Alright — let’s make this a **one-stop, crystal-clear, beginner-to-intermediate Python crash course** so you can confidently say *“Yeah, I know Python basics”* by the end.  
We’ll go step-by-step, with explanations, examples, and a few “gotchas” to watch for.

**1. Introduction to Python**

* **High-level**: Easy to read and write.
* **Interpreted**: Runs line-by-line, no need for compilation.
* **Dynamically typed**: No need to declare variable types (x = 5 is fine).
* **General purpose**: Used in web dev, AI, data science, scripting, automation, etc.

Example:

print("Hello, Python!") # This prints text to the console

**2. Variables & Data Types**

Python decides the type automatically when you assign a value.

**Common types:**

# Numbers

x = 10 # int

y = 3.14 # float

z = 2 + 3j # complex

# Text

name = "Alice" # str

# Boolean

is\_happy = True # bool

# Collections

my\_list = [1, 2, 3] # list

my\_tuple = (1, 2, 3) # tuple (immutable)

my\_set = {1, 2, 3} # set (unique elements)

my\_dict = {"a": 1, "b": 2} # dictionary (key-value pairs)

💡 **Gotcha**: = assigns values, == checks equality.

**3. Basic Input & Output**

name = input("Enter your name: ")

print("Hello,", name)

* **input()** always returns a **string**, so convert when needed:

age = int(input("Enter your age: "))

**4. Operators**

* **Arithmetic**: + - \* / // % \*\*

5 // 2 # 2 (floor division)

5 % 2 # 1 (modulus)

2 \*\* 3 # 8 (power)

* **Comparison**: == != > < >= <=
* **Logical**: and or not
* **Assignment**: += -= \*= /=
* **Membership**: in, not in

"x" in "text" # True

**5. Conditions**

age = 18

if age >= 18:

print("Adult")

elif age > 12:

print("Teen")

else:

print("Child")

**6. Loops**

**While Loop**

count = 0

while count < 3:

print(count)

count += 1

**For Loop**

for i in range(5): # 0 to 4

print(i)

💡 **range(start, stop, step)**  
Example: range(2, 10, 2) → 2, 4, 6, 8

**7. Functions**

def greet(name):

return "Hello, " + name

print(greet("Bob"))

* Default values:

def greet(name="Guest"):

print("Hello,", name)

* Multiple returns:

def math\_ops(a, b):

return a+b, a-b

sum\_val, diff\_val = math\_ops(5, 3)

**8. Lists & Operations**

fruits = ["apple", "banana", "cherry"]

fruits.append("orange") # Add

fruits.remove("banana") # Remove

fruits[0] = "mango" # Change

print(fruits[1:]) # Slicing

* Loop through list:

for fruit in fruits:

print(fruit)

**9. Tuples**

Immutable list-like structure.

coords = (10, 20)

**10. Dictionaries**

person = {"name": "Alice", "age": 25}

print(person["name"])

person["age"] = 30

**11. Sets**

nums = {1, 2, 2, 3}

print(nums) # {1, 2, 3}

**12. String Operations**

text = " Hello World "

print(text.lower()) # hello world

print(text.upper()) # HELLO WORLD

print(text.strip()) # Removes spaces

print(text.replace("World", "Python"))

print(text.split()) # ['Hello', 'World']

String formatting:

name = "Bob"

age = 25

print(f"My name is {name} and I am {age} years old.")

**13. File Handling**

# Write

with open("file.txt", "w") as f:

f.write("Hello, file!")

# Read

with open("file.txt", "r") as f:

print(f.read())

**14. Error Handling**

try:

x = int(input("Enter a number: "))

print(10 / x)

except ZeroDivisionError:

print("Cannot divide by zero!")

except ValueError:

print("Invalid input!")

finally:

print("Done")

**15. Modules & Libraries**

import math

print(math.sqrt(16))

from random import randint

print(randint(1, 10))

**16. List Comprehensions**

squares = [x\*\*2 for x in range(5)]

**17. Common Gotchas**

* **Mutable defaults** in functions:

def f(val, my\_list=[]): # Bad practice

my\_list.append(val)

* **Indentation** matters (4 spaces is standard).
* Strings use ' or " interchangeably.

If you want, I can now make you a **Python basics mind map + 50 practice problems** so you can master these concepts quickly.  
Do you want me to prepare that next?

Perfect — we’ll go **full package**:

1. **Python Basics Mind Map** (visual structure of what you need to know)
2. **50 practice problems** covering all basics
3. **Complete solved code** for every problem so you can check yourself

**1. Python Basics Mind Map**

Python Basics

│

├── Variables & Data Types

│ ├── int, float, complex

│ ├── str

│ ├── bool

│ ├── list, tuple, set, dict

│

├── Operators

│ ├── Arithmetic (+ - \* / // % \*\*)

│ ├── Comparison (== != > < >= <=)

│ ├── Logical (and, or, not)

│ ├── Membership (in, not in)

│

├── Input & Output

│ ├── input()

│ ├── print()

│

├── Conditions

│ ├── if / elif / else

│

├── Loops

│ ├── for range()

│ ├── while

│ ├── break / continue

│

├── Functions

│ ├── def / return

│ ├── Default arguments

│

├── Strings

│ ├── lower(), upper(), strip(), replace(), split()

│ ├── f-strings

│

├── Lists

│ ├── append(), remove(), slicing

│ ├── list comprehensions

│

├── Dictionaries

│ ├── keys(), values(), items()

│

├── Sets

│ ├── Unique elements

│

├── File Handling

│ ├── open(), read(), write()

│

├── Error Handling

│ ├── try / except / finally

│

└── Modules

├── import math, random, datetime

**2. 50 Practice Problems (with solved code)**

I’ll group them by topic so you can learn progressively.

**A. Variables & Data Types**

# 1. Store your name and age, print them

name = "Alice"

age = 25

print("Name:", name, "Age:", age)

# 2. Swap two variables

a, b = 5, 10

a, b = b, a

print(a, b)

# 3. Convert string to int and float

num\_str = "42"

print(int(num\_str), float(num\_str))

# 4. Get type of variable

x = 3.14

print(type(x))

# 5. Complex number operations

c1 = 2 + 3j

c2 = 1 + 4j

print(c1 + c2)

**B. Input & Output**

# 6. Take name as input and greet

name = input("Enter your name: ")

print(f"Hello, {name}")

# 7. Take two numbers and sum them

x = int(input("Enter first number: "))

y = int(input("Enter second number: "))

print("Sum:", x + y)

**C. Operators**

# 8. Check if number is even

n = int(input("Enter number: "))

print("Even" if n % 2 == 0 else "Odd")

# 9. Find square and cube of a number

n = int(input("Enter number: "))

print("Square:", n\*\*2, "Cube:", n\*\*3)

**D. Conditions**

# 10. Check if number is positive, negative or zero

n = int(input("Enter number: "))

if n > 0:

print("Positive")

elif n < 0:

print("Negative")

else:

print("Zero")

# 11. Grade system

marks = int(input("Enter marks: "))

if marks >= 80:

print("A+")

elif marks >= 60:

print("B")

else:

print("Fail")

**E. Loops**

# 12. Print 1 to 10

for i in range(1, 11):

print(i)

# 13. Print even numbers from 1 to 20

for i in range(2, 21, 2):

print(i)

# 14. Sum of first n numbers

n = int(input("Enter n: "))

total = 0

for i in range(1, n+1):

total += i

print("Sum:", total)

# 15. While loop countdown

n = 5

while n > 0:

print(n)

n -= 1

**F. Functions**

# 16. Function to add two numbers

def add(a, b):

return a + b

print(add(3, 5))

# 17. Function with default value

def greet(name="Guest"):

print(f"Hello, {name}")

greet()

**G. Lists**

# 18. Create list and print each item

fruits = ["apple", "banana", "cherry"]

for fruit in fruits:

print(fruit)

# 19. Append item

fruits.append("orange")

print(fruits)

# 20. Remove item

fruits.remove("banana")

print(fruits)

# 21. Slicing list

print(fruits[1:])

# 22. List comprehension (squares of 1 to 5)

squares = [x\*\*2 for x in range(1, 6)]

print(squares)

**H. Dictionaries**

# 23. Create dictionary

person = {"name": "Alice", "age": 25}

print(person["name"])

# 24. Add new key-value

person["city"] = "Dhaka"

print(person)

# 25. Loop through dictionary

for k, v in person.items():

print(k, v)

**I. Sets**

# 26. Create set and add element

nums = {1, 2, 3}

nums.add(4)

print(nums)

# 27. Remove duplicates from list

nums\_list = [1, 2, 2, 3, 4, 4]

print(set(nums\_list))

**J. Strings**

# 28. Reverse a string

s = "python"

print(s[::-1])

# 29. Count vowels in string

s = "hello world"

count = sum(1 for ch in s if ch in "aeiou")

print(count)

# 30. Replace word

text = "I like Java"

print(text.replace("Java", "Python"))

**K. File Handling**

# 31. Write to file

with open("test.txt", "w") as f:

f.write("Hello file!")

# 32. Read from file

with open("test.txt", "r") as f:

print(f.read())

**L. Error Handling**

# 33. Division with exception

try:

a = int(input("Enter number: "))

print(10 / a)

except ZeroDivisionError:

print("Cannot divide by zero!")

**M. Mixed Logic**

# 34. Factorial

n = int(input("Enter number: "))

fact = 1

for i in range(1, n+1):

fact \*= i

print("Factorial:", fact)

# 35. Fibonacci series

n = int(input("Enter number of terms: "))

a, b = 0, 1

for \_ in range(n):

print(a, end=" ")

a, b = b, a+b

# 36. Check prime

n = int(input("Enter number: "))

if n > 1:

for i in range(2, int(n\*\*0.5)+1):

if n % i == 0:

print("Not prime")

break

else:

print("Prime")

else:

print("Not prime")

This covers **36 problems** — I can continue with the **remaining 14** to make it a **full set of 50** with solutions.  
Do you want me to complete all 50 now so you have the **entire solved practice pack**?

Alright — let’s complete the **remaining 14 problems** so you get the **full 50 solved Python basics exercises** in one place.

**N. More Loops & Logic**

# 37. Multiplication table of n

n = int(input("Enter number: "))

for i in range(1, 11):

print(f"{n} x {i} = {n\*i}")

# 38. Sum of digits of a number

n = int(input("Enter number: "))

total = 0

while n > 0:

total += n % 10

n //= 10

print("Sum of digits:", total)

# 39. Reverse a number

n = int(input("Enter number: "))

rev = 0

while n > 0:

rev = rev \* 10 + n % 10

n //= 10

print("Reversed:", rev)

**O. Advanced List Work**

# 40. Find largest number in list

nums = [3, 5, 1, 8, 4]

print("Max:", max(nums))

# 41. Remove even numbers from list

nums = [1, 2, 3, 4, 5, 6]

nums = [x for x in nums if x % 2 != 0]

print(nums)

# 42. Merge two lists

list1 = [1, 2, 3]

list2 = [4, 5, 6]

merged = list1 + list2

print(merged)

**P. String Challenges**

# 43. Check palindrome string

s = input("Enter string: ")

print("Palindrome" if s == s[::-1] else "Not palindrome")

# 44. Count words in sentence

text = "Python is fun and powerful"

print("Word count:", len(text.split()))

# 45. Remove spaces from string

text = "Python is cool"

print(text.replace(" ", ""))

**Q. Dictionary Challenges**

# 46. Count frequency of each word

sentence = "apple banana apple orange banana apple"

words = sentence.split()

freq = {}

for w in words:

freq[w] = freq.get(w, 0) + 1

print(freq)

# 47. Merge two dictionaries

dict1 = {"a": 1, "b": 2}

dict2 = {"c": 3, "d": 4}

dict1.update(dict2)

print(dict1)

**R. Miscellaneous**

# 48. Generate random number between 1 and 100

import random

print(random.randint(1, 100))

# 49. Current date and time

import datetime

print(datetime.datetime.now())

# 50. Simple calculator

a = float(input("Enter first number: "))

b = float(input("Enter second number: "))

op = input("Enter operator (+, -, \*, /): ")

if op == "+":

print(a + b)

elif op == "-":

print(a - b)

elif op == "\*":

print(a \* b)

elif op == "/":

if b != 0:

print(a / b)

else:

print("Cannot divide by zero!")

else:

print("Invalid operator")

✅ **Now you have:**

* **Mind Map** of Python basics
* **50 solved problems** covering all beginner concepts
* Examples of **variables, loops, conditions, functions, strings, lists, sets, dictionaries, files, error handling, and modules**

If you want, I can now bundle this into a **single well-organized .py file** so you can run all examples easily without copy-pasting one by one.  
Do you want me to prepare that file for you?