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# Python Basics - Theory Questions & Answers
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# 1. What is Python, and why is it popular?
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Python is a high-level, interpreted programming language known for its simplicity and readability.
It is popular due to its large standard library, active community, and wide use in data science,
web development, automation, and more.
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# 2. What is an interpreter in Python?
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An interpreter is a program that executes Python code line by line, converting it to machine code.
Python uses an interpreter to run scripts directly without compiling them first.
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# 3. What are pre-defined keywords in Python?
"""
Keywords are reserved words that have special meaning in Python, like 'if', 'else', 'for', 'while'.
They cannot be used as variable names.
"""

# 4. Can keywords be used as variable names?
"""
No, keywords are reserved and cannot be used as variable names.
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# 5. What is mutability in Python?
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Mutability refers to whether an object's state can be changed after creation.
Mutable: lists, sets, dicts; Immutable: int, float, string, tuple.
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# 6. Why are lists mutable, but tuples are immutable?
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Lists allow modifications (like append, remove), while tuples are fixed once created.
This design provides flexibility with lists and performance/stability with tuples.
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# 7. What is the difference between "==" and "is" operators in Python?
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'==' checks value equality, while 'is' checks reference (memory location) equality.
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# 8. What are logical operators in Python?
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Logical operators: and, or, not – used to combine boolean expressions.
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# 9. What is type casting in Python?
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Type casting is converting one data type to another (e.g., str to int).
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# 10. What is the difference between implicit and explicit type casting?
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Implicit casting: done by Python automatically (int to float).
Explicit casting: manually done by the programmer (e.g., int("10")).
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# 11. What is the purpose of conditional statements in Python?
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Conditional statements (if, elif, else) allow decision-making in programs.
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# 12. How does the elif statement work?
"""
'elif' checks another condition if the previous 'if' or 'elif' is False.
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# 13. What is the difference between for and while loops?
"""
'for' loop iterates over a sequence; 'while' loop runs based on a condition.
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# 14. Describe a scenario where a while loop is more suitable than a for loop.
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When the number of iterations is unknown beforehand (e.g., reading input until valid), use a while loop.
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# Python Basics - Practical Questions
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# 1. Print "Hello, World!"
print("Hello, World!")

# 2. Display name and age
name = "Alice"
age = 20
print("Name:", name)
print("Age:", age)

# 3. Print all Python keywords using keyword library
import keyword
print("Python keywords:")
print(keyword.kwlist)

# 4. Check if a word is a Python keyword
word = "for"
print(f"Is '{word}' a keyword? :", keyword.iskeyword(word))

# 5. List vs Tuple mutability
my_list = [1, 2, 3]
my_tuple = (1, 2, 3)
my_list[0] = 100  # Works
print("Modified List:", my_list)
# my_tuple[0] = 100  # Raises TypeError

# 6. Mutable vs Immutable argument behavior
def mutate_example(lst, num):
    lst.append(4)
    num += 10
    print("Inside function - List:", lst, "| Number:", num)

mylist = [1, 2, 3]
mynum = 5
mutate_example(mylist, mynum)
print("Outside function - List:", mylist, "| Number:", mynum)

# 7. Basic arithmetic operations
a = int(input("Enter first number: "))
b = int(input("Enter second number: "))
print("Sum:", a + b)
print("Difference:", a - b)
print("Product:", a * b)
print("Quotient:", a / b)

# 8. Logical operators demo
x = True
y = False
print("x and y:", x and y)
print("x or y:", x or y)
print("not x:", not x)

# 9. Convert input to int, float, bool
s = input("Enter a number: ")
print("Integer:", int(s))
print("Float:", float(s))
print("Boolean:", bool(int(s)))  # non-zero -> True

# 10. Type casting list elements
str_list = ['1', '2', '3']
int_list = list(map(int, str_list))
print("Casted List:", int_list)

# 11. Check if number is positive, negative, or zero
n = int(input("Enter a number: "))
if n > 0:
    print("Positive")
elif n < 0:
    print("Negative")
else:
    print("Zero")

# 12. For loop to print 1 to 10
for i in range(1, 11):
    print(i, end=' ')

# 13. Sum of even numbers between 1 to 50
even_sum = sum(i for i in range(1, 51) if i % 2 == 0)
print("\nSum of even numbers:", even_sum)
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# 14. Reverse string using while loop
text = input("Enter string to reverse: ")
rev = ""
i = len(text) - 1
while i >= 0:
    rev += text[i]
    i -= 1
print("Reversed string:", rev)

# 15. Factorial using while loop
num = int(input("Enter a number: "))
fact = 1
while num > 0:
    fact *= num
    num -= 1
print("Factorial:", fact)
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