

# Maths Circle India

TIFR-STCS Maths Circle Team

Session 2: April 29, 2022

## 3 So much to read!

Arun, Barun and Kiron from last time have now taken to reading electronic books. Unfortunately, the story books they like are large, and their electronic devices aren't so new, so they are afraid they would soon run out of storage space.

Arun notices that the books they read are composed of letters, numbers, punctuation marks and spaces, of course arranged in a sequence that makes sense. He then notices that sometimes, he can express some longer strings using much smaller expressions. For example, he claims that the screaming sound of "AAAAAAAAAAAAAAAAAAAA!" that the hero in their last story made on seeing a lizard could as well be described in just four symbols as "20A!". He tells this to Barun, and they both get excited. After several days of labour, they come back to Kiron and claim that they have written two computer programs: the first, which they call "Shrinker", is supposed to take any of their story books, and output a "shorter" book (also composed of letters, numbers, spaces and punctuation marks, but not necessarily readable by humans), and "Deshrinker" (which will take as input one of the "shrunk" books given as output by "Shrinker" and output the original book from which "Shrinker" produced that output). They offer the programs to Kiron if she would share with them her new story book, Kironmala.

Kiron thinks for a few moments, tells them that such programs cannot exist, and that they must have made some error, and then goes back to reading her storybook.

Is she right?