

NIE PART 4

Did you know?

- The number 0 has many names including zero, nought/naught, nil, nix, zilch and zip.
- A palindrome is a number that can be read in the same order in either forward or reverse direction. Eg 45654

THE NUMBERS GAME

SOCIETY has had a long-standing relationship with numbers from the earliest times with many aspects of the natural world displaying strong numerical patterns.

Numbers are intertwined in our life and they appear in almost all areas of our life.

Without them it would be impossible to assign values and comprehend the world around us.

What makes numbers special?

THERE'S sequences of numbers, magic squares, polygonal numbers, triangular numbers, cubes, Fibonacci numbers, perfect, deficient, and abundant numbers, the list goes on and on.

They are the numbers that form distinctive mathematical patterns – the special numbers.

All numbers are special but some are more special than others.

★ Zero – You may understand the concept of zero as meaning the absence of any quantity, being nothing or having nothing. The idea of zero, developed in India around the fifth century AD, allows us to perform calculus, do complicated equations, and is central to the invention of computers.

★ A Perfect number, is a positive integer that is equal to the sum of its divisors.

The smallest perfect number is 6, which is the sum of 1, 2, and 3.

Other perfect numbers are 28, 496, and 8,128.

If the sum of the divisors is bigger than itself it is called an abundant number eg $20 = 1, 2, 4, 5, 10 = 22$

If the sum of the divisors is

smaller than the number itself, it is called a deficient number eg $15 = 1, 3, 5 = 9$

★ Fibonacci numbers are a special sequence of numbers where the next number in the sequence is found by adding up the two numbers before it.

Starting with 0 and 1, the sequence goes 0, 1, 1, 2, 3, 5, 8, 13, 21, 34 and so on.

Fibonacci numbers actually appear in nature and are found in

FACTS & FIGURES

Why is the number 37 special?

- $3 \times 37 = 111$ and $1 + 1 + 1 = 3$
- $6 \times 37 = 222$ and $2 + 2 + 2 = 6$
- $9 \times 37 = 333$ and $3 + 3 + 3 = 9$
- $12 \times 37 = 444$ and $4 + 4 + 4 = 12$

the structure of crystals, patterns of leaves and seeds, the spiral of galaxies and a nautilus shell.

★ A googol is a 1 with a hundred zeroes behind it. We can write a googol using exponents by saying a googol is 10^{100} .

The biggest named number that we know is googolplex, 10 to the googol power, or $(10)^{(10^{100})}$. That's written as a one followed by googol zeroes.

★ WHAT IS YOUR SPECIAL NUMBER? WHY?

Know-how

Number patterns PATTERNS are all around us and occur in a wide range of forms.

In mathematics, a sequence is a string of objects like numbers that follow a particular pattern. Sequences can be created based on arithmetic or geometric shapes.

Working with number patterns leads directly to the concept of functions in mathematics and recognising number patterns is also an important problem-solving skill.

Kaprekar's sequence

In 1949, Indian mathematician D.R. Kaprekar came up with an interesting routine. Applied to any positive four digit number (all the digits should be different), converges to the same number 6174 known as Kaprekar constant.

Follow this procedure

1. Take any four digit number [in base 10], eg 1234.
2. Arrange these digits in descending order, eg 4321
3. Now rearrange the digits in ascending order, eg 1234
4. Subtract the smaller number from bigger to get a new number.
5. Repeat the above procedure for each new number you get.

- $4321 - 1234 = 3087$
- $8730 - 0378 = 8352$
- $8532 - 2358 = 6174$
- $7641 - 1467 = 6174$

TRY THIS

1. Think of a two-digit number whose digits are not identical eg 28
2. Reverse the digits ie 82
3. Take the smaller number from the larger number ie $82 - 28 = 54$
4. Using this answer, go to step 2 and repeat the process a number of times

- $54 - 45 = 9 / 90 - 09 = 81 / 81 - 18 = 63$

Can you see a link?



TOMORROW: The numbers game – Part 5

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