

Odd Evens and More Evens by Jonny Russell

1) Which sequence will contain the number 1000?

A_0 = Odd number sequence so there is not 1000 in it.

A_1 = $A_0 \times 2$ so all even. A_0 does not contain 1000 so A_1 cannot contain 1000.

A_2 = $A_0 \times 4$. A_0 cannot contain 250 so A_2 cannot contain 1000.

A_3 = $A_0 \times 8$. A_0 can contain 125 so A_3 can contain 1000.

A_4 = $A_0 \times 16$. A_0 cannot contain a non-whole number so A_4 cannot contain 1000.

A_n = cannot contain 1000 for the same reason as A_4 .

2) Numbers 1 - 63:

A_0 has 32 numbers from 1 - 63.

A_1 must have 16 numbers from 1 - 63.

A_2 must have 8 numbers.

A_3 must have 4 numbers.

A_4 must have 2 numbers.

A_5 must have 1 number.

3) Do all positive whole numbers appear in a sequence?

A_0 = all odd numbers

$A_1 - A_n$ contain all other numbers by observation.

4) Do any numbers appear more than once?

Odd numbers only appear once as all in A_0 and only in A_0 .

Even numbers only appear once by observation.

5) Which sequence will be the longest?

All sequences are infinite. For a maximum number limit A_0 will always be the longest as it has the largest difference between each number.

6) How can you work out where any number goes?

A_0 = all odd numbers.

Rule

Find biggest power of 2 it is divisible by.

Find the maximum n so that it is divisible by 2^n . The number will appear in A_n .

e.g. 24.

even factors are 2, 4, 6, 8, 12, 24

largest power of 2 = $8 = 2^3$

So 24 appears in A_3 .

Describe the n^{th} term

Formula = $A_n = 2^n A_0$