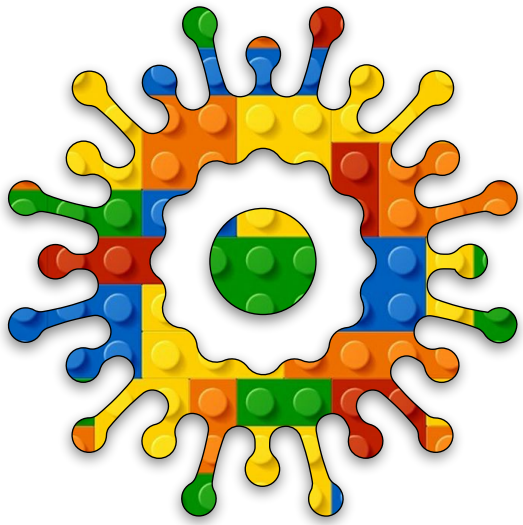
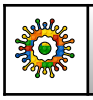
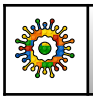
Creative Coding Module A Unit #7 pixels





Content

Module A Unit #7 pixels



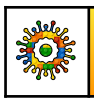
Introduction to pixels

Every image on your screen or on the canvas is made up of `pixels`. They are too tiny to be seen individually; even so, we can draw pixels using the `point()` function on the canvas. This is a very simple and early introduction to pixels as a shape we can draw. There is so much more to the pixels of the canvas or an image on the canvas, but that is for a bit later on.

One concept which is based on the `for()` loop is something called a `nested loop`. This is useful for `pixel arrays` and 3D objects and shapes.

Key concepts:

- pixels
- point()
- nested loops
- colorMode()



Sketch A7.1 what's the point?

❗ our starting sketch

We have drawn a pixel at position (`0, 0`). Can you see it?
A `point()` shape is just one pixel shape.

```
function setup()
{
  createCanvas(400, 400)
}

function draw()
{
  background(220)
  point(0, 0)
}
```

🗒️ Notes

No! Look closer at Fig. A7.1b, can you see it now?

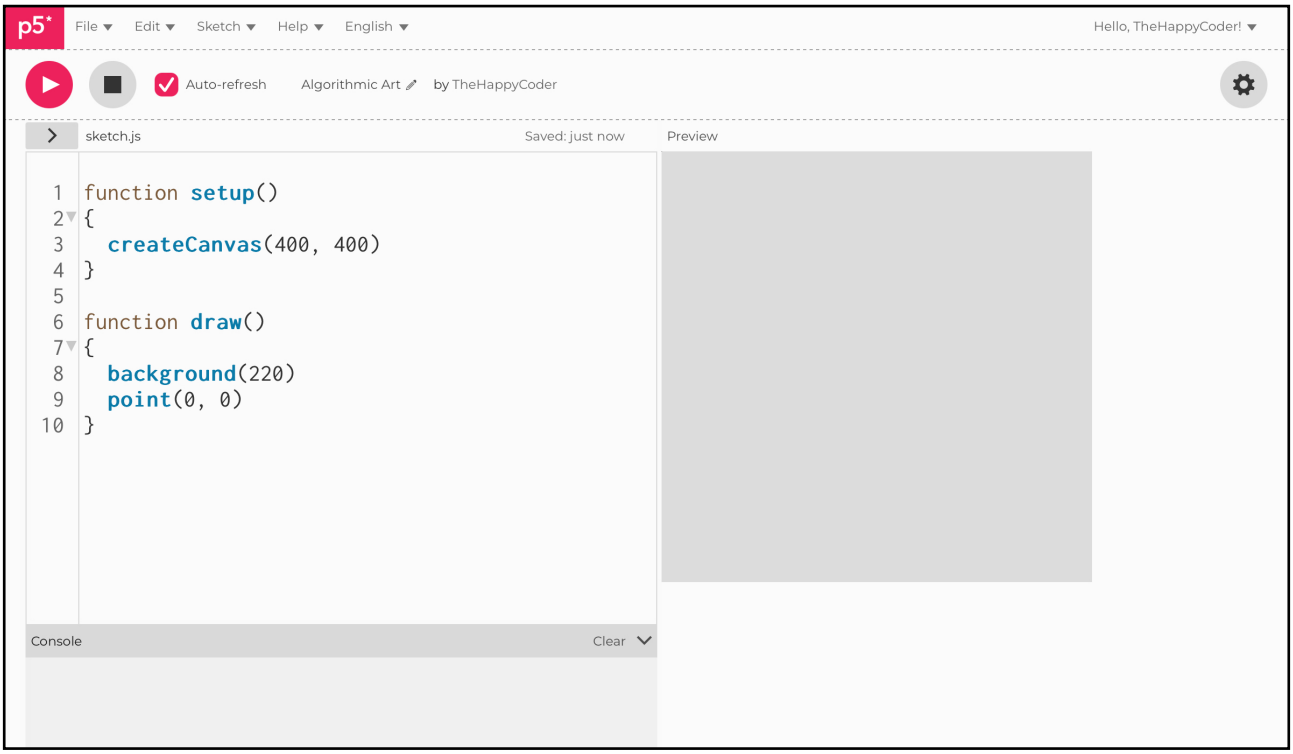
🌻 Challenge

Give it a `strokeWeight(50)` to see it clearly.

🛠️ Code Explanation

`point(0, 0)`	This is draws a pixel at coordinates (0, 0)

Figure A7.1a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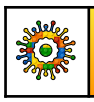
2 {
3 createCanvas(400, 400)
4 }
5
6 function draw()
7 {
8 background(220)
9 point(0, 0)
10 }
Console
Clear

Figure A7.1b: pixel point



Sketch A7.2 a line of pixels

We use a `for()` loop to draw a line across the top of the canvas. Remember to change `point(0, 0)` to `point (x, 0)`.

```
function setup()
{
  createCanvas(400, 400)
}

function draw()
{
  background(220)
  for (let x = 0; x < width; x++)
  {
    point(x, 0)
  }
}
```

🗒️ Notes

You should be able to see a thin line going across the top of the canvas. We used `x` instead of `i` for this `for()` loop.

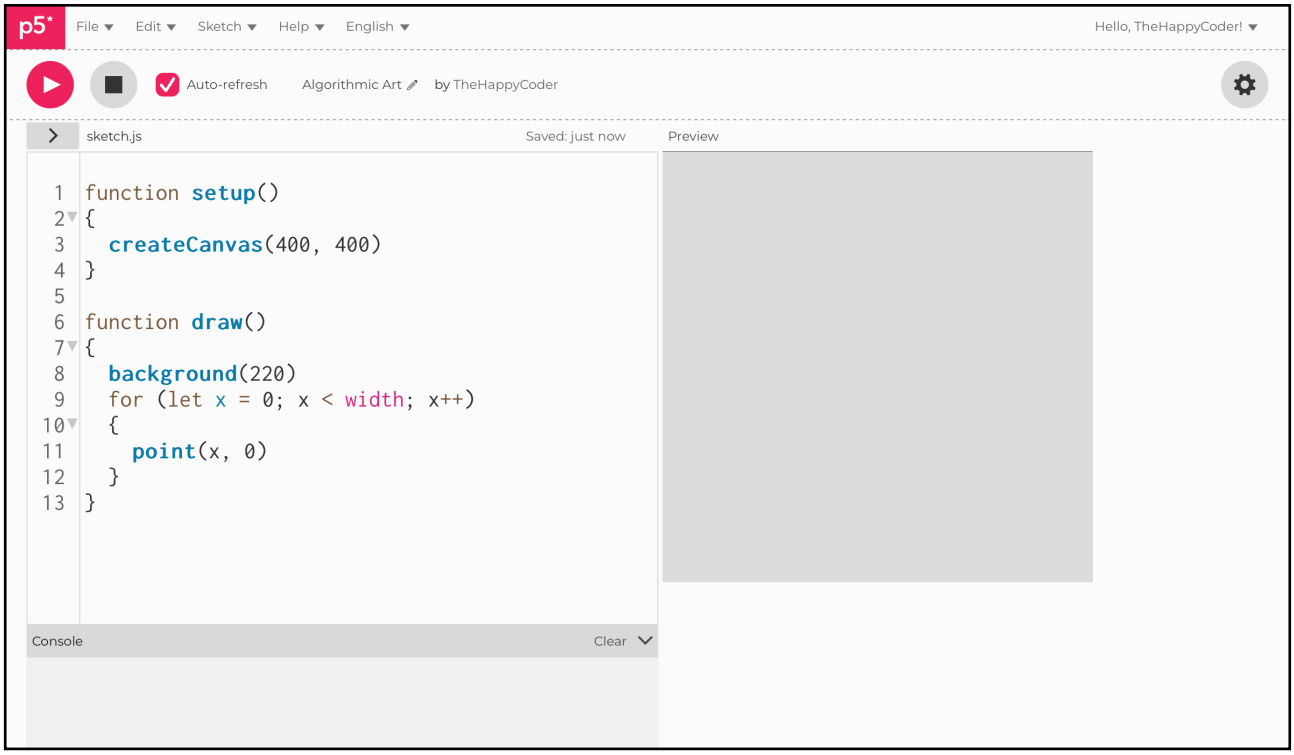
🌻 Challenge

Give it a higher `strokeWeight(10)` or so.

🛠️ Code Explanation

`for (let x = 0; x < width; x++)`	A for() loop for the x value
`point(x, 0)`	Draw pixel for each x value

Figure A7.2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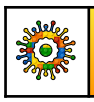
createCanvas(400, 400)
}
function draw()
{
background(220)
for (let x = 0; x < width; x++)
{
point(x, 0)
}
}
Console
Clear



Sketch A7.3 nested loop

Now we can use another `for()` loop inside the original `for()` loop to draw all the `y` components for each `x` component of the coordinates for each pixel. This I call a `nested loop`.

```
function setup()
{
  createCanvas(400, 400)
}

function draw()
{
  background(220)
  for (let x = 0; x < width; x++)
  {
    for (let y = 0; y < height; y++)
    {
      point(x, y)
    }
  }
}
```

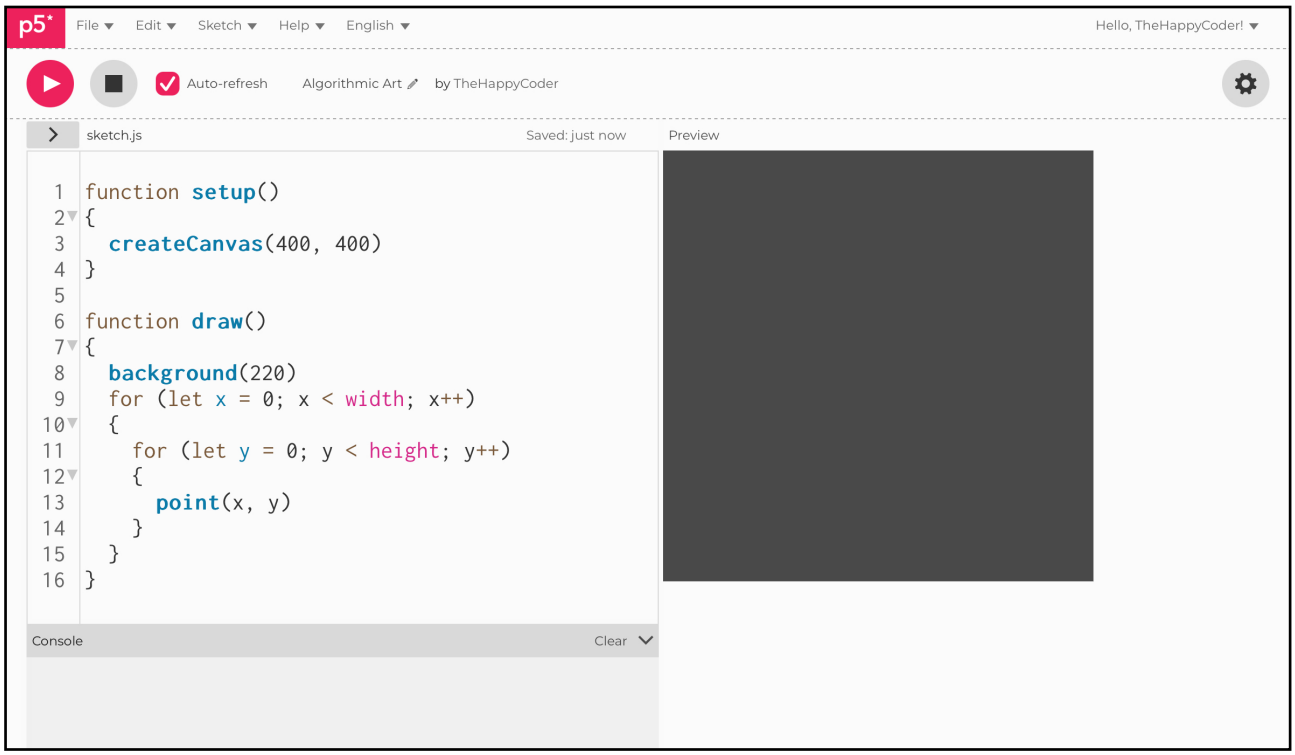
🗒️ Notes

We have drawn a column of pixels working from left to right; this draws every pixel black. Remember to change `point(x, 0)` to `point(x, y)`.

🛠️ Code Explanation

`for (let y = 0; y < height; y++)`	A for() loop for all the y values
`point(x, y)`	Draw the pixel at (x, y) coordinates

Figure A7.3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5
6 function draw()
7 {
8 background(220)
9 for (let x = 0; x < width; x++)
10 {
11 for (let y = 0; y < height; y++)
12 {
13 point(x, y)
14 }
15 }
16 }
Console
Clear

Sketch A7.4 colouring the pixel

We can give every pixel a colour using `stroke()`.

```
function setup()
{
  createCanvas(400, 400)
}

function draw()
{
  background(220)
  for (let x = 0; x < width; x++)
  {
    for (let y = 0; y < height; y++)
    {
      stroke('lightblue')
      point(x, y)
    }
  }
}
```

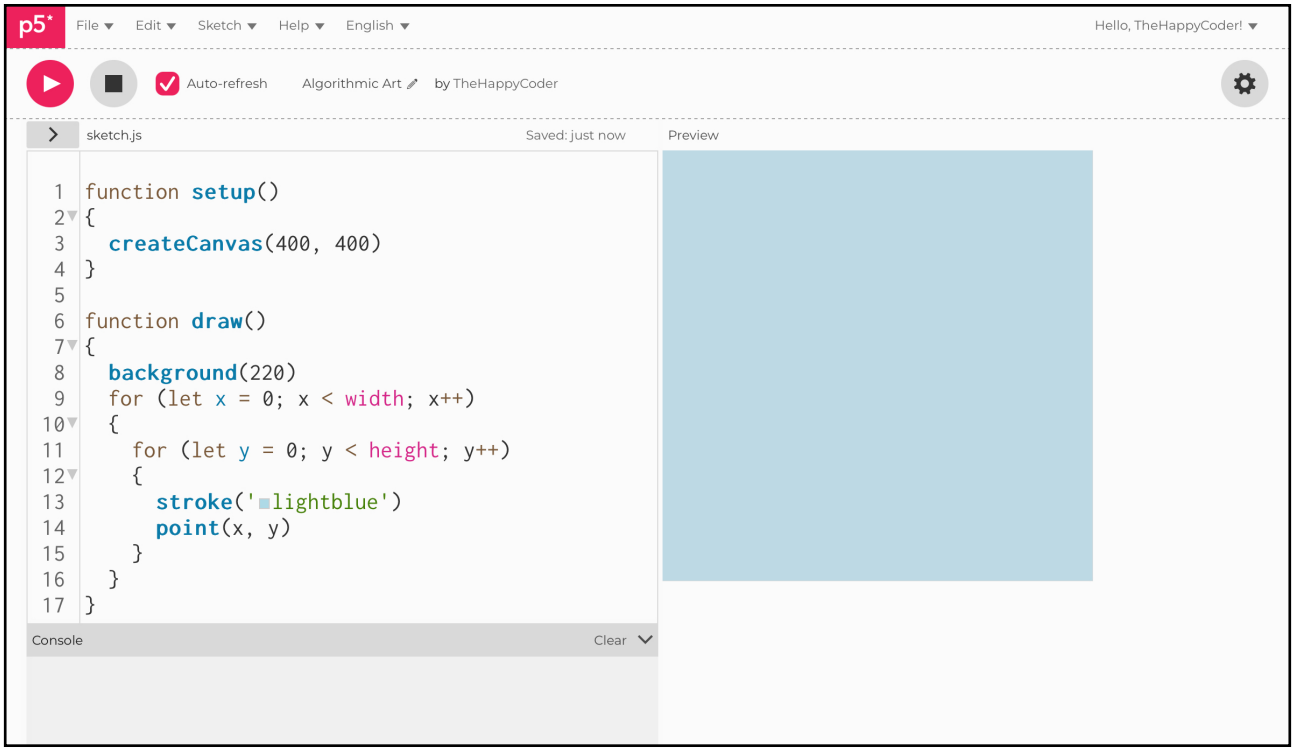
🗒️ Notes

Our canvas is now a light blue colour.

🌻 Challenge

Try other colours.

Figure A7.4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function setup()
{
createCanvas(400, 400)
}
function draw()
{
background(220)
for (let x = 0; x < width; x++)
{
for (let y = 0; y < height; y++)
{
stroke('lightblue')
point(x, y)
}
}
}
Console
Clear

Sketch A7.5 random pixel colour

Give each pixel a random greyscale colour.

```
function setup()
{
  createCanvas(400, 400)
}

function draw()
{
  background(220)
  for (let x = 0; x < width; x++)
  {
    for (let y = 0; y < height; y++)
    {
      stroke(random(255))
      point(x, y)
    }
  }
  noLoop()
}
```

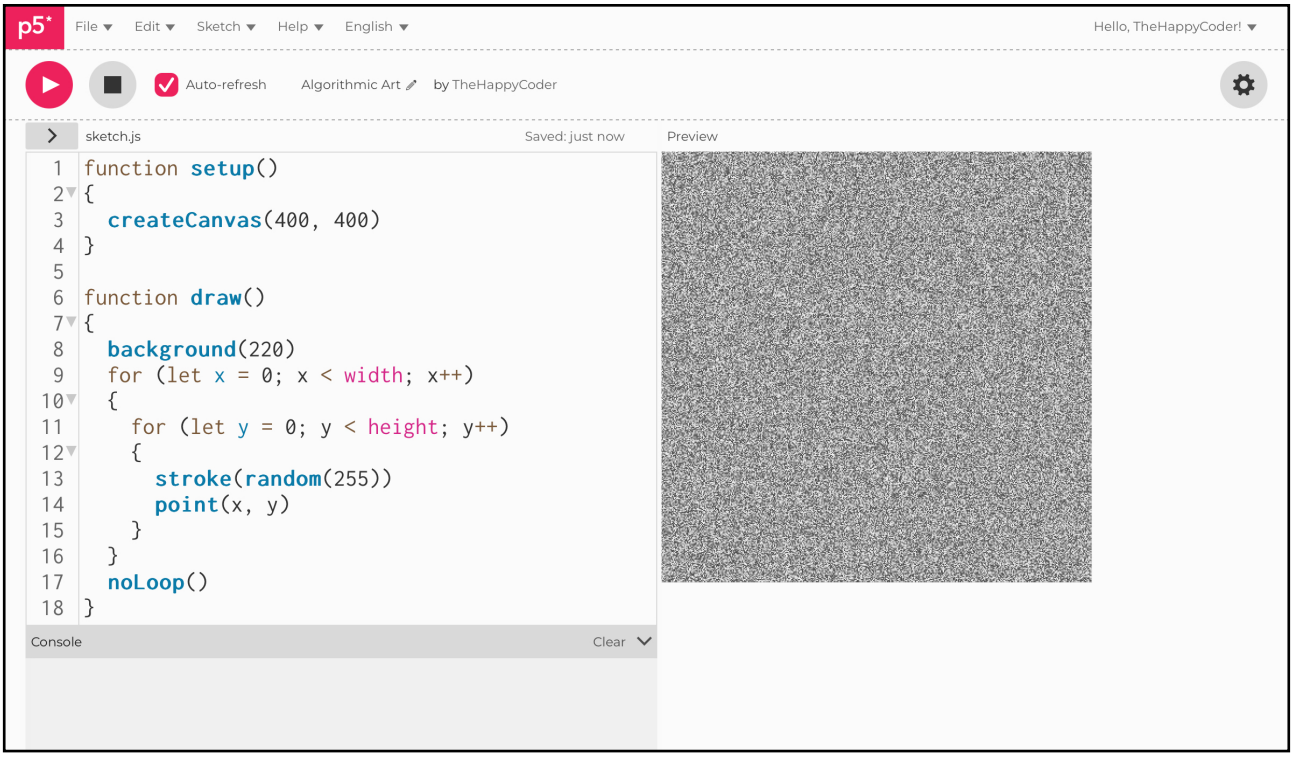
Notes

We get a random image, a bit like static on old TVs.

Challenge

Try random RGB colours.

Figure A7.5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Preview
function setup()
{
createCanvas(400, 400)
}
function draw()
{
background(220)
for (let x = 0; x < width; x++)
{
for (let y = 0; y < height; y++)
{
stroke(random(255))
point(x, y)
}
}
noLoop()
}
Console
Clear

Sketch A7.6 gradual colour

Adding some colour to the pixels gradually.

```
function setup()
{
  createCanvas(400, 400)
}

function draw()
{
  background(220)
  for (let x = 0; x < width; x++)
  {
    for (let y = 0; y < height; y++)
    {
      stroke(x, 0, 0)
      point(x, y)
    }
  }
  noLoop()
}
```

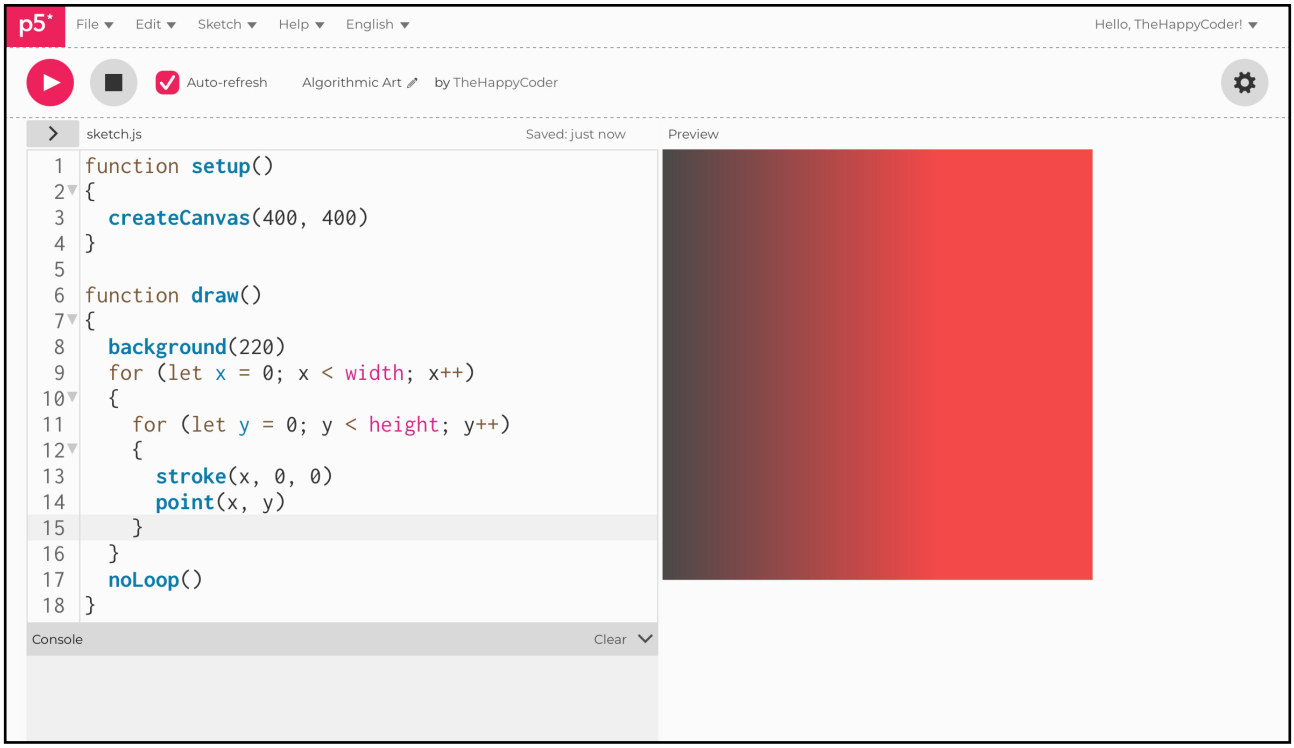
🗒️ Notes

We increase the `x` value of red from `0` to `400`, but the RGB values stop at `255`; however, there is a way round this...

🌻 Challenge

Play with the values of the `stroke()` function.

Figure A7.6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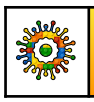
function setup()
{
createCanvas(400, 400)
}
function draw()
{
background(220)
for (let x = 0; x < width; x++)
{
for (let y = 0; y < height; y++)
{
stroke(x, 0, 0)
point(x, y)
}
}
noLoop()
}
Console
Clear



Sketch A7.7 colour mode RGB

The default `colorMode()` is RGB, so that is why we don't specify (more on other modes later). In this mode, we can specify the values of the red, green, and blue; they are extrapolated to any value you choose. We can give it an extra argument of `400`, as this is the dimension of the canvas.

```
function setup()
{
  createCanvas(400, 400)
  colorMode(RGB, 400)
}

function draw()
{
  background(220)
  for (let x = 0; x < width; x++)
  {
    for (let y = 0; y < height; y++)
    {
      stroke(x, 0, 0)
      point(x, y)
    }
  }
  noLoop()
}
```

Notes

Now we have a more graduated colouring of the pixels with a range of `0` to `400` (rather than `0` to `255`).

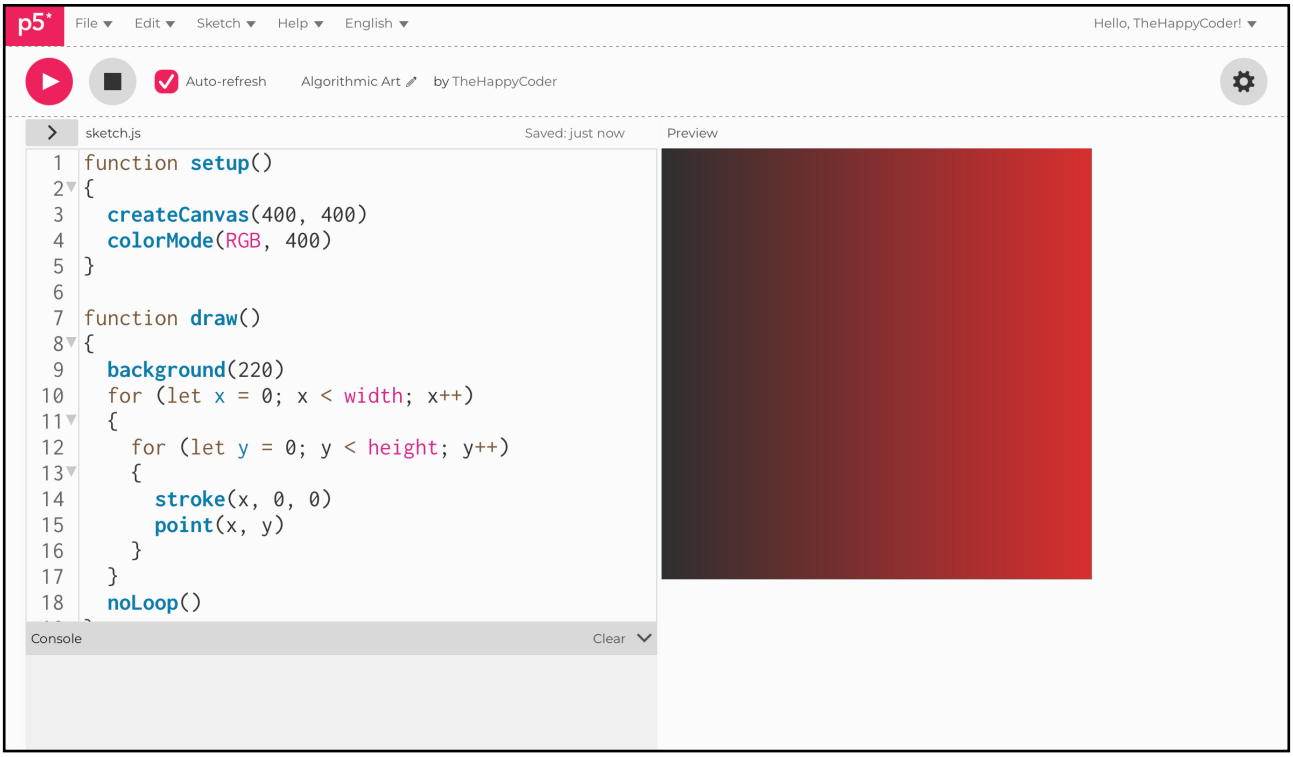
🌻 Challenges

1. Try other colours.
2. How would you start with a high value for red and work backwards? Clue: `stroke(400 - x, 0, x)`.

🛠️ Code Explanation

`colorMode(RGB, 400)`	The colorMode() function allows us to change to other modes of colour and also change their properties

Figure A7.7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Preview
function setup()
{
createCanvas(400, 400)
colorMode(RGB, 400)
}
function draw()
{
background(220)
for (let x = 0; x < width; x++)
{
for (let y = 0; y < height; y++)
{
stroke(x, 0, 0)
point(x, y)
}
}
noLoop()
Console
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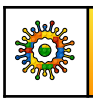


Sketch A7.8 in both directions

If we add in the y values as well.

```
function setup()
{
  createCanvas(400, 400)
  colorMode(RGB, 400)
}

function draw()
{
  background(220)
  for (let x = 0; x < width; x++)
  {
    for (let y = 0; y < height; y++)
    {
      stroke(x, 0, y)
      point(x, y)
    }
  }
  noLoop()
}
```

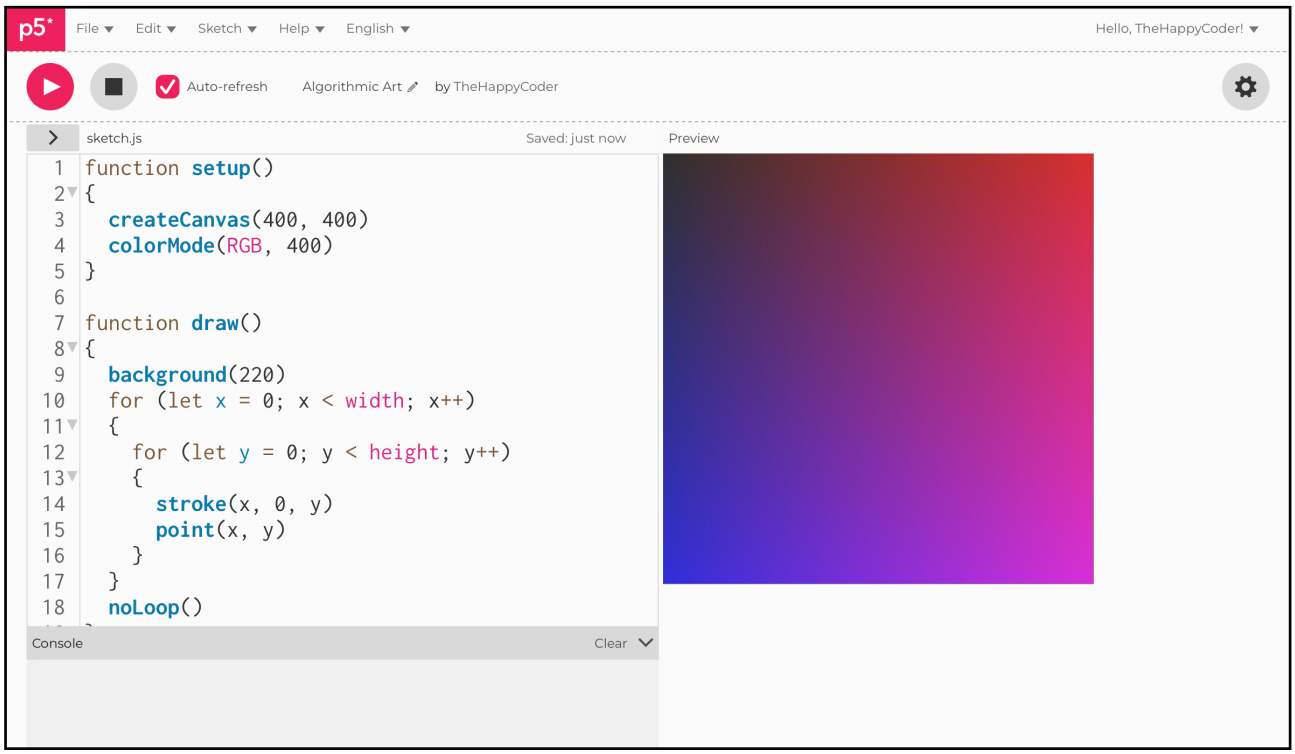
🗒️ Notes

There is a lot you can do to play with these values.

🌻 Challenges

1. Try: `stroke(400 - x, 400 - y, y)`.
2. Experiment further.

Figure A7.8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2 {
3 createCanvas(400, 400)
4 colorMode(RGB, 400)
5 }
6
7 function draw()
8 {
9 background(220)
10 for (let x = 0; x < width; x++)
11 {
12 for (let y = 0; y < height; y++)
13 {
14 stroke(x, 0, y)
15 point(x, y)
16 }
17 }
18 noLoop()
Console
Clear

Next. . .

In the final unit (#8) of this module, we will put much of what we have learned into creating a classic pattern called 10PRINT.