

O-Level Computer Science P1 & P2 Notes

First Edition

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SISA

KIMS

ROOTS

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Topic 1 :
NUMBER SYSTEMS

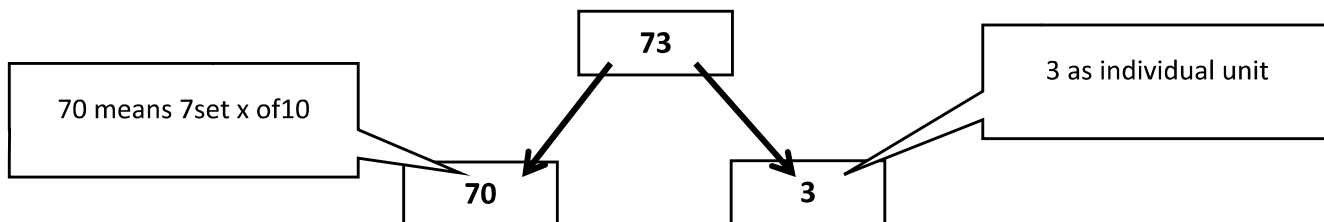
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Introduction

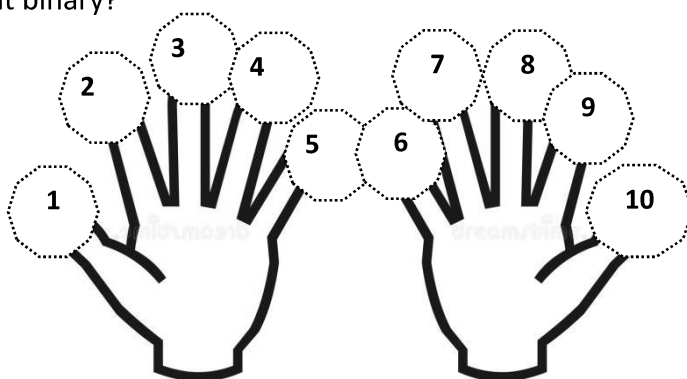
The whole number system resolves around three components.

- Denary System
- Binary System
- Hexadecimal

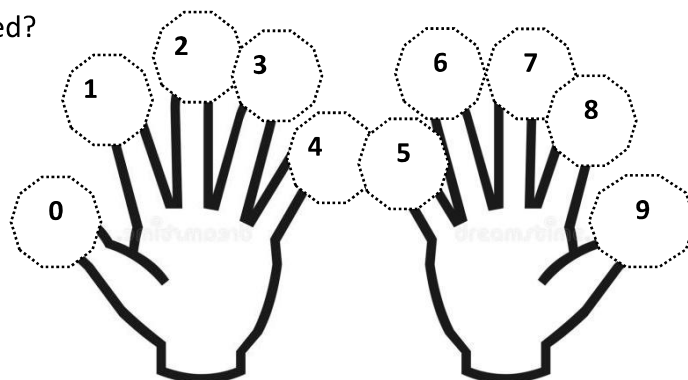
Denary System: We humans are familiar to denary system which is based on base 10. Which means count/set of 10 will be used.



How we human invent binary?



How digits are formulated?



BINARY SYSTEM: is based on the Base 2. Which means only two values 0 and 1 can be used in this system to represent each digit. All machines and devices and circuitry used binary as a main source to implement human commands to do task for them.

Concept of 8 bit:

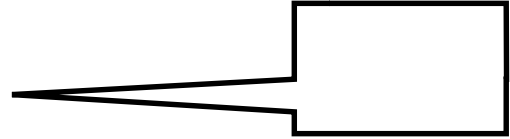
8 bit is the Smallest unit used in computer either its memory or its data storage let's see its scale

Storage Scale

| |
|------------------------------------|
| 8bits = 1 byte = 1 character e.g A |
| 1024 bytes = 1KB |
| 1024 MB = 1MB |
| 1024 MB = 1GB |
| 1024GB = 1TB |

Let's take 8 boxes as eight bit and calculate its location

| | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
| 2^7 | 2^6 | 2^5 | 2^4 | 2^3 | 2^2 | 2^1 | 2^0 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |



Let's Calculate 40 into binary

| | | | | | | | |
|--------------------------|--------------------------|-------|--------------------------|-------|--------------------------|--------------------------|--------------------------|
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
| 2^7 | 2^6 | 2^5 | 2^4 | 2^3 | 2^2 | 2^1 | 2^0 |
| <input type="checkbox"/> | <input type="checkbox"/> | 1 | <input type="checkbox"/> | 1 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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

Re calculation:

| | | | | | | | |
|-----|----|----|----|---|---|---|---|
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
| 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| 0 | 0 | 32 | 0 | 8 | 0 | 0 | 0 |
| =40 | | | | | | | |



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Conversion into Denary

Let's take the previous examples into account

| | | | | | | | |
|-----|----|----|----|---|---|---|---|
| 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |

We will add the values beneath 1s

In this case

$$128 + 16 + 2 = (146)_{10}$$

Another example

| | | | | | | | |
|-----|----|----|----|---|---|---|---|
| 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 |
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |

We will add the values beneath 1s

In this case

$$128 + 16 + 32 + 4 + 1 = (181)_{10}$$

Convert other examples by yourself

