by twos I land on both 100 and 1000. When I count by threes I do not land on either. What can you count by so you don't land on 100 but you do land on 1000?

TASK 4: YOU ARE THE TEACHER *Adapted from FUSE, Department of Education*

Jen has been having some difficulties understanding indices. She has completed her maths homework, but all of her answers are incorrect. Your task is to teach Jen about indices and help her understand where she has made errors. Use visuals, diagrams, PowerPoint, video or write a script demonstrating your explanation.

$2^3 = 6$ $3^2 = 6$ $2^{-1} = -2$ $3^0 = 0$ $(a + b)^2 = a^2 + b^2$ $(ab)^2 = ab^2$

TASK 5: ORDERING INDICIES

Cut out the cards below, which are expressions written in index form.

- Place each card in ascending order (smallest to largest).
- Create your own set of nine cards containing expressions using indices, for a classmate to put in ascending order.

Enabling prompt: You may need to simplify the expressions.

$5^0 \times 5^2$	$\frac{10^4}{10^3}$	$\left(9^2\right)^2 \times 9^5$
$\frac{4^2 \times 4^5}{4^3 \times 4^4}$	$\frac{\left(3^8\right)^4}{\left(3^2\right)^8}$	$2^4 \times 2^2 \times 2^3$
$7^2 \times 7^9$	$3^2 \times 3^2$	$\frac{\left(6^2\right)^2 \times 6^{10}}{6^5 \times 6^7}$

TASK 6: SQUARE ROOTS OF PERFECT SQUARES

Refresh your knowledge of square roots of perfect square by playing the online game. How many levels can you travel through? If you challenge yourself you'll be estimating positive and negative square roots!

https://au.mathgames.com/skill/7.4-square-roots-of-perfect-squares

TASK 7: AGE OF AUGUSTUS

The English mathematician Augustus de Morgan, who died in 1871, claimed that he became x years old in the year x^2. When was he born?

https://nrich.maths.org/6747

TASK 8: HOW MANY STARS ARE IN THE UNIVERSE? *Adapted from Robert Kaplinsky*

Consider the following questions:

- How many stars are there in the universe?
- How do astronomers estimate how many stars exist?
- What is a guess that is too high?
- What is your best guess?
- Can we see every star in the universe from Earth?
- What are some strategies can we use to estimate the number of stars in the universe?
- Watch the video Stars Blacked-Out-Best, https://www.youtube.com/watch?v=hRGM3cRNLec&feature=youtu.be

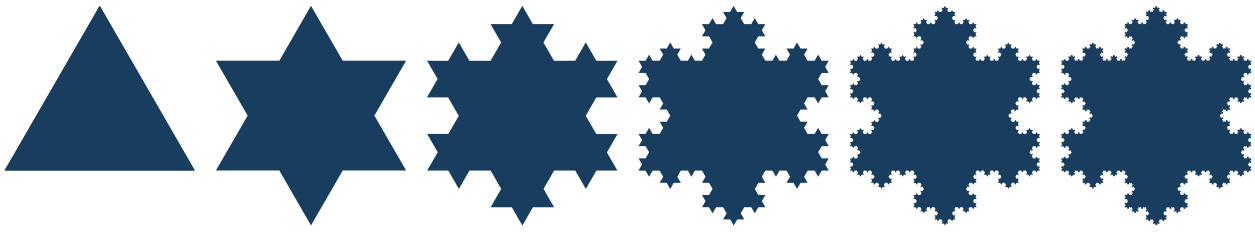
In the video the narrator states that, 'There are around 100 billion stars in our galaxy. And it's thought that the universe holds up to 400 billion galaxies. Multiplying these together suggests that space holds over BLEEP stars.' 100 billion x 400 billion is a very large number! Can you try and write this number using you understand of index notation? Explore this concept and write down some examples.

- Now watch the video Stars In The Universe Answer, https://www.youtube.com/watch?v=QiWaYf280t0&feature=youtu.be

Explore and record some other examples of extremely large numbers that are best described using index notation.

TASK 9: THE KOCH SNOWFLAKE *From https://nrich.maths.org/10972*

The Koch snowflake is sometimes called the Koch star or the Koch island. It was discovered by Swedish mathematician Helge Von Koch in 1904. It is a continuous curve that does not have a tangent at any point. To generate the Koch snowflake: start with an equilateral triangle. Replace each line segment by a zig-zag curve (a generator) made up of four copies of the line segment it replaces, each reduced to one third of the original length. Repeat the same process for every line segment of the new shape, and keep repeating forever, for each new shape in turn. Its perimeter is infinite yet its area is finite. It's a member of the fractal family. Try constructing one using the computer programme Scratch.



EDITION 10: BEAUTIFUL NUMBERS (CONT.)

TASK 10: CARD TOWERS *From engagememathematics.com*

Watch Tom's video about creating card towers.

https://www.youtube.com/watch?v=qr6_1Bh4hPQ&feature=youtu.be&fbclid=IwAR1jpTldKp1rKycAvwcGitkdCKr1GllXkJtnAtOzzWAYxflVPMYxPNCQbY8

- How many cards are required to make the tower below in Tom's videos?
- How high would the tower be if you used an entire packet of cards?
- How many cards would you need to make a tower as tall as you?
- How many cards would you need to make a tower as high as the Eureka Tower? Hint it is 297.3 metres tall
- You may like to use isometric paper to explore these questions – just like Tom!

Tom also has some great animations on triangular and square numbers.

MATHS APP OF THE WEEK: FLOW FIT SUDOKU

Sudoku meets jigsaw in this addictive evolution of everybody's favorite number puzzle.

iOS: https://apps.apple.com/us/app/flow-fit-sudoku/id1475678781

Google Play: https://play.google.com/store/apps/details?id=com.bigduckgames.flowfitsudoku&hl=en_AU

Look out for more tasks next week!