Python Lists

Lists are one of the most important data structures in Python.

So far, you have worked with individual values:

```
name = "Hafsa"
age = 25
language = "Python"
```

But real programs rarely work with just one value.

A website might have:

- many users
- many products
- many courses
- many prices
- many tasks
- many resources

Instead of creating separate variables for every value:

```
student1 = "Hafsa"
student2 = "Ali"
student3 = "Sara"
```

Python lets you store multiple values together:

```
students = ["Hafsa", "Ali", "Sara"]
```

That collection is called a **list**.

By the end of this guide, you will understand how lists work, how to access and modify their elements, how to add and remove data, how to loop through lists, and how lists are used in real applications.

---

1. What Is a List?

A list is an ordered collection of items.

Example:

```
fruits = ["apple", "banana", "mango"]
```

The list contains three elements:

```
apple
banana
mango
```

Each element has a position called an **index**.

```
Index:   0       1       2
         □       □       □
       apple   banana   mango
```

Python lists:

- are ordered
- are mutable
- can contain duplicate values
- can contain different data types
- use zero-based indexing

- can grow and shrink dynamically

---

2. Creating a List

Lists are created using square brackets:

```
fruits = ["apple", "banana", "mango"]
```

A list can contain numbers:

```
numbers = [10, 20, 30, 40]
```

It can contain strings:

```
languages = ["Python", "JavaScript", "Java"]
```

It can contain mixed data:

```
data = ["Hafsa", 25, True, 3.14]
```

It can even be empty:

```
tasks = []
```

An empty list is useful when you plan to add items later.

---

3. Why Lists Matter

Imagine you are building a learning platform.

You could store resources like this:

```
resource1 = "Python Basics"
resource2 = "Python Loops"
resource3 = "Python Strings"
```

But this becomes difficult to manage.

Instead:

```
resources = [
    "Python Basics",
    "Python Loops",
    "Python Strings"
]
```

Now you can:

- loop through all resources
- add new resources
- remove resources
- search for a resource
- count resources
- sort resources
- update resources

This is the real power of lists.

---

4. List Indexing

Lists use zero-based indexing.

```
fruits = ["apple", "banana", "mango"]
```

Their indexes are:

```
Index:    0        1        2
          □        □        □
       apple    banana    mango
```

Access an item:

```
print(fruits[0])
```

Output:

```
apple
```

```
print(fruits[1])
```

Output:

```
banana
```

```
print(fruits[2])
```

Output:

```
mango
```

---

5. Negative Indexing

Python also supports negative indexes.

```
Index:     0       1       2
          □       □       □
        apple   banana   mango
          □       □       □
Index:    -3      -2      -1
```

So:

```
print(fruits[-1])
```

Output:

```
mango
```

And:

```
print(fruits[-2])
```

Output:

```
banana
```

Negative indexing is especially useful when you want the last items without knowing the list length.

---

6. List Length

Use `len()` to find the number of items.

```
fruits = ["apple", "banana", "mango"]
```

```
print(len(fruits))
```

Output:

```
3
```

You can also use it in conditions:

```
if len(fruits) > 0:
    print("The list has items.")
```

A shorter approach is:

```
if fruits:
    print("The list has items.")
```

---

7. Accessing Items Safely

This works:

```
fruits = ["apple", "banana", "mango"]

print(fruits[2])
```

But:

```
print(fruits[5])
```

causes:

`IndexError`

because index `5` does not exist.

A safer approach is to check the length:

```
index = 2

if index < len(fruits):
    print(fruits[index])
```

When working with negative indexes, remember that they also have valid ranges.

---

8. Lists Are Mutable

One of the most important differences between lists and strings is that lists are **mutable**.

Mutable means:

> You can change the contents of a list after creating it.

Example:

```
fruits = ["apple", "banana", "mango"]

fruits[1] = "orange"

print(fruits)
```

Output:

```
['apple', 'orange', 'mango']
```

The list itself changed.

---

9. Updating Multiple Items

You can replace a range of items using slicing.

```
numbers = [10, 20, 30, 40, 50]

numbers[1:3] = [200, 300]

print(numbers)
```

Output:

```
[10, 200, 300, 40, 50]
```

You can even replace one item with multiple items:

```
numbers = [10, 20, 30]

numbers[1:2] = [200, 300, 400]

print(numbers)
```

Output:

```
[10, 200, 300, 400, 30]
```

This is possible because lists are mutable.

---

10. Adding Items With `append()`

`append()` adds one item to the end of a list.

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

fruits.append("mango")

print(fruits)
```

Output:

```
['apple', 'banana', 'mango']
```

This is one of the most commonly used list methods.

Example:

```
tasks = []

tasks.append("Study Python")
tasks.append("Practice loops")
tasks.append("Build project")

print(tasks)
```

Output:

```
['Study Python', 'Practice loops', 'Build project']
```

---

11. Adding Multiple Items With `extend()`

`extend()` adds multiple items to a list.

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

fruits.extend(["mango", "orange"])

print(fruits)
```

Output:

```
['apple', 'banana', 'mango', 'orange']
```

`append()` vs `extend()`

This distinction is extremely important.

```
fruits.append(["mango", "orange"])
```

produces:

```
['apple', 'banana', ['mango', 'orange']]
```

The entire list was added as **one element**.

But:

```
fruits.extend(["mango", "orange"])
```

produces:

```
['apple', 'banana', 'mango', 'orange']
```

Think:

append() → add one item
extend() → add items from another collection

---

12. Inserting Items With `insert()`

`insert()` adds an item at a specific index.

```
fruits = ["apple", "mango"]

fruits.insert(1, "banana")

print(fruits)
```

Output:

```
['apple', 'banana', 'mango']
```

Syntax:

```
list.insert(index, value)
```

Example:

```
numbers = [10, 30, 40]

numbers.insert(1, 20)

print(numbers)
```

Output:

```
[10, 20, 30, 40]
```

---

13. Removing Items With `remove()`

`remove()` removes the first matching value.

```
fruits = ["apple", "banana", "mango"]

fruits.remove("banana")

print(fruits)
```

Output:

```
['apple', 'mango']
```

If the value does not exist:

```
fruits.remove("orange")
```

Python raises:

```
ValueError
```

So when necessary, check first:

```
if "orange" in fruits:
    fruits.remove("orange")
```

---

14. Removing by Index With `pop()`

`pop()` removes an item by index.

```
fruits = ["apple", "banana", "mango"]

fruits.pop(1)

print(fruits)
```

Output:

```
['apple', 'mango']
```

The removed item can also be stored:

```
removed = fruits.pop(0)

print(removed)
```

`pop()` Without an Index

If you don't provide an index:

```
fruits = ["apple", "banana", "mango"]

last_item = fruits.pop()

print(last_item)
```

Output:

```
mango
```

The last item is removed.

This is useful when implementing stack-like behavior.

---

15. del

Python also provides the `del` statement.

```
fruits = ["apple", "banana", "mango"]

del fruits[1]

print(fruits)
```

Output:

```
['apple', 'mango']
```

You can delete a range:

```
numbers = [10, 20, 30, 40, 50]

del numbers[1:4]

print(numbers)
```

Output:

```
[10, 50]
```

You can even delete the entire list:

```
del numbers
```

After that, `numbers` no longer exists.

---

16. Clearing a List

Use `clear()` to remove all items while keeping the list itself.

```
tasks = ["Study", "Practice", "Build"]

tasks.clear()

print(tasks)
```

Output:

```
[]
```

Difference:

```
clear() → removes contents
del     → can remove the list itself
```

---

17. Checking Whether an Item Exists

Use `in`.

```
fruits = ["apple", "banana", "mango"]

print("banana" in fruits)
```

Output:

```
True
```

You can use it in conditions:

```
if "mango" in fruits:
    print("Mango is available.")
```

And:

```
if "orange" not in fruits:
    print("Orange is not available.")
```

This is one of the most useful list operations.

---

18. Finding an Item's Position

Use `index()`.

```
fruits = ["apple", "banana", "mango"]

position = fruits.index("banana")

print(position)
```

Output:

```
1
```

If the value doesn't exist, Python raises:

```
ValueError
```

You can check first:

```
if "banana" in fruits:
    print(fruits.index("banana"))
```

---

19. Counting Items

Use `count()`.

```
numbers = [1, 2, 2, 3, 2, 4]

print(numbers.count(2))
```

Output:

```
3
```

This is useful for frequency-based problems.

Example:

```
votes = ["A", "B", "A", "C", "A"]

print(votes.count("A"))
```

Output:

```
3
```

---

20. Sorting Lists

sort()

Sorts a list in place.

```
numbers = [50, 10, 30, 20, 40]

numbers.sort()

print(numbers)
```

Output:

```
[10, 20, 30, 40, 50]
```

For strings:

```
names = ["Zara", "Hafsa", "Ali"]

names.sort()

print(names)
```

Output:

```
['Ali', 'Hafsa', 'Zara']
```

Descending Order

Use:

```
numbers.sort(reverse=True)
```

Example:

```
numbers = [10, 50, 20, 40, 30]

numbers.sort(reverse=True)

print(numbers)
```

Output:

```
[50, 40, 30, 20, 10]
```

---

21. sorted() vs sort()

These look similar but behave differently.

sort()

Changes the original list.

```
numbers = [3, 1, 2]

numbers.sort()
```

```
print(numbers)
```

sorted()

Creates and returns a new sorted list.

```
numbers = [3, 1, 2]

new_numbers = sorted(numbers)

print(numbers)
print(new_numbers)
```

Output:

```
[3, 1, 2]
[1, 2, 3]
```

Mental model:

```
sort()   modify existing list
sorted()  create sorted result
```

---

22. Reversing a List

Use:

```
reverse()
```

Example:

```
numbers = [1, 2, 3, 4]
```

```
numbers.reverse()

print(numbers)
```

Output:

```
[4, 3, 2, 1]
```

Important:

`reverse()` changes the original list.

---

23. List Slicing

You can extract part of a list using slicing.

```
numbers = [10, 20, 30, 40, 50]

print(numbers[1:4])
```

Output:

```
[20, 30, 40]
```

Remember:

```
start  included
end    excluded
```

So:

`numbers[1:4]`

means:

`index 1`
`index 2`
`index 3`

Common Slices

`numbers[:3]`

First three items.

`numbers[2:]`

From index 2 to the end.

`numbers[:]`

All items.

`numbers[-3:]`

Last three items.

`numbers[::2]`

Every second item.

---

24. Copying a List

Consider:

```
numbers = [1, 2, 3]

copy = numbers
```

It may look like you created a separate list.

You didn't.

Both variables refer to the same list.

```
copy.append(4)

print(numbers)
```

Output:

```
[1, 2, 3, 4]
```

To create a separate shallow copy:

```
copy = numbers.copy()
```

Now:

```
copy.append(5)

print(numbers)
print(copy)
```

Output:

```
[1, 2, 3, 4]
[1, 2, 3, 4, 5]
```

You can also use:

```
copy = numbers[:]
```

for a shallow copy.

---

25. Lists Can Contain Different Data Types

Python allows mixed lists:

```
person = [
    "Hafsa",
    25,
    True,
    36.5
]
```

You can access each item:

```
print(person[0])
print(person[1])
print(person[2])
print(person[3])
```

However, in real applications, keeping a list logically organized usually makes your code easier to understand.

For example:

```
ages = [21, 25, 28, 30]
```

is clearer than:

```
data = [21, "Hafsa", True, 3.14]
```

when the purpose is to store ages.

---

26. Lists Inside Lists

A list can contain another list.

This creates a **nested list**.

```
students = [
    ["Hafsa", 90],
    ["Ali", 85],
    ["Sara", 95]
]
```

Access the first student's name:

```
print(students[0][0])
```

Output:

```
Hafsa
```

Access the first student's score:

```
print(students[0][1])
```

Output:

```
90
```

The first index selects the inner list.

The second index selects an item inside it.

---

27. Iterating Through a List

Lists become especially powerful with loops.

```
fruits = ["apple", "banana", "mango"]

for fruit in fruits:
    print(fruit)
```

Output:

```
apple
banana
mango
```

Python automatically gives you each item one by one.

This is usually cleaner than manually using indexes.

---

28. List and `range()`

Sometimes you need the index too.

```
students = ["Hafsa", "Ali", "Sara"]

for i in range(len(students)):
    print(i, students[i])
```

Output:

```
0 Hafsa
1 Ali
2 Sara
```

However, Python provides a cleaner solution.

---

29. Using `enumerate()`

```
students = ["Hafsa", "Ali", "Sara"]

for index, student in enumerate(students):
    print(index, student)
```

Output:

```
0 Hafsa
1 Ali
2 Sara
```

If you want numbering to start from 1:

```
for number, student in enumerate(students, start=1):
    print(number, student)
```

Output:

```
1 Hafsa
2 Ali
3 Sara
```

---

30. Modifying List Items in a Loop

You can update items using indexes.

```
numbers = [1, 2, 3, 4]

for i in range(len(numbers)):
    numbers[i] *= 2

print(numbers)
```

Output:

```
[2, 4, 6, 8]
```

The original list has been modified.

---

31. Finding Maximum and Minimum

Python provides:

`max()`
`min()`

Example:

```
scores = [70, 85, 92, 68, 88]

print(max(scores))
print(min(scores))
```

Output:

```
92
68
```

You can calculate the total:

```
print(sum(scores))
```

Output:

```
403
```

And average:

```
average = sum(scores) / len(scores)

print(average)
```

Output:

```
80.6
```

---

32. List Unpacking

You can assign list items to separate variables.

```
person = ["Hafsa", 25, "Python"]

name, age, language = person

print(name)
print(age)
print(language)
```

Output:

```
Hafsa
25
Python
```

The number of variables must normally match the number of values.

Extended Unpacking

Python also allows:

```
numbers = [1, 2, 3, 4, 5]

first, *middle, last = numbers

print(first)
print(middle)
print(last)
```

Output:

```
1
[2, 3, 4]
5
```

This becomes useful when handling variable-length data.

---

33. Combining Lists

You can combine lists using `+`.

```
frontend = ["HTML", "CSS", "JavaScript"]
backend = ["Python", "Django"]

skills = frontend + backend

print(skills)
```

Output:

```
['HTML', 'CSS', 'JavaScript', 'Python', 'Django']
```

The original lists remain unchanged.

---

34. Repeating a List

The `*` operator can repeat a list.

```
numbers = [1, 2]

print(numbers * 3)
```

Output:

```
[1, 2, 1, 2, 1, 2]
```

Be careful when using repetition with nested mutable lists because references can be shared.

For example:

```
matrix = [[0] * 3] * 3
```

can cause unexpected behavior when modifying one row.

For beginners, prefer constructing independent rows explicitly when you need a mutable matrix.

---

35. List Comprehensions

A list comprehension is a concise way to create a list.

Instead of:

```
numbers = []

for number in range(1, 6):
    numbers.append(number * 2)

print(numbers)
```

You can write:

```
numbers = [number * 2 for number in range(1, 6)]

print(numbers)
```

Output:

```
[2, 4, 6, 8, 10]
```

Basic structure:

```
[expression for item in iterable]
```

---

36. List Comprehension With a Condition

Suppose you only want even numbers.

```
numbers = [1, 2, 3, 4, 5, 6]

even_numbers = [
    number
    for number in numbers
    if number % 2 == 0
]

print(even_numbers)
```

Output:

```
[2, 4, 6]
```

Mental model:

```
Take each number
    ↓
Check condition
    ↓
Keep it if condition is True
```

Do not use list comprehensions just to make code shorter. If a comprehension becomes difficult to read, a normal loop may be better.

---

37. Transforming Strings in a List

Suppose:

```
names = ["hafsa", "ali", "sara"]
```

You want title case:

```
formatted_names = [name.title() for name in names]

print(formatted_names)
```

Output:

```
['Hafsa', 'Ali', 'Sara']
```

This demonstrates how lists and string methods work together.

---

38. Filtering Data

Suppose you have scores:

```
scores = [45, 78, 90, 32, 88, 61]
```

Find passing scores:

```
passing = [score for score in scores if score >= 50]

print(passing)
```

Output:

```
[78, 90, 88, 61]
```

This is a common pattern in data processing.

---

39. Real Example: haas.dev Resources

Imagine your resource titles are stored in a list:

```
resources = [
    "Python Loops",
    "Python Strings",
    "JavaScript Functions",
    "React Native Navigation"
]
```

You can search for Python resources:

```
python_resources = [
    resource
```

```
    for resource in resources
    if "Python" in resource
]

print(python_resources)
```

Output:

```
['Python Loops', 'Python Strings']
```

You can also count them:

```
print(len(python_resources))
```

Output:

```
2
```

This is the same type of operation that appears in real search and filtering features.

---

40. Real Example: Shopping Cart

A shopping cart can be represented using a list:

```
cart = ["Laptop", "Mouse", "Keyboard"]
```

Add an item:

```
cart.append("Headphones")
```

Remove an item:

```
cart.remove("Mouse")
```

Check whether something is present:

```
if "Laptop" in cart:
    print("Laptop is in the cart.")
```

Count products:

```
print("Items:", len(cart))
```

A simple list already gives you many operations required by a basic cart system.

---

41. Real Example: To Do List

```
tasks = []

tasks.append("Study Python")
tasks.append("Practice lists")
tasks.append("Build a project")

print("Tasks:")

for task in tasks:
    print("-", task)
```

Marking/removing a task:

```
tasks.remove("Practice lists")
```

Adding another:

```
tasks.append("Learn dictionaries")
```

Lists are often the first data structure beginners use to build practical applications.

---

42. Real Example: Student Scores

```
scores = [78, 92, 65, 88, 74]

print("Highest:", max(scores))
print("Lowest:", min(scores))
print("Total:", sum(scores))
print("Students:", len(scores))
```

Calculate average:

```
average = sum(scores) / len(scores)

print("Average:", average)
```

Sort scores:

```
scores.sort(reverse=True)

print(scores)
```

---

43. Common Mistakes

Mistake 1: Forgetting zero-based indexing

Wrong assumption:

`fruits[1]`

means the first item.

It actually means the **second** item.

Remember:

```
0 → first
1 → second
2 → third
```

Mistake 2: Accessing an index that doesn't exist

```
numbers = [10, 20, 30]

print(numbers[3])
```

This causes:

`IndexError`

The valid positive indexes are:

`0, 1, 2`

Mistake 3: Confusing `append()` and `extend()`

```
numbers.append([4, 5])
```

adds one nested list.

`numbers.extend([4, 5])`

adds two individual elements.

Mistake 4: Forgetting that `sort()` changes the original list

`numbers.sort()`

does not return a new sorted list for you to store.

Use:

`sorted_numbers = sorted(numbers)`

when you want to preserve the original order.

Mistake 5: Accidentally sharing a list

```
a = [1, 2, 3]
b = a

b.append(4)

print(a)
```

Output:

`[1, 2, 3, 4]`

Use:

```
b = a.copy()
```

when you need a separate shallow copy.

---

44. A Practical List Problem Solving Framework

Whenever you receive a list problem, ask:

1. What data do I have?

```
numbers = [10, 20, 30, 40]
```

2. Do I need one item or all items?

One item:

```
numbers[2]
```

All items:

```
for number in numbers:
    ...
```

3. Do I need to modify the list?

Add:

```
append()
extend()
insert()
```

Remove:

```
remove()
pop()
clear()
```

Update:

```
numbers[index] = value
```

4. Do I need to search?

```
in
index()
count()
```

5. Do I need to reorder?

```
sort()
sorted()
reverse()
```

6. Do I need a filtered or transformed list?

Consider:

```
list comprehension
```

This framework helps you choose the right tool instead of memorizing methods randomly.

---

45. List Methods Cheat Sheet

```
items.append(value)
items.extend(other_items)
items.insert(index, value)

items.remove(value)
items.pop()
items.pop(index)
items.clear()

items.index(value)
items.count(value)

items.sort()
items.sort(reverse=True)
items.reverse()

items.copy()
```

Useful built-in functions:

```
len(items)
max(items)
min(items)
sum(items)
sorted(items)
```

Useful operators:

```
value in items
value not in items

list1 + list2
items * 3
```

---

46. Mini Project: Simple To Do List

Let's combine what you have learned.

```
tasks = []

while True:
    print("\n--- To Do List ---")
    print("1. Add task")
    print("2. View tasks")
    print("3. Remove task")
    print("4. Clear tasks")
    print("5. Exit")

    choice = input("Choose an option: ").strip()

    if choice == "1":
        task = input("Enter task: ").strip()

        if task:
            tasks.append(task)
            print("Task added.")
        else:
            print("Task cannot be empty.")

    elif choice == "2":
        if not tasks:
            print("No tasks yet.")
        else:
            for number, task in enumerate(tasks, start=1):
                print(f"{number}. {task}")

    elif choice == "3":
```

```
        if not tasks:
            print("No tasks to remove.")
        else:
            for number, task in enumerate(tasks, start=1):
                print(f"{number}. {task}")

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

            if 1 <= number <= len(tasks):
                removed = tasks.pop(number - 1)
                print(f"Removed: {removed}")
            else:
                print("Invalid task number.")

    elif choice == "4":
        tasks.clear()
        print("All tasks cleared.")

    elif choice == "5":
        print("Goodbye!")
        break

    else:
        print("Invalid option.")
```

This project combines:

- lists
- append()
- pop()
- clear()
- len()
- enumerate()
- if...elif...else

- while
- break
- strip()
- user input

This is how individual Python concepts begin coming together into real programs.

---

47. Practice Exercises

Exercise 1: Favorite Foods

Create a list of five favorite foods.

Print:

- first food
- last food
- total number of foods

Exercise 2: Add and Remove

Create:

```
languages = ["Python", "JavaScript", "Java"]
```

Then:

- add `"Dart"`
- remove `"Java"`

- print the final list

Exercise 3: Search

Ask the user for a programming language.

Check whether it exists in:

```
languages = ["Python", "JavaScript", "Java", "Dart"]
```

Exercise 4: Numbers

Create a list of numbers and display:

- largest number
- smallest number
- total
- average

Exercise 5: Reverse

Create a list of five items and reverse it.

Try both:

```
reverse()
```

and slicing:

`[::-1]`

Exercise 6: Filtering

Given:

```
numbers = [5, 12, 8, 21, 30, 17]
```

create a new list containing only numbers greater than `10`.

Exercise 7: Name Formatter

Given:

```
names = ["hafsa", "ALI", "sara", "ahmed"]
```

create:

```
['Hafsa', 'Ali', 'Sara', 'Ahmed']
```

using a list comprehension.

Exercise 8: Duplicate Counter

Given:

```
numbers = [1, 2, 2, 3, 4, 2, 5]
```

find how many times `2` appears.

---

48. 5 Minute Challenge

Create a **Student Score Analyzer**.

Start with:

```
scores = [78, 92, 65, 88, 74]
```

Your program should display:

```
Total students: 5
Highest score: 92
Lowest score: 65
Average score: 79.4
```

Then:

1. Add a new score.
2. Remove the lowest score.
3. Sort the scores from highest to lowest.
4. Display every score with its position.

Try to solve it using lists, loops, `len()`, `max()`, `min()`, `sum()`, `append()`, `remove()`, `sort()`, and `enumerate()`.

---

49. Mini Quiz

Question 1

What is the index of the first item in a Python list?

A. `1`
B. `0`
C. `-1`
D. `first`

Answer: B

Question 2

What does `append()` do?

A. Removes an item
B. Sorts a list
C. Adds an item to the end
D. Clears the list

Answer: C

Question 3

What is the difference between `append()` and `extend()`?

A. They are identical
B. `append()` adds one item, while `extend()` adds items from another iterable
C. `extend()` removes items

D. `append()` only works with numbers

Answer: B

---

50. Interview Questions

Beginner

1. What is a list in Python?
2. How do you create an empty list?
3. Are Python lists mutable?
4. What is zero-based indexing?
5. How do you access the last item of a list?
6. What does `len()` return?
7. How do you add an item to a list?
8. What is the difference between `append()` and `extend()`?
9. What does `remove()` do?
10. What does `pop()` do?

Intermediate

11. What is the difference between `remove()` and `pop()`?
12. What is the difference between `sort()` and `sorted()`?
13. What is the difference between `copy()` and assignment?
14. What is list slicing?
15. What is a nested list?
16. How do you check whether an item exists in a list?
17. How do you find the index of an item?
18. What is list unpacking?
19. What is a list comprehension?

20. When would you use a list comprehension instead of a normal loop?

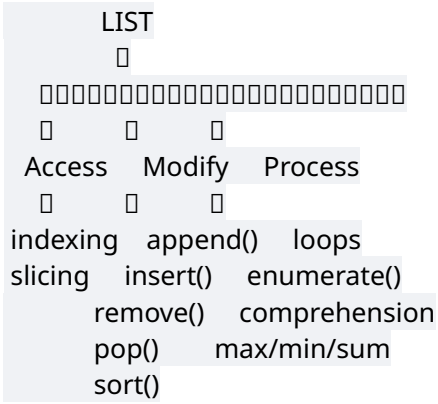
---

51. Key Takeaways

- A list stores multiple values in one variable.
- Lists are ordered and use zero-based indexing.
- Lists are mutable, so their contents can be changed.
- Use indexing to access individual items.
- Use slicing to access ranges of items.
- Use `append()` to add one item.
- Use `extend()` to add multiple items.
- Use `insert()` to add an item at a specific position.
- Use `remove()` to remove a value.
- Use `pop()` to remove an item by position.
- Use `clear()` to empty a list.
- Use `in` to check whether an item exists.
- Use `count()` to count occurrences.
- Use `sort()` or `sorted()` to order data.
- Use `reverse()` to reverse a list in place.
- Use `copy()` when you need a separate shallow copy.
- Use loops to process every item.
- Use `enumerate()` when you need both the index and value.
- Use list comprehensions for concise filtering and transformation.
- Lists are foundational to real applications because applications constantly work with collections of data.

Final Mental Model

Think of a Python list as a **container of ordered, changeable data**:



When you see multiple related values in a Python problem, ask:

> **Should these values belong together in a list?**

That question is one of the first steps toward thinking like a programmer.

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https://dev-roast-app.vercel.app/resources