

# Python Operators

Review arithmetic, comparison, assignment, and other Python operators with this short e-book!

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## Addition

Can be used to add numbers (integers or floats) or join (concatenate) strings.

```
44 + 19.5 # 63.5
```

```
"My name is " + "James" # My name is James
```

You cannot add strings and numbers together!

```
"The correct number is" + 5  
# TypeError: can only concatenate str (not "int") to str
```

## Subtraction

Can be used mathematically, between integers and floats:

```
93.1 - 50 # 43.1
```

You can also subtract sets to return elements of `set_1` that aren't in `set_2`:

```
set_1 = {3, 6, 9, 7, 5}
set_2 = {3, 6, 9, 95}

set_difference = set_1 - set_2 # {5, 7}
```

## Multiplication

Has the typical arithmetic use.

```
8 * 5 # 40
```

Multiplying most data types usually duplicates their contents.

```
"Hello " * 2 # Hello Hello
[100] * 2 # [100, 100]
(100, 1) * 2 # (100, 1, 100, 1)
```

## Division

Can be true division, which always results in a float.

```
30 / 2 # 15.0
30.5 / 2 # 15.5
```

Or floor division, which always rounds down to the nearest whole number.

```
30.5 // 2 # 15.0
```

## Modulo

- Based on Euclidean division (see ref #2 below).
- Start with a dividend and a divisor.
- Used to get the remainder of the division between both operands.

```
10 % 3 # 1
9 % 3 # 0
8 % 3 # 2
```

## Exponentiation

Raises the first operand to the power of the second operand.

```
2 ** 3 # 2 * 2 * 2 == 8
```

### Extra Resources

1. [How do mathematics work in Python?](#)
2. [Python's modulo operator and floor division](#)
3. [Python's divmod function](#)

## Comparison operators

### Equal

Used to compare two values. They can be numbers, strings, or anything else.

```
4 == 4 # True
4 == 5 # False
"Hello" == "Hello" # True
"Hello" == "HELLO" # False
(100, 50) == 50 # False
(100, 50) == (500, 219) # False
```

### Not equal

The opposite of `==`.

```
4 != 4 # False
4 != 5 # True
```

### Greater than

### Less than

```
10 > 10 # False
11 > 10 # True

10 < 10 # False
9 < 10 # True
```

### Greater than or equal to

### Less than or equal to

```
10 >= 10 # True
10 <= 10 # True
```

## Assignment operators

Operator	Example	Explanation
=	<code>var = 2</code>	Makes var equal to the value 2.
+=	<code>var += 2</code>	Adds 2 to var.
-=	<code>var -= 2</code>	Subtracts 2 from var.
*=	<code>var *= 2</code>	Multiplies var by 2.
**=	<code>var **= 2</code>	Elevates var to the power of 2.
/=	<code>var /= 2</code>	Divides var by 2.
//=	<code>var //= 2</code>	Divides var by 2 using floor division.
%=	<code>var %= 2</code>	Calculates the remainder of var / 2.

### Extra Resources

1. [Conditionals and Booleans](#)

# Logic Operators

## And

Returns the first value if it evaluates to **False**, otherwise it returns the second value.

Statement	Result
True and True	True
True and False	False
False and False	False
False and True	False

## Or

Returns the first value if it evaluates to **True**, otherwise it returns the second value.

Statement	Result
True or True	True
True or False	True
False or False	False
False or True	True

## Not

Returns **True** if the operand evaluates to **False**, or **False** if it evaluates to **True**.

Statement	Result
not True	False
not False	True

# Identity operators

## is

Returns **True** if the operands have the same identity (i.e. are exactly the same value).

```
users = ['James', 'Charlie', 'Ana']
print(id(users)) # 2425142160952

users_copy = users
print(id(users_copy)) # 2425142160952

print(users_copy is users) # True

users_copy = ['James', 'Charlie', 'Ana']
print(id(users_copy)) # 2425142558551

print(users_copy is users) # False
```

Above, **users\_copy is users** returns **False** because although the two lists have the same values inside them, they are not the same list.

## is not

Returns **True** if the operands don't have the same identity.

```
users = ['James', 'Charlie', 'Ana']
print(id(users)) # 2425142160952

users_copy = users
print(id(users_copy)) # 2425142160952

print(users_copy is not users) # False

users_copy = ['James', 'Charlie', 'Ana']
print(id(users_copy)) # 2425142558551

print(users_copy is not users) # True
```

## Extra Resources

1. [Logical comparisons in Python: and & or](#)

## Membership operators

### in

Returns **True** if an element exists inside an object.

```
users = ['James', 'Charlie', 'Ana']  
print("Johnny" in users) # False
```

### not in

Returns **True** if an element does not exist inside an object.

```
users = ['James', 'Charlie', 'Ana']  
print("Johnny" not in users) # True
```