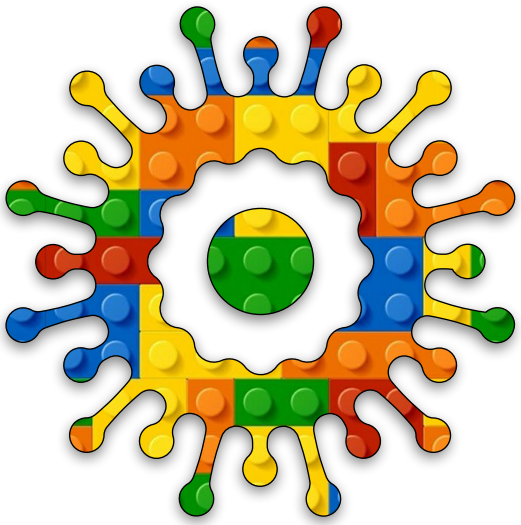
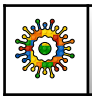
Making Games

Module A

Unit #1

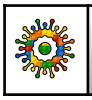
lerp





Content

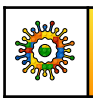
Section A Unit #1 lerp game



Introduction to the lerp game

We are going to make what should be quite a simple game, although it is far from simple as you will see. You will move around the canvas using the arrow keys to collect targets without being caught by a circle following you around.

This uses the `lerp()` function, which measures the distance between two points and incrementally closes that distance in units supplied by you. The bigger the units/steps/increments, the faster it approaches you. It is worked out as a percentage, so as it gets closer, the rate it moves decreases and stops when the distance is zero.

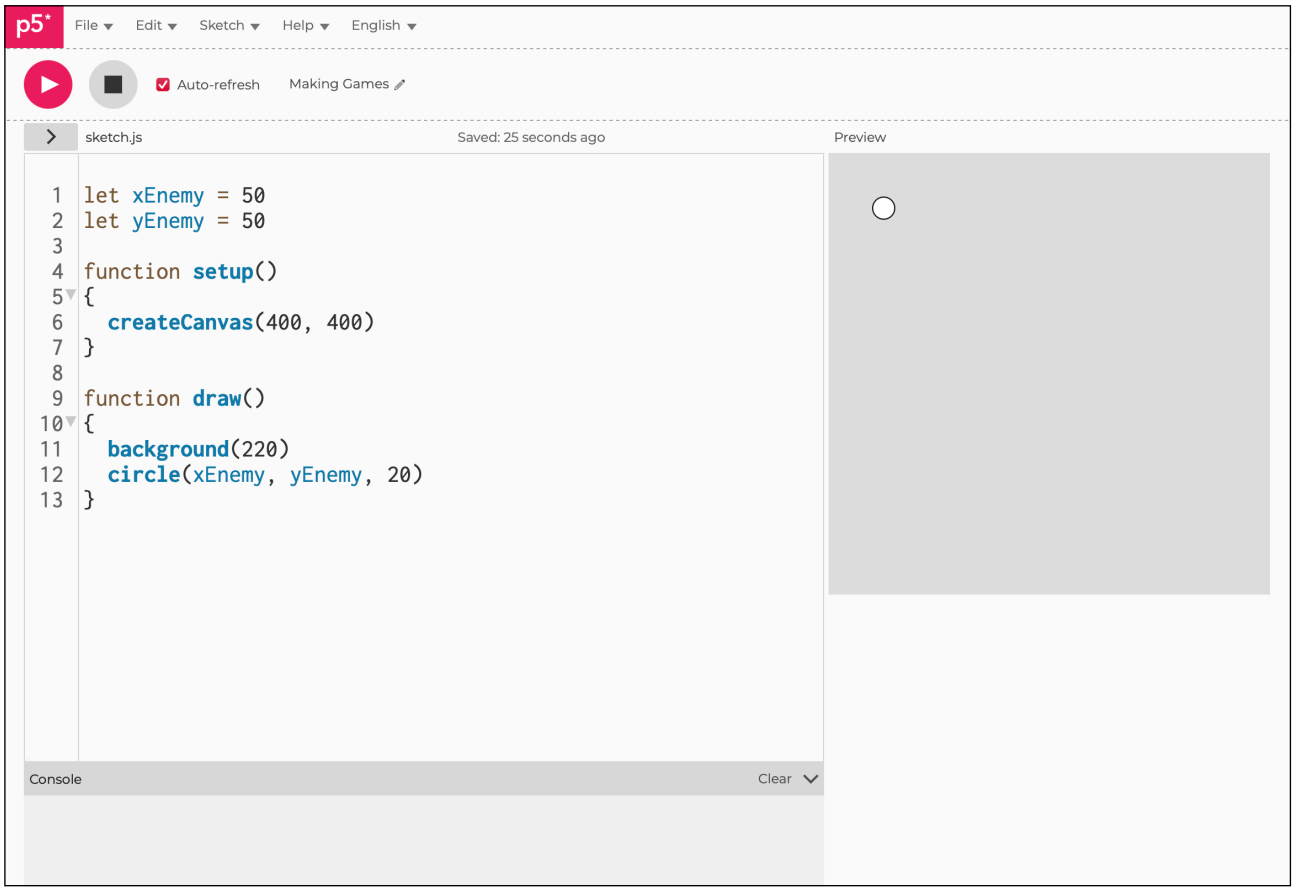


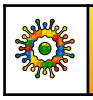
Sketch A1.1 the enemy

Create two variables for the enemy's x and y coordinates and draw the enemy who will come after you.

```
let xEnemy = 50
let yEnemy = 50

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

function draw()
{
  background(220)
  circle(xEnemy, yEnemy, 20)
}
```

Figure A1.1


p5*
File
Edit
Sketch
Help
English
Auto-refresh
Making Games
sketch.js
Saved: 25 seconds ago
Preview
let xEnemy = 50
let yEnemy = 50
function setup()
{
createCanvas(400, 400)
}
function draw()
{
background(220)
circle(xEnemy, yEnemy, 20)
}
Console
Clear

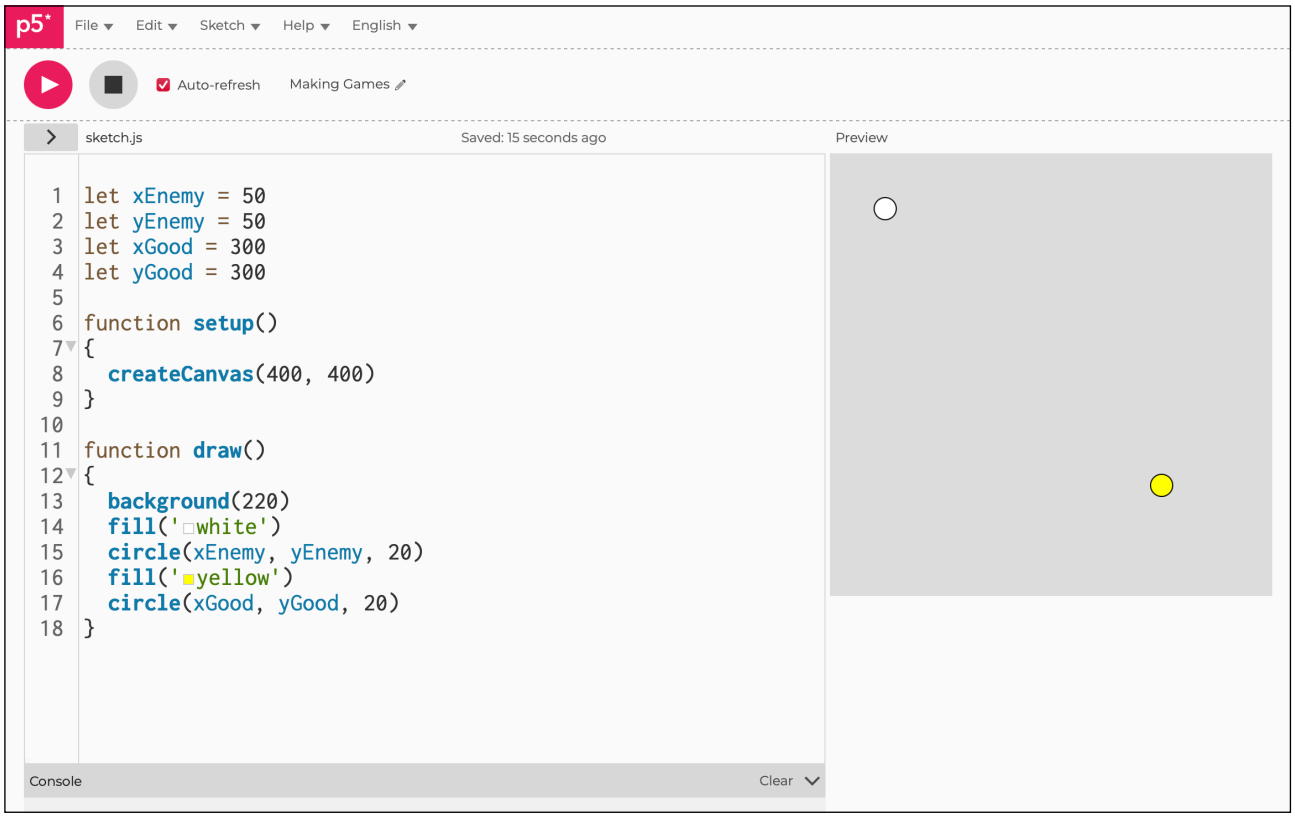


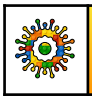
Sketch A1.2 you are the goody

Now we add you to the goody and you are in yellow.

```
let xEnemy = 50
let yEnemy = 50
let xGood = 300
let yGood = 300

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

function draw()
{
  background(220)
  fill('white')
  circle(xEnemy, yEnemy, 20)
  fill('yellow')
  circle(xGood, yGood, 20)
}
```

Figure A1.2


p5*
File
Edit
Sketch
Help
English
Auto-refresh
Making Games
sketch.js
Saved: 15 seconds ago
Preview
let xEnemy = 50
let yEnemy = 50
let xGood = 300
let yGood = 300
function setup()
{
createCanvas(400, 400)
}
function draw()
{
background(220)
fill('white')
circle(xEnemy, yEnemy, 20)
fill('yellow')
circle(xGood, yGood, 20)
}
Console
Clear



Sketch A1.3 seeking you out

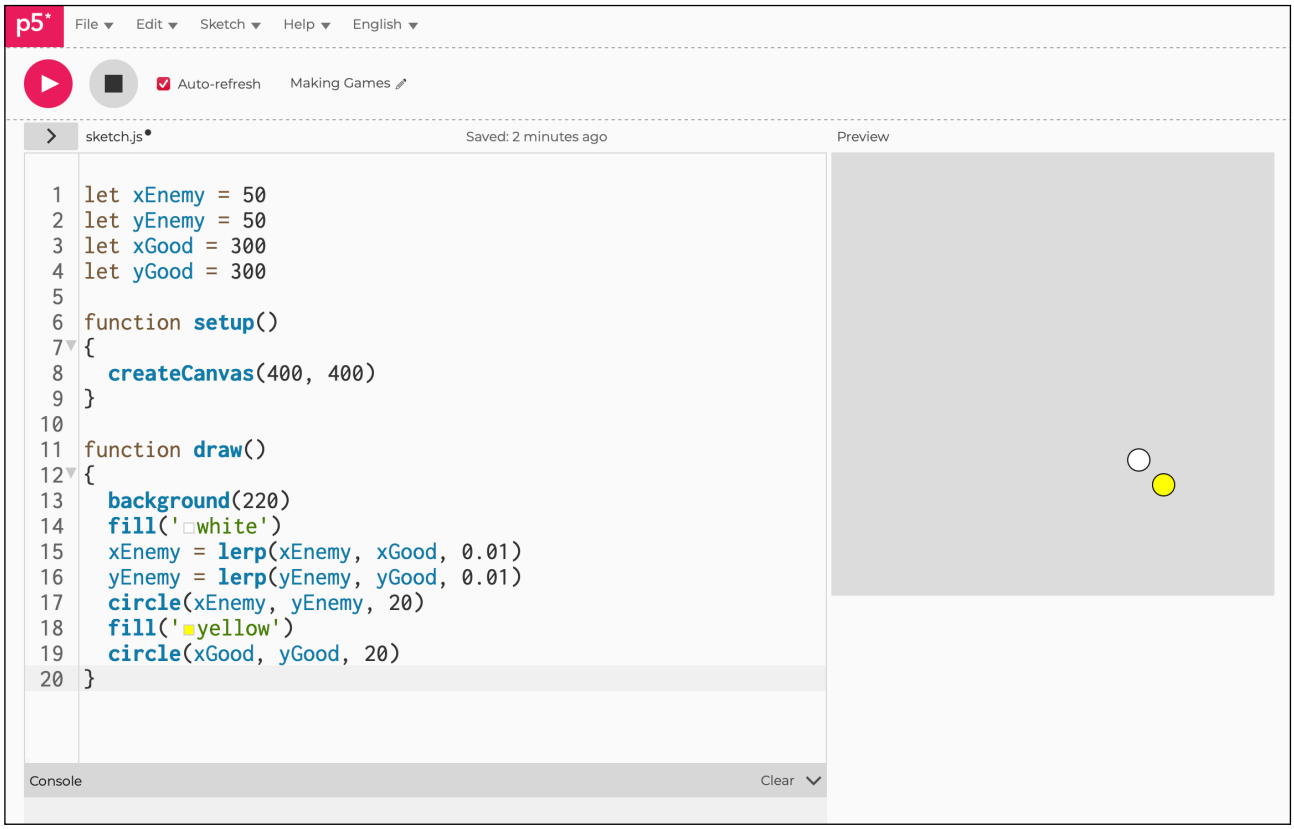
We can now demonstrate the `lerp()` function; the enemy will seek you out gradually, slowing down as it gets closer.

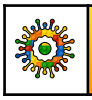
```
let xEnemy = 50
let yEnemy = 50
let xGood = 300
let yGood = 300

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

function draw()
{
  background(220)
  fill('white')
  xEnemy = lerp(xEnemy, xGood, 0.01)
  yEnemy = lerp(yEnemy, yGood, 0.01)
  circle(xEnemy, yEnemy, 20)
  fill('yellow')
  circle(xGood, yGood, 20)
}
```

Challenges

1. Play around with the `lerp()` incremental variable, change it from `0.01` to `0.1`.
2. Also, give the `x` and `y` different values.

Figure A1.3


p5*
File
Edit
Sketch
Help
English
Auto-refresh
Making Games
sketch.js
Saved: 2 minutes ago
Preview
1 let xEnemy = 50
2 let yEnemy = 50
3 let xGood = 300
4 let yGood = 300
5
6 function setup()
7 {
8 createCanvas(400, 400)
9 }
10
11 function draw()
12 {
13 background(220)
14 fill('white')
15 xEnemy = lerp(xEnemy, xGood, 0.01)
16 yEnemy = lerp(yEnemy, yGood, 0.01)
17 circle(xEnemy, yEnemy, 20)
18 fill('yellow')
19 circle(xGood, yGood, 20)
20 }
Console
Clear

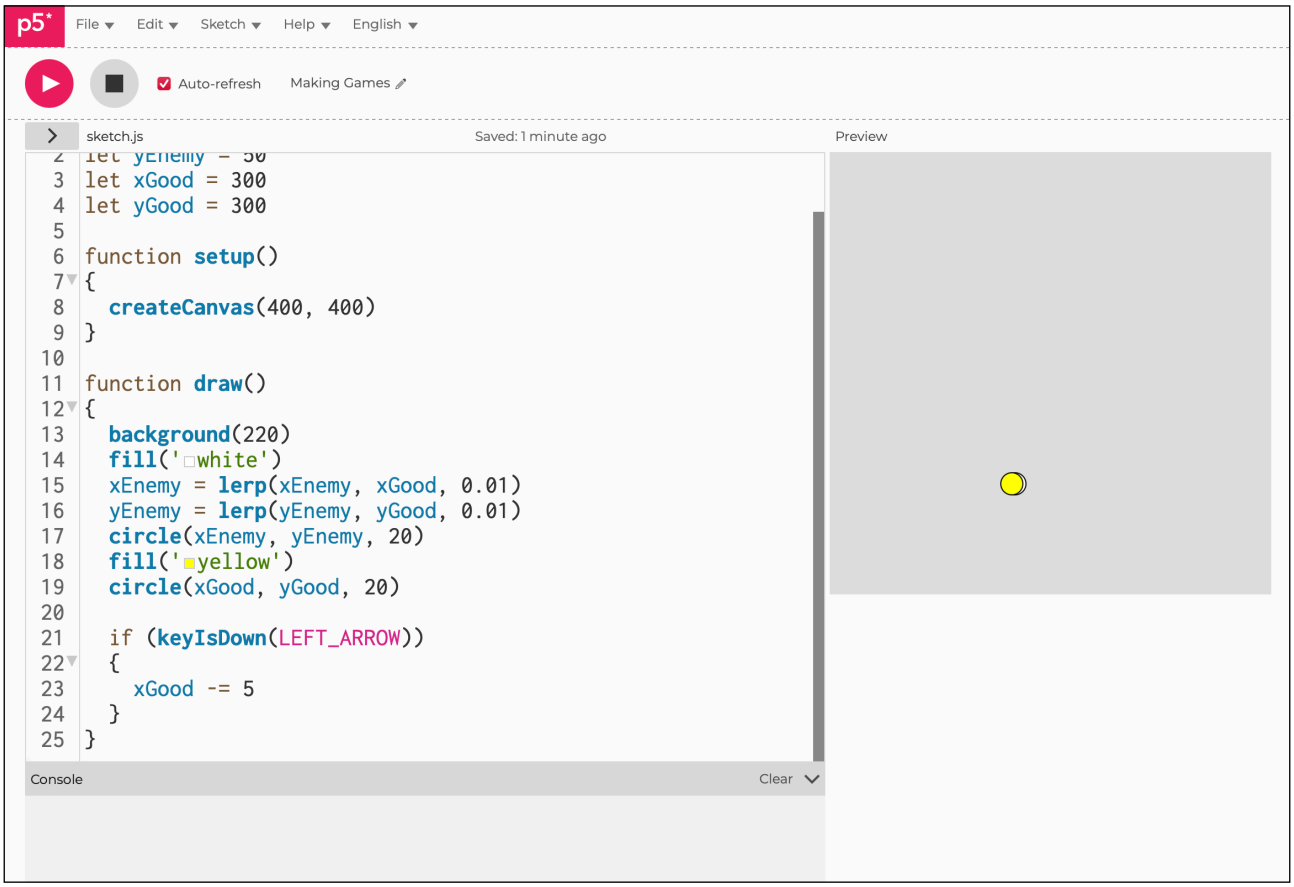


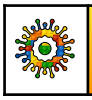
Sketch A1.4 the arrow keys

However, we want to escape the clutches of our arch-enemy, so we are going to use the arrow keys to move you around. We will start with the left arrow key. Try it (first click on the canvas and then press the left arrow key).

```
let xEnemy = 50
let yEnemy = 50
let xGood = 300
let yGood = 300

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

function draw()
{
  background(220)
  fill('white')
  xEnemy = lerp(xEnemy, xGood, 0.01)
  yEnemy = lerp(yEnemy, yGood, 0.01)
  circle(xEnemy, yEnemy, 20)
  fill('yellow')
  circle(xGood, yGood, 20)

  if (keyIsDown(LEFT_ARROW))
  {
    xGood -= 5
  }
}
```

Figure A1.4


p5*
File
Edit
Sketch
Help
English
Auto-refresh
Making Games
sketch.js
Saved: 1 minute ago
Preview
let yEnemy = 50
let xGood = 300
let yGood = 300
function setup()
{
createCanvas(400, 400)
}
function draw()
{
background(220)
fill('white')
xEnemy = lerp(xEnemy, xGood, 0.01)
yEnemy = lerp(yEnemy, yGood, 0.01)
circle(xEnemy, yEnemy, 20)
fill('yellow')
circle(xGood, yGood, 20)
if (keyIsDown(LEFT_ARROW))
{
xGood -= 5
}
}
Console
Clear



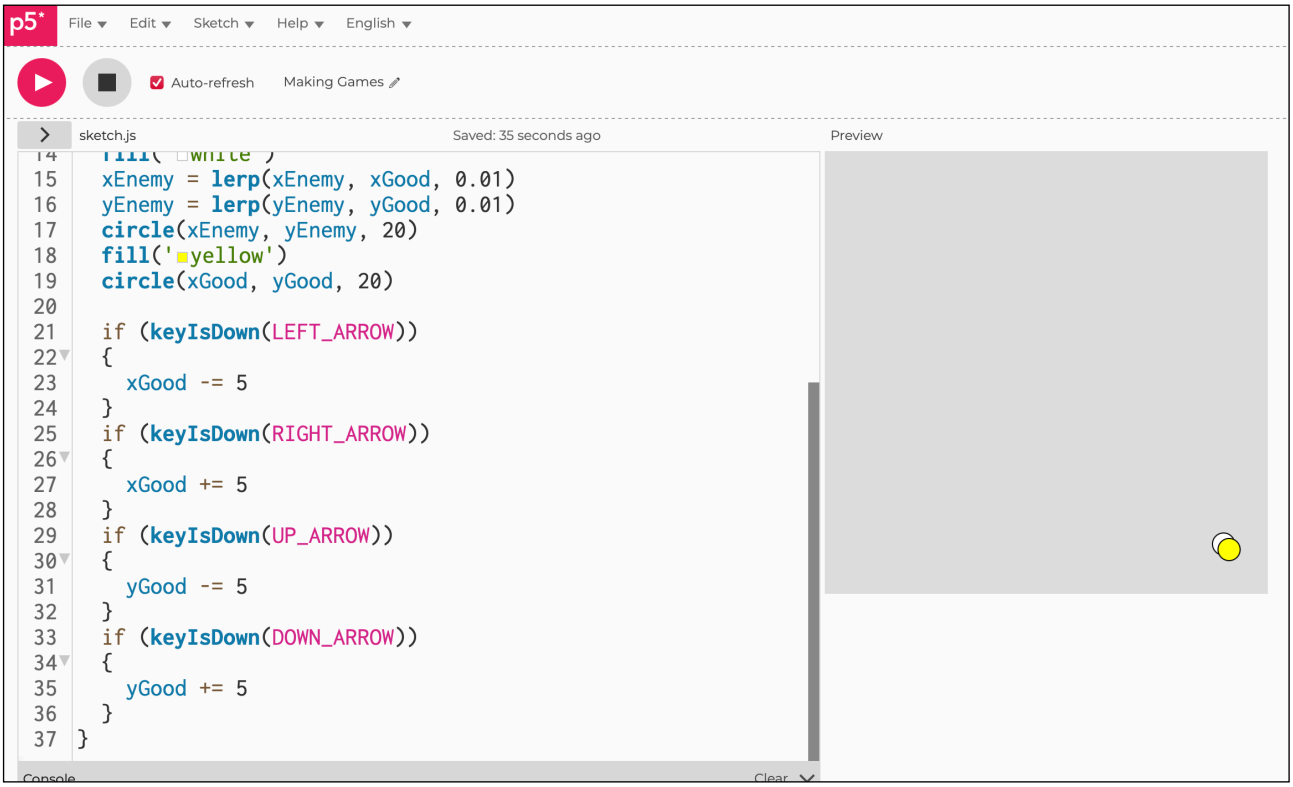
Sketch A1.5 more arrow keys

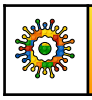
Now let us add the other keys and keep away from the enemy.

```
let xEnemy = 50
let yEnemy = 50
let xGood = 300
let yGood = 300

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

function draw()
{
  background(220)
  fill('white')
  xEnemy = lerp(xEnemy, xGood, 0.01)
  yEnemy = lerp(yEnemy, yGood, 0.01)
  circle(xEnemy, yEnemy, 20)
  fill('yellow')
  circle(xGood, yGood, 20)

  if (keyIsDown(LEFT_ARROW))
  {
    xGood -= 5
  }
  if (keyIsDown(RIGHT_ARROW))
  {
    xGood += 5
  }
```

```
  if (keyIsDown(UP_ARROW))
  {
    yGood -= 5
  }
  if (keyIsDown(DOWN_ARROW))
  {
    yGood += 5
  }
}
```

Figure A1.5


p5*
File
Edit
Sketch
Help
English
Auto-refresh
Making Games
sketch.js
Saved: 35 seconds ago
Preview
fill(white)
xEnemy = lerp(xEnemy, xGood, 0.01)
yEnemy = lerp(yEnemy, yGood, 0.01)
circle(xEnemy, yEnemy, 20)
fill('yellow')
circle(xGood, yGood, 20)
if (keyIsDown(LEFT_ARROW))
{
xGood -= 5
}
if (keyIsDown(RIGHT_ARROW))
{
xGood += 5
}
if (keyIsDown(UP_ARROW))
{
yGood -= 5
}
if (keyIsDown(DOWN_ARROW))
{
yGood += 5
}
}
Console
Clear



Sketch A1.6 off the edge

The problem is that you can disappear off the edge. We could do one of two things:

1. Put a barrier so you can't escape beyond the canvas, or
2. Reappear on the opposite side. We will go with the second option because it is easier to play.

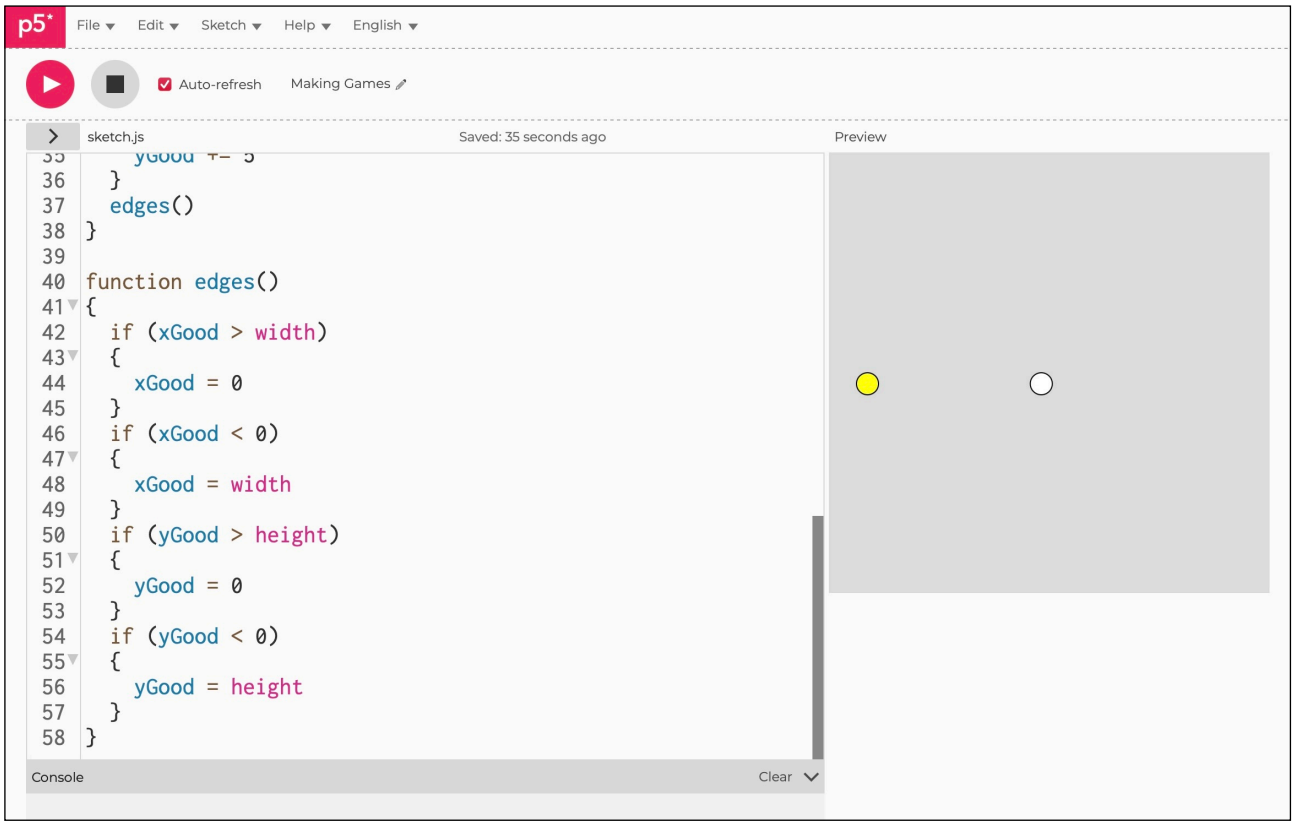
We add another function called `edges()` to facilitate this. We call it in `draw()`.

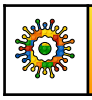
```
let xEnemy = 50
let yEnemy = 50
let xGood = 300
let yGood = 300

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

function draw()
{
  background(220)
  fill('white')
  xEnemy = lerp(xEnemy, xGood, 0.01)
  yEnemy = lerp(yEnemy, yGood, 0.01)
  circle(xEnemy, yEnemy, 20)
  fill('yellow')
  circle(xGood, yGood, 20)

  if (keyIsDown(LEFT_ARROW))
  {
    xGood -= 5
```

```
  }
  if (keyIsDown(RIGHT_ARROW))
  {
    xGood += 5
  }
  if (keyIsDown(UP_ARROW))
  {
    yGood -= 5
  }
  if (keyIsDown(DOWN_ARROW))
  {
    yGood += 5
  }
  edges()
}

function edges()
{
  if (xGood > width)
  {
    xGood = 0
  }
  if (xGood < 0)
  {
    xGood = width
  }
  if (yGood > height)
  {
    yGood = 0
  }
  if (yGood < 0)
  {
    yGood = height
```

```
    }
}
```

Figure A1.6


p5*
File
Edit
Sketch
Help
English
Auto-refresh
Making Games
sketch.js
Saved: 35 seconds ago
Preview
yGood += 5
}
edges()
}
function edges()
{
if (xGood > width)
{
xGood = 0
}
if (xGood < 0)
{
xGood = width
}
if (yGood > height)
{
yGood = 0
}
if (yGood < 0)
{
yGood = height
}
}
Console
Clear



Sketch A1.7 targets

We need targets for you to accumulate as part of the game without being caught by the enemy. We will store them in two arrays for their x and y values. Although we will create 20 of them in setup(), we will only display 5 of them at a time in draw().

```
let xEnemy = 50
let yEnemy = 50
let xGood = 300
let yGood = 300
let xTarget = []
let yTarget = []

function setup()
{
  createCanvas(400, 400)
  for (let i = 0; i < 20; i++)
  {
    xTarget[i] = random(width)
    yTarget[i] = random(height)
  }
}

function draw()
{
  background(220)
  for (let i = 0; i < 5; i++)
  {
    fill('red')
    circle(xTarget[i], yTarget[i], 20)
  }
  fill('white')
```

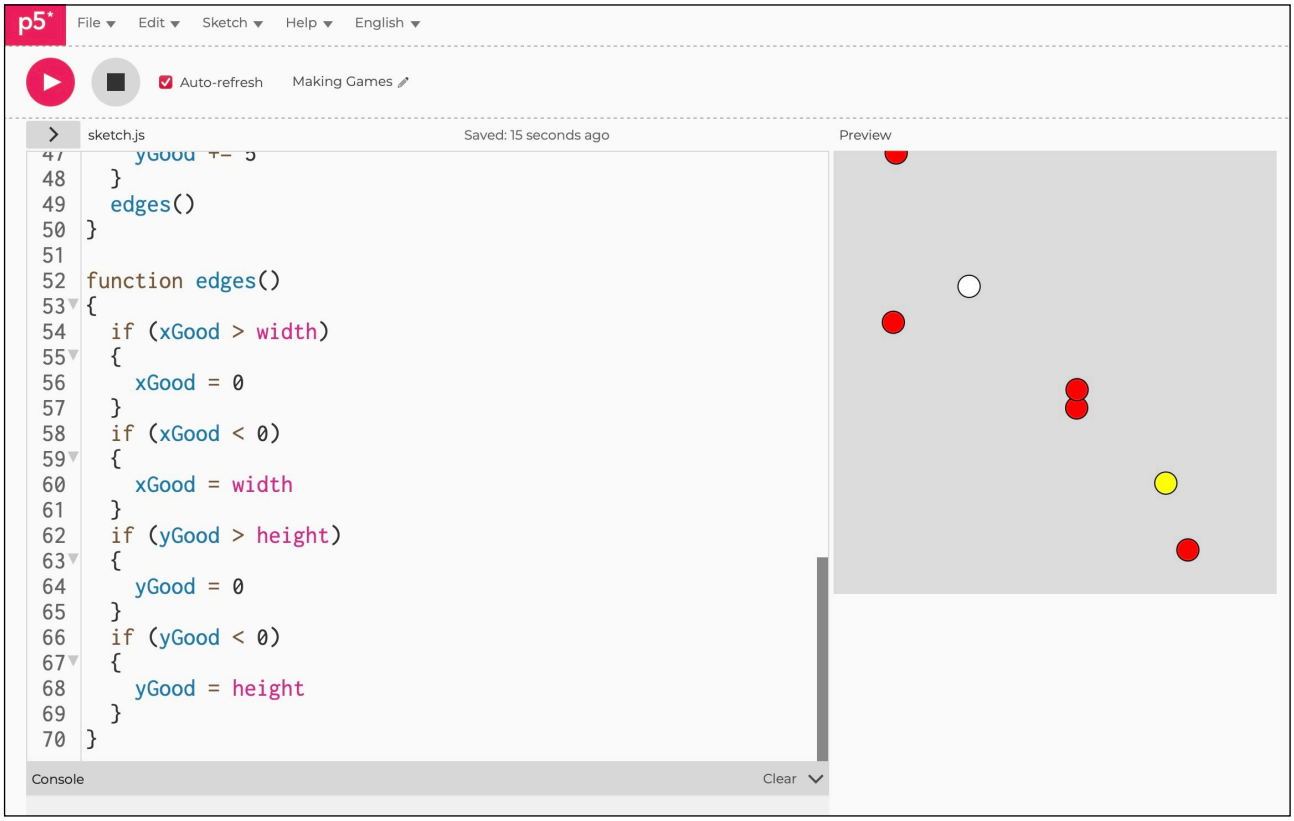
```
  xEnemy = lerp(xEnemy, xGood, 0.01)
  yEnemy = lerp(yEnemy, yGood, 0.01)
  circle(xEnemy, yEnemy, 20)
  fill('yellow')
  circle(xGood, yGood, 20)

  if (keyIsDown(LEFT_ARROW))
  {
    xGood -= 5
  }
  if (keyIsDown(RIGHT_ARROW))
  {
    xGood += 5
  }
  if (keyIsDown(UP_ARROW))
  {
    yGood -= 5
  }
  if (keyIsDown(DOWN_ARROW))
  {
    yGood += 5
  }
  edges()
}

function edges()
{
  if (xGood > width)
  {
    xGood = 0
  }
  if (xGood < 0)
  {
```

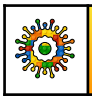
```
    xGood = width
  }
  if (yGood > height)
  {
    yGood = 0
  }
  if (yGood < 0)
  {
    yGood = height
  }
}
```

Notes

The idea is that you collect them before you get caught, so we need to work out when you have caught one of the targets. We use the `dist()` function.

Figure A1.7


p5*
File
Edit
Sketch
Help
English
Auto-refresh
Making Games
sketch.js
Saved: 15 seconds ago
Preview
yGood += 5
}
edges()
}
function edges()
{
if (xGood > width)
{
xGood = 0
}
if (xGood < 0)
{
xGood = width
}
if (yGood > height)
{
yGood = 0
}
if (yGood < 0)
{
yGood = height
}
}
Console
Clear



Sketch A1.8 measuring the distance

We create an empty array to store the distances between you and the targets. It is constantly updated as you move around the canvas.

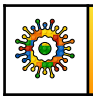
```
let xEnemy = 50
let yEnemy = 50
let xGood = 300
let yGood = 300
let xTarget = []
let yTarget = []
let tDist = []

function setup()
{
  createCanvas(400, 400)
  for (let i = 0; i < 20; i++)
  {
    xTarget[i] = random(width)
    yTarget[i] = random(height)
  }
}

function draw()
{
  background(220)
  for (let i = 0; i < 5; i++)
  {
    fill('red')
    circle(xTarget[i], yTarget[i], 20)
    tDist[i] = dist(xGood, yGood, xTarget[i], yTarget[i])
  }
  fill('white')
```

```
  xEnemy = lerp(xEnemy, xGood, 0.01)
  yEnemy = lerp(yEnemy, yGood, 0.01)
  circle(xEnemy, yEnemy, 20)
  fill('yellow')
  circle(xGood, yGood, 20)

  if (keyIsDown(LEFT_ARROW))
  {
    xGood -= 5
  }
  if (keyIsDown(RIGHT_ARROW))
  {
    xGood += 5
  }
  if (keyIsDown(UP_ARROW))
  {
    yGood -= 5
  }
  if (keyIsDown(DOWN_ARROW))
  {
    yGood += 5
  }
  edges()
}

function edges()
{
  if (xGood > width)
  {
    xGood = 0
  }
  if (xGood < 0)
  {
```

```
    xGood = width
  }
  if (yGood > height)
  {
    yGood = 0
  }
  if (yGood < 0)
  {
    yGood = height
  }
}
```

Notes

Nothing new to see. We can now see if at any time you are within 20 pixels from centre to centre to a target.



Sketch A1.9 removing the targets

We are then going to remove that target from the array. You will notice that it replaces it with another target from the array. When you run out of targets, you should get an error message.

```
let xEnemy = 50
let yEnemy = 50
let xGood = 300
let yGood = 300
let xTarget = []
let yTarget = []
let tDist = []

function setup()
{
  createCanvas(400, 400)
  for (let i = 0; i < 20; i++)
  {
    xTarget[i] = random(width)
    yTarget[i] = random(height)
  }
}

function draw()
{
  background(220)
  for (let i = 0; i < 5; i++)
  {
    fill('red')
    circle(xTarget[i], yTarget[i], 20)
    tDist[i] = dist(xGood, yGood, xTarget[i], yTarget[i])
    if(tDist[i] < 20)
```

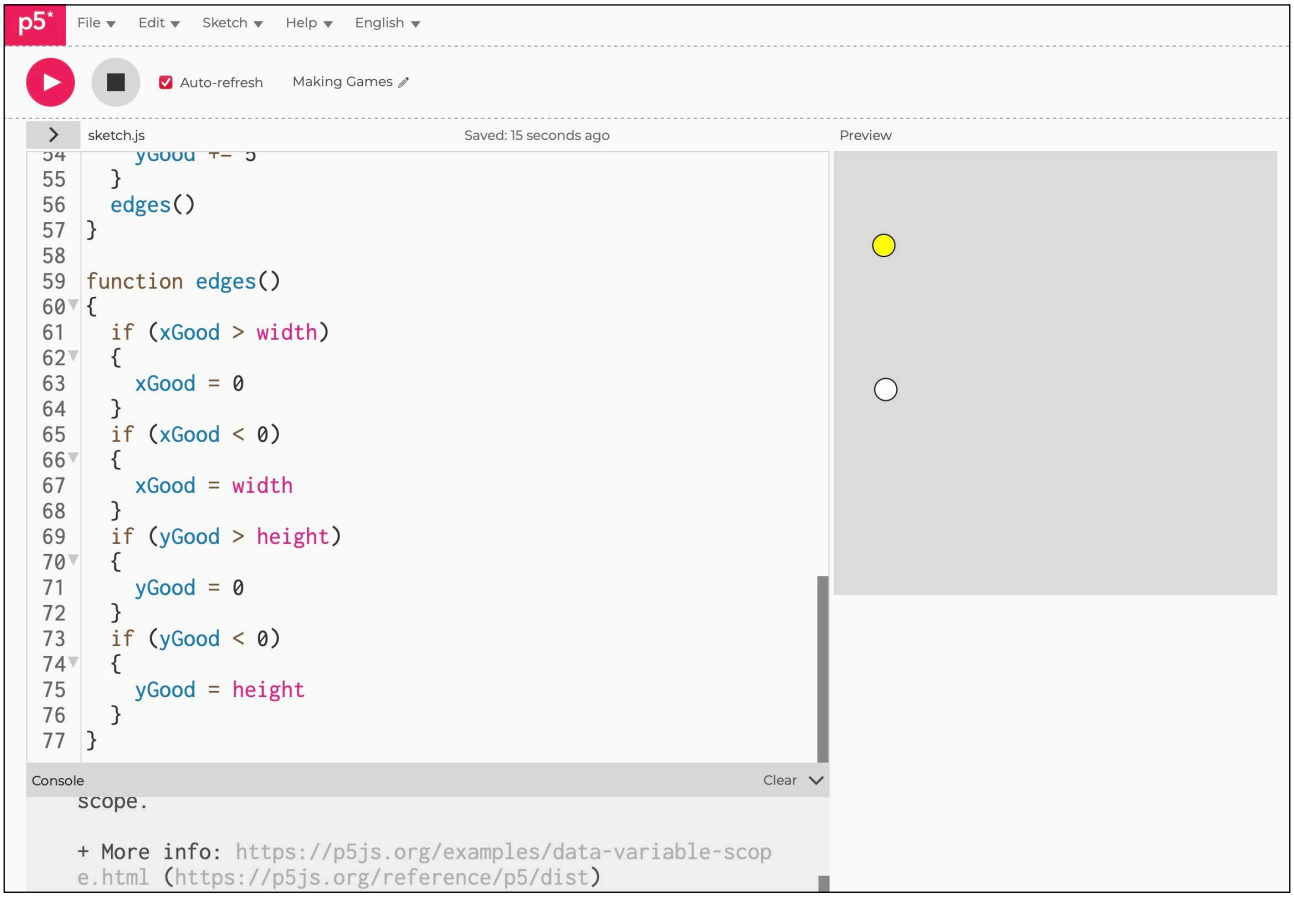
```
    {
      xTarget.splice([i], 1)
      yTarget.splice([i], 1)
    }
  }
  fill('white')
  xEnemy = lerp(xEnemy, xGood, 0.01)
  yEnemy = lerp(yEnemy, yGood, 0.01)
  circle(xEnemy, yEnemy, 20)
  fill('yellow')
  circle(xGood, yGood, 20)

  if (keyIsDown(LEFT_ARROW))
  {
    xGood -= 5
  }
  if (keyIsDown(RIGHT_ARROW))
  {
    xGood += 5
  }
  if (keyIsDown(UP_ARROW))
  {
    yGood -= 5
  }
  if (keyIsDown(DOWN_ARROW))
  {
    yGood += 5
  }
  edges()
}

function edges()
{
```

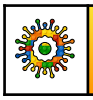
```
  if (xGood > width)
  {
    xGood = 0
  }
  if (xGood < 0)
  {
    xGood = width
  }
  if (yGood > height)
  {
    yGood = 0
  }
  if (yGood < 0)
  {
    yGood = height
  }
}
```

🗒️ Notes

Eventually, you get an error message; just keep finding the targets.

Figure A1.9


p5*
File
Edit
Sketch
Help
English
Auto-refresh
Making Games
sketch.js
Saved: 15 seconds ago
Preview
yGood += 5
}
edges()
}
function edges()
{
if (xGood > width)
{
xGood = 0
}
if (xGood < 0)
{
xGood = width
}
if (yGood > height)
{
yGood = 0
}
if (yGood < 0)
{
yGood = height
}
}
Console
Clear
scope.
+ More info: https://p5js.org/examples/data-variable-scope.html (https://p5js.org/reference/p5/dist)



Sketch A1.10 error message

To get round the error message because it is trying to draw a circle that has been deleted from that index, we have a check if the xTarget or yTarget value is null. Also, stop the loop on the last circle.

```
let xEnemy = 50
let yEnemy = 50
let xGood = 300
let yGood = 300
let xTarget = []
let yTarget = []
let tDist = []

function setup()
{
  createCanvas(400, 400)
  for (let i = 0; i < 20; i++)
  {
    xTarget[i] = random(width)
    yTarget[i] = random(height)
  }
}

function draw()
{
  background(220)
  for (let i = 0; i < 5; i++)
  {
    if (xTarget[i] != null || yTarget[i] != null)
    {
      fill('red')
      circle(xTarget[i], yTarget[i], 20)
```

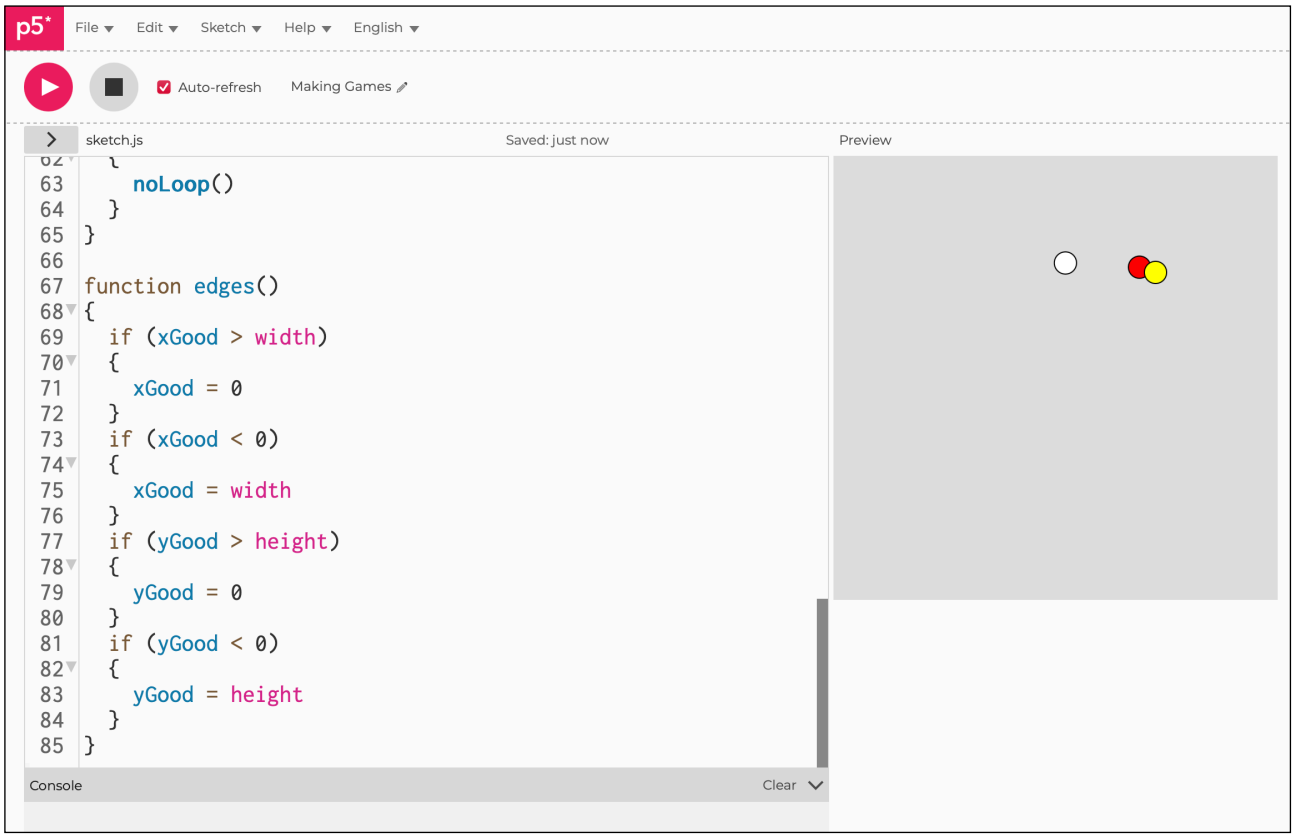
```
    tDist[i] = dist(xGood, yGood, xTarget[i], yTarget[i])
    if(tDist[i] < 20)
    {
      xTarget.splice([i], 1)
      yTarget.splice([i], 1)
    }
  }
}

fill('white')
xEnemy = lerp(xEnemy, xGood, 0.01)
yEnemy = lerp(yEnemy, yGood, 0.01)
circle(xEnemy, yEnemy, 20)
fill('yellow')
circle(xGood, yGood, 20)

if (keyIsDown(LEFT_ARROW))
{
  xGood -= 5
}
if (keyIsDown(RIGHT_ARROW))
{
  xGood += 5
}
if (keyIsDown(UP_ARROW))
{
  yGood -= 5
}
if (keyIsDown(DOWN_ARROW))
{
  yGood += 5
}
edges()
```

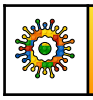
```
  if (xTarget.length <= 0)
  {
    noLoop()
  }
}

function edges()
{
  if (xGood > width)
  {
    xGood = 0
  }
  if (xGood < 0)
  {
    xGood = width
  }
  if (yGood > height)
  {
    yGood = 0
  }
  if (yGood < 0)
  {
    yGood = height
  }
}
```

🗒️ Notes

No error messages, it just stops because of the `noLoop()` function.

Figure A1.10


p5*
File
Edit
Sketch
Help
English
Auto-refresh
Making Games
sketch.js
Saved: just now
Preview
noLoop()
}
}
function edges()
{
if (xGood > width)
{
xGood = 0
}
if (xGood < 0)
{
xGood = width
}
if (yGood > height)
{
yGood = 0
}
if (yGood < 0)
{
yGood = height
}
}
Console
Clear



Sketch A1.11 you have won

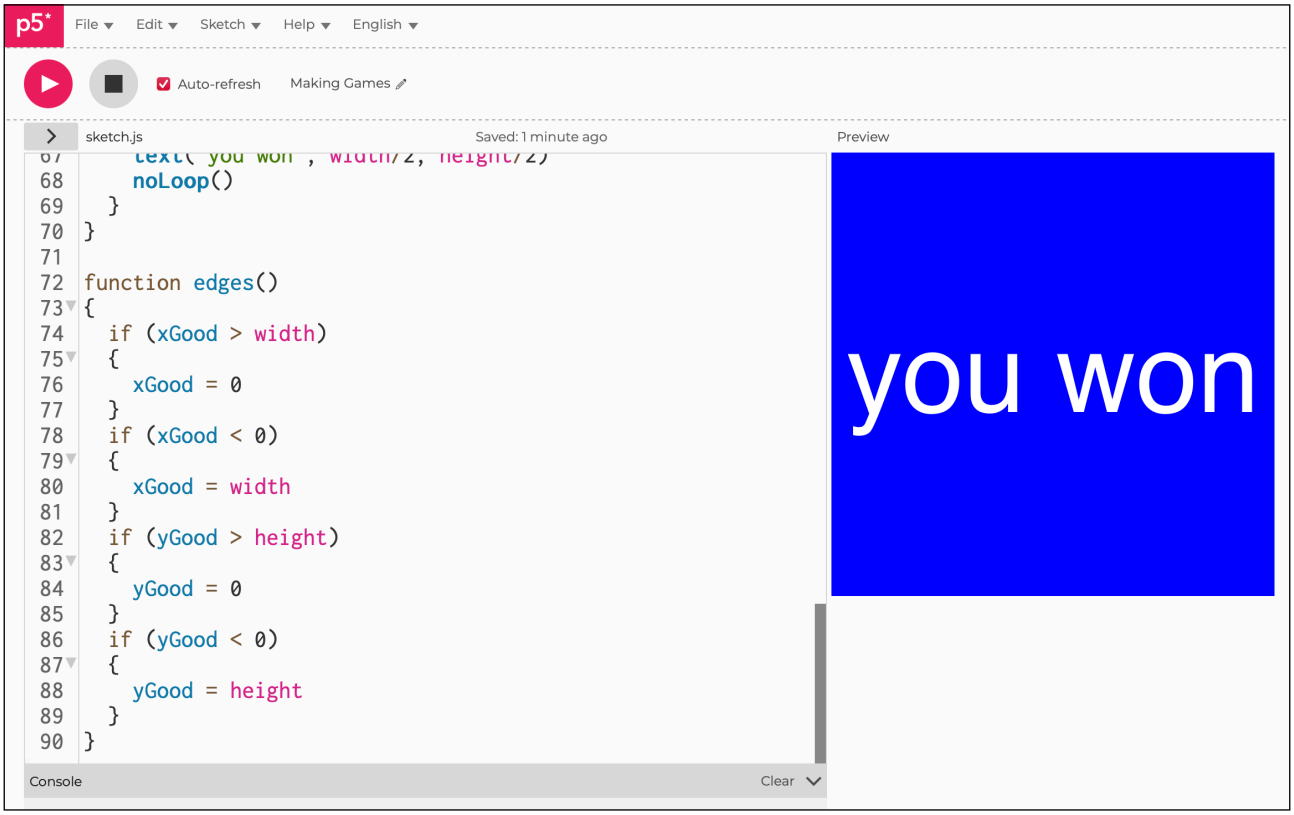
When we reach the point where you have caught all the targets you want, a sign that says you have won. So instead of just a `noLoop()`, we change the canvas.

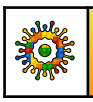
```
let xEnemy = 50
let yEnemy = 50
let xGood = 300
let yGood = 300
let xTarget = []
let yTarget = []
let tDist = []

function setup()
{
  createCanvas(400, 400)
  for (let i = 0; i < 20; i++)
  {
    xTarget[i] = random(width)
    yTarget[i] = random(height)
  }
}

function draw()
{
  background(220)
  for (let i = 0; i < 5; i++)
  {
    if (xTarget[i] != null || yTarget[i] != null)
    {
      fill('red')
      circle(xTarget[i], yTarget[i], 20)
```

```
    tDist[i] = dist(xGood, yGood, xTarget[i], yTarget[i])
    if(tDist[i] < 20)
    {
      xTarget.splice([i], 1)
      yTarget.splice([i], 1)
    }
  }
}

fill('white')
xEnemy = lerp(xEnemy, xGood, 0.01)
yEnemy = lerp(yEnemy, yGood, 0.01)
circle(xEnemy, yEnemy, 20)
fill('yellow')
circle(xGood, yGood, 20)

if (keyIsDown(LEFT_ARROW))
{
  xGood -= 5
}
if (keyIsDown(RIGHT_ARROW))
{
  xGood += 5
}
if (keyIsDown(UP_ARROW))
{
  yGood -= 5
}
if (keyIsDown(DOWN_ARROW))
{
  yGood += 5
}
edges()
```

```
  if (xTarget.length <= 0)
  {
    background('blue')
    textSize(100)
    fill('white')
    textAlign(CENTER, CENTER)
    text('you won', width/2, height/2)
    noLoop()
  }
}

function edges()
{
  if (xGood > width)
  {
    xGood = 0
  }
  if (xGood < 0)
  {
    xGood = width
  }
  if (yGood > height)
  {
    yGood = 0
  }
  if (yGood < 0)
  {
    yGood = height
  }
}
```

Figure A1.11


p5*
File
Edit
Sketch
Help
English
Auto-refresh
Making Games
sketch.js
Saved: 1 minute ago
Preview
text('you won' , width/2, height/2)
noLoop()
}
}
function edges()
{
if (xGood > width)
{
xGood = 0
}
if (xGood < 0)
{
xGood = width
}
if (yGood > height)
{
yGood = 0
}
if (yGood < 0)
{
yGood = height
}
}
Console
Clear
you won



Sketch A1.12 you have lost

But what if you get caught by the enemy? We create a variable to measure that distance called `eDist` for short.

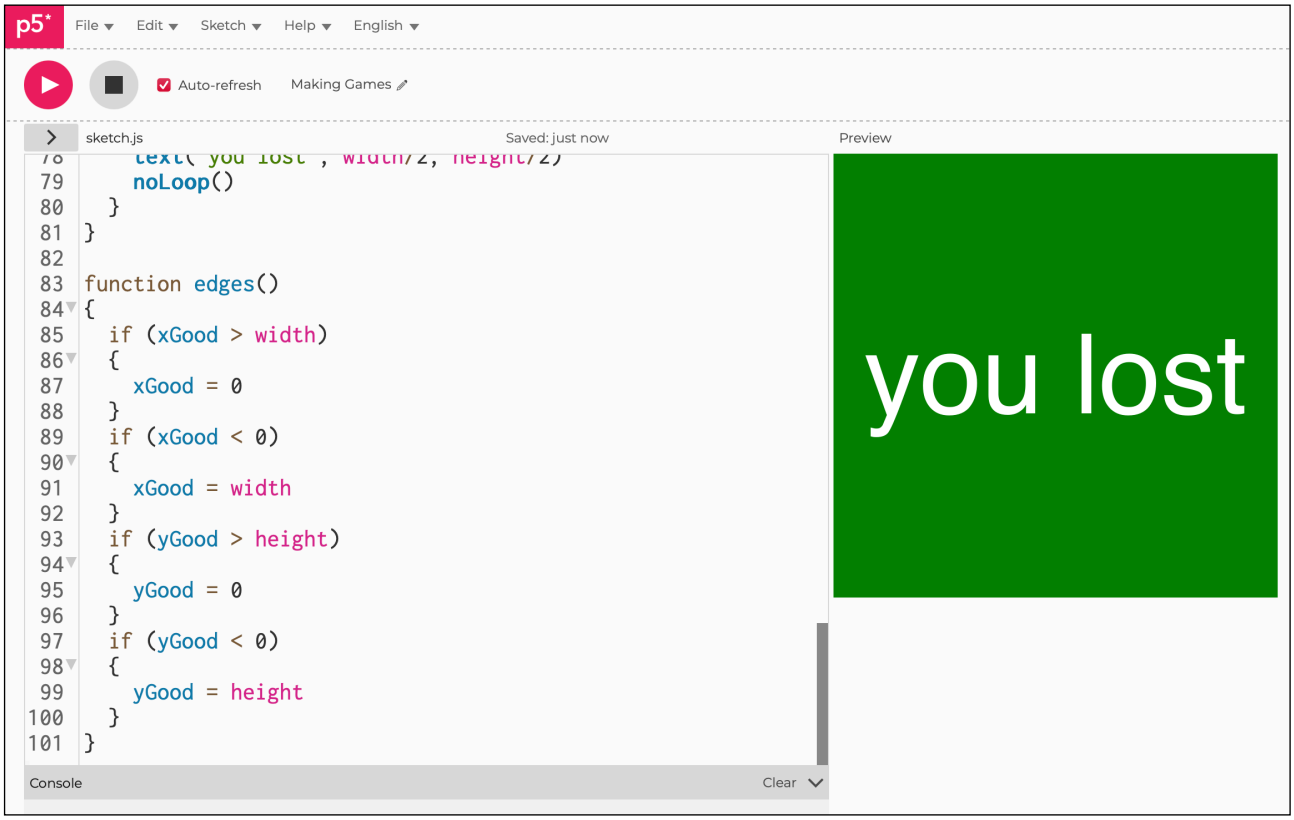
```
let xEnemy = 50
let yEnemy = 50
let xGood = 300
let yGood = 300
let xTarget = []
let yTarget = []
let tDist = []
let eDist

function setup()
{
  createCanvas(400, 400)
  for (let i = 0; i < 20; i++)
  {
    xTarget[i] = random(width)
    yTarget[i] = random(height)
  }
}

function draw()
{
  background(220)
  for (let i = 0; i < 5; i++)
  {
    if (xTarget[i] != null || yTarget[i] != null)
    {
      fill('red')
      circle(xTarget[i], yTarget[i], 20)
```

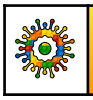
```
    tDist[i] = dist(xGood, yGood, xTarget[i], yTarget[i])
    if(tDist[i] < 20)
    {
      xTarget.splice([i], 1)
      yTarget.splice([i], 1)
    }
  }
}

fill('white')
xEnemy = lerp(xEnemy, xGood, 0.01)
yEnemy = lerp(yEnemy, yGood, 0.01)
circle(xEnemy, yEnemy, 20)
fill('yellow')
circle(xGood, yGood, 20)

if (keyIsDown(LEFT_ARROW))
{
  xGood -= 5
}
if (keyIsDown(RIGHT_ARROW))
{
  xGood += 5
}
if (keyIsDown(UP_ARROW))
{
  yGood -= 5
}
if (keyIsDown(DOWN_ARROW))
{
  yGood += 5
}
edges()
```

```
  if (xTarget.length <= 0)
  {
    background('blue')
    textSize(100)
    fill('white')
    textAlign(CENTER, CENTER)
    text('you won', width/2, height/2)
    noLoop()
  }
  eDist = dist(xEnemy, yEnemy, xGood, yGood)
  if (eDist < 20)
  {
    background('green')
    textSize(100)
    fill('white')
    textAlign(CENTER, CENTER)
    text('you lost', width/2, height/2)
    noLoop()
  }
}

function edges()
{
  if (xGood > width)
  {
    xGood = 0
  }
  if (xGood < 0)
  {
    xGood = width
  }
  if (yGood > height)
  {
```

```
    yGood = 0
  }
  if (yGood < 0)
  {
    yGood = height
  }
}
```

Figure A1.12


p5*
File
Edit
Sketch
Help
English
Auto-refresh
Making Games
sketch.js
Saved: just now
Preview
text(you lost , width/2, height/2)
noLoop()
}
}
function edges()
{
if (xGood > width)
{
xGood = 0
}
if (xGood < 0)
{
xGood = width
}
if (yGood > height)
{
yGood = 0
}
if (yGood < 0)
{
yGood = height
}
}
you lost
Console
Clear



Sketch A1.13 increase the speed

We are going to give the enemy's speed a variable name enemySpeed and set it to 0.01, but during the game that speed will increase incrementally each time you catch a target. You will notice that it speeds up quite a lot by the end.

```
let xEnemy = 50
let yEnemy = 50
let xGood = 300
let yGood = 300
let xTarget = []
let yTarget = []
let tDist = []
let eDist
let enemySpeed = 0.01

function setup()
{
  createCanvas(400, 400)
  for (let i = 0; i < 20; i++)
  {
    xTarget[i] = random(width)
    yTarget[i] = random(height)
  }
}

function draw()
{
  background(220)
  for (let i = 0; i < 5; i++)
  {
    if (xTarget[i] != null || yTarget[i] != null)
```

```
    {
      fill('red')
      circle(xTarget[i], yTarget[i], 20)
      tDist[i] = dist(xGood, yGood, xTarget[i], yTarget[i])
      if(tDist[i] < 20)
      {
        xTarget.splice([i], 1)
        yTarget.splice([i], 1)
        enemySpeed += 0.001
      }
    }
  }

  fill('white')
  xEnemy = lerp(xEnemy, xGood, enemySpeed)
  yEnemy = lerp(yEnemy, yGood, enemySpeed)
  circle(xEnemy, yEnemy, 20)
  fill('yellow')
  circle(xGood, yGood, 20)

  if (keyIsDown(LEFT_ARROW))
  {
    xGood -= 5
  }
  if (keyIsDown(RIGHT_ARROW))
  {
    xGood += 5
  }
  if (keyIsDown(UP_ARROW))
  {
    yGood -= 5
  }
  if (keyIsDown(DOWN_ARROW))
```

```
  {
    yGood += 5
  }
  edges()
  if (xTarget.length <= 0)
  {
    background('blue')
    textSize(100)
    fill('white')
    textAlign(CENTER, CENTER)
    text('you won', width/2, height/2)
    noLoop()
  }
  eDist = dist(xEnemy, yEnemy, xGood, yGood)
  if (eDist < 20)
  {
    background('green')
    textSize(100)
    fill('white')
    textAlign(CENTER, CENTER)
    text('you lost', width/2, height/2)
    noLoop()
  }
}

function edges()
{
  if (xGood > width)
  {
    xGood = 0
  }
  if (xGood < 0)
  {
```

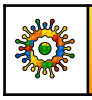
```
    xGood = width
  }
  if (yGood > height)
  {
    yGood = 0
  }
  if (yGood < 0)
  {
    yGood = height
  }
}
```

🗒️ Notes

There is nothing new to show you here; it just gets faster and faster.

🌻 Challenge

How would you put a limit on its maximum speed?



Sketch A1.14 a bit more menacing

Let's make the enemy a little more menacing

```
let xEnemy = 50
let yEnemy = 50
let xGood = 300
let yGood = 300
let xTarget = []
let yTarget = []
let tDist = []
let eDist
let enemySpeed = 0.01
let r = 0

function setup()
{
  createCanvas(400, 400)
  for (let i = 0; i < 20; i++)
  {
    xTarget[i] = random(width)
    yTarget[i] = random(height)
  }
}

function draw()
{
  background(220)
  for (let i = 0; i < 5; i++)
  {
    if (xTarget[i] != null || yTarget[i] != null)
    {
```

```
    fill('red')
    circle(xTarget[i], yTarget[i], 20)
    tDist[i] = dist(xGood, yGood, xTarget[i], yTarget[i])
    if(tDist[i] < 20)
    {
      xTarget.splice([i], 1)
      yTarget.splice([i], 1)
      enemySpeed += 0.001
    }
  }
}

fill('black')
xEnemy = lerp(xEnemy, xGood, enemySpeed)
yEnemy = lerp(yEnemy, yGood, enemySpeed)
push()
strokeWeight(2)
translate(xEnemy, yEnemy)
rotate(r)
circle(0, 0, 10)
line(-10, 0, 10, 0)
line(0, -10, 0, 10)
r += 0.9
pop()
fill('yellow')
circle(xGood, yGood, 20)

if (keyIsDown(LEFT_ARROW))
{
  xGood -= 5
}
if (keyIsDown(RIGHT_ARROW))
{
```

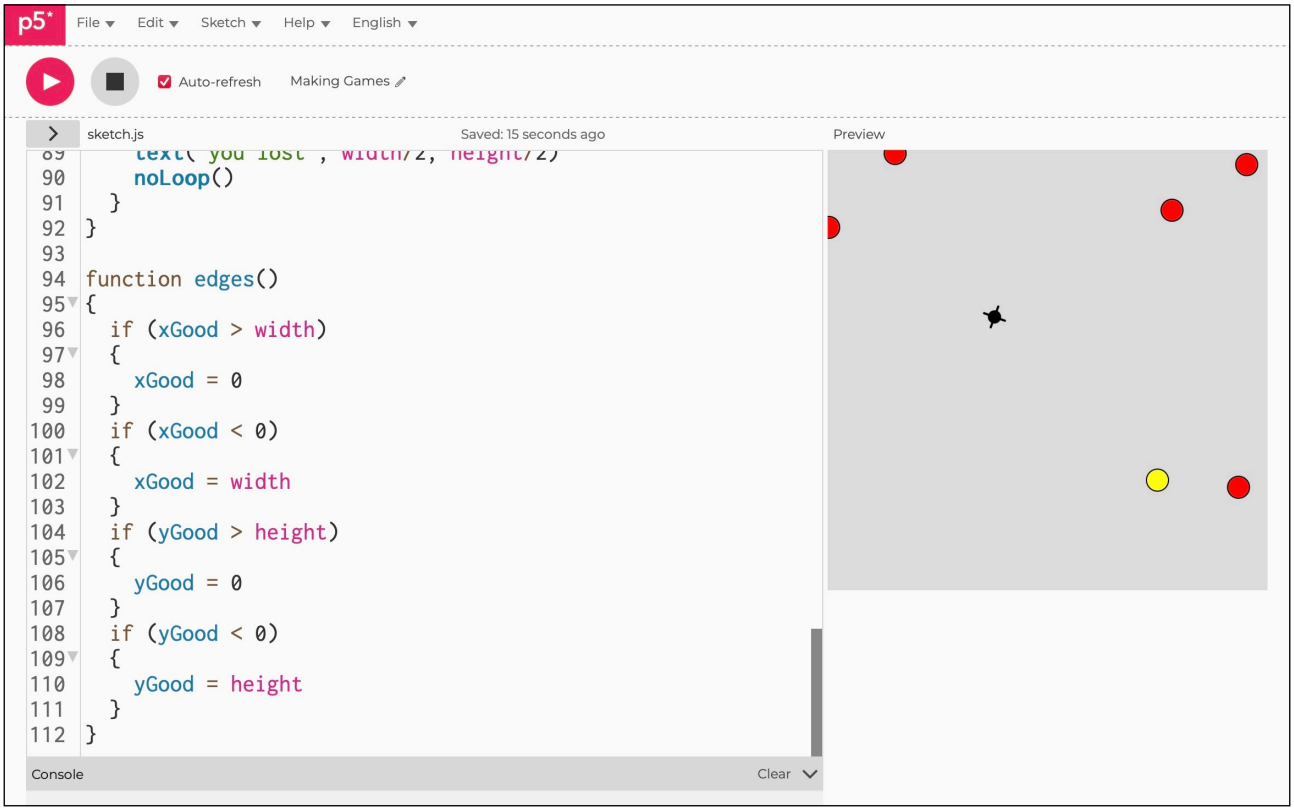
```
    xGood += 5
  }
  if (keyIsDown(UP_ARROW))
  {
    yGood -= 5
  }
  if (keyIsDown(DOWN_ARROW))
  {
    yGood += 5
  }
  edges()
  if (xTarget.length <= 0)
  {
    background('blue')
    textSize(100)
    fill('white')
    textAlign(CENTER, CENTER)
    text('you won', width/2, height/2)
    noLoop()
  }
  eDist = dist(xEnemy, yEnemy, xGood, yGood)
  if (eDist < 20)
  {
    background('green')
    textSize(100)
    fill('white')
    textAlign(CENTER, CENTER)
    text('you lost', width/2, height/2)
    noLoop()
  }
}

function edges()
```

```
{
  if (xGood > width)
  {
    xGood = 0
  }
  if (xGood < 0)
  {
    xGood = width
  }
  if (yGood > height)
  {
    yGood = 0
  }
  if (yGood < 0)
  {
    yGood = height
  }
}
```

🌻 Challenges

1. Change the background.
2. Make the enemy move increasingly faster.
3. Have the targets move around.
4. Add a PNG image for the targets, you and the enemy.
5. You could have a score at the top.
6. You could have lives.
7. Instead of reappearing on the opposite side, you could stop at the edge.

Figure A1.14


p5*
File
Edit
Sketch
Help
English
Auto-refresh
Making Games
sketch.js
Saved: 15 seconds ago
Preview
text('you lost ', width/2, height/2)
noLoop()
}
}
function edges()
{
if (xGood > width)
{
xGood = 0
}
if (xGood < 0)
{
xGood = width
}
if (yGood > height)
{
yGood = 0
}
if (yGood < 0)
{
yGood = height
}
}
Console
Clear