ALIEN MATH

G'Day! This is your math friend James. Today I am answering a question from Evy.

DO ALIENS DO MATH?

Of course, I don't actually know the answer to this. Nor do I really know if there are aliens. But the universe is so incredibly big and full of many, many, and many more planets than I can imagine. It is inconceivable to me that we are alone. Surely there are other civilizations out there ... somewhere!

I used to wonder about this as a kid. In fact, I remember, at around age 12 or so, asking myself how it might be possible to communicate with aliens. What would it take to do so?

This question fascinated me and I took a logical approach to trying to answer it.

First, I realized that "talking to someone" means you that you at least have to be aware of there being another person. There's you and there's someone else. If an alien has no concept of beings other than itself, the idea of "talking to someone" would be meaningless to that alien.

So I can only hope to communicate with those aliens that aware of themselves and something different from themselves. These aliens, most likely, thus have the awareness of counting two things: themselves and not themselves, at the very least. They then are most likely, I reasoned, able to conceive of other counts of things too: three things, four things, five things, and so on.

So I concluded that the aliens that I could talk with are probably aware of the counting numbers:

1, 2, 3, 4, 5, 6, ...

I could talk math!

To send a message out to space, I reasoned I should send out "blips" of sound or light that count out different numbers. That would be a way to say, "Hello!"

But what counts of pulses should I send that would be interpreted as deliberate and "intelligent," as undeniably coming from someone trying to communicate.

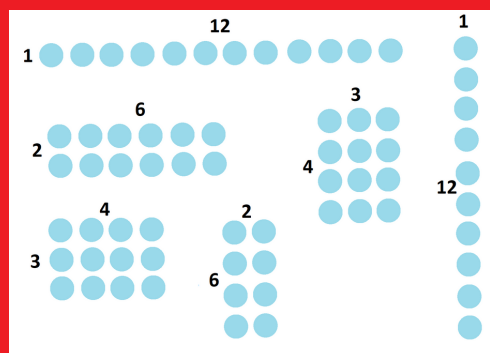What pattern of numbers should it be?

Did you know?

In 1938, nine-year old Milton Sirotta chose the name "googol" for the counting number given by 1 followed by one-hundred zeros.

10000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000

He also called the number given by 1 followed by a googol zeros a "googolplex."

puzzle #2

In puzzle 1 we see that one can only make four rectangles with 14 dots and with 15 dots. One can also only make four rectangles 10 dots, and with 6 dots.

We're getting a list of the FOUR-RECTANGLE NUMBERS: 6, 10, 14, 15, ...

What's the twentieth number in this list?

In doing Puzzle 1 one sees that some counts of dots are resistant to making rectangles. For example, with 13 dots one can only make two rectangles - the long skinny ones that maybe shouldn't even count as proper rectangles!

The numbers that are resistant to making rectangles are: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, ... People call these the prime numbers.

I decided as a young lad that I should send out into space the prime numbers: 2 blips, pause, 3 blips, pause, 5 blips, pause, 7 blips, pause, 11 blips, pause, 13 blips, pause, 17 blips, pause, 19 blips, and so on.

These are not random numbers. They probably don't naturally appear from universal phenomena like pulsars and such. Thus they would likely be seen as an "intelligent" message coming from someone trying to communicate.

So: Do aliens do math? I think my thought is YES, at least the ones we can communicate with.

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Check out this video from NUMBERPHILE showing that there are infinitely many prime numbers.

Do you have a math question for me to answer, or try to answer?

Write to me at the website. Each week I'll pick a new question and give my thoughts on it!

About the Author: Dr. James Tanton

The NMF Weekly is written by mathematician Dr. James Tanton as a resource for friends and fans of the 2021 National Math Festival.

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