How many/largest/range

Q. How many binary numbers can be represented using 6 bits?

Q. What is the **largest** binary number which can be represented using 6 bits?

Q. What **range** of binary numbers can be represented using 6 bits?

How many binary numbers?

This all involves using the binary sequence:

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= 32 + 16 + 8 + 4 + 2 + 1 = 63

Which is one less than the next number in the binary sequence… (this is a shortcut)

How many binary numbers?

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128	64	32	16	8	4	2	1
		1	1	1	1	1	1

If 63 is the biggest number you can make, you can make all the numbers up to 63 with 6 bits. Including 00000000 (zero).

That's 64 numbers

Which is the next number in the binary sequence… (hack)

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128	64	32	16	8	4	2	1
		1	1	1	1	1	1

So, the **range** of numbers is 0 - 63

How many binary numbers?

Another way of looking at it:

Number of values which can be represented:

128	64	32	16	8	4	2	1
256	128	64	32	16	8	4	2
8 bits	7 bits	6 bits	5 bits	4 bits	3 bits	2 bits	1 bit
2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1

It is always OK to give answers using powers:

6 bits: values = 2^6; biggest = 2^6-1; range = 0 to 2^6-1