In this project you will use Scratch to draw squares. Lots of squares! Starting with just one square and building up to complex artistic patterns.

The key to the coding here is using Loops to repeat an instruction.

What are Loops?

Sometimes in coding the same instructions are repeated lots of times. This is a bit like being in a race around a circular track. If you have to do six laps you could give six instructions:

Go around the track
Go around the track
Go around the track
Go around the track
Go around the track
Go around the track

Or you could give one instruction
Go around the track 6 times

Loops are really important in coding and you will come across them all the time.

Key coding points to look for

- Write a sequence of code to draw a square
- Use the Pen blocks
- Change the code to make it much simpler by using a Loop
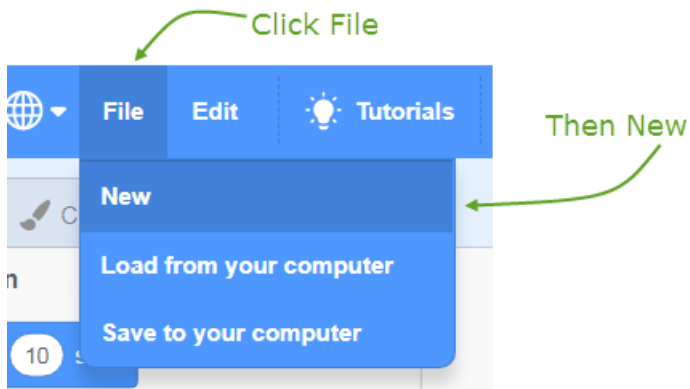- Make small changes the code to create complex patterns

Information!

If you haven't used Scratch before we suggest you first take a look at our introductory project Coding with Scratch – First Steps. You can go directly to the project by clicking the link below.

Coding with Scratch – First Steps

Let's start coding

Open a new Scratch project.

Access the Pen Blocks

The Pen blocks are used in Scratch for drawing and all sorts of artistic projects and games.

In order to use Pen blocks you need to add them from the Extensions.

Click on the Extensions icon which is below the Blocks Palette at the bottom left of your screen.

Then click on the Pen extension to add the Pen blocks.

Pen
Draw with your sprites.
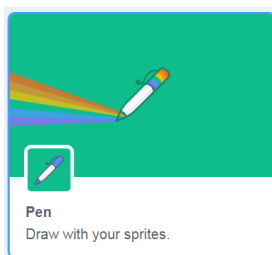
Now carefully put together the following code

Clears the stage of any previous drawing

Starts the drawing

Makes the cat move 100 steps and draws a line.

Makes the cat turns a right angle

Makes a pause between drawing each side of the square

```
when 🏳 clicked
erase all
pen down
wait 1 seconds
move 100 steps
turn ↻ 90 degrees
wait 1 seconds
move 100 steps
turn ↻ 90 degrees
wait 1 seconds
move 100 steps
turn ↻ 90 degrees
wait 1 seconds
move 100 steps
turn ↻ 90 degrees
```

Test your code to make sure it works. The cat should draw the four sides of a square like this.
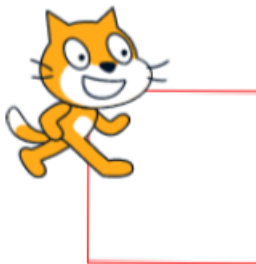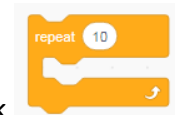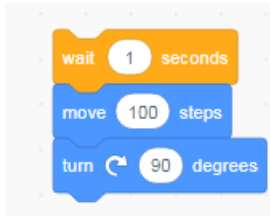
(The colour of your square may be different – don't worry about that!)
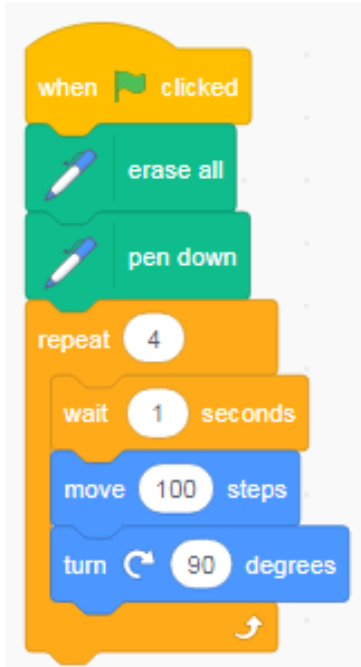
Lets get loopy

You can see from the code you created above that there are lots of repeated blocks. In particular this sequence of three blocks is repeated four times:

So we are going to create a Loop to make the code simpler using a repeat block which you will find in the Control blocks.
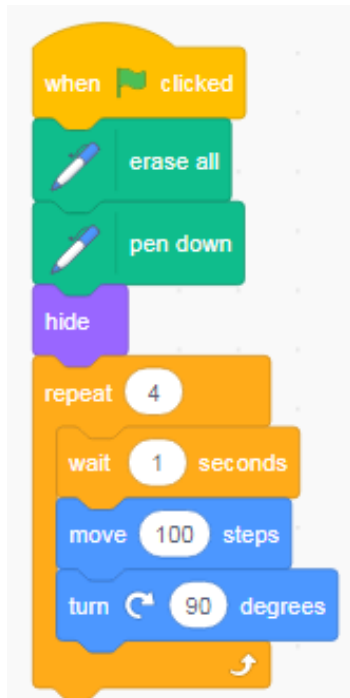
Change the number of repeats in the repeat block to 4 and put together this code.

Test your code to make sure it works. The cat should draw the same four sides of a square but with this much simpler code.

The cat sprite gets in the way when the square is being drawn. We can hide the sprite by adding a **hide** block from the Looks blocks

Challenge!

Try making the square bigger or smaller.

Try making the drawing go faster.

If you need some help there are some suggestions at the end of the project.

Loop the Loop

We can put a loop inside another loop, this is called 'nesting'.

We are going to draw the square 4 times.

Drag out another repeat block and put it over the existing code as shown below when the 'jaws' of the new block are in the right place and the grey shadow appears release it and it will snap into place as shown in the image below.
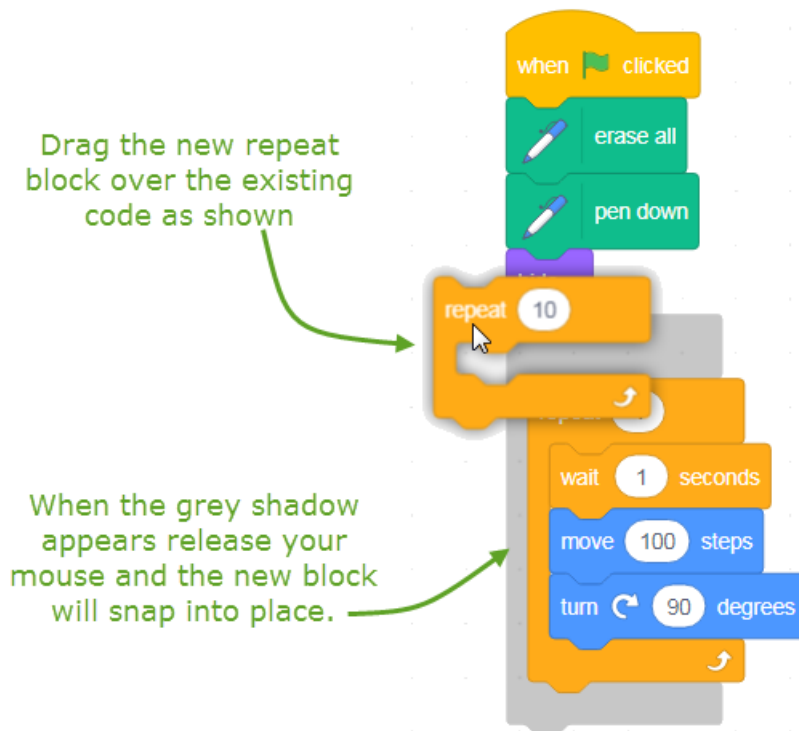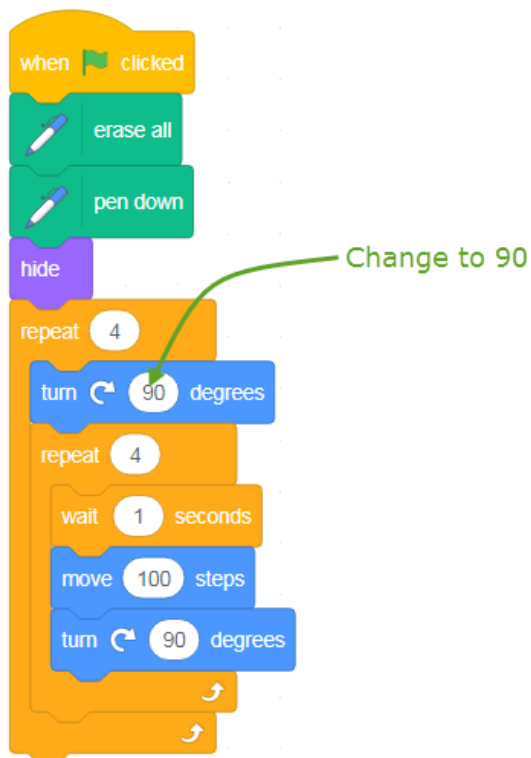

Change the number of repeats in the new block to 4.

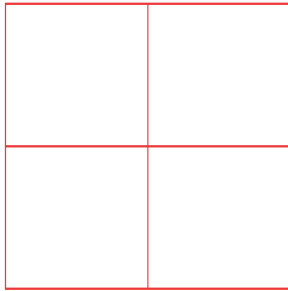Now add a new turn block. Be careful to put it in the right place as shown below
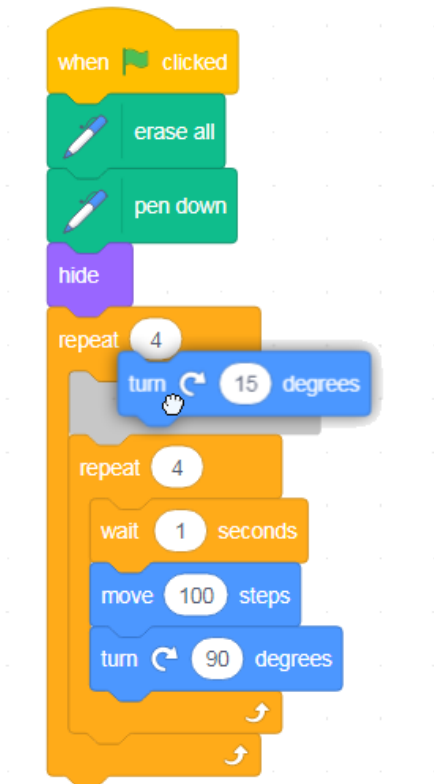
And change to number in the new block to 90 degrees so that your code should look like this:
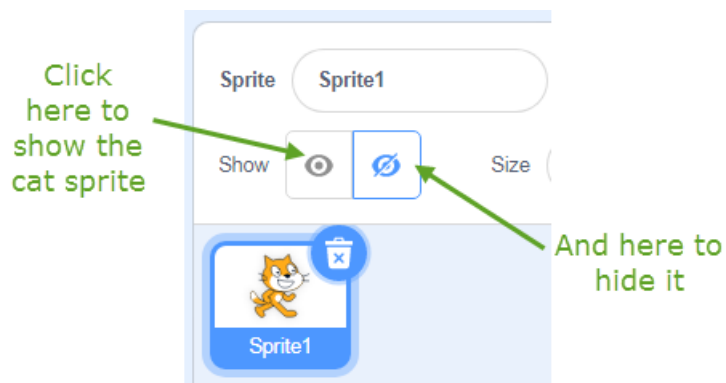
Try running your code. You should get a drawing of four separate squares.

If you can't see all your drawing it is probably because the sprite has move to the edge of the stage. In the sprite panel click on the Show icon and drag the cat to the centre of the stage and run the code again.

Click here to show the cat sprite
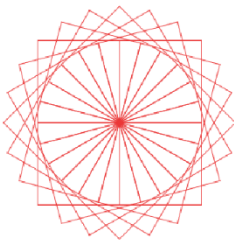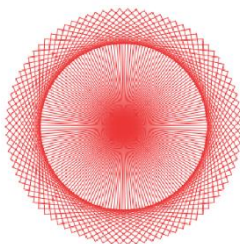
And here to hide it

Challenge!

Try changing the number of repeats and number of degrees.
(You may also want to change the wait block to 0 to make the drawing go quicker)
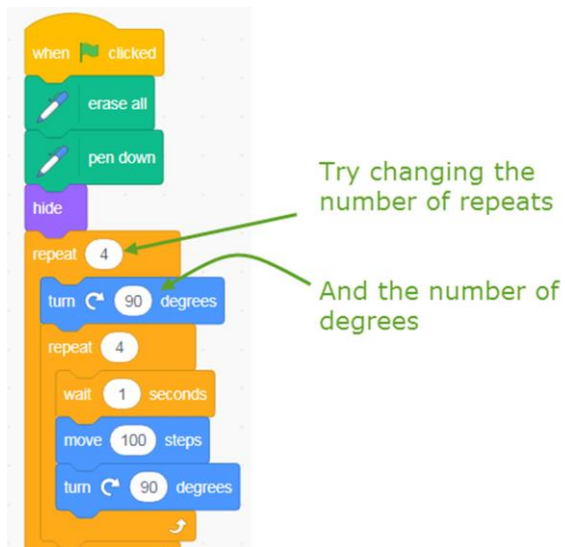
With 24 repeats and 15 degrees you get a drawing like this.

And with 4 degrees and 90 repeats like this.

You can see how small changes to the code can make big differences to what happens!

Answers to challenges on page 5

To make the square bigger or smaller change the number of steps in the move block.

To make the drawing go faster make the number in the wait block smaller. Try 0.1 or 0