Python for Beginners

1. Variables & Data Types

- Variables and naming rules
- Primitive types: str, int, float, bool, None, complex
- Reference types: list, tuple, dict, set, function, object

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2. Operators

- Arithmetic Operators: +, -, *, /, %, **, //
- Assignment Operators: =, +=, -=, *=, /=, //=, %=
- Comparison Operators: ==, !=, >, <, >=, <=
- Logical Operators: and, or, not
- Membership Operators: in, not in
- Identity Operators: is, is not
- Ternary Operator: x if condition else y

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3. Control Structures

- Conditional statements: if, elif, else
- Pattern matching: match case (Python 3.10+)
- Loops: for, while

- Loop controls: break, continue, pass
- Iteration helpers: range(), enumerate(), zip()

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4. Functions

- Function definition (def)
- Default parameters
- *args and **kwargs
- Lambda functions
- Higher-order functions: map(), filter(), reduce()
- Scope: local, global, nonlocal
- Recursion

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5. Strings

- Properties: length, indexing, slicing
- Searching methods: find(), index(), count()
- Modification methods: upper(), lower(), strip(), replace()
- Checking methods: startswith(), endswith(), isalnum(), isdigit(), isalpha()
- Formatting: f-strings, .format(), % formatting
- Splitting & joining
- String immutability

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6. Lists

- Properties: length, indexing, slicing
- Adding/removing elements: append(), insert(), pop(), remove()
- Searching: in, index(), count()
- Transforming: sorting, reversing, list comprehensions
- Nested lists
- Copying vs referencing
- Combining lists

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7. Tuples

- Immutable sequences
- Indexing and slicing
- Tuple unpacking
- Useful in function returns

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8. Sets

- Creating sets
- Unique values
- Set operations: union, intersection, difference, symmetric difference
- Adding and removing elements
- Frozen sets (immutable sets)

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9. Dictionaries

- Key-value pairs
- Accessing values
- Dictionary methods: .keys(), .values(), .items(), .update(), .copy()
- Dictionary comprehensions
- Nested dictionaries

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10. Numbers & Math

- Integers, floats, complex numbers
- Built-in functions: round(), abs(), pow(), divmod()
- math module: constants, rounding, powers, roots, trigonometry
- random module: random numbers, choices, shuffling

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11. Dates & Time

- datetime module basics
- Creating and manipulating dates
- Extracting day, month, year, weekday
- Formatting dates and times
- Time differences (timedelta)

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12. Classes & OOP

- Defining classes and objects
- Constructors (__init__)
- Instance variables and methods
- Class variables and methods
- Static methods
- Inheritance and method overriding
- Encapsulation
- Special methods (__str__, __repr__, __len__, __eq__)

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13. File Handling

- Opening and closing files
- Reading files (whole, line by line)
- Writing and appending
- File modes (r, w, a, b)
- Context managers (with)
- Working with JSON files
- File operations with os module (delete, rename, check existence)