The Evolution of Numbers

The Counting Numbers

We can use numbers to **count**: 1, 2, 3, 4, etc

Humans have been using numbers to count with for thousands of years. It is a very natural thing to do.

- You can have "**3** friends",
- a field can have "**6** cows"
- and so on.

So we have:

Counting Numbers: {1, 2, 3, ...}

And the "Counting Numbers" satisfied people for a long time.

Zero

The idea of **zero**, though natural to us now, was not natural to early humans ... if there is nothing to count, how can you count it?

Example: you can count dogs, but you can't count an empty space:

Two Dogs

Zero Dogs? Zero Cats?

An empty patch of grass is just an empty patch of grass!

Placeholder

But about 3,000 years ago, when people started writing bigger numbers like "42" they had a problem: how to tell the difference between "4" and "40" ? Without the zero they look the same!

So they used a "placeholder", a space or special symbol, to show "there are no digits here"

5 2

So "5 2" meant "502"

(5 hundreds, nothing for the tens, and 2 units)

The idea of zero had begun, but it wasn't for another thousand years or so that people started thinking of it as an actual **number**.

But now we can think

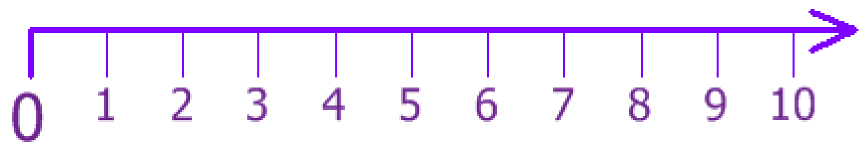
*"I had 3 oranges, then I ate the 3 oranges, now I have **zero** oranges...!"*

The Whole Numbers

So, let us add zero to the counting numbers to make **a new set of numbers.**

But we need a new name, and that name is "Whole Numbers":

Whole Numbers: {0, 1, 2, 3, ...}



Negative Numbers

But the history of mathematics is all about people asking questions, and seeking the answers!

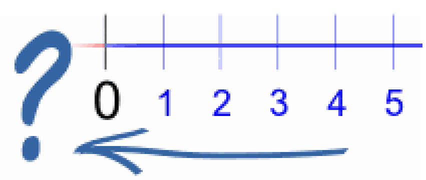
One of the good questions to ask is

"if you can go one way, can you go the *opposite* way?"

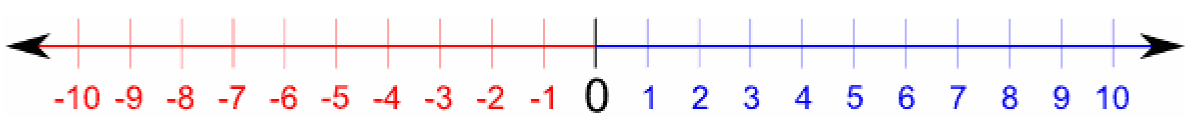
We can count forwards: 1, 2, 3, 4, ...

... but what if we count backwards:

3, 2, 1, 0, ... **what happens next?**



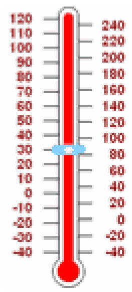
The answer is: you get negative numbers:



Now we can go forwards and backwards as far as we want

But how can a number be "negative"?

By simply being less than zero.



A simple example is temperature.

We define zero degrees Celsius (**0° C**) to be when water freezes ... but if we get colder than that we need negative temperatures.

So **-20° C** is 20° below Zero.

Negative Cows?

And in theory you can have a negative cow!

Think about this ...If you had just **sold two cows**, but can only **find one** to hand over to the new owner... you actually **have minus one cow** ... you are in debt one cow!

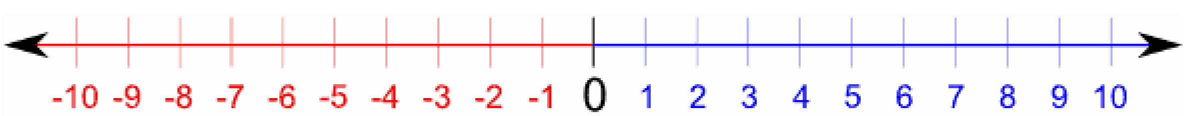
So negative numbers exist, and we're going to need a new set of numbers to include them ...

Integers

If we include the negative numbers with the whole numbers, we have a **new set of numbers** that are called **integers**

Integers: {..., -3, -2, -1, 0, 1, 2, 3, ...}

The Integers include zero, the counting numbers, and the negative of the counting numbers, to make a list of numbers that stretch in either direction infinitely.



http://www.mathsisfun.com/whole-numbers.html (I used ideas from this Web site)