

How Many Bits Do We Need to Represent N Things?

Let's test your understanding (and generalize)!

How many bits do we need to represent...

- a whole number from **1000 to 1100**?
101 different integers, so **7 bits** ($2^7 = 128$)
- one of **199 flavors of ice cream**?
199 different flavors, so **8 bits** ($2^8 = 256$)
- **a living person**?
7-8 billion people, so **33 bits** ($2^{33} > 8$ billion)
- **N things**?
(ceiling / integer at least as large as
log base 2 of **N**)