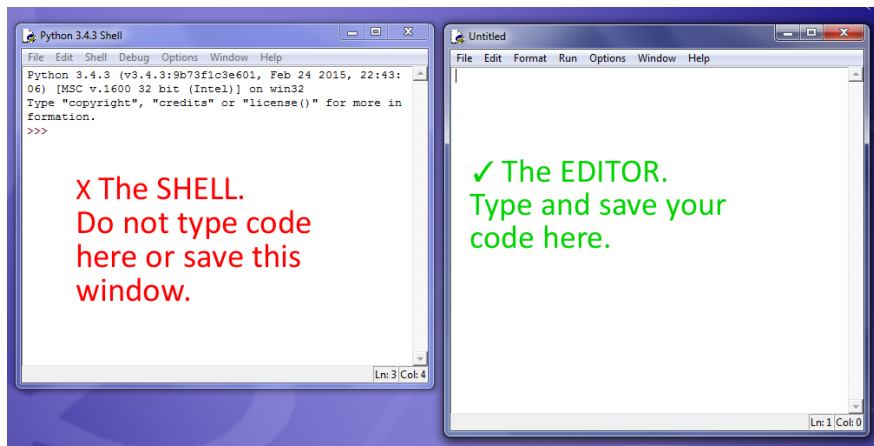
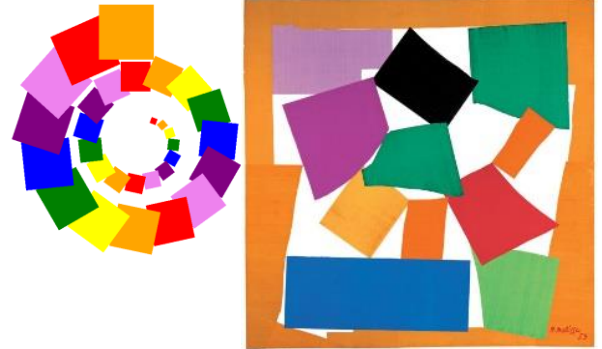


Name: _____

LO: To recreate Matisse’s Snail in Python

- **Step 1:** Open the Python editor IDLE and make a new document by pressing ctrl-N.

Make sure you type the Python code in the blank new document and not in the shell:



- **Step 2:** Type this code in the editor (not the shell!). You don’t need to type in the red comments.

```
import turtle
henri = turtle.Turtle()

space = 20

henri.penup()                                # This is new

for i in range(30):                            # Repeat next instructions 30 times
    henri.forward(space)                       # Move Henri along...
    henri.right(24)                            # ... and turn him 24 degrees.
    space = space + 3                          # Increase the space.
    henri.stamp()                              # Leave an impression on the canvas.
```

Save and run the code by pressing **F5**. What do you see?

We are using 2 new instructions here:

henri.penup() lifts the ‘pen’ off the ‘paper’ so we can move the turtle around without making a mark.

henri.stamp() prints the shape of the turtle on the screen like a rubber stamp.

□ **Step 3:** What happens if you make the angle of turn (24) bigger, for example **henri.right(50)** ?

□ **Step 4:** What happens if you make the angle smaller, eg 15 degrees?

□ **Step 5.** We can change the shape of the turtle by using the **henri.shape()** command. Add **the red words** to your code and experiment with different shape names. Tick them off:

Try arrow, blank, circle, classic, square, triangle, turtle.

```
import turtle
henri = turtle.Turtle()
henri.shape('square')
space = 20

henri.penup()
for i in range(30):
    henri.forward(space)
    henri.right(24)
    space = space + 3
    henri.stamp()
```

Which shape is best for The Snail picture?

- **Step 6.** Let’s make the stamps bigger. Add the **line in red** and run again:

```
import turtle
henri = turtle.Turtle()
henri.shape('square')
henri.turtlesize(2)
space = 20

henri.penup()
for i in range(30):
    henri.forward(space)
    henri.right(24)
    space = space + 3
    henri.stamp()
```

Try changing the number. What do you notice?

- **Step 7.** Let’s add some colour:

```
import turtle
henri = turtle.Turtle()
henri.shape('square')
henri.turtlesize(2)
henri.color('red')
space = 20

henri.penup()
for i in range(30):
    henri.forward(space)
    henri.right(24)
    space = space + 3
    henri.stamp()
```

Experiment with different colours, for example ‘darkred’, ‘lightgreen’.

Which colours do you think you might need to match Matisse’s snail?

- **Step 8.** Let’s make the shapes get **bigger** as the turtle goes round the spiral.

We can do this by creating a new variable called **size**, and making it get a bit bigger each time Python goes round the **for i in range(30):** loop.

Note that we can delete the original line where we set Henri’s size – we now do this inside the **for i in range 30:** loop.

```
import turtle
henri = turtle.Turtle()
henri.shape('square')
# delete this line: henri.turtlesize(2)
henri.color('red')
space = 20
size = 1

henri.penup()
for i in range(30):
    henri.turtlesize(size)
    size = size + 0.2
    henri.forward(space)
    henri.right(24)
    space = space + 3
    henri.stamp()
```

Experiment with different numbers for the **size = size + 0.2** line.

Which number do you think works best?

- **Step 9.** Let’s **change the colour** with every square.

We can do this by making a **list** of colours called **colourlist**.

Lists in Python have commas, just like when we write lists in English. They also have square brackets round them and the names of our colours need to be in inverted commas.

We will also keep track of which colour we are using with an index variable called **ink**.

```
import turtle

henri = turtle.Turtle()
henri.shape('square')

# you can delete this line: henri.color('red')
space = 20
size = 1
colourlist = ['red', 'orange', 'yellow', 'green', 'blue', 'purple', 'violet']
ink = 0

henri.penup()

for i in range(30):
    if ink > 6:
        ink = 0
    henri.color(colourlist[ink])
    ink = ink + 1
    henri.turtlesize(size)
    size = size + 0.2
    henri.forward(space)
    henri.right(24)
    space = space + 3
    henri.stamp()
```

Experiment with your own choices of colours.

If you want to change the number of colours, you need to change the number in the line that checks the ink index doesn’t get too big

```
if ink > 6:
```

The number should be **one less** than the number of colours in your list.

□ Step 10. Signing your work.

All great artists sign their work – so add your name to your picture. There may be merits for the best ones.

Add the 4 lines of code at the end, making sure they are not indented – we don’t want them in the loop as we only want to write your name once.

```
import turtle

henri = turtle.Turtle()
henri.shape('square')

# you can delete this line henri.color('red')
space = 20
size = 1
colourlist = ['red', 'orange', 'yellow', 'green', 'blue', 'purple', 'violet']
ink = 0

henri.penup()

for i in range(30):
    if ink > 6:
        ink = 0
    henri.color(colourlist[ink])
    ink = ink + 1
    henri.turtlesize(size)
    size = size + 0.2
    henri.forward(space)
    henri.right(24)
    space = space + 3
    henri.stamp()

henri.hideturtle()
henri.color('black')
henri.goto(200, -240)
henri.write('matisse')
```

You may need to experiment with the numbers in the line **henri.goto(200, -240)** to make sure your signature is in a good place.

□ **Step 11. Learning assessment.**

1. Which new Python turtle command did you learn today that stops the turtle drawing a line on the screen?
2. Which turtle command makes it stamp the turtle shape on the screen?
3. Which command changes the turtle shape?
4. How do change the size of the turtle?
5. What would you need to change to make your picture look even more like Matisse’s snail?