1. Indentation

Indentation refers to space at the beginning of a code line. In other programming languages indentation is used for easier reading, but in Python it is **very important** because it **indicates a block of code**.

Wrong

```
if 5 > 2:
#This belongs to IF statement block
#of code
print ("Five is greater than two")
#This doesn't belong to the IF
#statement block of code
```

Correct

```
if 5 > 2:
    #This belongs to IF statement block
    #of code
    print ("Five is greater than two")
#This doesn't belong to the IF
#statement block of code
```

2. Comments

Comments can be used for explaining the code. They make code more readable. **A comment starts with # symbol**.

```
#This is a comment
print("Hello, World!")
```

If a comment is placed at the end of the line, Python will **ignore everything after** the comment if it is in the same line

```
print("Hello, World!") #This is a comment
```

We can use a multiple line comment by using 3 quotation symbols (""") and the beginning and 3 quotation symbols (""") at the end of the comment.

```
"""
This is a comment
written in
more than just one line
"""
print("Hello, World!")
```

3. Variables

Variables are containers for **storing data values**. Python doesn't have any command for declaring variables. A variable is created the moment we assign the value to it.

```
x = 5
y = "John"
```

A variable can have a **short name** (1 letter) or more **descriptive name** (`age`, `carname`, `total_volume`)
Rules for Python variables:

- A variable must start with a letter or underscore
- A variable can not start with a number
- A variable name can only contain alpha-numeric characters and underscores (A-z, 0-9, _)
- Variable names are case-sensitive (age, Age, AGE, agE, aGe are all different)

```
#Correct names
myVar = "John"
my_var = "John"
_my_var = "John"
myVar = "John"
```

```
#Incorrect names
2myvar = "John"
my-var = "John"
my var = "John"
```

4. Data types

Data type is an important concept in programming because **it defines the data** that is **stored** in the **variable**. Variables can store data of different types, and **different types can do different things**.
Example of data types:

Text Type:	`str`
Numeric Types:	`int`, `float`
Sequence Type:	`list`
Boolean Type:	`bool`

5. Output

To output information on the screen we use `print()` function

```
print("Hello World")
```

To output a variable, we have to use + symbol, we can **combine text** and a variable that is **string type only**.

```
x = "awesome"
print("Python is " + x)
```

If we want to show a **number** with **text,** we have to do it in a different way. First, we have to **define** a **variable** that will **contain** the **text** that we want to **show**, and **where** we want to **show** a **number** we have to **write** `{}`. After that, we use a `print` statement where we write the `variable_name.format(numberVariable)`

```
1 area = 50
2 txt = "Square area is {}"
3 print(txt.format(area))
```

We can also show more than one number by adding more `{}` in the text. And when we are showing the text, we add more number variables that are separated by a `,` (comma)

```
1 SArea = 50
2 TArea = 25
3 txt = "Square area is {} and triangle area is {}"
4 print(txt.format(SArea,TArea))
```

The most easiest way to show a number with text is to use a `,` (comma) operator. This will add the number next to your text.

```
1 SArea = 50
2 TArea = 25
3 print("Square area is",SArea,"and triangle area is",TArea)
```

6. Input

Input is used when we want to get some information from the user, can be text or number

```
name = input("Write your name: ")
```

Everything that the user writes will be text, if we need a number, we will need to convert it to the correct data type

```
age = int(input("Write your age: "))

weight = float(input("Write your weight"))
```

7. Strings

A **string** is a textual type of data. It can contain 1 character, 1 word or more words. Strings in Python are surrounded by either single quotation marks, or double quotation marks.

```
print("Hello")
print('Hello')
```

Assigning a string to a variable is done with the variable name followed by an equal sign and the string:

```
a = "Hello"
```

We can assign a **multiline string** to a variable by using **three quotes or three single quotes**:

```
a = """Lorem ipsum dolor sit amet,
consectetur adipiscing elit,
sed do eiusmod tempor incididunt
ut labore et dolore magna aliqua."""
print(a)
```

```
a = '''Lorem ipsum dolor sit amet,
consectetur adipiscing elit,
sed do eiusmod tempor incididunt
ut labore et dolore magna aliqua.'''
print(a)
```

We can **measure** the **length** of a string by using the `len()` function

```
a = "Hello, World!"
print(len(a))
```

We can **combine** two or more strings into one string by using + operator

```
a = "Hello"
b = "World"
c = a + " " + b
print(c)
```

8. Numbers

There are three numeric types in Python:

```
x = 1    # int
y = 2.8  # float
z = 1j   # complex
```

Int, or **integer**, is a whole number, positivie or negative, without decimals, of unlimited length.

```
x = 1
y = 35656222554887711
z = -3255522
```

Float, or "**floating point number**" is a number, positive or negative, containing one or more decimals

```
x = 1.10
y = 1.0
z = -35.59
```

We can convert from one type to another with the `int()` and `float()` methods:

```
x = 1    # int
y = 2.8  # float

#convert from int to float:
a = float(x)

#convert from float to int:
b = int(y)
```

Python has a built-in module called random that can be used to make random numbers:

```
import random

print(random.randrange(1, 34))
```

9. Operators

Operators are used to **perform operations** on variables and values. Python divides the operators in the following groups:

Arithmetic operators	Logical operators
Assignment operators	Comparison operators

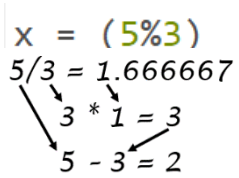
Arithmetic Operators

Arithmetic operators are used with numeric values to perform common mathematical operations:

Operator	Name	Example
+	Addition	x + y
-	Subtraction	x - y
*	Multiplication	x * y
/	Division	x / y
%	Modulus	x % y
**	Exponentiation	x ** y
//	Floor division	x // y

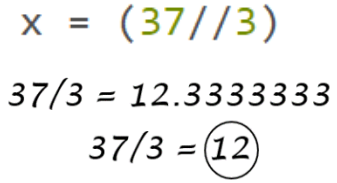
Modulus:

In computing, the **modulo operation** returns the **remainder** of a **division**, after one number is divided by another.



Floor division:

The **floor division //** rounds the result down to the nearest Whole number.



Assignment Operators

Assignment operators are used to assign values to variables:

Operator	Example	Same As
=	x = 5	x = 5
+=	x += 3	x = x + 3
-=	x -= 3	x = x - 3
*=	x *= 3	x = x * 3
/=	x /= 3	x = x / 3

Comparison Operators

Comparison operators are used to **compare two values**:

Operator	Name	Example
==	Equal	x == y
!=	Not equal	x != y
>	Greater than	x > y
<	Less than	x < y
>=	Greater than or equal to	x >= y
<=	Less than or equal to	x <= y

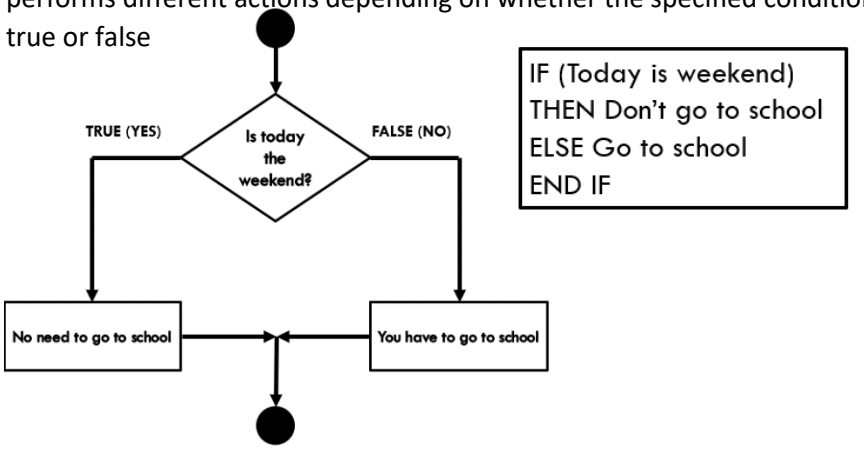
Logical Operators

Logical operators are used to **combine conditional statements**:

Operator	Description	Example
and	Returns True if both statements are true	x < 5 and x < 10
or	Returns True if one of the statements is true	x < 5 or x < 4
not	Reverse the result, returns False if the result is true	not(x < 5 and x < 10)

10. Conditional Statements

A **conditional statement** is a feature of a programming language, which performs different actions depending on whether the specified condition is true or false



IF (Today is weekend)
THEN Don't go to school
ELSE Go to school
END IF

IF statements

IF statements are used to check IF a condition is true or not, if it is true then we will do an action

```
a = 33
b = 200
if b > a:
    print("b is greater than a")
```

ELSE

ELSE is used when our conditions are not correct and we still want to do something. **Has** to go with IF

```
a = 33
b = 200
if b < a:
    print("b is less than a")
else:
    print("b is greater than a")
```

ELIF (ELSE-IF)

If we have **more** than **one condition**, we have to use **ELIF**. The **ELIF** keyword is Python's way of saying "**if** the **previous** conditions were **not true**, then **try this condition**"

```
a = 33
b = 33
if b < a:
    print("b is less than a")
elif b == a
    print("b is same as a")
else:
    print("b is greater than a")
```

11. Lists

Lists are used to store multiple items in a single variable. Lists are one of 4 built-in data types in Python used to store collections of data, the other 3 are Tuple, Set, and Dictionary, all with different qualities and usage.

```
thislist = ["apple", "banana", "cherry"]
print(thislist)
```
(0, 1, 2)

List items are ordered, changeable, and allow duplicate values.

To determine how many items a list has, use the **len()** function:

```
thislist = ["apple", "banana", "cherry"]
print(len(thislist))
```

List items are indexed and you can access them by referring to the index number:

```
thislist = ["apple", "banana", "cherry"]
print(thislist[1])
```

12. Loops

A **loop** in a computer program is an instruction that repeats until a specified condition is reached. Python has two loop commands:

- while loops
- for loops

While Loop:

With the while loop we can execute a set of statements as long as a condition is true

```
i = 1
while i < 6:
    print(i)
    i += 1
```

The **while loop** requires relevant variables to be ready, in this example we need to define an indexing variable, **i,** which we set to 1

For Loop:

A **for loop** is used for iterating over a sequence (that is either a list, a tuple, a dictionary, a set, or a string). With the for **loop** we can execute a set of statements, once for each item in a list.

```
fruits = ["apple", "banana", "cherry"]
for x in fruits:
  print(x)
```

Break Statement:

With the break statement we can stop the loop even if the while condition is true:

```
fruits = ["apple", "banana", "cherry"]
for x in fruits:
  if x == "banana":
    break
  print(x)
```

Continue Statement:

With the continue statement we can stop the current iteration, and continue with the next:

```
fruits = ["apple", "banana", "cherry"]
for x in fruits:
  if x == "banana":
    continue
  print(x)
```

13. Functions

A **function** is a block of code which only runs when it is called. You can pass data, known as parameters, into a function. In Python a function is defined using the def keyword:

```
def my_function():
  print("Hello from a function")

my_function()
```

Arguments/Parameters:

Information can be passed into functions as arguments. Arguments are specified after the function name, inside the parentheses

```
def my_function(fname, lname):
  print(fname + " " + lname)

my_function("Peter", "Parker")
```