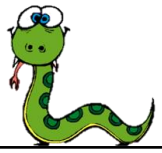
Python – Subroutines



Remember, save each program with the task number.

Task 19

When writing large programs, it is easiest if they can be broken down into sections. We do this by using subroutines. The following program creates a subroutine to draw a small square, then calls the subroutines once.

```
import turtle

def square():
    for i in range(4):
        turtle.forward(30)
        turtle.right(90)

square()
```

When creating a subroutine:

- **def** stands for define, and tells they program you are defining a subroutine
- this is then followed by the name of the subroutine (**square** in this case) followed by **2 brackets** and a **colon**
- the contents of the subroutine are indented

To call a subroutine (run it) – type the name of the subroutine in the program

Run create the program above and run it to check that it works.

Task 20

Create a new subroutine:

- call it **nextshape**
- get it to:
    - lift the pen
    - move forward 60
    - put the pen back down

Create a program that uses the subroutine to draw 3 squares:

square()
nextshape()
square()
nextshape()
square()

Task 21

Change the program in Task 20 to now draw 10 shapes in a row – use a loop! (look back at previous programs if you can't remember how)

Task 22

Create a subroutine called **nextrow** which:

- lifts the pen
- goes backwards 600
- moves down 60
- ends pointing to the right again

Test this by extending the program in Task 21 to now draw 2 rows of 10 squares.

Task 23

You are now going to extend your program to create a 10 x 10 grid of squares. Things you might want to do:

- speed up the turtle by using **turtle.speed(0)** at the start of your program
- create a subroutine **gotostart()** that moves the turtle up 300 and left 300 before starting the pattern (otherwise it goes off the window)
- in the same way that you used a loop to do a row of 10 squares, use a loop to draw 10 rows of squares

Task 24

To make a multi-coloured grid of squares, think about what you will need to add to your program. What do you know how to do – what do you not yet know how to do? See if you can find out the additional commands on the Internet – when searching remember to include the word **python** in your search phrase!