

Pre-Practical activity (Memo)

This week you will be required to use a software known as Scratch for the first 3 tasks and additionally a C++ activity.

There's a desktop version but you may use the website instead: <https://scratch.mit.edu/>

Important information:

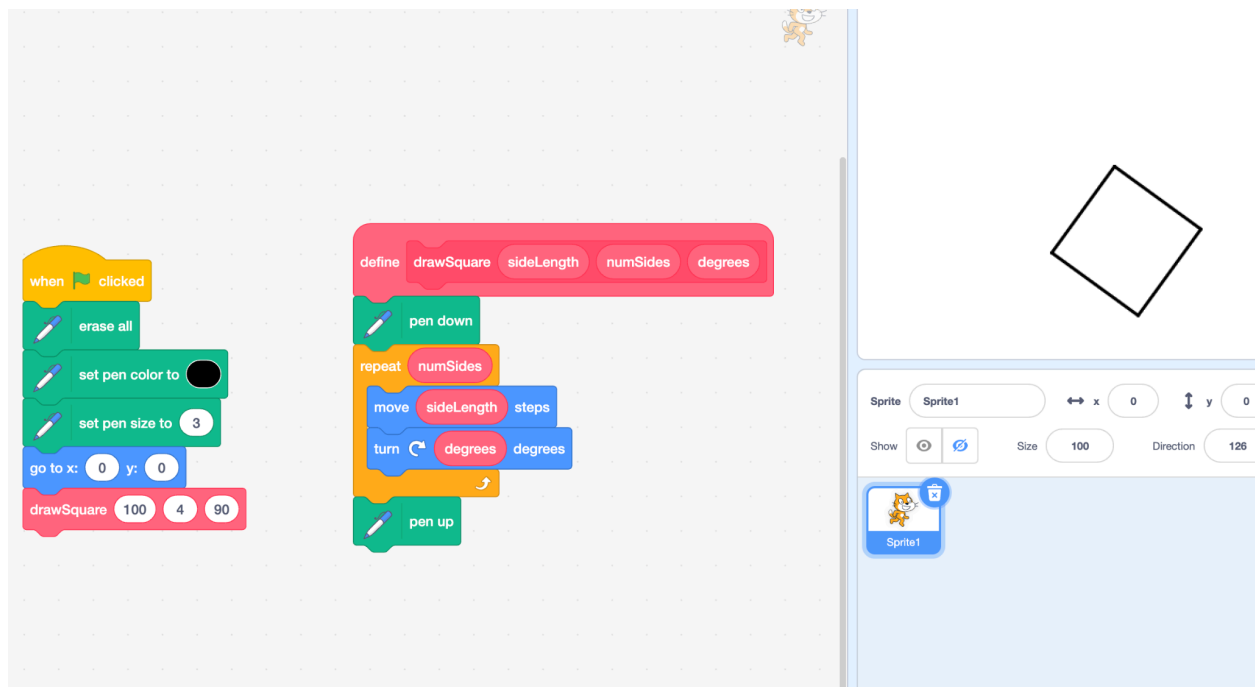
Add the Pen extension by clicking the blue “+” in the bottom-left corner of the Scratch editor.

Scratch Tasks:

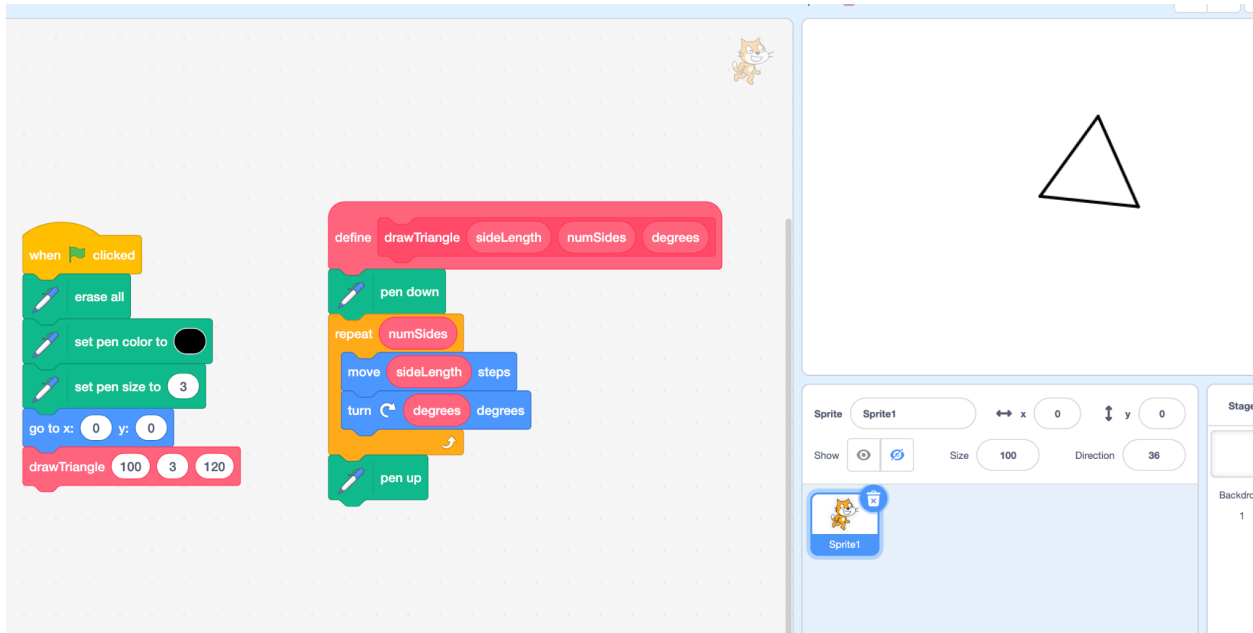
Task	Objective
Draw a Square	<p>Create a custom block called drawSquare with a parameter called sideLength.</p> <p>Define the block to move the sprite in a square pattern by repeating the following actions numSides:</p> <p>Move the sprite forward by sideLength steps.</p> <p>Turn the sprite 90 degrees to form the corners of the square.</p> <p>Set the pen color, size, and initial position in the main script. Then call the drawSquare function with the appropriate parameters.</p>
Draw a Triangle	<p>Create a custom block called drawTriangle with a parameter sideLength.</p> <p>Define the block so that the sprite moves in a triangle pattern by repeating the following actions based on the numSides:</p> <p>Move the sprite forward by sideLength steps.</p>

	<p>Turn the sprite 120 degrees to form the corners of the triangle (since the internal angles of an equilateral triangle are 60 degrees, the external turn angle is 120 degrees).</p>
<p>Draw a polygon</p>	<p>Create a custom block called drawPolygon with parameters such as sideLength and numSides.</p> <p>Define the block so the sprite moves in a polygon pattern. The angle for each turn should be $360 / \text{numSides}$.</p>

Square:



Triangle:

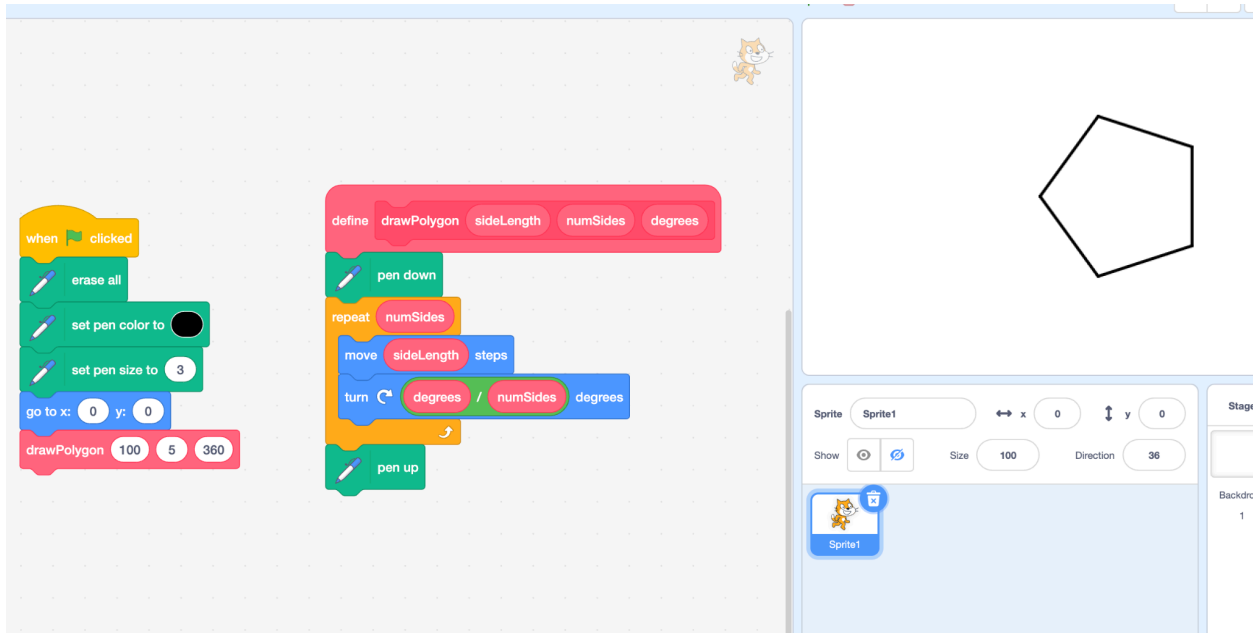


The image shows a Scratch script for drawing a triangle. The script starts with a 'when clicked' event, followed by 'erase all', 'set pen color to black', and 'set pen size to 3'. It then moves to x: 0, y: 0 and calls a custom block 'drawTriangle' with arguments 100, 3, and 120. The 'drawTriangle' block is defined with parameters 'sideLength', 'numSides', and 'degrees'. It contains a 'pen down' block, a 'repeat' loop for 'numSides' times, and inside the loop, a 'move' block with 'sideLength' steps and a 'turn' block with 'degrees' degrees. The loop ends with a 'pen up' block. The stage shows a black triangle.

```
when clicked
  erase all
  set pen color to black
  set pen size to 3
  go to x: 0 y: 0
  drawTriangle 100 3 120

define drawTriangle sideLength numSides degrees
  pen down
  repeat numSides
    move sideLength steps
    turn degrees degrees
  pen up
```

Polygon:



The image shows a Scratch script for drawing a polygon. The script starts with a 'when clicked' event, followed by 'erase all', 'set pen color to black', and 'set pen size to 3'. It then moves to x: 0, y: 0 and calls a custom block 'drawPolygon' with arguments 100, 5, and 360. The 'drawPolygon' block is defined with parameters 'sideLength', 'numSides', and 'degrees'. It contains a 'pen down' block, a 'repeat' loop for 'numSides' times, and inside the loop, a 'move' block with 'sideLength' steps and a 'turn' block with 'degrees / numSides' degrees. The loop ends with a 'pen up' block. The stage shows a black pentagon.

```
when clicked
  erase all
  set pen color to black
  set pen size to 3
  go to x: 0 y: 0
  drawPolygon 100 5 360

define drawPolygon sideLength numSides degrees
  pen down
  repeat numSides
    move sideLength steps
    turn degrees / numSides degrees
  pen up
```

C++ Task:

You are required to write functions to calculate the area of different shapes (circle, rectangle, triangle, and square) and practice calling these functions with different inputs. Use the appropriate variables and return the values

Make use of the cmath library:

Area of a Circle	$\pi \times radius^2$
Area of a Triangle	$width \times height$
Area of a Rectangle	$\frac{1}{2} \times base \times height$
Area of a Square	$side\ length^2$

```

#include <iostream>
#include <cmath>

double areaCircle(double radius) {
    return M_PI * radius * radius;
}

double areaRectangle(double width, double height) {
    return width * height;
}

double areaTriangle(double base, double height) {
    return 0.5 * base * height;
}

double areaSquare(double sideLength) {
    return sideLength * sideLength;
}

int main() {
    double radius, width, height, base, sideLength;

    std::cout << "Enter the radius of the circle: ";
    std::cin >> radius;
    std::cout << "Area of the circle: " << areaCircle(radius) << std::endl;

    std::cout << "Enter the width and height of the rectangle: ";
    std::cin >> width >> height;
    std::cout << "Area of the rectangle: " << areaRectangle(width, height)
    << std::endl;

    std::cout << "Enter the base and height of the triangle: ";
    std::cin >> base >> height;
    std::cout << "Area of the triangle: " << areaTriangle(base, height) <<
    std::endl;

    std::cout << "Enter the side length of the square: ";
    std::cin >> sideLength;
    std::cout << "Area of the square: " << areaSquare(sideLength) <<
    std::endl;

    return 0;
}

```

