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1) What is Python?

Python is a high-level, interpreted programming language known for its readability and simplicity. It's widely used for web development, automation, data analysis, AI and more.

2) What are the key features of Python?

- Easy to read syntax
- Interpreted and dynamically typed
- Extensive standard library
- Supports multiple programming paradigms (oop, procedural, functional)
- Large community and third party modules
- platform independent (write once, run anywhere)

3) Is Python compiled or interpreted?

Python is interpreted. The code is executed line by line by the Python interpreter, not compiled to machine code beforehand.

4) What are the main applications of Python?

- web development (using Django, Flask)
- Data Science and machine learning
- Automation and scripting

- Game development
- Desktop and GUI Applications.
- Internet of things (IoT)
- cybersecurity and Ethical Hacking.
- Artificial Intelligence and Deep learning.

5. How do you install python on your system?

- Go to <https://www.python.org/downloads/>
- Download the latest version (e.g. python 3X)
- Run the installer and check add python to PATH.
- complete the installation.

6. What is the difference between python 2 and python 3?

feature	python 2	python 3
Print syntax	Print "Hello"	print("Hello")
Division	Integer division by default	True division by default
unicode support	Limited	Default String type
Official Support	Ended in 2020	Actively supported

7. How can you check the installed python version?

bash
python --version
(in terminal or Command Prompt)

(03) bash
python3 --version

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8) What is the role of the `print()` function in Python?

`print()` is used to display output on the screen.

Ex:

```
print("Hello, world!")
```

9) What is an IDE? Name a few commonly used Python IDE's.

IDE stands for Integrated Development Environment. - It provides tools for writing, testing, and debugging code.

Common Python IDE's:

- VS Code
- PyCharm
- Thonny
- IDLE (Comes with Python)
- Jupyter Notebook
- Spyder.

10) How do you run a Python file from the terminal?
Navigate to the folder containing the .py file,
then run

```
python filename.py
```

(or) if using Python 3, `python3 filename.py`

Variables in python.

(4)

11) What is a variable in Python?

A variable is a name that refers to a value stored in memory. It is used to store and manipulate data in a program.

Eg: $\Rightarrow X = 10$ # x is a variable storing the value 10.

12) How do you declare a variable in Python?

Just assign a value to a name - No keyword (or) type declaration needed.

name = "Alice"

age = 25

13) Is it necessary to declare the type of a variable in Python?

No. Python is dynamically typed, meaning the type is automatically inferred at runtime.

14) What are the rules for naming variables in Python?
Valid rules are:

- must start with a letter or underscore (-)
- can contain letters, numbers and underscores (a-z, A-Z, 0-9, -)
- case sensitive (name and Name are different)
- cannot be a Python keyword (if, while, etc)

- 15) What is the difference between global and local variable? ⁽⁵⁾
- Global variable - declared outside functions: accessible everywhere.
 - Local variable - declared inside a function: accessible only within that function.

```
x = 100 # Global
```

```
def demo():
```

```
    x = 50 # Local
```

```
    print(x)
```

```
demo() # 50
```

```
print(x) # 100.
```

- 16) Can a variable name start with a number in python? why (Or) why not?

No, it causes a syntax error.
Variable names must begin with a letter or underscore.
Starting with a number breaks python's naming rules.

- 17) What happens if you use a variable without assigning a value?
- You get a NameError, because python doesn't know what the variable is referring to.

```
print(a) # NameError: Name 'a' is not defined.
```

17) What happens if you use a variable without assigning a value?
You get a NameError.

(8) How is memory managed for variable in python?
python manages memory using,

Reference Counting

Garbage Collection

- Garbage collection
- variables are references to objects stored in memory, and memory is automatically freed when no reference exists.

reference exists.

19) Can Python variable names contain special characters like \$ or @ ?

No, Python only allows letters, digits and underscores in variable name.

\$, @, ! etc, are not allowed.

~ and == in Python ?

20) What is the difference between `=` and `==` in Python?

Meaning
Operator Assignment operator Example
`X = 5`

U

11 11

Equality Comparison

Example

X 17 57

17 11 15

Data types in Python

21) What are the basic data types in Python?

python's core data types:

int - Integer numbers (eg. 5)

float - Decimal numbers (eg. 3.14)

complex - complex numbers (eg. $2+3j$)

str - strings (text)

bool - Boolean (true or false)

list - ordered, changeable collection.

tuple - ordered, unchangeable collection

set - unordered, unique elements.

dict - Key-value pairs.

22) What is the difference between int, float and complex?

Type	Example	Description
int	10	Whole numbers
float	10.5	Numbers with decimal part
Complex	$2+3j$	Numbers with real and imaginary part.

23) What is the difference between list and tuple? ⑧

Feature	List	Tuple
Mutable?	Yes	No
Example	[1, 2, 3]	(1, 2, 3)

24) How is a dictionary different from a list?

- lists stores items by position (index)
- dictionary stores items by key-value pairs

Ex: list-example = [10, 20, 30]
dict-example = {"name": "John", "age": 25}

25) What is set and how is it different from a list?

→ A set is an unordered collection of unique elements and can have duplicate.

- A list is ordered

my_set = {1, 2, 3}

my_list = [1, 2, 2, 3]

26) What is the difference between mutable and immutable data types?

Mutables (changeable)

list, dict, set

between mutable and

immutable (unchangeable)

int, float, str,

tuple,

⑨

27) What will type() function return if the variable is a string?

it returns <class 'str'>

x = "hello"

print (type(x)) # <class 'str'>

28) What are boolean data types?

- boolean represent True or False values
- used in comparison and conditions

x = 5 > 3 # True

print (type(x)) # <class 'bool'>

29) How do you convert data from one type to another in python?

using built in functions:

int("5")

5

str(100)

"100"

float("3.14")

3.14

30) What does the len() function do for different data types?

it returns the number of items (elements) in the data types

str

Example "hello"

5

list

[1, 2, 3]

3

Conditional statements

(10)

31) What are conditional statements in python?

They allow you to make decisions in code based on condition. used to run code only when condition is true.

32) What is the syntax of an if statement in python?

```
if condition:  
    # code block
```

33) What is the difference between if and if-else?

- if runs

when condition is true.

- if-else

gives either result.

```
if a > 0:
```

```
    print ("positive")
```

```
else:
```

```
    print ("not positive")
```

34) What is the use of elif in python?

To check multiple conditions one after another.

```
if marks >= 90:  
    grade = 'A'
```

```
elif marks >= 80:
```

```
    grade = 'B'
```

```
else
```

```
    grade = 'C'
```

35) can you use multiple elif blocks in a condition? ¹¹
Yes, python supports multiple elifs.

36) What happens if none of the conditions are true in an if-elif-else block?

The else block executes if not, nothing happens.

37) Can we use if inside another if? Explain
Yes, this is called nested if.

```
if age > 18:
```

```
    if has_id == "yes":
```

```
        print("Entry allowed")
```

38) How is indentation important in writing conditionals in python?

Python uses indentation (spaces) to define blocks. Incorrect indentation causes errors.

39) How do you check multiple conditions using and/or?

```
if age >= 18 and citizen == "indian":
```

```
    print("Eligible to vote")
```

40) What is the output of if "or" if 0 in python? why?
Both are treated as False.
if "": print('Hi') # Nothing prints
if 0: print('Hi') # Nothing prints

For loop in Python.

(12)

41.) What is a for loop in python and how is it used?
A loop used to iterate over a sequence
(like list, string)

```
for i in [1,2,3]:  
    print(i)
```

42.) What is the syntax of a for loop?
for variable in iterable:
 # block of code

43.) How does the range() function work with loops?
for i in range(1,6):
 print(i) # prints 1 to 5

44.) Can you loop over strings and lists using for?
yes.
for letter in "python":
 print(letter)

```
for item in ["apple", "banana"]:  
    print(item)
```

45.) What is the use of break and continue inside a loop?
break → exits loop
continue → skips to the next iteration

(13)

46) How do you print only even numbers between 1 and 20 using loop?

```
for i in range (1,21):
```

```
    if i%2 == 0:
```

```
        print(i)
```

47) What is the use of else with a for loop?

Runs when the loop completes normally

(not interrupted

```
for i in range (3):
```

```
    print(i)
```

by break)

```
else print ("done")
```

48) What does enumerate() do in a for loop?

```
for index, value in enumerate (["a", "b"]:
```

start = 1):

```
    print (index, value)
```

49) What is nested loop? provide an example.

A loop inside another loop

```
for i in range (3):
```

```
    for j in range (2):
```

```
        print (i, j)
```

50) Can we use for loop with dictionary? if yes, how?

yes.

```
d = {"a": 1, "b": 2}
```

```
for key in d:
```

```
    print (key, d[key])
```