Lists and dictionaries
Lists: ordered collections of things

In [1]: pets = ['fido', 'molly', 'tweety']
   pets[0]  # get 1st element of list
Out[1]: 'fido'  # result is a string

In [2]: pets[1:3]  # get 2nd and 3rd element
Out[2]: ['molly', 'tweety']  # result is a list
Dictionaries: unordered collections of key-value pairs

In [1]: pets = {'fido':'dog', 'molly':'cat'}
   pets['fido'] # return the value for key 'fido'
Out[1]: 'dog'

In [2]: 'molly' in pets # does dict have key 'molly'?
Out[2]: True      # yes

In [3]: 'tweety' in pets # does dict have key 'tweety'?
Out[3]: False     # no
Conditional code execution
if/else statements

if condition:
    statement
else:
    alternative statement
if/else statements

if condition:
    statement
else:  # optional, can be omitted
    alternative statement
if/else statements

```python
if condition:
    statement
```
Simple if/else example

In [1]: if 2<3:
   print("yes")
   else:
       print("no")

Out[1]: yes
In [1]: if 3<2:
    print("yes")
else:
    print("no")

Out[1]: no
Indentation defines code blocks

In [1]: if 3<2:  # False
    
    print("1")  # not run
    print("2")  # not run
    print("3")  # not run
    print("4")  # run

Out[1]: 4
Indentation defines code blocks

In [1]: if 2<3:  # True
   
    print("1")  # run
   
    print("2")  # run
   
    print("3")  # run
   
    print("4")  # run

Out[1]: 1
   
2
   
3
   
4
Doing things multiple times (loops)
for loops

for variable in list:
    statement
for-loop example

In [1]: for name in ["John", "Sara", "Bill"]:  
   print(name)  

Out[1]: John  
   Sara  
   Bill
Again, indentation defines code blocks

In [1]: for name in ["John", "Sara", "Bill"]:  
   print("----")  # run for every name  
   print(name)  # run for every name  
   print("----")  # run once  

Out[1]: ----
       John
       ----
       Sara
       ----
       Bill
       ----
We use for loops when we want to do something a number of times

In [1]: for i in range(5):    # range(5) creates the
    print("Hello!")    # numbers from 0 to 4

Out[1]: Hello!
Hello!
Hello!
Hello!
Hello!
We use `for` loops when we want to do something a number of times

```
In [1]: for i in range(5):  # range(5) creates the
   
   print("Hello: ", i)   # numbers from 0 to 4

Out[1]: Hello: 0
       Hello: 1
       Hello: 2
       Hello: 3
       Hello: 4
```
One more example:
Make a list of the numbers 1 through 5

In [1]: result = []  # start with empty list
for i in range(1, 6):  # count from 1 to 5
    result.append(i)

print(result)

Out[1]: [1, 2, 3, 4, 5]
Combining loops and conditional execution
We often combine for loops and if statements

Typical example:
Loop over all elements in a list, and do an action if some condition is met.
Example:
Find names starting with 'S'

In [1]: for name in ["John", "Sara", "Bill"]:  
   if name[0]=='S':  
       print(name, "starts with S")  
   else:  
       print(name, "doesn't start with S")

Out[1]: John doesn't start with S  
Sara starts with S  
Bill doesn't start with S
Example:
Count names starting with 'S'

In [1]: count = 0    # start with count of 0
for name in ["John", "Sara", "Bill"]:  
    if name[0]== 'S':
        count += 1    # increase count by 1
print(count)    # print final result

Out[1]: 1
Last example: Count how often letters occur in a string

In [1]: sentence = "Time flies like an arrow."
   # first we count, using a dict
counts = {} # empty dict
for c in sentence:
    if c in counts:  # have we seen this letter before?
        counts[c]+=1  # yes, increase count by 1
    else:
        counts[c]=1  # no, set count to 1

    # now that we have the counts, we print them
for c in counts:  # loop over all letters in the dict
    print(c, "appears", counts[c], "times.")
Last example: Count how often letters occur in a string

Out[1]:

i appears 3 times.
k appears 1 times.
o appears 1 times.
r appears 2 times.
l appears 2 times.
    appears 4 times.
n appears 1 times.
m appears 1 times.
f appears 1 times.
e appears 3 times.
    appears 1 times.
s appears 1 times.
T appears 1 times.
a appears 2 times.
w appears 1 times.