ODM EDUCATIONAL GROUP
Changing your Tomorrow

NUMBER SYSTEM

CLASS VII

CH-1 PERIOD -2

Website: www.odmegroup.org
Email: info@odmps.org
Toll Free: **1800 120 2316**
Sishu Vihar, Infocity Road, Patia, Bhubaneswar- 751024

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Learning Outcomes

- Learn to convert decimal to octal and vice versa
- Learn about the octal number
- Learn about the Hexadecimal no and reason why it is named as hexadecimal
- Learn to convert decimal to hexadecimal and vice versa.

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OCTAL NUMBER SYSTEM

The Octal number system (Oct) consists of 8 digits: 0 to 7 with the base 8. The concept of Octal number system came from the Native Americans as they used to count numbers by using the space between their fingers rather than using their fingers. The procedure of 'octal to decimal' conversion is similar to 'binary to decimal' conversion, the only difference is the change of base. So, if we want to convert any octal number to decimal number, we have to start multiplying the digits of the number from right hand side with the increasing power of 8 starting from 0. And finally summing up all the products.

Example 1:

$(345)_8$

$(3 \times 8^2) + (4 \times 8^1) + (5 \times 8^0)$

$192 + 32 + 5$

Thus $(345)_8 = (229)_{10}$

Example 2:

$(317)_8$

$(3 \times 8^2) + (1 \times 8^1) + (7 \times 8^0)$

$192 + 8 + 7$

Thus $(317)_8 = (207)_{10}$

HEXADECIMAL NUMBER SYSTEM

This number system consists of 16 digits: 0–9 and the letters A–F, where A-F represents digits 10 to 15 with the base 16. This number system is also known as Hex, where Hex=6 and Decimal=10, so it is called **Hexadecimal**. The procedure of converting hexadecimal to decimal is similar to the methods shown above, the only difference is the change of base. To convert hexadecimal number to decimal, multiply the number with base 16.

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Hex	Decimal Value
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

Hex	Decimal Value
10	A
11	B
12	C
13	D
14	E
15	F

4 bits = 1 nibble
2 nibbles = 8 bits
8 bits = 1 byte

Let's Discuss

Why do we use Binary Number system in computers?

Example 1:

$(3B)_{16}$

$(3 \times 16^1)+(11 \times 16^0)$

$48 + 11$

Thus $(3B)_{16} = (59)_{10}$

Example 2:

$(4D2)_{16}$

$(4 \times 16^2) + (D \times 16^1) + (2 \times 16^0)$

$1024 + 208 + 2$

Thus $(4D2)_{16} = (1234)_{10}$

Let's Know More

Most computer operations use the byte, or a multiple of the byte (16 bits, 24, 32, 64, etc). Hexadecimal makes it easier to write these large binary numbers.

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recap

- The base of octal no is 8 because it consist of eight digit 0 to 7
- The conversion of decimal to octal procedure is same as you have only use the base of octal as 8.
- The base or radix of hexadecimal no is 16 as it use 16 digit 0 to 15 where first 10 digit is 0 to 9 which is decimal and 10 to 15 is called hex as 10 is A, 11is B, !2 is C, 13 is D, 14 is E, 15 is F
- Decimal to hexadecimal conversion is same decimal to binary only change is base.

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ASSIGNMENT

- Convert the following binary numbers to octal form.
  1. 10110100_2

2. 110001_2

Convert the following binary numbers to hex form.

- Q.1) 1010001100

2. 100111011111

Convert the following decimal numbers to hex form.

1. **$(345)_{10}$=(------)$_{16}$**

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THANKING YOU

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