What is a List?

A *list* is a collection of items in a particular order.

In Python, square brackets([]) indicate a list, and individual elements in the list are separated by commas.

```
bicycles = ["trek", "cannondale", "redline", "specialized"]
```

Accessing Elements in a List

Lists are ordered collections, so you can access any element in a list by telling Python the position, or *index*, of the item desired.

```
bicycles = ["trek", "cannondale", "redline", "specialized"]
print(bicycles[0])

---> trek
```

Index Positions Start at 0, Not 1

Python considers the first item in a list to be at position 0, not position 1.
This is true of most programming languages, and the reason has to do with how the list operations are implemented at a lower level.

Python has a special syntax for accessing the last element in a list. if you ask for the item at index -1, Python always returns the last item in the list

```
bicycles = ["trek", "cannondale", "redline", "specialized"]
print(bicycles[-1])

---> specialized
```

Modifying, Adding, and Removing Elements

Most lists you create will be *dynamic*, meaning you'll build a list and then add and remove elements from it as your program runs its course.

Modifying Elements in a list

```
motorcycles = ['honda', 'yamaha', 'suzuki']
print(motorcycles)
---> ['honda', 'yamaha', 'suzuki']

motorcycles[0] = 'ducati'
print(motorcycles)
---> ['ducati', 'yamaha', 'suzuki']
```

Adding Elements to a list

Appending Elements to the End of a List

The simplest way to add a new element to a list is to *append* the item to the list. When you append an item to a list, the new element is added to the end of the list.

```
motorcycles = ['honda', 'yamaha', 'suzuki']
print(motorcycles)
---> ['honda', 'yamaha', 'suzuki']

motorcycles.append('ducati')
print(motorcycles)
---> ['honda', 'yamaha', 'suzuki', 'ducati']
```

Inserting Elements into a List

You can add a new element at any position in your list by using the `insert()` method. You do this by specifying the index of the new element and the value of the new item.

```
motorcycles = ['honda', 'yamaha', 'suzuki']
motorcycles.insert(0, 'ducati')
print(motorcycles)
---> ['ducati', 'honda', 'yamaha', 'suzuki']
```

Removing Elements from a list

Removing an Item Using the del Statement

```
motorcycles = ['honda', 'yamaha', 'suzuki']
print(motorcycles)
---> ['honda', 'yamaha', 'suzuki']
```

```
4
5  del motorcycles[0]
6  print(motorcycles)
7  ---> ['yamaha', 'suzuki']
```

Removing an Item Using the pop() Method

Sometimes you'll want to use the value of an item after you remove it from a list.
The `pop()` method removes the last item in a list, but it lets you work with that item after removing it.
The term `pop` comes from thinking of a list as a stack of items and popping one item off the top of the stack.

```
1  motorcycles = ['honda', 'yamaha', 'suzuki']
2  print(motorcycles)
3  ---> ['honda', 'yamaha', 'suzuki']
4  popped_motorcycle = motorcycles.pop()
5  print(motorcycles)
6  ---> ['honda', 'yamaha']
7  print(popped_motorcycle)
8  ---> suzuki
```

Popping Items from Any Position in a List

You can use `pop()` to remove an item from any position in a list by including the index of the item you want to remove in parentheses

```
1  motorcycles = ['honda', 'yamaha', 'suzuki']
2  first_owned = motorcycles.pop(0)
3  print(f"The first motorcycle I owned was a {first_owned.title()}.")
4  ---> The first motorcycle I owned was a Honda.
```

Removing an Item by Value

If you only know the value of the item you want to remove, you can use the `remove()` method

```
1  motorcycles = ['honda', 'yamaha', 'suzuki', 'ducati']
2  print(motorcycles)
3  ---> ['honda', 'yamaha', 'suzuki', 'ducati']
4
5
6  motorcycles.remove('ducati')
7  print(motorcycles)
8  ---> ['honda', 'yamaha', 'suzuki']
```

Sorting a List Permanently with the `sort()` Method

Python's `sort()` method makes it relatively easy to sort a list.

```
cars = ['bmw', 'audi', 'toyota', 'subaru']
cars.sort()

print(cars)
---> ['audi', 'bmw', 'subaru', 'toyota']
```

```
cars = ['bmw', 'audi', 'toyota', 'subaru']
cars.sort(reverse=True)

print(cars)
---> ['toyota', 'subaru', 'bmw', 'audi']
```

Sorting a List Temporarily with the `sorted()` Function

```
cars = ['bmw', 'audi', 'toyota', 'subaru']

print(sorted(cars))
---> ['audi', 'bmw', 'subaru', 'toyota']

print(cars)
---> ['bmw', 'audi', 'toyota', 'subaru']
```

Printing a List in Reverse Order

```
cars = ['bmw', 'audi', 'toyota', 'subaru']
print(cars)
---> ['bmw', 'audi', 'toyota', 'subaru']

cars.reverse()
print(cars)
---> ['subaru', 'toyota', 'audi', 'bmw']
```

Finding the Length of a List

```
cars = ['bmw', 'audi', 'toyota', 'subaru']
print(len(cars))
---> 4
```