

Programming Fundamental

A Hitchhiker Guide to Coding with Python

Lesson 2: Handling of Inputs

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Lesson Outline

- 1 Basic Data Types
- 2 Data Operations
- 3 Input Function
- 4 Type Casting

Basic Data Types

Class	Examples	Data Type
int	4, -290, 65_000_000, ...	Integer Numbers
float	4.0, -0.29, 15.458, 3.145E2, 1.22e-3 ...	Floating Point Numbers


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$$3.145E2 = 3.145 \times 10^2 = 314.5$$

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$$1.22\text{E} - 3 = 1.22 \times 10^{-3} = 0.00112$$

Basic Data Types

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float	4.0, -0.29, 15.458, 3.145E2, 1.22e-3 ...	Floating Point Numbers
complex	3+2j, -2+0.5j, -3.14j, -5.1+3.114e2j, ...	Complex Numbers

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str	'Hello', "World", '2022', 's', '*!4aP(&^4)', ...	Strings

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str	'Hello', "World", '2022', 's', '*!4aP(&^4)', ...	Strings
bool	True, False	Boolean

Basic Data Types

The type of a Python object determines what kind of object it is; every object has a type.

```
>>> type(-255)
<class 'int'>
>>> type(3.1415E5)
<class 'float'>
>>> type(3.0-16.5j)
<class 'complex'>
>>> type(True)
<class 'bool'>
```

Data Operations: Numbers

Operation	Operator	Example	Result
Addition	+	123 + 45.5	168.5
Subtraction	-	123 - 45.5	77.5
Multiplication	*	123 * 45.5	5571.9
Exponentiation	**	123 ** 4	228886641
Division	/	123 / 45.5	2.7032967
Floor Division	//	123 / 45	2
Modulus	%	123 % 45	32

Data Operations: Strings


Operation	Operator	Example	Result
Addition	+	'Hello' + 'World'	'HelloWorld'
		'Hello' + 2022	☹️ TypeError
Multiplication	*	3 * 'Hello'	'HelloHelloHello'
		'*' * 10	'*****'
		'World' * 10.45	☹️ TypeError
		'Hello' * 'World'	☹️ TypeError

Input Function

Python `input()` function takes user keyboard input. It returns the user input in form of a `string` data type.

```
>>> name = input('Enter your name: ')
Enter your name: John Wick
>>> print(name)
John Wick
>>> type(name)
<class 'str'>
```

Example

 ask_name.py

```
1 print('This is how input function works')
2 name = input('Enter your name: ')
3 age = input('Enter your age: ')
4 print('Your name is', name, ', and you are', age, 'years old.')
```

```
>_ python ask_name.py
This is how input function works
Enter your name: John Wick
Enter your age: 42
Your name is John Wick , and you are 42 years old.
```

Example

 area_rectangle.py

```
1 print('Rectangle Area Calculator')
2 width = input('Enter the width: ')
3 height = input('Enter the height: ')
4 area = width * height
5 print('Area is', area)
```

 TypeError

```
>_ python area_rectangle.py
Rectangle Area Calculator
Enter the width: 4.5
Enter the height: 6.25
Traceback (most recent call last):
  File ".../area_rectangle.py", line 4, in <module>
    area = width * height
TypeError: can't multiply sequence by non-int of type 'str'
```

Type casting in Python is achieved by constructor functions:

- `int()` - constructs an integer number from an integer literal, a float literal (by removing all decimals), or a string literal
- `float()` - constructs a float number from an integer literal, a float literal or a string literal
- `str()` - constructs a string from a wide variety of data types, including strings, integer literals and float literals

```
>>> x = '123456'
```

← String Literal

```
>>> type(x)
```

```
<class 'str'>
```

```
>>> y = int(x)
```



Integer Casting

```
>>> type(y)
```

```
<class 'int'>
```

```
>>> print(y + 1)
```

```
123457
```



```
>>> x = '123.456'
```

String Literal

```
>>> type(x)
```

```
<class 'str'>
```

```
>>> y = float(x)
```



Floating Point Casting

```
>>> type(y)
```

```
<class 'float'>
```

```
>>> print(y + 1)
```

```
124.456
```

```
>>> x = 3.1414
>>> type(x)
<class 'float'>
>>> y = str(x)
>>> type(y)
<class 'str'>
>>> print(y + '55555')
3.141455555
```

Floating Point Literal

String Casting

```
>>> int('3.1415')
```

```
Traceback (most recent call last):
```

```
  File "<stdin>", line 1, in <module>
```

```
ValueError: invalid literal for int() with base  
10: '3.1415'
```

```
>>> int(3.1415)
```

```
3
```


```
>>> float('3')
```

```
3.0
```

```
>>> float(3)
```

```
3.0
```

Example

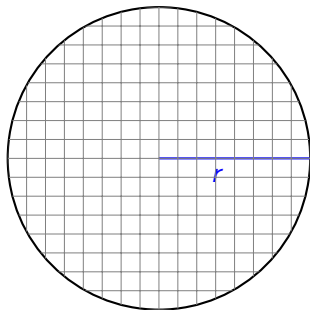
 area_rectangle.py

```
1 print('Rectangle Area Calculator')
2 width = float( input('Enter the width: ') )
3 height = float( input('Enter the height: ') )
4 area = width * height
5 print('Area is', area)
```

```
>_ python area_rectangle.py
Rectangle Area Calculator
Enter the width: 4.5
Enter the height: 6.25
Area is 28.125
```

Exercise

Write a Python script to perform the calculation of the *perimeter* and *area* of a circle. It takes an input radius from user.



$$\text{Perimeter} = 2 \cdot \pi \cdot r$$

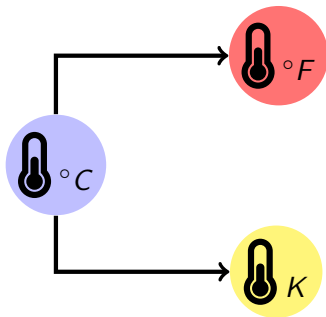
$$\text{Area} = \pi \cdot r^2$$

Exercise

The following formulas

$$\frac{C}{5} = \frac{F - 32}{9} = \frac{K - 273.15}{5}$$

can be used to do conversions of temperatures in degree Celsius (C), Fahrenheit (F) and Kelvin (K). Write a Python script to convert a temperature in degree Celsius to degree Fahrenheit and Kelvin.



Exercise

Equal Monthly Installment (EMI) formula is:

$$\text{EMI} = P \cdot \frac{r \cdot (1 + r)^n}{(1 + r)^n - 1}$$

where P is a principle (loan); r is a monthly interest rate, and n is a number of payments.

Write a Python script to do calculations of EMI and the amount of monthly payment. It takes inputs P , r and n .

