Python → Functions → <u>Kwargs</u>

Theory: Kwargs

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With *args you can create more flexible functions that accept a varying number of *positional* arguments. You may now wonder how to do the same with *named* arguments. Fortunately, in Python, you can work with *keyword* arguments in a similar way.

§1. Multiple keyword arguments

Let's get acquainted with the ** operator used to pass a varying number of keyword arguments into a function. **kwargs collects all possible extra values in a dictionary with keywords as keys.

By convention, people use special names for this kind of arguments: *args for positional arguments and **kwargs for keyword arguments, but you can call them whatever you want. The main thing is that a single asterisk * matches a value by position and a double asterisk ** associates a value with a name, or keyword. So, **kwargs differs from *args in that you will need to assign keywords.

Here is an example:

```
def capital(**kwargs):
    for key, value in kwargs.items():
        print(value, "is the capital city of", key)

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capital(Canada="Ottawa", Estonia="Tallinn", Venezuela="Caracas", Finland="Helsinki")
```

Once the function has been invoked, these 4 lines will be printed:

```
Ottawa is the capital city of Canada
Tallinn is the capital city of Estonia
Caracas is the capital city of Venezuela
Helsinki is the capital city of Finland
```

So, everything works just fine! And again, the number of arguments we pass may differ in the next call.

Note that the names in a call are without quotes. That is not a mistake. Moreover, the names should be valid, for example, you cannot start a keyword with a number. Follow the same naming rules as for variables.

It is also possible to combine *args and **kwargs in one function definition:

```
def func(positional_args, defaults, *args, **kwargs):
    pass
```

The order is crucial here. Just as non-keyword arguments precede keyword arguments, *args must come before **kwargs in this case. Otherwise, both when creating and calling a function with *args and *kwargs in the wrong order, a SyntaxError will appear:

```
def func(positional_args, defaults, **kwargs, *args):

# SyntaxError: invalid syntax

func(positional_args, defaults, **kwargs, *args)

# SyntaxError: iterable argument unpacking follows keyword argument unpacking
```

§2. Unpacking in function calls

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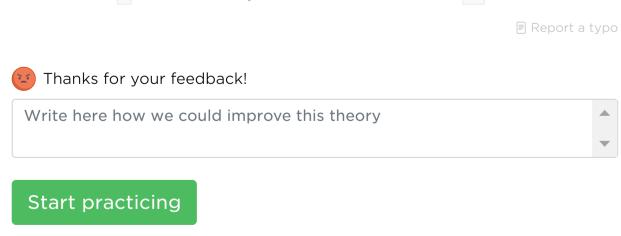
There are two unpacking operators in Python: a single asterisk * unpacks elements of an iterable object and a double asterisk ** works with dictionaries. Let's try to get key-value pairs from a dictionary and pass them as keyword arguments using a double asterisk **:

By default, you iterate over keys in a dictionary, so be careful with this. You might need this type of unpacking when setting specific parameters of a function. Saving values in a dictionary and then unpacking them in this way might be much easier than listing them in each call manually. Also, it will save time when you choose to fine-tune these parameters.

§3. Recap

Let's go over the main points discussed in the topic:

- If you want to work with a varying number of **keyword** arguments, make use of **kwargs.
- The variable name kwargs is conventional, you can always choose another one.
- Notice the difference: *args provides access to a tuple of remaining values, while **kwargs collects remaining key-value pairs in a dictionary.
- The order of parameters in the function definition is important, as well as the order of passed arguments.
- In function calls, now you can use both **unpacking operators**: a single asterisk * for iterable objects and a double asterisk ** for dictionaries.



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