Term 1

Lesson 1011

Binary & Octal Numbers

Bits

Computers store information using electricity, which has two states

ON or OFF

Bits

Representing numbers

So to represent zero - the light bulb is off

Challenge Question

If you had two lightbulbs, how many numbers could you represent?

The Answer:

The Answer:

Base Ten Numbers

Lets look at the number 8237

7 x 1	=	7
3 x 10	=	30
2 X 100	=	200
8 x 1000	=	8000

Base Ten Numbers

So the number 53027:

10^4	10^3	10^2	10^1	10^0
10000	1000	100	10	1

Binary

means base two
uses the digits 0 and 1

1 represents an ON state
0 represents an OFF state

Binary

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0

Binary

So to change a binary number to base ten:

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
128	64	32	16	8	4	2	1

The Algorithm:

1. Start from the left – pick the first power of two smaller than the decimal value. Put a 1.

2. Subtract the power of two from the original decimal number.

3. Repeat until you get to the 20 column.

Octal - base eight

Works on the same pattern as binary

4	3	2	1	0
8^4	8^3	8^2	8^1	8^0
4096	512	64	8	1

Octal - base eight

Translate 95 to octal

4	3	2	1	0
8^4	8^3	8^2	8^1	8^0
4096	512	64	8	1

Octal - base eight

Translate 172_8 to base ten

4	3	2	1	0
8^4	8^3	8^2	8^1	8^0
4096	512	64	8	1