



# Binary Numbers

Calculate your age

# Binary and decimal differences

	Decimal	Binary
<b>Digits</b>	0, 1, 2, 3, 4, 5, 6, 7, 8, 9	0, 1
<b>Base</b>	10	2
<b>Word origin Latin</b>	Deci = 10	Bi = 2
<b>Digits called</b>	Decimals	Bits

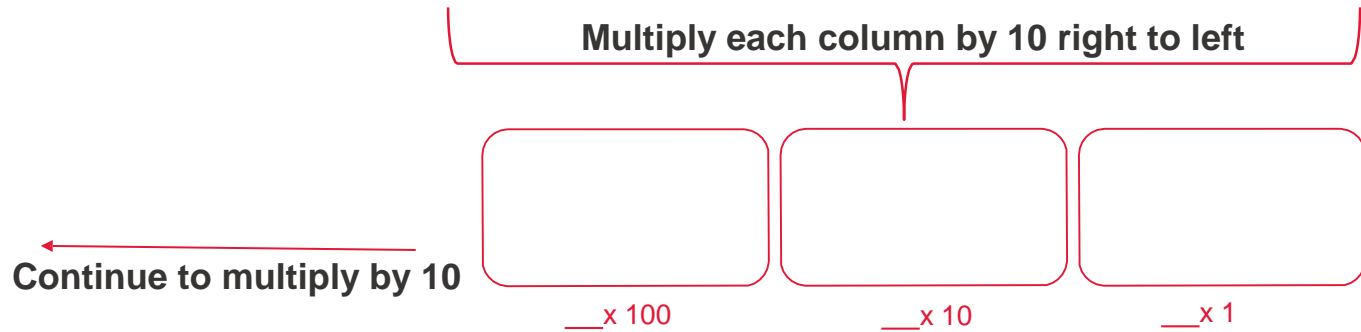
## Fun Facts

Why 10 digits? Because people typically have 10 fingers and 10 toes, making it easy for counting!

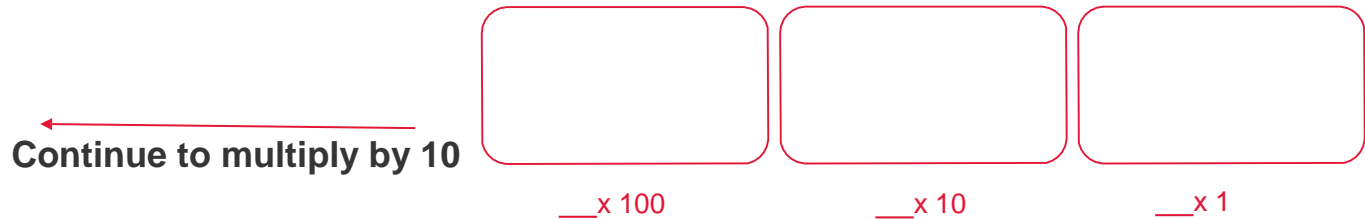
In binary 1 represents “on” and the 0 represents “off”

# How decimal numbers work

- The decimal system uses these digits to represent the number of ones, tens, and hundreds there are.
- Starting from the right, each box to the left multiplies the prior number by 10 (hence base 10!)



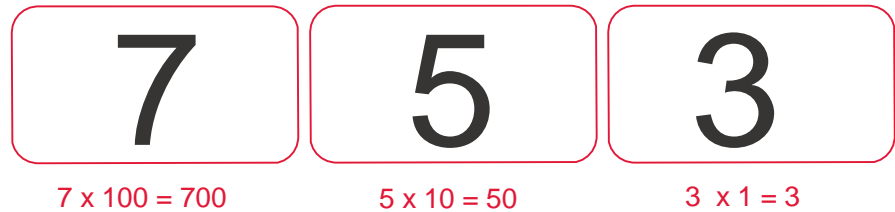
# Example of numbers in decimal/base 10



Example of Base 10 using the #

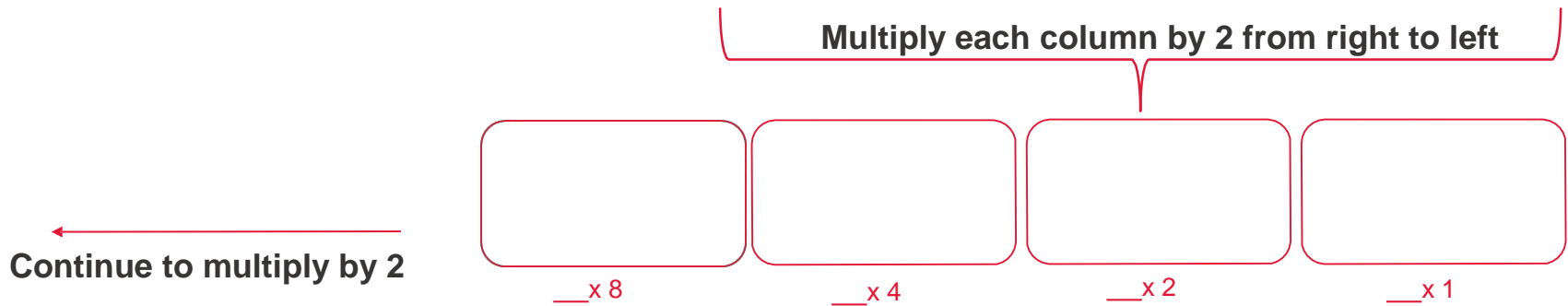
# 753

753 includes 7 in the hundreds column, 5 in the tens columns and 3 in the ones column



$$700 + 50 + 3 = 753$$

# Example of numbers in binary/base 2



# Let's count to 10 in binary!

<b>1</b>	0	0	0	1	$(0 \times 8) + (0 \times 4) + (0 \times 2) + (1 \times 1) = 1$	<b>6</b>	0	1	1	0	$(0 \times 8) + (1 \times 4) + (1 \times 2) + (0 \times 1) = 6$
<b>2</b>	0	0	1	0	$(0 \times 8) + (0 \times 4) + (1 \times 2) + (0 \times 1) = 2$	<b>7</b>	0	1	1	1	$(0 \times 8) + (1 \times 4) + (1 \times 2) + (1 \times 1) = 7$
<b>3</b>	0	0	1	1	$(0 \times 8) + (0 \times 4) + (1 \times 2) + (1 \times 1) = 3$	<b>8</b>	1	0	0	0	$(1 \times 8) + (0 \times 4) + (0 \times 2) + (0 \times 1) = 8$
<b>4</b>	0	1	0	0	$(0 \times 8) + (1 \times 4) + (0 \times 2) + (0 \times 1) = 4$	<b>9</b>	1	0	0	1	$(1 \times 8) + (0 \times 4) + (0 \times 2) + (1 \times 1) = 9$
<b>5</b>	0	1	0	1	$(0 \times 8) + (1 \times 4) + (0 \times 2) + (1 \times 1) = 5$	<b>10</b>	1	0	1	0	$(1 \times 8) + (0 \times 4) + (1 \times 2) + (0 \times 1) = 10$

# Now – calculate your age in binary!

Your age in decimal = \_\_\_\_\_

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>				
(__ x 16)	+	(__ x 8)	+	(__ x 4)	+	(__ x 2)	+	(__ x 1)

If you are 20 or under, you can use the following charts to check your work.

# Decimal to binary chart 0 to 10

DECIMAL VALUE	BINARY VALUE
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001
10	1010



# Decimal to binary 11 to 20

DECIMAL VALUE	BINARY VALUE
11	1011
12	1100
13	1101
14	1110
15	1111
16	10000
17	10001
18	10010
19	10011
20	10100



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