Variables and Datatypes

1. Variables in Python

Think of a **variable** as a labeled container where you can store data. You can put anything in it — numbers, text, lists, etc. — and retrieve it later.

Rules for variable names:

- Can contain letters, numbers, and underscores (`_`), but cannot start with a number.

- Cannot be a Python **keyword** (`if` , `for` , `while` , `class` , etc.).

- Case-sensitive (`age` and `Age` are different variables).

Example:

```
age = 17        # storing an integer
name = "Ameya"    # storing text (string)
is_student = True # storing a boolean value
```

Here:

- `age` is a variable storing `17`

- `name` stores `"Ameya"`

- `is_student` stores `True`

You can print variables like this:

```
print(age)
print(name)
print(is_student)
```

2. Datatypes

A **datatype** defines the kind of value a variable holds. In Python, the main datatypes are:

Datatype	Example	Description
int	17, -5, 100	Integer numbers
float	3.14, 0.5, -2.0	Decimal numbers
str	"Hello"	Text / string
bool	True , False	Boolean (True/False)
list	[1, 2, 3]	Collection of items
tuple	(1, 2, 3)	Immutable collection
dict	{"name":"Ameya"}	Key-value pairs
NoneType	None	Represents "nothing"

Example:

```python
x = 10        # int
y = 3.14      # float
z = "Python"  # str
is_active = True # bool

print(type(x)) # <class 'int'>
print(type(y)) # <class 'float'>
print(type(z)) # <class 'str'>
```

Notice how `type()` tells you what datatype the variable is.

3. Typecasting

Sometimes, you want to **convert one datatype to another**. This is called **typecasting**.

Common typecasting functions:

Function	Converts to
int()	integer
float()	float/decimal
str()	string
bool()	boolean

Examples:

```
x = "100"     # string
y = int(x)    # converts string to integer
print(y, type(y))  # 100 <class 'int'>

a = 10
b = float(a)  # converts int to float
print(b, type(b))  # 10.0 <class 'float'>

c = 0
d = bool(c)   # converts 0 to False
print(d, type(d))  # False <class 'bool'>
```

Important:

- `"123"` → `int()` works

- `"123.45"` → `int()` **will NOT work**, you need `float()` first.

Quick Mental Model

1. **Variable** = a box that stores a value.

2. **Datatype** = the type of value in the box.

3. **Typecasting** = changing the type of the value in the box.

Mini Exercise

Try this on your Python console:

1. Create a variable `my_age` with your age.

2. Create a variable `my_height` with your height in meters (decimal).

3. Convert `my_height` to a string and print it along with `my_age`.

This will make you practice **variables, datatypes, and typecasting** together.