

In python integer values or literals are represented in 4 formats

1. Decimal integer
2. Octal Integer
3. Hexadecimal integer
4. Binary integer

Decimal, octal, hexadecimal and binary are called number system in python.

Number system defines set of rules and regulations for representing numbers in computer science.

Decimal Integer

An integer value with base 10 is called decimal integer.

This integer is created using digits range from 0-9

This integer is prefix with + or –

This integer should not start with 0

It is default representation of integer value

```
>>> n1=56
>>> type(n1)
<class 'int'>
>>> n1
56
>>> rollno=125
>>> type(rollno)
<class 'int'>
>>> rollno
125
>>> n2=0126
```

SyntaxError: leading zeros in decimal integer literals are not permitted; use an 0o prefix for octal integers

```
>>> n3=+45
>>> n4=-45
>>> type(n3)
<class 'int'>
>>> type(n4)
<class 'int'>
>>> n3
45
>>> n4
```

-45

Octal integer

An integer value with base 8 is called octal integer

This integer is created using digits range from 0-7

This integer is prefix with 0o or 0O

Where octal integers are used,

1. Assembly language
2. Integer where 8 and 9 digits not allowed (Operating system permissions)

Decimal to Octal	Octal to Decimal
$(28)_{10} \longrightarrow (0O34)_8$ <p>A division diagram for converting decimal 28 to octal 34. It shows 28 divided by 8, with a quotient of 3 and a remainder of 4. The quotient 3 is then divided by 8, resulting in a final remainder of 3. The remainders are read from bottom to top to form the octal number 34.</p>	$(0O34)_8 \longrightarrow (28)_{10}$ $8^0 \times 4 + 8^1 \times 3 = 4 + 24$ $(0O11)_8 \longrightarrow (9)_{10}$ $8^0 \times 1 + 8^1 \times 1$ $1 + 8 = 9$
$(9)_{10} \longrightarrow (0O11)_8$ <p>A division diagram for converting decimal 9 to octal 11. It shows 9 divided by 8, with a quotient of 1 and a remainder of 1. The quotient 1 is then divided by 8, resulting in a final remainder of 1. The remainders are read from bottom to top to form the octal number 11.</p>	

```
>>> n1=0o75
>>> n1
61
>>> n2=0o11
>>> n2
>>> n3=0o78
SyntaxError: invalid digit '8' in octal literal
>>> n3=0o99
SyntaxError: invalid digit '9' in octal literal
>>> n4=0o4
>>> n4
4
>>> n5=0o25
>>> n5
```

```

21
>>> a=0o11
>>> b=0o12
>>> c=a+b
>>> c
19
>>> a
9
>>> b
10
>>> type(a)
<class 'int'>
>>> type(b)
<class 'int'>

```

Hexadecimal Integer

An integer value with base 16 is called hexadecimal integer
 This integer is created using digits range from 0-9,A-F/a-f
 This integer is prefix with 0x or 0X.

Where hexadecimal integer values are used,

1. Larger values are represented in hexadecimal format
2. Color Values
3. UNICODE values
4. Memory Addresses

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
										A	B	C	D	E	F
(42) ₁₀										(2A) ₁₆					
	16	42													
	16		2	10											
	16				2										
(255) ₁₀										(FF) ₁₆					
	16	255													
	16		15	15											
	16				15										

```
>>> a=0x9
```

```
>>> a
```

```
9
```

```
>>> b=0x1
```

```
>>> b
```

```
1
```

```
>>> a=0xA  
>>> a  
10  
>>> b=0xB  
>>> b  
11  
>>> c=0xD  
>>> c  
13  
>>> d=0xab  
>>> d  
171  
>>> e=0xg1  
SyntaxError: invalid hexadecimal literal  
>>> f=0X1f  
>>> f  
31
```

Binary integer

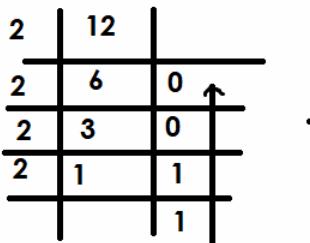
An integer value with base 2 is called binary integer

Binary integer is created using two digits 0,1

Binary integer is prefix with 0b or 0B

Where binary integer are used,

1. Embedded Applications (Logic Gates)
2. Images Processing
3. Audio Processing
4. Video Processing

Decimal to Binary	Binary to Decimal
$(12) \frac{10}{2} = (0b1100)_2$ 	$(0b1100)_2 = (12)_{10}$ $2^0 \times 0 + 2^1 \times 0 + 2^2 \times 1 + 2^3 \times 1 \\ 0+0+4+8=12$

```
>>> a=0b1100
```

```
>>> a
```

```
12
```

```
>>> b=0b101
```

```
>>> b
```

```
5
```

```
>>> c=0b1010
```

```
>>> c
```

```
10
```

Base Conversion functions

Base conversion functions are predefined functions provided by python, to convert base on one number to another

1. Oct()
2. Hex()
3. Bin()

Oct(value) → This function return octal representation of integer value

Hex(value) → This function return hexadecimal representation of integer value

Bin(value) → This function return binary representation of integer value

Example:

```
>>> oct(9)
```

```
'0o11'
```

```
>>> oct(0xA)
```

```
'0o12'
```

```
>>> oct(0b1010)
'0o12'
>>> hex(10)
'0xa'
>>> hex(15)
'0xf'
>>> hex(255)
'0xff'
hex(177)
'0xb1'
>>> hex(0b1010)
'0xa'
>>> bin(10)
'0b1010'
>>> bin(5)
'0b101'
>>> bin(0xA)
'0b1010'
>>> bin(0xb)
'0b1011'
```

float data type