

Notes on Operators in Python

Operators are special symbols or keywords that perform operations on variables and values (operands). In Python, operators are fundamental for performing mathematical, logical, comparison, assignment, identity, membership, and bitwise operations.

1. Types of Operators in Python

- **Arithmetic Operators**
 - **Assignment Operators**
 - **Comparison (Relational) Operators**
 - **Logical Operators**
 - **Bitwise Operators**
 - **Membership Operators**
 - **Identity Operators**
 - **Ternary (Conditional) Operator**
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2. Arithmetic Operators

Used for basic mathematical operations:

Operator	Description	Example	Result
+	Addition	$a + b$	Sum
-	Subtraction	$a - b$	Difference
*	Multiplication	$a * b$	Product

/	Division	a / b	Quotient (float)
%	Modulus	a % b	Remainder
**	Exponentiation	a ** b	Power
//	Floor Division	a // b	Quotient (int)

Example:

```
python
a = 15
b = 4
print(a + b) # 19
print(a - b) # 11
print(a * b) # 60
print(a / b) # 3.75
print(a // b) # 3
print(a % b) # 3
print(a ** b) # 50625
```

3. Assignment Operators

Used to assign values to variables:

Operator	Example	Equivalent To
=	x = 5	x = 5
+=	x += 3	x = x + 3
-=	x -= 3	x = x - 3
*=	x *= 3	x = x * 3
/=	x /= 3	x = x / 3
%=	x %= 3	x = x % 3
//=	x //= 3	x = x // 3
**=	x **= 3	x = x ** 3

&=, =, ^=, >>=, <<=, := Various bitwise & assignment operations [w3schools+1](#)

4. Comparison (Relational) Operators

Compare values and return a Boolean result:

Operator	Description	Example
==	Equal to	a == b
!=	Not equal to	a != b
>	Greater than	a > b
<	Less than	a < b
>=	Greater than or equal to	a >= b
<=	Less than or equal to	a <= b

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5. Logical Operators

Used to combine conditional statements:

Operator	Description	Example
and	Logical AND	a and b
or	Logical OR	a or b
not	Logical NOT	not a

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6. Bitwise Operators

Operate at the bit level:

Operator	Description	Example
&	AND	a & b
		OR
^	XOR	a ^ b
~	NOT	~a
<<	Left Shift	a << 2
>>	Right Shift	a >> 2

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7. Membership Operators

Test sequence membership:

Operator	Description	Example
in	True if found	'x' in list
not in	True if not found	'x' not in list

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8. Identity Operators

Test object identity:

Operator	Description	Example
is	True if same object	a is b
is not	True if not same object	a is not b

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9. Ternary (Conditional) Operator

A compact syntax for conditional assignment:

```
python  
min = a if a < b else b
```

10. Operator Precedence & Associativity

- **Precedence:** Determines the order operations are performed in expressions.
- **Associativity:** Determines the direction (left-right or right-left) for operators with the same precedence.

Example:

```
python  
result = 10 + 20 * 30 # Output: 610 (multiplication before addition)
```
