

Variable and data type in Python programs

Variable

- A variable is a name (or placeholder) to store and represent numbers or strings

name is a variable to store the text you typed



```
name = input("what is your name? ")  
print("Hello", name)
```

x and **y** are variables to store the number you typed



```
# perform multiplication for you  
print("This program will perform multiplication x*y")  
x = float(input("Please type x value: "))  
y = float(input("Please type y value: "))  
print("The product of x and y is:")  
print(x*y)
```

Rules for Python variables

- A variable can have a short name (like x and y) or a more descriptive name (e.g. age, carname, totalvolume).
- A variable name must start with a letter, cannot start with a number
- No spaces in variable names
- Variable names are case-sensitive.
 - What will you see when running the following program?

```
name = input("what is your name? ")  
print("Hello", Name)
```

Python variables

- **Assign a value to a variable by using “=” symbol. For example:**
 - `x=5`
 - `hisname =“Bill”`
- **Print can be used to display the value of the variables. For example:**
 - `print(x)`
 - `print(hisname)`
- **You can change the value of a variable in your program**
 - What will you see when running the following program?

```
name = input("what is your name? ")  
name = "World"  
print("Hello", name)
```

Python Data Types

- In earlier examples, variables are used to represent different types of values
 - `x=5`, `x` represents a number
 - `hisname = "Bill"` , `hisname` represents a name
- Four frequently used data types

Data type:	Description:	Example:
str	A <u>string</u> of characters, which can include letters, numbers, spaces, and symbols	'Daytona 500'
int	An <u>integer</u> whole number, which DOES NOT have a decimal point part	1000
float	A <u>floating</u> -point number, which DOES have a decimal point part	98.6
bool	A <u>Boolean</u> logical truth value, which is either True or False	True

Python Data Types

○ Example

x=12 # x is integer

y=1.2 # y is float

z="Hello" # z is string

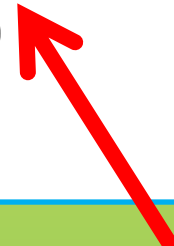
- String values must always be enclosed with quotation marks.

○ Convert data type (type casting)

Function:	Description:
int(x)	Converts x to an integer whole number
float(x)	Converts x to a decimal floating-point number
str(x)	Converts x to a string representation

Python Data Types

```
# perform multiplication for you
print("This program will perform multiplication x*y")
x = float(input("Please type x value: "))
y = float(input("Please type y value: "))
print("The product of x and y is:")
print(x*y)
```



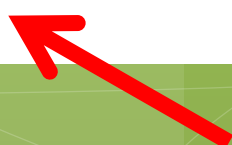
The data from input command is string. Float() is used to convert string data to float data

Program output

```
This program will perform multiplication x*y

Please type x vale: 12.3

Please type y: 2.4
The product of x and y is:
29.52
```



Can you let the program only print the integer part of the product?

Python Data Types

```
# perform multiplication for you
print("This program will perform multiplication x*y")
x = float(input("Please type x value: "))
y = float(input("Please type y value: "))
print("The product of x and y is:")
print(int(x*y))
```

 Here is the change

Program output

```
This program will perform multiplication x*y

Please type x vale: 12.3

Please type y: 2.4
The product of x and y is:
29
```

 only the integer part is printed

Python Data Types

```
# perform multiplication for you
print("This program will perform multiplication x*y")
x = float(input("Please type x value: "))
y = float(input("Please type y value: "))
print("The product of x and y is:")
print(x, "X", y, "=", x*y)
```

Change how the program display results

Program output

```
This program will perform multiplication x*y

Please type x vale: 1.23

Please type y: 1.65
The product of x and y is:
1.23 X 1.65 = 2.0295
```

There are spaces between numbers, multiplication, and equal symbols. Can you remove the spaces?

Python Data Types

- ◉ symbol **+** can be used to concatenate (link together) two string data

```
x="Hello "
```

```
y="World"
```

```
z=x+y          # z is "Hello World"
```

- ◉ Is there any problem in the following code?

```
x="Hello "
```

```
y=123
```

```
z=x+y
```

- ◉ How can you make **z="Hello 123"** in the above example?

Python Data Types

```
# perform multiplication for you
print("This program will perform multiplication x*y")
x = float(input("Please type x value: "))
y = float(input("Please type y value: "))
s1=str(x)
s2=str(y)
p=str(x*y)
print(s1+"X"+s2+"="+p)
```

← **Convert x, y, and x*y to string**

Program output

```
This program will perform multiplication x*y

Please type x vale: 12.3

Please type y: 12.1
12.3X12.1=148.83
```

← **Spaces are removed**

Alternative solution

```
# perform multiplication for you
print("This program will perform multiplication x*y")
x = input("Please type x vale: ")
y = input("Please type y: ")
p=str(float(x)*float(y))
print(x+"X"+y+ "="+p)
```

Any problem in this program?

```
# perform multiplication for you
print("This program will perform multiplication x*y")
x = input("Please type x vale: ")
y = input("Please type y: ")
p=str(float(x*y))
print(x+"X"+y+ "="+p)
```

Today's Challenge

```
import datetime
date_time = datetime.datetime.now()
date = date_time.date() # Gives the date
time = date_time.time() # Gives the time
print("Today is (Year Month Day):")
print(date.year, date.month, date.day)
print("The current time is (Hour Minute Second):" )
print(time.hour, time.minute, time.second)
```

Could you modify the above program to display date and time in the following format?

- Hint: data represented by date.year, date.month, date.day, time.hour, time.minute, time.second are integer type

```
Today is (MM/DD/YYYY): 5/27/2019
The current time is (Hour:Minute:Second): 10:4:58
```

Solution

```
import datetime
date_time = datetime.datetime.now()
date = date_time.date() # Gives the date
time = date_time.time() # Gives the time
tdate = str(date.month)+"/"+str(date.day)+"/"+str(date.year)
print("Today is (MM/DD/YYYY):", tdate)
ctime = str(time.hour)+":"+str(time.minute)+":"+str(time.second)
print("The current time is (Hour:Minute:Second):", ctime)
```

Additional Exercise

- What do you expect for the following code?

```
x=12
y=1.2
z=x+y           # what's the data type of z?
y="1.2"         # what's the data type of y now?
t=int(y)         # can you do this?
```