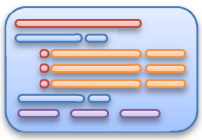


Aim: To learn about functions and modular programming.

A **procedure** is a section of programming code that performs a specific task. Examples include:

- A section of code which returns a value. It might change text to upper case, for example, and return the new string.
- A section of code that doesn't return a value. It simply carries out a set of tasks and then returns control of the program back to the place where the procedure was called.

In Python, both types of procedures are known as **functions**. There are a range of built-in (or internal) functions that you can call. You may also create your own functions and use them whenever they are required.

Jargon Alert

There are lots of different names for separate pieces of code. Depending on which programming language you are using, you might see the terms function, subroutine, procedure, sub-program and method all meaning pretty much the same thing. Python uses functions and methods.

Task 1 – Return Values

Decide whether each statement returns a value or not. You can simply write 'yes' or 'no'.

a. Take someone's date of birth and return how old the person is in years. _____

b. Look at a price for an item and return the cost after a given discount. _____

c. Organise some data and insert it into a database. _____

d. Play a tune and display the score when a player completes a level in a game. _____

e. Check whether an email address is formatted correctly and return the value *True* if it is. _____

Task 2 – Arguments and Parameters

Our procedures might need some information to work with. Let's suppose we have found a function that will calculate the area of a regular shape from the number of sides and the length of one of these. We simply need to tell the function how many sides our shape has and how long one side is, then let the function perform the calculation. The actual values we pass to the function are known as the ***arguments***. These are picked up by the function ***parameters*** (special variables used only in the procedure). The function sends back the area of the shape as the ***return value***.

For each procedure in Task 1, say what information the parameters would pick up. Also, if data is returned, say what information the return values would carry back.

a. Parameter: *Date of Birth* Return value: *Age*

b. _____

c. _____

d. _____

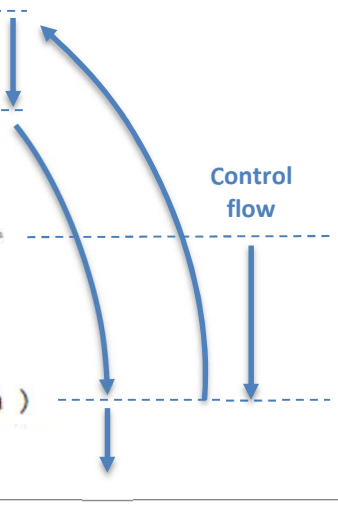
e. _____

Procedures (page 2)

Task 3 – Using the Procedure

The section of programming code below sets up some variables then calls a function which calculates the area of a regular shape. The function must be told the number of sides and the length of one of these. The function is defined at the top of the code, but it is ignored until the main program calls it. Look at the control flow and make sure you understand what is happening.

```
1  def calc_shape_area( sides, length ):
2
3    #do something clever
4    return the_area
5
6
7
8  number_sides = 5     #This could be inputted by the user
9  side_length = 3.5    #This could also be inputted
10
11 #Call the function and send the arguments
12
13 shape_area = calc_shape_area( number_sides, side_length )
14
15 #Carry on with the program
```



Try and answer the questions based on the code.

a. How many values are passed to the function? _____

b. What are the names of the variables holding these values originally? _____

c. What are the two *arguments* in this case (the actual numbers passed)? _____

d. What is the name of the function? _____

e. The function defines two parameters. What are these called? _____

Why do we use Procedures?

The use of separate functions has the following benefits:

- It avoids the need for repeated blocks of code in your program;
- It makes it easier to find errors (debugging);
- It means that you can use code that has already been written and solves a problem;
- It helps keep your code organised in modules which address a particular part of the solution.

Task 4 – Fact Check

a. What is the difference between a parameter and any normal variable?

b. What is an argument?

c. What is a return value?