Numbers in different bases

Binary base (radix). The only digits used are 0 and 1.

512	256	128	64	32	16	8	4	2	1
2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0

Consider the decimal number 139.

What is the highest power of 2 that will make 2 raised to that power just less than 139. This highest power is 7 and $2^7 = 128$.

Place a 1 under 2^7.

2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
		1							

Subtract 139-128=11.

What is the highest power of 2 that will make 2 raised to that power just less than 11. The highest power is 3 and $2^3 = 8$

Place a 1 under 2^3.

2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
		1				1			

Subtract 11-8=3.

What is the highest power of 2 that will make 2 raised to that power just less than 3. The highest power is 1 and $2^1 = 2$

Place a 1 under 2^1.

2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
		1				1		1	

Subtract 3-2=1.

What is the highest power of 2 that will make 2 raised to that power just less than 2. The highest power is 0 and $2^0 = 1$.

Place a 1 under 2^0 so that finally

2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
		1	0	0	0	1	0	1	1

Subtract 2-1=1.

Thus expressed in binary, the number 139 is 10001011.

Note that, 2+1 = 3, and in binary is 10+01=11. Also 2+2 = 4 and in binary is 10+10=100.

Ternary base (radix). The only digits used are 0, 1 and 2.

19683	6561	2187	729	243	81	27	9	3	1
3^9	3^8	3^7	3^6	3^5	3^4	3^3	3^2	3^1	3^0

Performing similar operations for decimal 139 for the ternary base system we have

139 = 81 + 58 = 81 + 2.27 + 4 = 81 + 2.27 + 3 +1 so the ternary representation is

19683	6561	2187	729	243	81	27	9	3	1
3^9	3^8	3^7	3^6	3^5	3^4	3^3	3^2	3^1	3^0
					1	2	0	1	1

What is 139 decimal in the quaternary base system?

Show video "Alternative Math" (AM).

What is 2 + 2 (by "Alternative Math")?

In the binary system 2 →10, so 2 + 2 = 10 + 10 = 100 (binary) = 4 (decimal) by ordinary binary addition.

But by "Alternative Math" 10 + 10 = 1010.

Back in decimal, 1010 translates to 1.8+0+1.2+0=10 so by binary AM 2 + 2 = 10 decimal.

In the ternary system 2 →2, so 2 + 2 = 2 + 2 = 11 (ternary) by ordinary ternary addition.

But by "Alternative Math" 2 + 2 = 22.

Back in decimal this translates to 2.3+2.1 = 8 so by binary AM 2 + 2 = 8 decimal.

What is 2+2 in the quaternary base system?

In the quaternary base system, but using AM for 2+2 what is its result in the ordinary base 10 system?