Identifiers

What is identifier?
Identifier is a user defined word.
This word is used to identify programming elements

1. Variables
2. Function
3. Data types
4. Program/module
5. Package-name

Identifier is user defined word which is created using alphabets (a-z, A-Z),0-9 and allows one special characters _

Rules for defining identifiers
1. Identifier should not be keyword

```
>>> pass=100
SyntaxError: invalid syntax
>>> rollno=101
>>> studentname="naresh"
>>> radious=1.5
>>> break=1
SyntaxError: invalid syntax
>>> class=100
SyntaxError: invalid syntax
>>> PASS=1
>>> PASS
1
```

2. Identifier should not start with digit

```
>>> number1=10
>>> 2number=20
SyntaxError: invalid decimal literal
>>> x1=10
>>> 2x=20
SyntaxError: invalid decimal literal
```

3. There should not any space between identifier

```
>>> student rollno=1
SyntaxError: invalid syntax
>>> radious of circle is=1
SyntaxError: invalid syntax
```

4. Identifier allows one special character _

```
>>> _amt=1
>>> amt_=100
>>> _=1000
>>> __=2000
>>> student_rollno=1
```

5. The maximum length of identifier is unlimited

```
>>> aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa=100
>>> aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa
100
```

6. Identifier can be given in uppercase or lowercase

```
>>> PI=3.147
>>> pi=3.14
>>> PI
3.147
>>> pi
3.14
```

Data Types and Literals

What is literal?
A literal is nothing value or constant value which never changed

What is data type?
Data types are used to represent data in memory.
Data types are used to allocate memory for data or reserve space for data inside main memory (RAM)
Data types are used to allocate memory for literals.

What is variable?
Variable is an identifier, which is used to identify value
Variable is a named memory location
Variable is container which contains value.
The value of variable can be changed.

Python data types are classified into 2 categories
1. Scalar Data types
2. Collection Data types (OR) Data Structures

Scalar data types

Scalar data types reserve memory for single value or one value
Python support 5 scalar data types
1. Int
2. Float
3. Complex
4. Boolean
5. NoneType

Collection data types
Collection data types are used to represent more than one value
Every collection type is used one data structure for organizing data in memory.
Python collection types are divided into 3 types

1. Sequences
    a. List
    b. Tuple
    c. Range
    d. String
    e. Byte
    f. bytearray
2. Sets
    a. Set
    b. frozenset
3. Mapping
    a. Dictionary

Python support 14 standard data types

Python is a dynamically typed language; the type of variable is not fixed. Variable type changes based on value.

```
>>> a=10
>>> a
10
>>> type(a)
<class 'int'>
>>> a=1.5
>>> a
1.5
>>> type(a)
<class 'float'>
>>> int a
SyntaxError: invalid syntax
```

Note: every data type in python is a "class" and data is represented as object. Python is object oriented programming language.

int data type

int data type is used to represent integer values in memory.

What is integer value?
An integer is numeric value without decimal place or fractional part.
Example: whole numbers, even numbers, odd numbers,…

In python integer values are represented in 4 formats.

1. Decimal

2. Octal
3. Hexadecimal
4. Binary

Decimal, Octal, Hexadecimal and binary are called number system

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

```
>>> n1=45
>>> n2=4800
>>> n3=+12
>>> n4=-89
>>> n5=0123
SyntaxError: leading zeros in decimal integer literals are not
permitted; use an 0o prefix for octal integers
>>> rollno=123
>>> otp=4567
>>> pin=9988
>>> a=10,20,30,40,50
>>> type(a)
<class 'tuple'>
>>> x=1,000
>>> type(x)
<class 'tuple'>
>>> x
(1, 0)
>>> a=1_20_500
>>> a
```

120500

While representing integer value, grouping of digits are not done
using , It allows a special character _

>>> x=10_
SyntaxError: invalid decimal literal
>>> x=1_2_3
>>> x
123

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

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

This integer is prefix with 0x or 0X

Application development hexadecimal representation is used,
1. Color Values
2. Memory addresses
3. Unicode values

If value is very big, it is represented in hexadecimal format.

>>> n1=0xA
>>> n1
10
>>> n2=0xB
>>> n2

11

```
>>> n3=0xAA
>>> n3
170
>>> n4=0x12
>>> n4
18
```

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

Decimal to Hexa	Hexa to Decimal

Decimal to Hexa

$(26)_{10}$ ——— $(0X1A)_{16}$

```
16 | 26
16 |  1  | 10
         |  1
```

Hexa to Decimal

$(0X1A)_{16}$ ——— $(26)_{10}$

$16^{0} \times A + 16^{1} \times 1$

$1 \times 10 + 16 = 26$