

Operators in Python

Operators are the symbols which provides information about the operation going to be performed using operands.

Expression :-

$$a = 4 + 9 + 3 \quad (\text{Valid})$$

$$b + 3 = 9 + 4 \quad (\text{Invalid})$$

Arithmetic Operator

- It is used to perform numeric calculation.
- It generates numeric result.

(i) Addition (+) → to add two numbers

$$\begin{array}{r} \text{Q.} \\ \hline \underline{\underline{9}} \end{array} \quad x = 4 + 9 \\ \therefore x = 13$$

ii) Subtraction (-) → to subtract two numbers.

$$\text{Q. } x = 4 - 9$$

$$\therefore x = -5$$

iii) Multiplication (*) → to multiply two numbers.

$$\text{Q. } x = 4 * 9$$

$$\therefore x = 36$$

iv) Power (***) → to calculate power of given number raised to given exponent.

Syntax :-

Variable = Base ** exponent

$$\text{Q. } x = 2 ** 6$$

$$\therefore x = 64$$

$$y = 3 ** 4$$

$$\therefore y = 81$$

(V) Division (Quotient) (/) → to calculate
Quotient after dividing first number by
second number.

$$\underline{\text{e.g.}} \quad x = 14.0 / 4$$

$$\therefore x = 3.5$$

(vi) Floor division (Integer Quotient) (//) →
to calculate integer quotient after dividing
one number by another number.

$$\underline{\text{e.g.}} \quad m = 14.0 // 4$$

$$\therefore m = 3.0$$

(vii) Modulo (Remainder) (%) → to calculate
remainder after dividing one number
by another.

$$\underline{\text{e.g.}} \quad n = 14.0 \% 4$$

$$\therefore n = 2$$

Q. Write a program to calculate volume of Sphere.

Program:-

```
#Input of radius of sphere through Keyboard  
radius = float(input("Enter radius of sphere(in cm):"))  
  
#Calculating volume of sphere  
volume = (4 * 3.14 * (radius ** 3)) / 3  
  
#to display data to user  
print("-----")  
print("----- Sphere -----")  
print("Radius =", radius, "cm")  
print("Volume =", volume, "cubic.cm")
```

Q. Write a program to input cost price of book. Then apply 20% discount on it. Calculate the price to be paid by user.

Relational Operator

- It is used to compare two data.
- It generates Boolean result (True, False)
- During comparison, left operand is compared with right operand.

(i) Greater than ($>$) \rightarrow It returns True, if left operand is greater than right operand otherwise returns False.

e.g.
=

$$45 > 86$$

False

$$105 > 95$$

True

(ii) Less Than ($<$) \rightarrow It returns True if left operand is less than right operand otherwise returns False.

e.g.
=

$$25 < 10$$

False

$$45 < 65$$

True

(iii)

Equals to ($=$) \rightarrow It returns True if both operands are equal to each other otherwise returns False.

C₉ $40 == 40$ True

$25 == 89$ False

(iv) Greater than or equals to ($>=$) \rightarrow It returns True if left operand is either greater than or equals to right operand, Otherwise returns False.

C₉ $49 >= 37$ True

$83 >= 83$ True

$87 >= 149$ False.

(v) Less than or equals to ($<=$) \rightarrow It returns True if left operand is either less than or equals to right operand otherwise returns

False.

Eg.
 $\underline{=}$ $89 \leq 105$ True

$37 \leq 37$ True

$105 \leq 93$ False

(vi) Not equals to (\neq or \neq) \rightarrow It

returns True if both operands are
not equal to each other otherwise returns
false.

Eg.
 $\underline{\underline{=}}$

$49 \neq 83$ True

$25 \neq 25$ False.

Logical operator

Whenever we are required to verify multiple conditions altogether and have to generate common result for them, then we will use logical operator.

(i) and → It returns True, if all the conditions are True.

If any condition is False, then it stops verification of remaining conditions and generates overall result False.

c.9.

			Result
$(29 > 15)$	$(43 > 65)$	$(89 > 33)$	False
True	False		

			Result
$(30 == 30)$	$(89 > 49)$	$(25 > 10)$	True
True	True	True	

ii) $\text{or} \rightarrow$ It returns False, if all the conditions are False.

If any condition becomes True, then it stops verification of remaining condition and returns overall result as True.

c.g.

$$(91 < 53) \text{ or } (83 > 45) \text{ or } (59 < 39)$$

False

True

True

$$(39 == 47) \text{ or } (59 >= 105)$$

False

False

False

Selection Construct or Conditional Statement

It is a style of program in which execution of statements depends upon the condition specified.

In Python following conditional statements are available:-

- (i) if statement
- (ii) if...else statement
- (iii) Nested if...else
- (iv) if...elif...else statement

if Statement

Whenever we are required to execute the statements only when the condition is True, but it has not been specified what to do or not if condition is False, then we will use if statement.

Syntax:-

```
if (Condition):  
    #Statement1  
    #Statement2  
    #-----
```

- If Condition is True, then if-block will be executed.
- If Condition is False, then if-block will be skipped.

Program:-

```
num1 = int(input("Enter any number:"))  
  
if(num1 > 0):  
    print(num1, " is positive")  
  
if(num1 < 0):  
    print(num1, " is negative")  
  
if(num1 == 0):  
    print(num1, " is neither positive nor negative")
```

Output:-

Enter any Number: 10

10 is positive

if...else Statement

Whenever we are required to execute some task when condition is True, Otherwise we have to execute some different task, then we will use if...else statement.

Syntax :-

```
if (condition):  
    # Statement 1  
    # Statement 2  
    - - - - -  
else:  
    # Statement 3  
    # Statement 4  
    - - - - -
```

- if Condition is True, then if-block will be executed
- if Condition is False, then else-block will be executed.

Q: Write a program to check a number is natural number or not.

Program:-

```
#input of number through Keyboard  
num = int(input("Enter any number:"))  
#verifying natural number  
if(num > 0):  
    print(num," is natural number")  
else:  
    print(num," is not natural number")
```

Output

```
Enter any number: -10  
-10 is not natural number
```

Q. Write a program to input marked price of a product. Also input quantity. If the quantity is greater than 10 then apply a discount of 20%. Otherwise apply 10% discount. Then calculate the price to paid by customer.

Program:-

```
#input of marked price through keyboard
marked_price = float(input("Enter marked price of item (in Rs):"))
#input of quantity through keyboard
quantity = int(input("Enter the quantity of item : "))
# -----
print("-----")
#initailize the discount
dicount = 0
#calculating discount as per given criteria
if(quantity > 10):
    # discount of 20%
    discount = (marked_price*quantity*20)/100
else:
    # discount of 10%
    discount = (marked_price*quantity*10)/100
# -----
#calculate price to be paid by customer
price = (marked_price*quantity) - discount
# -----
# Displaying data to the user
print("Marked price : Rs",marked_price," per Unit")
print("Quantity : ",quantity)
print("Discount : Rs",discount)
print("-----")
print("Total Price : Rs",price)|
```

Output:-

```
Enter marked price of item (in Rs):560
Enter the quantity of item : 5
-----
```

```
Marked price : Rs 560.0 per Unit
Quantity : 5
Discount : Rs 280.0
-----
```

```
Total Price : Rs 2520.0
```

Q: Write a program to input three angles and check they form a triangle or not.

```
#input of angles through keyboard
angle1 = float(input("Enter first angle : "))
angle2 = float(input("Enter second angle : "))
angle3 = float(input("Enter third angle : "))
#
#Displaying angles to the user
print("-----")
print("First Angle : ",angle1)
print("Second Angle : ",angle2)
print("Third Angle : ",angle3)
print("-----")
#verifying triangle formation
if(angle1 > 0 and angle2 > 0 and angle3 >0 and (angle1 + angle2 + angle3) == 180):
    print("These angles form a Triangle")
else:
    print("These angles do not form triangle")
```

Output :-

```
Enter first angle : 45
Enter second angle : 90
Enter third angle : 45
-----
```

```
First Angle : 45.0
Second Angle : 90.0
Third Angle : 45.0
-----
```

Nested if...else

- Whenever we are required to verify multiple dependent condition, we use Nested if...else.
- Basically Nested if...else is a process of using if...else statement inside if-block or else-block or both as per requirement.

Syntax:-

if (condition1):

if (condition2):

- - - - -

else:

- - - - -

else:

if (condition3):

- - - - -

else:

- - - - -

Q. Write a program to input three angles and check they form a triangle or not.

If they form a triangle then specify the type of triangle.

Program:-

```
#input of angles through keyboard
angle1 = float(input("Enter first angle : "))
angle2 = float(input("Enter second angle : "))
angle3 = float(input("Enter third angle : "))
#-----
#Displaying angles to the user
print("-----")
print("First Angle : ",angle1)
print("Second Angle : ",angle2)
print("Third Angle : ",angle3)
print("-----")
#verifying triangle formation
if(angle1 > 0 and angle2 > 0 and angle3 >0 and (angle1 + angle2 + angle3) == 180):
    #determining type of triangle being formed
    #Acute angled traingle
    if(angle1 < 90 and angle2 < 90 and angle3 < 90):
        print("Above angles form an Acute angled traingle")
    else:
        #Right angled triangle
        if(angle1 == 90 or angle2 == 90 or angle3 == 90):
            print("Above angles form Right angled triangle")
        else:
            print("Above angles form Obtuse angled triangle")
else:
    print("These angles do not form triangle")
```

Output:-

```
Enter first angle : 56
Enter second angle : 24
Enter third angle : 100
-----
```

```
First Angle : 56.0
Second Angle : 24.0
Third Angle : 100.0
-----
```

```
Above angles form Obtuse angled triangle
```