

Lists

Textbook

Lists

In Python, there are 3 main ways to group data together:

- [List](#): a data group that is ordered (numbered) and changeable (you can change the list items). Allows duplicates.
- [Tuple](#): a data group that is unordered and unchangeable. Allows duplicates.
- [Dictionary](#): a data group that is unordered, changeable and indexed. No duplicates.

Each of these approaches to grouping data has a time and a place where it is most useful. It's important to understand each approach so you can select the one that will work best for any given problem. We will learn about tuples and dictionaries in the Python 2 Unit, so you don't need to worry about them yet. We will focus on lists for now.



Lists

A [list](#) in Python is a data group that is ordered and changeable. Lists in Python work much the same way as other kinds of lists you might use. Like a numbered to-do list or a step-by-step list of directions. Ordered means that the order of the data in the group matters. Changeable means that you can switch out the data points right in the middle of your list. For example, the order of a step-by-step list of directions matters (ordered), but you could possibly replace steps (changeable).

Creating Lists

Lists are assigned to a variable. Below is an example of a list assigned to the variable "friends."

```
1 friends = ["Kevin", "Lily", "Ajash", "Camilla"]
2 print(friends)
3
```

Try it!

Notice that the list named friends has 4 data points inside. Can you remember which data type those data points are? Each data point in the list named friends is a string.

Lists can contain other data types as well.

```
1 distance = [5, 7, 20, 11, 18]
2 print(distance)
```

Try it!

Notice that the list named distance has 5 data points inside. Each data point in the list named distance is an integer.

It is important to take note of what kind of data type you are working with because it will affect your ability to use the information.

Different Data Types

It is also possible to have a list with different data types in it.

```
1 information = [5, 7, "Ahmed", 9, "Sequoia"]
2 print(information)
```

Try it!

Creating Lists with Math

You can also use math to generate a list.

```
1 mylist = ["Hello"] * 6
2
```

Try it!

```
3 print(mylist)
```

This will print out

```
['Hello', 'Hello', 'Hello', 'Hello', 'Hello', 'Hello']
```

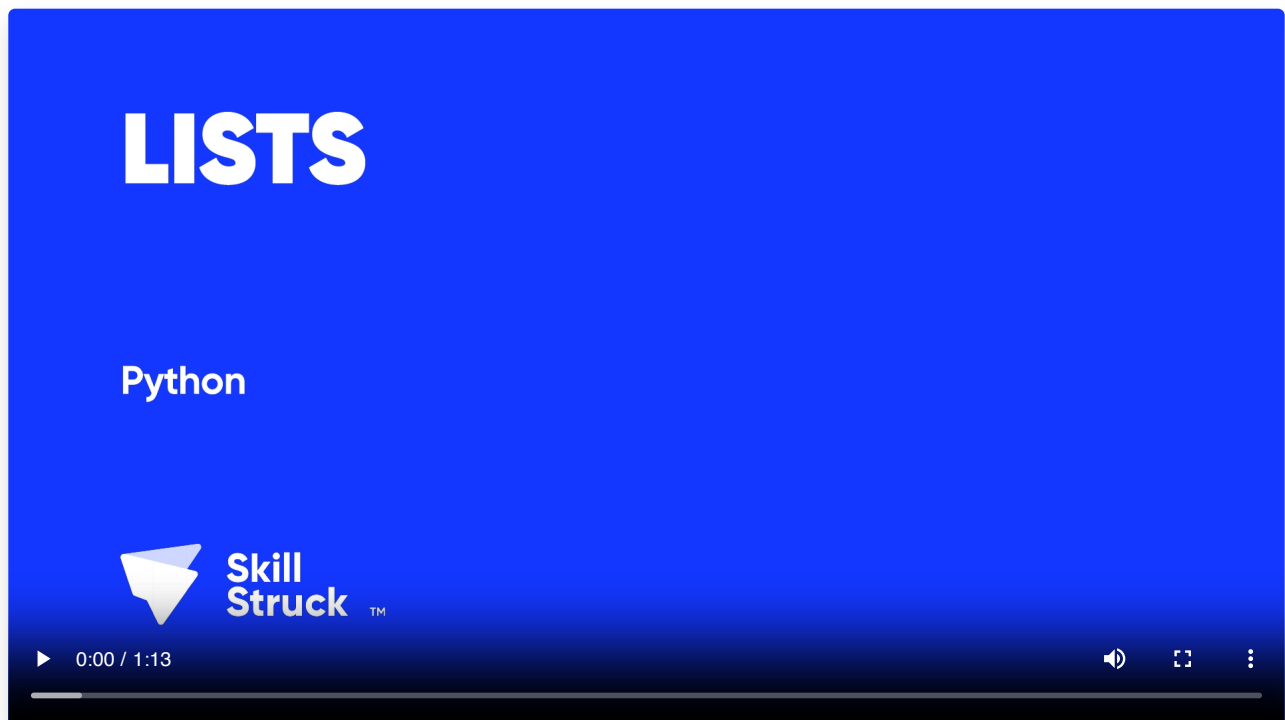
Altering Lists

We will discuss how to alter lists in later Python lessons.

Difference Between an Array and an Array List in Python

In Python, the terms **array** and **array list** refer to different ways of handling collections of data. A traditional **array** (like those found in libraries such as NumPy, or in other programming languages) is a fixed-size collection where all elements must be of the same data type. This strictness allows for very efficient storage and fast operations because the computer knows exactly how much space each element takes up and where to find it.

On the other hand, a Python **list** (which is often what people mean by "array list" in a general programming context, though Python doesn't have a distinct "ArrayList" class like Java) is a dynamic, or flexible, collection that can hold elements of different data types and can grow or shrink in size as needed. While Python lists offer great flexibility and ease of use, they can be less memory-efficient and slightly slower for certain numerical operations compared to true arrays because of their overhead in managing various data types and changing sizes.



Checkpoint

Lists Checkpoint

1. Create a list named `candy` .
2. Inside the list named candy, include **4 strings** of your favorite kinds of candy.
3. Create a list named `pieces` .
4. Inside the list named pieces, include **4 integer** data points of how many of those kinds of candy you wish you had.
5. Print both lists in separate print statements.

Requirements:

- Create a list named `candy` with strings inside.

- Create a list named `pieces` with integers inside.
- Print the list named `candy` .
- Print the list named `pieces` .

Questions (8)

1. Which data grouping is ordered and changeable?

MULTIPLE CHOICE

Choose the correct answer:

- A. List
- B. Tuple
- C. Dictionary

2. What kind of brackets are used for lists in Python?

MULTIPLE CHOICE

Choose the correct answer:

- A. {}
- B. ()
- C. []
- D. ||

3. Edit the text box below to debug (fix) the code:

DEBUG CODE

Code to Debug:

```
1 distance = (5, 7, 20, 11, 18)
```

4. Edit the text box below to debug (fix) the code:

DEBUG CODE

Code to Debug:

```
1 distance = [5; 7; 20; 11; 18]
```

5. Which of the following are ways to group data in Python? Select all that apply.

SELECT MULTIPLE

Select all that apply:

- A. dictionaries
- B. lists
- C. tuples
- D. collections

6. True or False: All items in a list must be the same data type.

MULTIPLE CHOICE

Choose the correct answer:

- A. True
- B. False

7. How many data points are in the list named distance?

MULTIPLE CHOICE

`distance = [5, 7, 20, 11, 18, 90]`

Choose the correct answer:

- A. 6
- B. 5
- C. 1
- D. 7

8. What will the following code print out?

MULTIPLE CHOICE

`pets = ["dog", "cat", 3, 5, "chicken"] print(pets)`

Choose the correct answer:

- A. ['dog', 'cat', 3, 5, 'chicken']
- B. 'dog', 'cat', 3, 5, 'chicken'
- C. 3, 5
- D. dog cat 3 5 chicken
- E. "dog", "cat", "chicken"

Challenges (5)

1. List of Friends

Who would you consider your friend? Friends can often be people older than you, younger than you, or even pets. Do you have any adults that you consider your friend? What about little kids?

Create a list called `friends` and add at least **3 friends** to that list.

Print the list.

Requirements:

- Create a list called `friends`.
- Add the names of at least three friends to the list.
- Print the list.

2. Reasons

Why are you learning coding? Is it just because it's part of your class? Or do you want to be able to put it on your resume and get a better job?

Create a list of at least 3 reasons why coding might be beneficial.

Make sure your reasons are in **string** format.

Requirements:

- Create a list called "reasons".
- Add at least 3 reasons to the list in the form of strings.
- Print the list.

3. Family's Age

Create a list called `ages` and fill it with the ages of everyone in your immediate family.

All the data types should be **integers**.

Print the list.

Requirements:

- Create a list called `ages`.
- Add at least 3 ages to your list.
- Print the list.

4. Places You've Visited

Where have you been? What kinds of places have you visited that are amazing? These could be local places or places on a vacation.

Make a list called `places` that includes the **top 5 places** you've visited in your life.

Print the list.

Requirements:

- Create a list called `places` .
- Add the top 5 places you've visited to the list.
- Print the list.

5. Remember

How has this year gone so far for you? Think back through everything you've done so far. If you can't remember exactly, make your best guess!

Create a list called `memories` that has **5 integer OR string values in it**.

The values will match the list below:

1. How many slices of pizza did you eat?

2. How many new places did you go?

3. Name one friend you hung out with.

4. Name one news event that happened this year.

5. How many teachers have you had?

Requirements:

- Create a list named `memories` that has at least 5 values in it.
- Print the list named `memories` .

Answer Keys & Solutions

Checkpoint Solutions

Lists Checkpoint

```
1 candy = ["chocolate", "peanut butter", "caramel", "peppermint"]
2 pieces = [5, 6, 7, 8]
3 print(candy)
4 print(pieces)
```

Questions

1. Which data grouping is ordered and changeable?

MULTIPLE CHOICE

Correct Answer:

- | | |
|---------------|-------------|
| A. List | ✓ Correct |
| B. Tuple | ✗ Incorrect |
| C. Dictionary | ✗ Incorrect |

Explanation:

This is the data type we discussed in this lesson.

2. What kind of brackets are used for lists in Python?

MULTIPLE CHOICE

Correct Answer:

- | | |
|-------|-------------|
| A. {} | ✗ Incorrect |
| B. () | ✗ Incorrect |
| C. [] | ✓ Correct |
| D. | ✗ Incorrect |

Explanation:

They are sometimes called "square brackets"

3. Edit the text box below to debug (fix) the code:

DEBUG CODE

Incorrect Code:

```
1 distance = (5, 7, 20, 11, 18)
```

Correct Solution:

```
1 distance = [5, 7, 20, 11, 18]
```

Explanation:

Lists use square brackets.

4. Edit the text box below to debug (fix) the code:

DEBUG CODE

Incorrect Code:

```
1 distance = [5; 7; 20; 11; 18]
```

Correct Solution:

```
1 distance = [5, 7, 20, 11, 18]
```

Explanation:

List items are separated by commas.

5. Which of the following are ways to group data in Python? Select all that apply.

SELECT MULTIPLE

Correct Answers:

A. dictionaries

✓ Correct

B. lists

✓ Correct

C. tuples

✓ Correct

D. collections

✗ Incorrect

Explanation:

Collections are not a form of data grouping in Python.

6. True or False: All items in a list must be the same data type.

MULTIPLE CHOICE

Correct Answer:

- A. True ✗ Incorrect
- B. False ✓ Correct

Explanation:

Lists can sometimes contain several different data types.

7. How many data points are in the list named distance?

MULTIPLE CHOICE

Correct Answer:

- A. 6 ✓ Correct
- B. 5 ✗ Incorrect
- C. 1 ✗ Incorrect
- D. 7 ✗ Incorrect

Explanation:

Each number in this example is a data point.

8. What will the following code print out?

MULTIPLE CHOICE

Correct Answer:

- A. ['dog', 'cat', 3, 5, 'chicken'] ✓ Correct
- B. 'dog', 'cat', 3, 5, 'chicken' ✗ Incorrect
- C. 3, 5 ✗ Incorrect
- D. dog cat 3 5 chicken ✗ Incorrect
- E. "dog", "cat", "chicken" ✗ Incorrect

Explanation:

The square brackets also get printed out.

Challenges

1. List of Friends

Solution:

```
1 friends = ["Jen", "Mat", "Fran"]
2
3 print(friends)
```

2. Reasons

Solution:

```
1 reasons = ["Better resume", "Build logic skills", "It's fun!"]
2
3 print(reasons)
```

3. Family's Age

Solution:

```
1 ages = [35, 38, 15, 12]
2
3 print(ages)
```

4. Places You've Visited

Solution:

```
1 places = ["Amazon", "Taj Mahal", "Africa", "Great Barrier Reef", "Thailand"]
2
3 print(places)
```

5. Remember

Solution:

```
1 memories = [50, 4, "Abbie", "Olympics got postponed", 8]
```

```
2  
3 print(memories)
```