Solutions and hints

Binary Numbers

3 requires cards 2 and 1
12 requires cards 8 and 4
19 requires cards 16, 2 and 1
There is only one way to make any number.
The biggest number you can make is 31. The smallest is 0. You can make every number in between, and each has a unique representation.

Experts: To increase any number by one, flip all the cards from right to left until you turn one face up.

Working with binary

10101 = 21, 11111 = 31

Sending Secret Messages

Coded message: HELP IM TRAPPED

Counting higher than 31

If you add the numbers up from the beginning the sum will always be one less than the next number in the sequence.

Miss Flexi-toes can count 1024 × 1024 = 1,048,576 numbers—from 0 to 1,048,575!

More on Binary Numbers

When you put a zero on the right hand side of a binary number the number doubles. All of the places containing a one are now worth twice their previous value, and so the total number doubles. (In base 10 adding a zero to the right multiplies it by 10.)

A computer needs 7 bits to store all the characters. This allows for up to 128 characters. Usually the 7 bits are stored in an 8-bit byte, with one bit wasted.