

We're going to use a programme called Thonny, a package called turtle and some commands to draw a Christmas tree! Before diving into the Christmas Tree project, let's understand what Turtle graphics is and how it works.

What is Turtle Graphics?

Imagine a robotic turtle that walks around the screen. As it moves, it draws a line behind it. This is the essence of Turtle graphics. In Python, Turtle graphics is a built-in library that enables users to create pictures and shapes by providing them with a virtual canvas.

How Does Turtle Work?

The turtle starts at the centre of the canvas (0, 0 coordinate). You can give commands like `forward(100)` to move it forward by 100 pixels, `right(90)` to turn it right by 90 degrees, etc. As the turtle moves, it draws a line behind it, unless you lift the pen using `penup()` or put it down using `pendown()`.

Why Use Turtle?

It's a fun and visual way to learn programming concepts. It helps in understanding the basics of loops, functions, and conditionals. Seeing the immediate result of code helps in quickly grasping the concepts. Now that you know what Turtle is, we will use it to draw a Christmas tree. You will use commands to move the turtle around the screen to create shapes. Here's how we'll do it:

1. Import the turtle - First we need a turtle! To do that we first import the library and create an instance of our turtle which we're calling t.

```
1 import turtle
2
3 t = turtle.Turtle()
```

2. Create a function for drawing a tree section - A function is a great way of reusing code. Since we're going to draw a tree with three sections, we don't want to write the same code three times and so we create a reusable function.

```
5 def draw_tree_section(t, length):
6     t.pendown()
7     t.color("green")
8     for i in range(3):
9         t.forward(length)
10        t.left(120)
```



3. Create a function for drawing the trunk - Even though we've only got one trunk, we'll create a function for drawing a trunk.

```

12 def draw_trunk():
13     t.penup()
14     t.goto(35, -100)
15     t.pendown()
16     t.color("brown")
17     t.begin_fill()
18     for i in range(2):
19         t.forward(30)
20         t.right(90)
21         t.forward(20)
22         t.right(90)
23     t.end_fill()

```



4. Move the pen to a starting position and draw three sections and then the trunk - Now we need to move our turtle to its starting position but first we need to lift the pen up or we'll draw a line across the canvas!

```

25 t.penup()
26 t.goto(0, -100) # Starting position
27
28 section_length = 100
29 for i in range(3):
30     draw_tree_section(t, section_length)
31     t.penup()
32     t.forward(15)
33     t.left(90)
34     t.forward(30)
35     t.right(90)
36     t.pendown()
37     section_length -= 30
38
39 draw_trunk()

```

5. That's it! If you've copied the code blocks above line by line you should have a lovely christmas tree being drawn by the Turtle. If you get stuck, try asking another ninja for help, searching for your problem online, or if that doesn't work, ask one of the Dojo volunteers!

If you found that too easy why don't you try tweaking the code, you could:

- Colour the tree in like the trunk is coloured in.
- Add decorations like stars, balls, or lights.
- Modify colours or shapes to personalise your trees.

