Operators and Conditionals

1. Operators in Python

Operators are **symbols that perform operations** on variables and values. Think of them as “actions” you can do on data.

A. Arithmetic Operators

Used for basic math:

Operator	Example	Meaning
`+`	`5 + 3`	Addition
`-`	`5 - 3`	Subtraction
`*`	`5 * 3`	Multiplication
`/`	`5 / 3`	Division (float)
`//`	`5 // 3`	Floor division (integer)
`%`	`5 % 3`	Modulus (remainder)
`**`	`5 ** 3`	Exponentiation (power)

Example:

```
a = 10
b = 3

print(a + b)  # 13
print(a - b)  # 7
print(a * b)  # 30
print(a / b)  # 3.3333
print(a // b) # 3
print(a % b)  # 1
print(a ** b) # 1000
```

B. Comparison Operators

Used to **compare values**; result is always `True` or `False`.

Operator	Example	Meaning
`==`	`5 == 5`	Equal to
`!=`	`5 != 3`	Not equal to
`>`	`5 > 3`	Greater than
`<`	`5 < 3`	Less than
`>=`	`5 >= 5`	Greater or equal
`<=`	`5 <= 3`	Less or equal

Example:

```
x = 10
y = 20

print(x == y)  # False
print(x != y)  # True
print(x < y)   # True
print(x >= y)  # False
```

C. Logical Operators

Used to combine conditions.

Operator	Meaning	Example
`and`	True if both True	`(x > 5 and y > 10)`
`or`	True if any True	`(x > 5 or y > 30)`
`not`	Reverse boolean	`not(x > 5)`

Example:

```
x = 10
y = 20

print(x > 5 and y > 10)  # True
```

```
print(x > 5 or y < 10)   # True
print(not(x > 5))        # False
```

2. Conditionals (if-else statements)

Conditionals let your program **make decisions**.

Syntax:

```
if condition:
    # code runs if condition is True
elif another_condition:
    # code runs if this is True
else:
    # code runs if all above are False
```

Example:

```
age = 17

if age >= 18:
    print("You are an adult.")
else:
    print("You are a minor.")
```

With multiple conditions:

```
marks = 75

if marks >= 90:
    print("Grade A")
elif marks >= 75:
    print("Grade B")
elif marks >= 50:
    print("Grade C")
```

```
else:
    print("Fail")
```

Here's what happens:

- Python checks conditions **top to bottom**.
- First condition that is `True` runs.
- If none are true, `else` runs.

Mental Model

1. **Operators** = tools to **do things with data** (math, compare, combine).
2. **Conditionals** = let your program **choose paths** based on conditions.
3. Think: "If this is true, do this; otherwise, do something else."

Mini Exercise

1. Create two variables: `num1` and `num2`.
2. Print the **sum, difference, product, division**.
3. Use an **if-else statement** to check if `num1` is greater than `num2`.
4. Print `"num1 is greater"` or `"num2 is greater or equal"` accordingly.