



COMPUTER SYSTEMS FUNDAMENTALS (4COSC004W)

Week 1. Part 1 of 2



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THE NATURE OF NUMBERS

Positional number systems

By the end of this video, you will:


- Understand the concept of Positional Number Systems
- Be able to count and interpret natural numbers
 - *Positive (unsigned) Integers*
- Understand the following number systems:
 - *Decimal / Denary – Base 10*
 - *Binary – Base 2*
- Be able to count in Binary

Decimal / Denary – Base 10

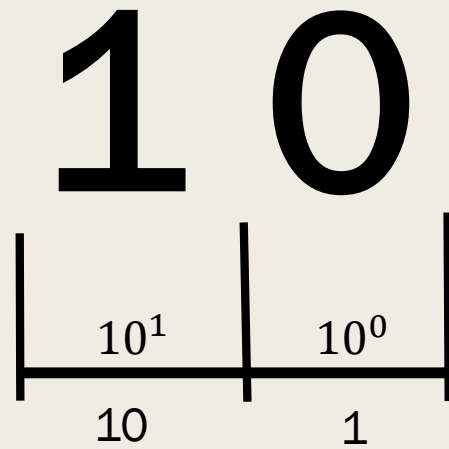
10

Decimal / Denary – Base 10

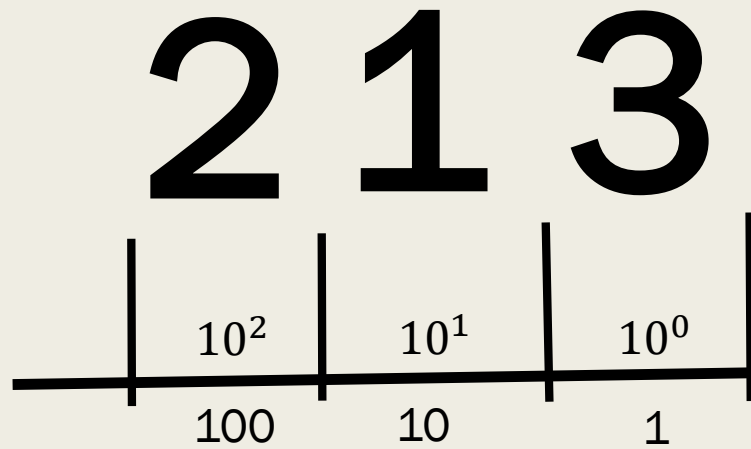
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Decimal / Denary – Base 10



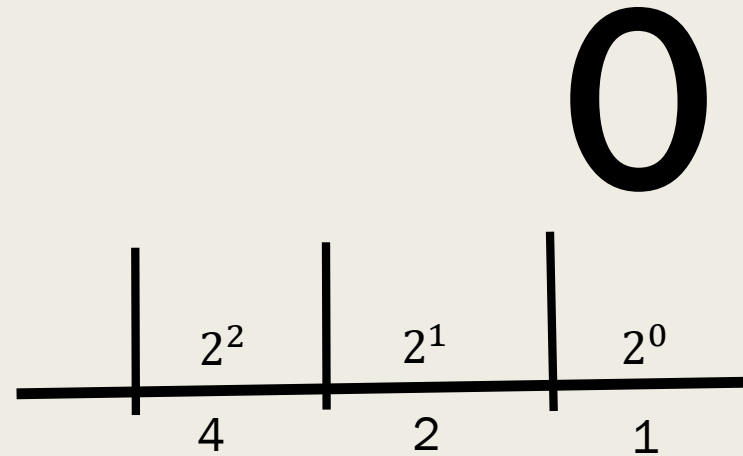
Decimal / Denary – Base 10



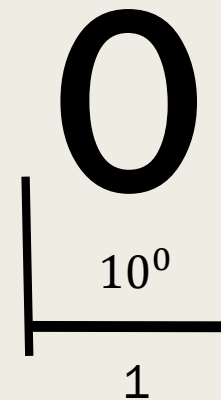
Binary : Why use Binary?

- Base 10 is convenient for humans.
- Binary is used for Digital systems
 - *On/Off*
- We will revisit this

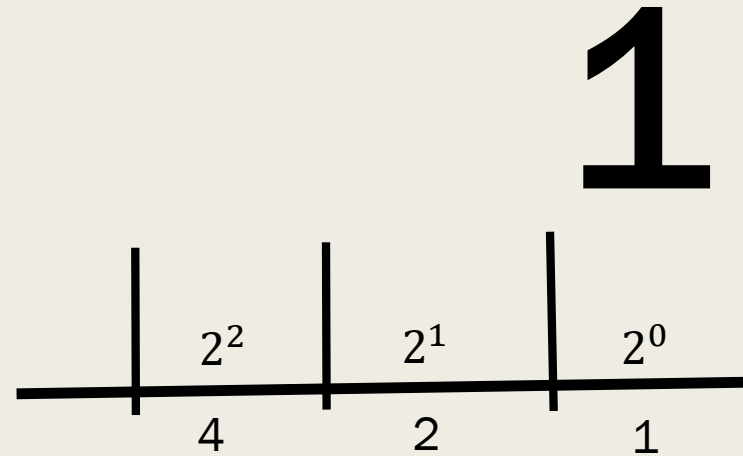
Base 2
Binary



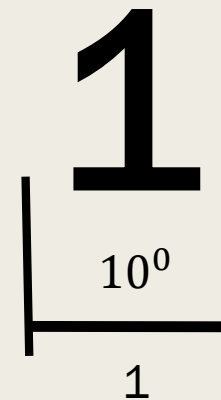
Base 10
Denary



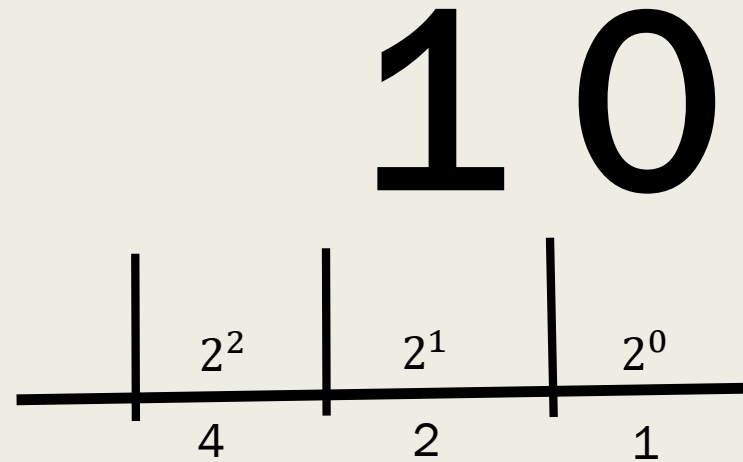
Base 2 Binary



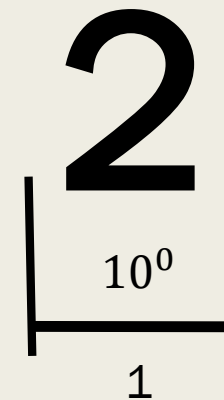
Base 10 Denary



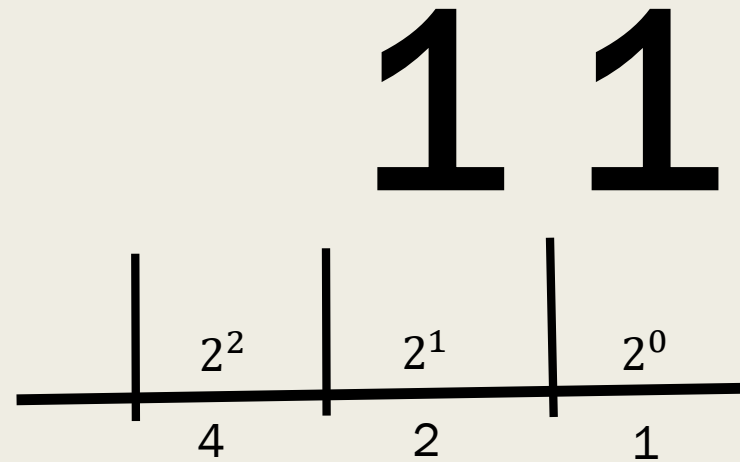
Base 2
Binary



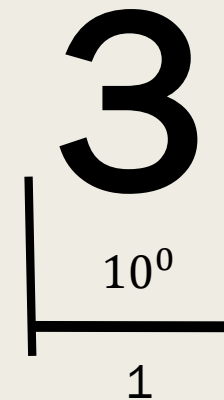
Base 10
Denary



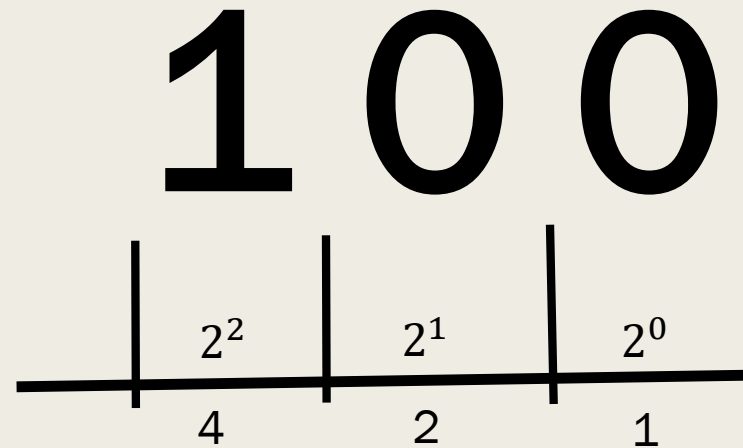
Base 2
Binary



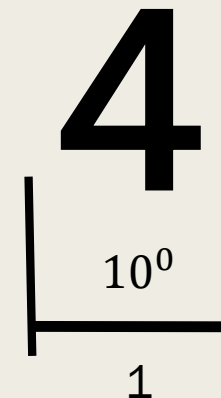
Base 10
Denary



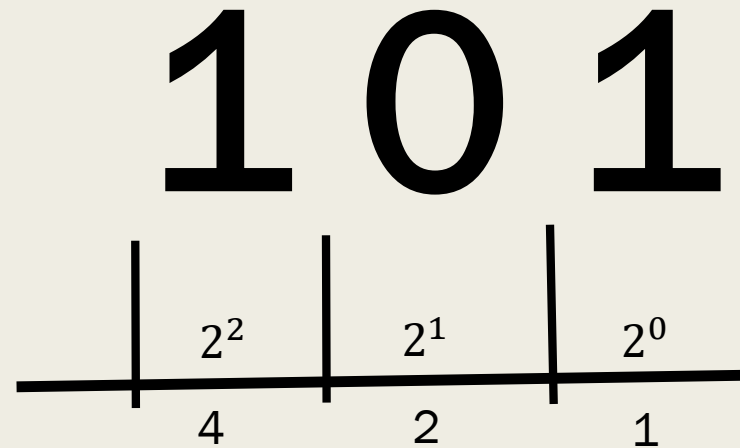
Base 2
Binary



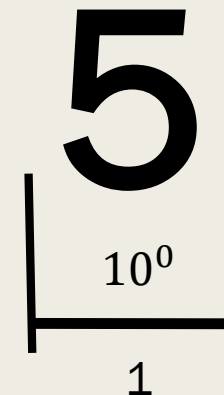
Base 10
Denary



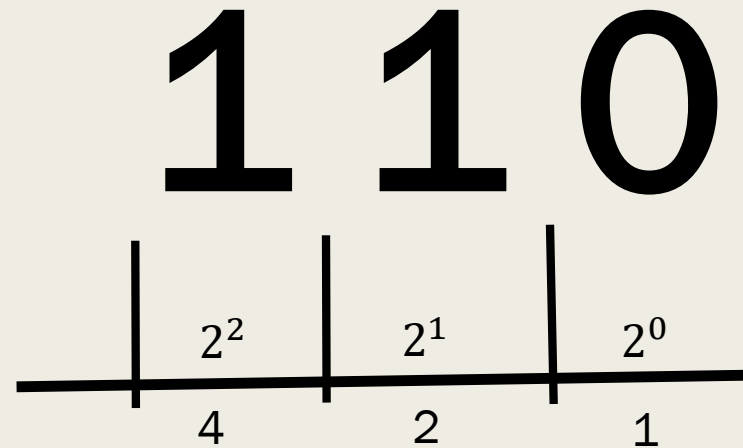
Base 2
Binary



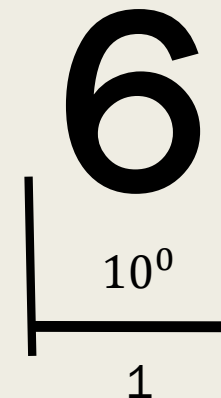
Base 10
Denary



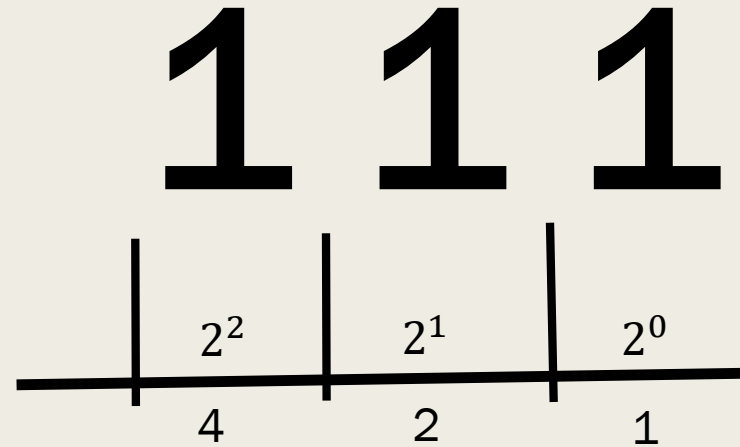
Base 2
Binary



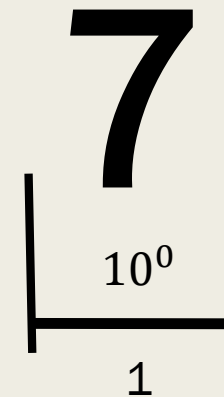
Base 10
Denary



Base 2
Binary

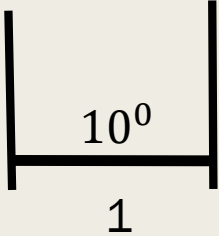


Base 10
Denary



Base 10
Denary

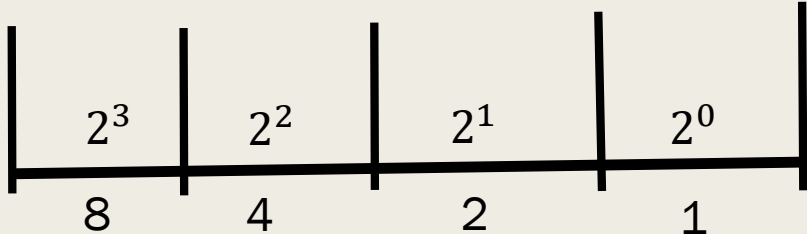
8



The diagram shows the number 8 positioned above a horizontal line. Below this line is a vertical line on the left and another on the right, forming a U-shape. Inside this U-shape, the text 10^0 is written. Below the horizontal line, the number 1 is centered.

Base 2
Binary

1000

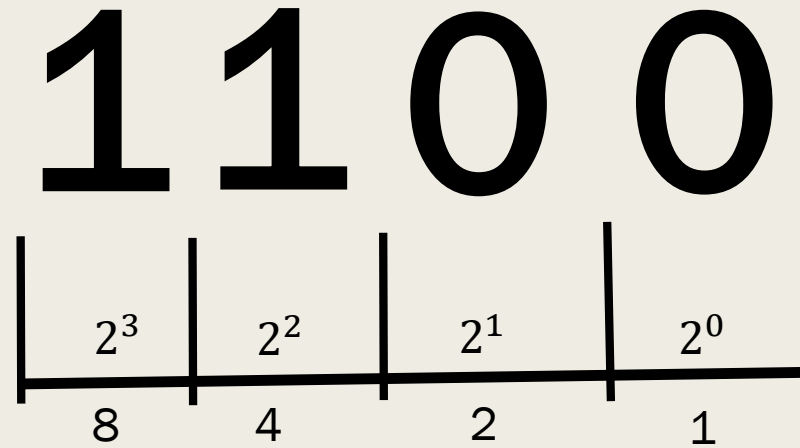


The diagram shows the binary number 1000 positioned above a horizontal line. Below this line are four vertical lines, dividing the space into four equal sections. Below each section, the powers of 2 are written: 2^3 , 2^2 , 2^1 , and 2^0 . Below these, the corresponding decimal values are written: 8, 4, 2, and 1.

An exercise for you:

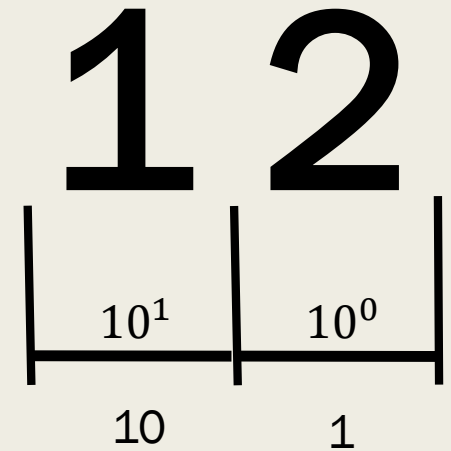
Convert the 4-bit **Binary** value **1100** into **Denary**:

Base 2
Binary



Base 10
Denary

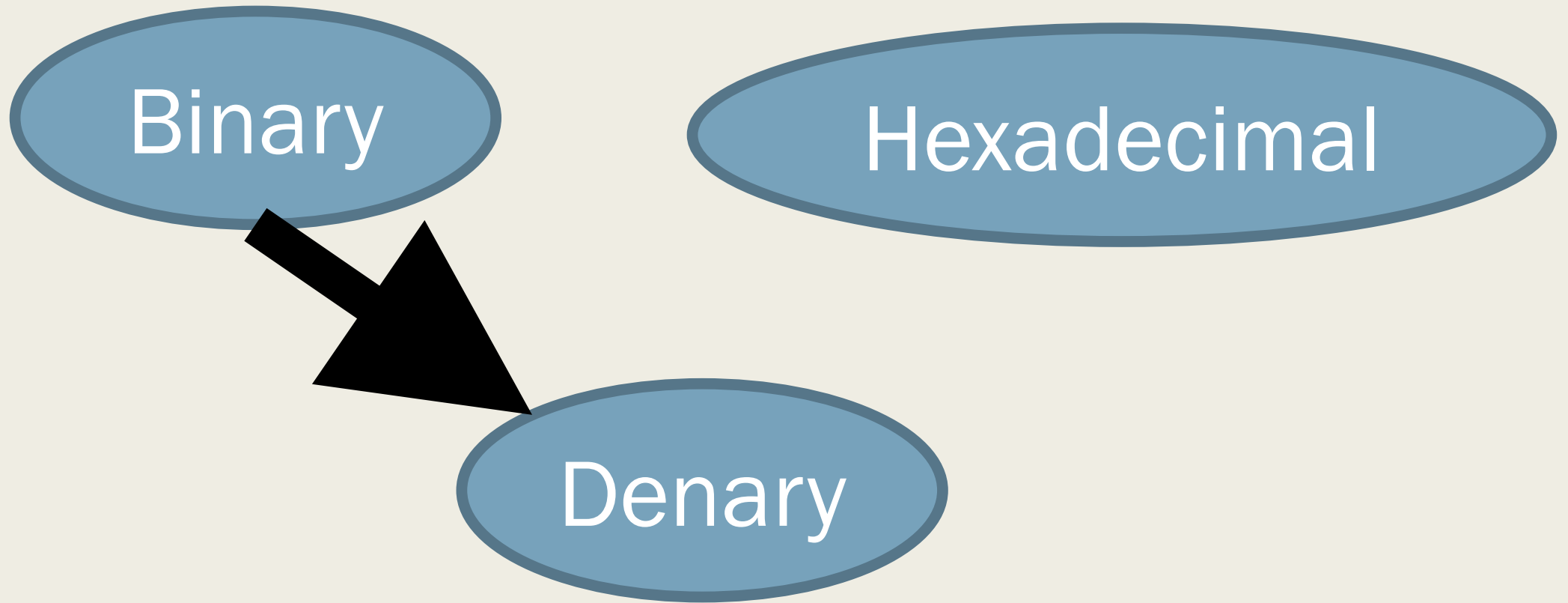
$$8 + 4 = 12$$



Tutorial exercise:

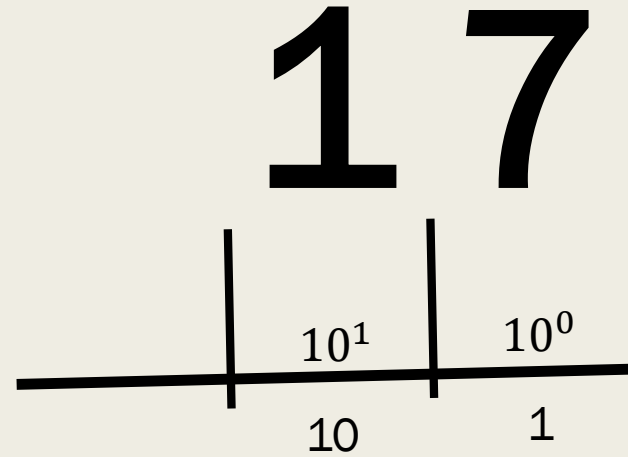
- This will provide you with more 4-bit Binary Nibbles to convert to Denary

Number System Triangle

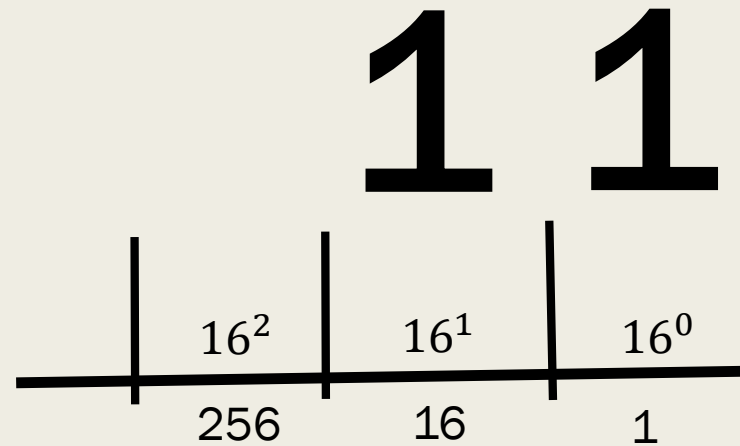


Denary	Binary				Hexadecimal
0	0	0	0	0	0
1	0	0	0	1	1
2	0	0	1	0	2
3	0	0	1	1	3
4	0	1	0	0	4
5	0	1	0	1	5
6	0	1	1	0	6
7	0	1	1	1	7
8	1	0	0	0	8
9	1	0	0	1	9
10	1	0	1	0	A
11	1	0	1	1	B
12	1	1	0	0	C
13	1	1	0	1	D
14	1	1	1	0	E
15	1	1	1	1	F

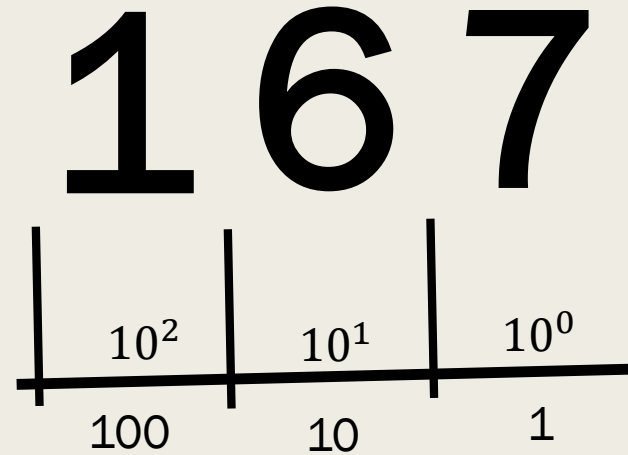
Base 10
Denary



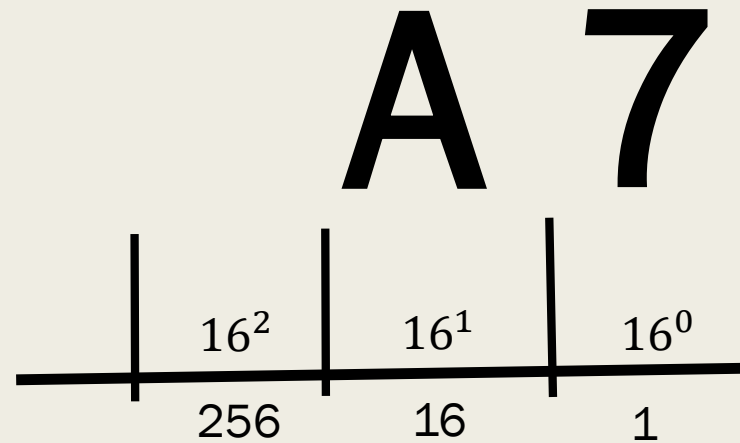
Base 16
Hexadecimal



Base 10
Denary



Base 16
Hexadecimal



In this video we have covered:

- Positional Number Systems
- Positive (unsigned) Integers
 - *Decimal / Denary – Base 10*
 - *Binary – Base 2*
 - *Hexadecimal – Base 16*

In the next video we will cover:

- Converting Denary to Binary

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