# 1. Strings

| Python | Java | Description |
|---|---|---|
| `"abc".charAt(i)` | `str.charAt(i)` | Get character at index `i`. |
| `"abc".substring(1, 3)` | `str.substring(1, 3)` | Substring from index 1 to 3. |
| `"abc".replace('a', 'x')` | `str.replace('a', 'x')` | Replace character. |
| `"abc".split(",")` | `str.split(",")` | Split by delimiter. |
| `"abc".index("b")` | `str.indexOf("b")` | Find first occurrence of a substring. |
| `"abc".startswith("a")` | `str.startsWith("a")` | Check prefix. |
| `"abc".endswith("c")` | `str.endsWith("c")` | Check suffix. |
| `"abc".lower()` | `str.toLowerCase()` | Convert to lowercase. |
| `"abc".upper()` | `str.toUpperCase()` | Convert to uppercase. |
| `" abc ".strip()` | `str.trim()` | Remove leading and trailing spaces. |

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# 2. Arrays (Lists in Python)

| Python | Java | Description |
|---|---|---|
| `arr = [1, 2, 3]` | `int[] arr = {1, 2, 3};` | Create an array. |
| `len(arr)` | `arr.length` | Get length of the array. |
| `arr.append(4)` | `list.add(4)` | Add an element to list. |
| `arr.pop()` | `list.remove(list.size() - 1)` | Remove last element. |
| `arr.insert(1, 10)` | `list.add(1, 10)` | Insert element at index. |
| `arr.index(3)` | `list.indexOf(3)` | Find index of element. |
| `sum(arr)` | `Arrays.stream(arr).sum()` | Sum of elements. |
| `sorted(arr)` | `Arrays.sort(arr)` | Sort array. |
| `[x**2 for x in arr]` | `Arrays.stream(arr).map(x -> x * x).toArray()` | Create new array with mapping. |

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# 3. Characters

| Python | Java | Description |
|---|---|---|
| `ord('a')` | `(int) 'a'` | Get ASCII value. |
| `chr(97)` | `(char) 97` | Get character from ASCII. |
| `char.isdigit()` | `Character.isDigit(char)` | Check if character is digit. |
| `char.isalpha()` | `Character.isLetter(char)` | Check if character is a letter. |

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## 4. Math Operations

| Python | Java | Description |
|---|---|---|
| `max(a, b)` | `Math.max(a, b)` | Maximum of two values. |
| `min(a, b)` | `Math.min(a, b)` | Minimum of two values. |
| `abs(-10)` | `Math.abs(-10)` | Absolute value. |
| `pow(2, 3)` | `Math.pow(2, 3)` | Power calculation. |
| `sqrt(16)` | `Math.sqrt(16)` | Square root. |
| `math.ceil(2.3)` | `Math.ceil(2.3)` | Round up. |
| `math.floor(2.9)` | `Math.floor(2.9)` | Round down. |

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## 5. HashMap (Dictionary in Python)

| Python | Java | Description |
|---|---|---|
| `dict = {}` | `Map<Key, Value> map = new HashMap<>();` | Create a HashMap. |
| `dict[key] = value` | `map.put(key, value);` | Add key-value pair. |
| `dict.get(key, default)` | `map.getOrDefault(key, default);` | Get value with default. |
| `key in dict` | `map.containsKey(key)` | Check if key exists. |
| `dict.pop(key)` | `map.remove(key)` | Remove key-value pair. |
| `dict.items()` | `map.entrySet()` | Iterate over key-value pairs. |

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## 6. HashSet (Set in Python)

| Python | Java | Description |
|---|---|---|
| `set = set()` | `Set<T> set = new HashSet<>();` | Create a HashSet. |
| `set.add(1)` | `set.add(1);` | Add element to set. |
| `set.remove(1)` | `set.remove(1);` | Remove element. |
| `1 in set` | `set.contains(1)` | Check if element exists. |
| `set.union(other_set)` | `set.addAll(otherSet);` | Union of two sets. |
| `set.intersection(other_set)` | `set.retainAll(otherSet);` | Intersection of sets. |

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# 7. Stacks

| Python | Java | Description |
|---|---|---|
| `stack = []` | `Stack<Integer> stack = new Stack<>();` | Create a stack. |
| `stack.append(1)` | `stack.push(1);` | Push element onto stack. |
| `stack.pop()` | `stack.pop();` | Pop element from stack. |
| `stack[-1]` | `stack.peek();` | Peek top element. |
| `len(stack)` | `stack.size();` | Get stack size. |

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# 8. Loops (for and while)

## For Loop

| Python | Java | Description |
|---|---|---|
| `for i in range(5):` | `for (int i = 0; i < 5; i++) {` | Simple for loop. |
| `for i, val in enumerate(arr):` | `for (int i = 0; i < arr.length; i++) {` | Iterate with index. |

## While Loop

| Python | Java | Description |
|---|---|---|
| `while condition:` | `while (condition) {` | While loop. |
| `break` | `break;` | Exit loop. |

| | | |
|---|---|---|
| `continue` | `continue;` | Skip iteration. |

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## 1. Looping Through Strings

| Python | Java | Description |
|---|---|---|
| `for char in "hello":` | `for (int i = 0; i < str.length(); i++) {` | Loop through each character in a string. |
| `print(char)` | `char ch = str.charAt(i);` | Access character by index. |
| `for i, char in enumerate("hello"):` | `for (int i = 0; i < str.length(); i++) {` | Loop through characters with index. |
| | `char ch = str.charAt(i); // Use index` | - |

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## 2. Looping Through Arrays (Lists in Python)

| Python | Java | Description |
|---|---|---|
| `arr = [1, 2, 3]` | `int[] arr = {1, 2, 3};` | Define an array. |
| `for num in arr:` | `for (int num : arr) {` | Iterate through elements (enhanced for loop). |
| `print(num)` | `System.out.println(num);` | Print elements. |
| `for i in range(len(arr)):` | `for (int i = 0; i < arr.length; i++) {` | Iterate with index. |
| `print(arr[i])` | `System.out.println(arr[i]);` | Access elements by index. |

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## 3. Looping Through Lists (Java `ArrayList`)

| Python | Java | Description |
|---|---|---|
| `arr = [1, 2, 3]` | `ArrayList<Integer> list = new ArrayList<>();` | Define a list. |
| `for num in arr:` | `for (int num : list) {` | Enhanced for loop. |
| `arr.append(4)` | `list.add(4);` | Add element to list. |
| `for i in range(len(arr)):` | `for (int i = 0; i < list.size(); i++) {` | Iterate with index. |
| `print(arr[i])` | `System.out.println(list.get(i));` | Access elements by index. |

## 4. Looping Through HashMaps (Dictionaries in Python)

| Python | Java | Description |
|---|---|---|
| `map = {'a': 1, 'b': 2}` | `Map<Character, Integer> map = new HashMap<>();` | Define a HashMap. |
| `for key, value in map.items():` | `for (Map.Entry<Character, Integer> entry : map.entrySet()) {` | Loop through key-value pairs. |
| `print(key, value)` | `System.out.println(entry.getKey() + " " + entry.getValue());` | Print key-value pairs. |
| `for key in map:` | `for (Character key : map.keySet()) {` | Loop through keys only. |
| `for value in map.values():` | `for (Integer value : map.values()) {` | Loop through values only. |

## 5. Looping Through HashSets (Sets in Python)

| Python | Java | Description |
|---|---|---|
| `set = {1, 2, 3}` | `Set<Integer> set = new HashSet<>();` | Define a HashSet. |
| `for num in set:` | `for (int num : set) {` | Enhanced for loop. |
| `print(num)` | `System.out.println(num);` | Print elements. |

## 6. Looping with Index (Enumerate in Python)

| Python | Java | Description |
|---|---|---|
| `arr = ['a', 'b', 'c']` | `String[] arr = {"a", "b", "c"};` | Define an array. |
| `for i, val in enumerate(arr):` | `for (int i = 0; i < arr.length; i++) {` | Loop with index. |
| `print(i, val)` | `System.out.println(i + " " + arr[i]);` | Print index and value. |

## 7. Looping with Conditions (While Loop)

| Python | Java | Description |
|---|---|---|

| | | |
|---|---|---|
| `i = 0` | `int i = 0;` | Initialize counter. |
| `while i < len(arr):` | `while (i < arr.length) {` | While loop. |
| `print(arr[i])` | `System.out.println(arr[i]);` | Print element. |
| `i += 1` | `i++;` | Increment counter. |

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## 8. Looping in 2D Arrays (Matrix Traversal)

| Python | Java | Description |
|---|---|---|
| `matrix = [[1, 2], [3, 4]]` | `int[][] matrix = {{1, 2}, {3, 4}};` | Define a 2D array. |
| `for row in matrix:` | `for (int[] row : matrix) {` | Loop through rows. |
| `for val in row:` | `for (int val : row) {` | Loop through elements of a row. |
| `print(val)` | `System.out.println(val);` | Print element. |