Module 2
Drawing Shapes and Repeating

SCRATCH

lero THE IRISH SOFTWARE ENGINEERING RESEARCH CENTRE

ICS IRISH COMPUTER SOCIETY

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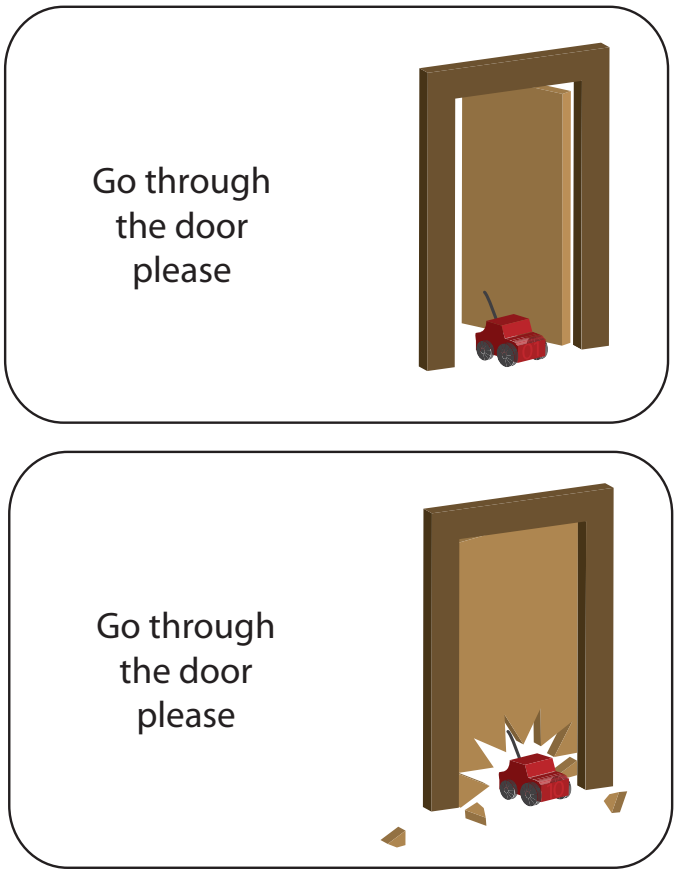
Think Like a Computer

In Module 1 you learned about algorithms. Algorithms are sets of instructions that solve a problem.

We also learned that humans can interpret instructions in a different way to computers.

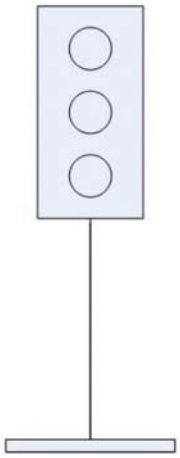
Computers work by following lists of instructions, and they do exactly what the instructions say, even if they are incorrect or nonsensical!!



Try out some exercises that will help you understand how to think like a computer by creating algorithms. You will execute the algorithms to test how well they work and make any modifications that are needed to improve the algorithm.

Exercises

❶



Describe how to draw this picture above using written instructions only in the box below.

Read out your instructions to a friend who can't see the picture. Check how closely the picture drawn by your friend matches the picture above.

❷

Describe how to draw this picture above using written instructions only in the box below. You should make some improvements based on your experience from exercise 1.

Read out your instructions to a friend who can't see the picture. Check how closely the picture drawn by your friend matches the picture above. Were there any improvements made from exercise 1?

❸ Follow the instructions in this algorithm to draw something in the first box below.

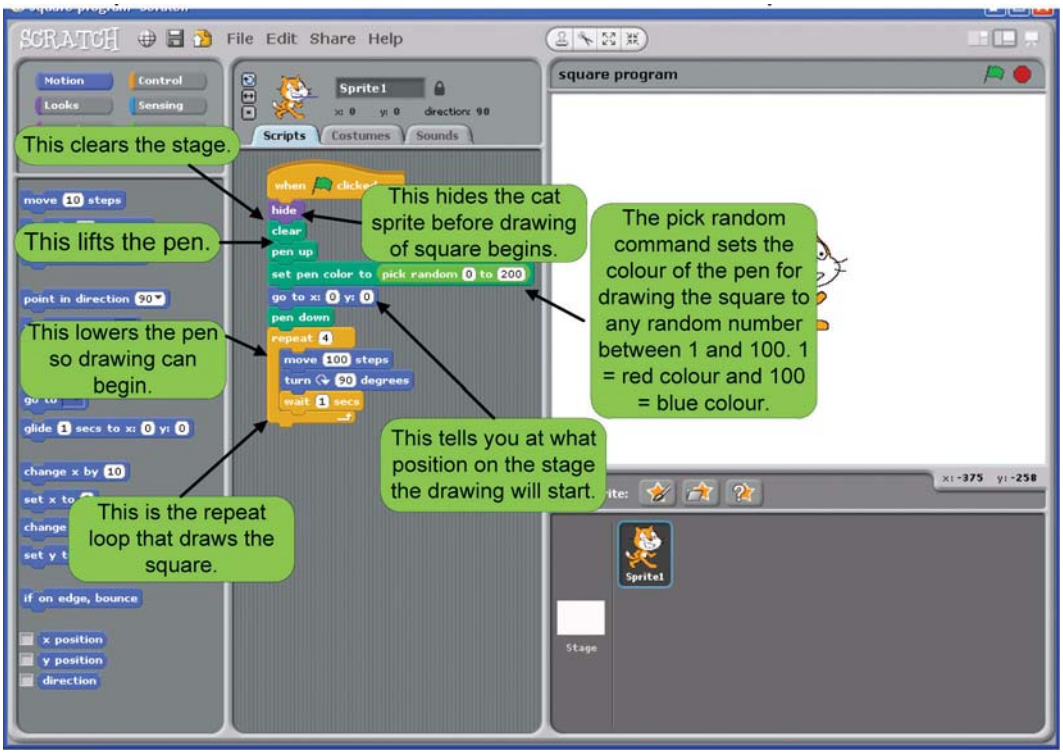
1. Draw a rectangle.
2. From the centre of the rectangle's uppermost longer side, draw a straight line upwards perpendicular to the rectangle. This straight line should be the same length as the longer side of the rectangle.
3. Draw a right-angled triangle on the right hand-side of the perpendicular line.
4. Draw another triangle on the left hand-side of the perpendicular line. This triangle should be a mirror image of the triangle drawn in step 3.
5. On the top of the page, draw three stars.

Does your picture match the one from the solutions section?

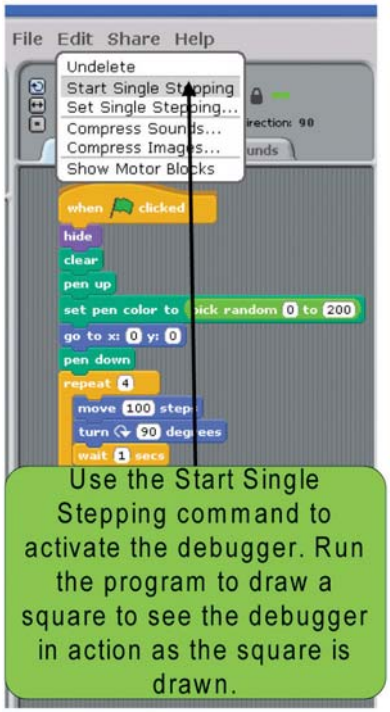
Write a new version of the algorithm including improvements in the box below.

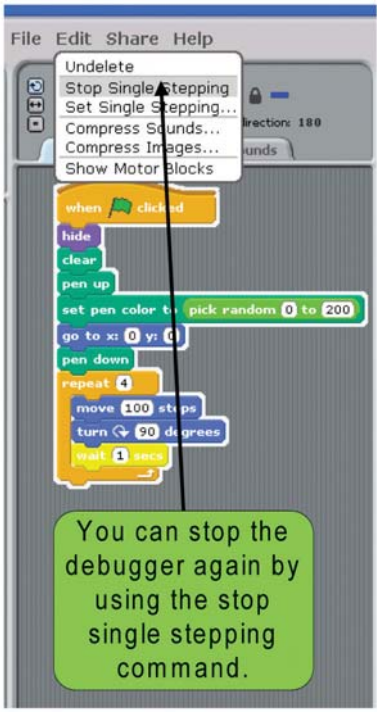
Could You Repeat That Please?

A computer can perform repetitive tasks efficiently. The code written below in Scratch will draw a square. In the script a loop will repeat the steps of drawing each side of the square and rotate to draw the next side of the square.



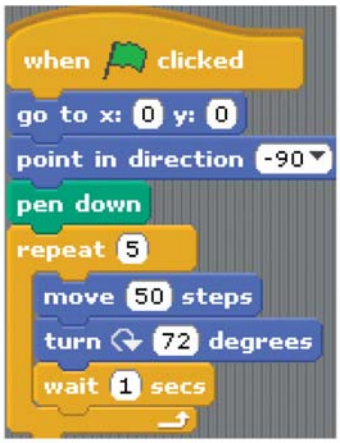
Like any programming language, Scratch code is executed very quickly. The debugger highlights the code step by step as things happen on the stage. This is useful to help you understand a script by seeing the order of how it executes. It can also help to pinpoint where changes need to be made if there are problems reaching your solution.





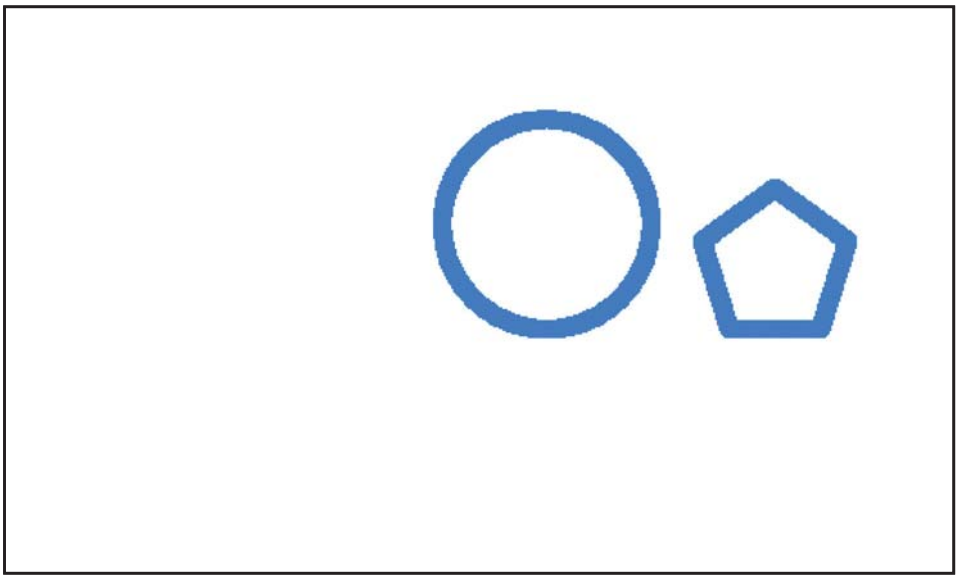
Exercises

❶ In the box provided, explain what each line of code does. What does this code draw?



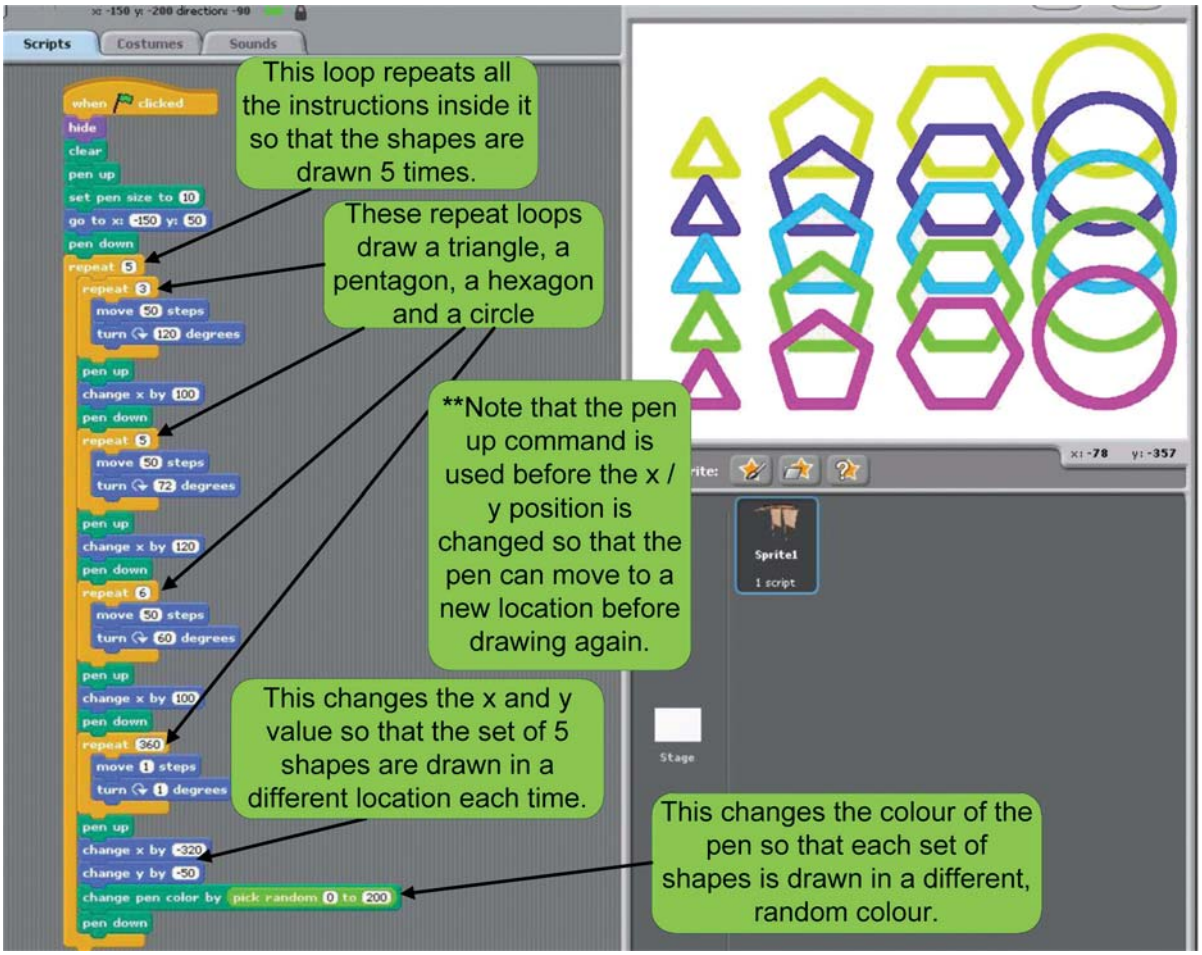
Use Scratch to write the script. Does it match what you have described in the box?

❷ Use Scratch to draw a circle and pentagon side by side on the stage as shown in the image below. Don't forget to use the single stepping command to help you.



Over and Over Again

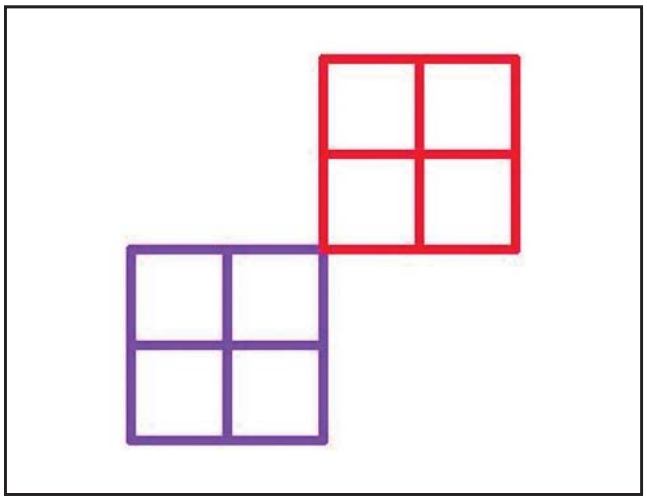
We learned in the previous section that a loop can be used by computers to perform repetitive tasks efficiently.
Use Scratch to write the script below to draw 4 different shapes 5 times. It uses a loop inside a loop also known as a nested loop.

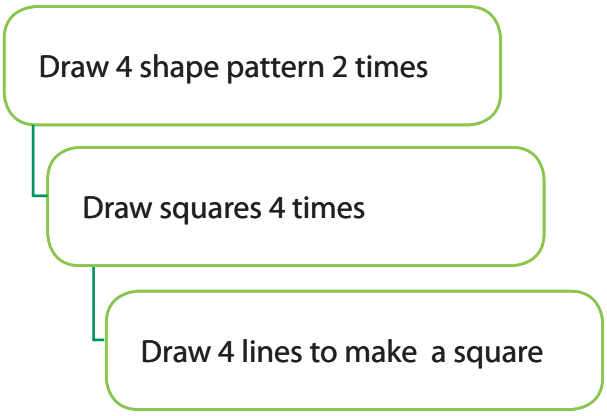


Exercises

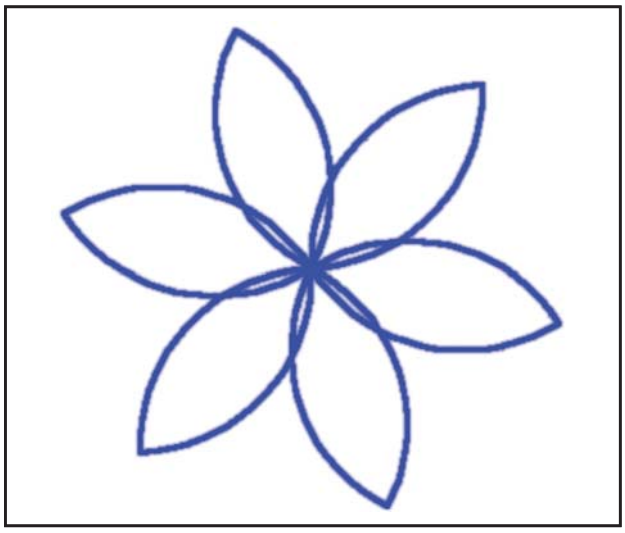
1. Use Scratch to draw the shape on the stage as shown in the image below.

   Hint: You can draw this shape by using a loop to draw 4 sides of a square, inside a loop to draw 4 squares, contained in a loop to draw the 4 square patterns twice.



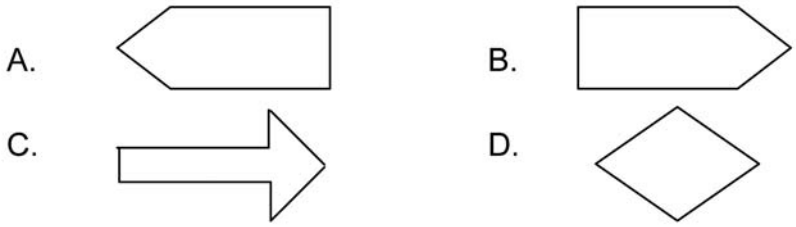


2. Use Scratch to draw the shape on the stage as shown in the image below.



End of Module Quiz

❶ Identify the shape that is described by this algorithm. "Put your pen on paper. Face right . Move 2cm. Face up. Move 0.5cm. Rotate right by 135 degrees. Move 1 cm. Rotate right by 90 degrees. Move 1 cm. Face up. Move 0.5cm. Face left. Move 2cm. Face up. Move 0.45cm."



❷ A useful feature in Scratch that lets you run programs one step at a time highlighting each block is known as

A. Sprite Stepping
B. Single Stepping
C. Script Stepping
D. Scratch Stepping

❸ Which of the items listed below is not a good reason for software testing?

A. It helps you find bugs in your program.
B. To make sure your program does what you expect.
C. It helps to see if other people can understand and use your program easily.
D. It helps you to find new costumes for a sprite.

❹ What does this script do?

A. It draws a Square
B. It draws a Hexagon
C. It draws a Triangle
D. It draws a Circle

5 Which one of these loops will draw a circle?

A.

B.

C.

D.

Module 2: References

Images used for Think Like a Computer (Page 2) are created by Irish Computer Society