

Constrained Bodies



What we did:

- We learned about constrained bodies and created constrained bodies using matter.js.
- We also created two constrained bodies using Matter.Constraint.
- While solving the class activity, we experimented with the different properties of constraint and used it in a class.

How we did it:

When one body is constrained or restricted in its movement by the position and movement of another body is called a constrained body.

We created a constraint using `Matter.Constraint.create()`. We also needed to pass some options to this function. The options were properties like length, stiffness etc. that described the type of constraint.

```
js sketch.js > ...
1  const Engine = Matter.Engine;
2  const World = Matter.World;
3  const Bodies = Matter.Bodies;
4  const Constraint = Matter.Constraint;
5
6  var engine, world;
7  var box1, pig1;
8  var backgroundImage, platform;
9  var constrainedLog;
10
11 function preload() {
12   backgroundImage = loadImage("sprites/bg.png");
13 }
14
15 function setup(){
16   var canvas = createCanvas(1200,400);
17   engine = Engine.create();
18   world = engine.world;
19
20   constrainedLog = new Log(230,180,80, PI/2);
21   ground = new Ground(600,height,1200,20);
22   platform = new Ground(150, 305, 300, 170);
23
24   box1 = new Box(700,320,70,70);
25   box2 = new Box(920,320,70,70);
26   pig1 = new Pig(810, 350);
27   log1 = new Log(810,260,300, PI/2);
28
29   box3 = new Box(700,240,70,70);
30   box4 = new Box(920,240,70,70);
31   pig3 = new Pig(810, 220);
32
33   log3 = new Log(810,180,300, PI/2);
```

The two bodies between which we needed to create the constraint are bird and the log we created earlier. To add some length and stiffness to it, refer to the below screenshot.

```
js sketch.js + setup + options
23 platform = new Ground(150, 305, 300, 170);
24
25 box1 = new Box(700,320,70,70);
26 box2 = new Box(920,320,70,70);
27 pig1 = new Pig(810, 350);
28 log1 = new Log(810,260,300, PI/2);
29
30 box3 = new Box(700,240,70,70);
31 box4 = new Box(920,240,70,70);
32 pig3 = new Pig(810, 220);
33
34 log3 = new Log(810,180,300, PI/2);
35
36 box5 = new Box(810,160,70,70);
37 log4 = new Log(760,120,150, PI/7);
38 log5 = new Log(870,120,150, -PI/7);
39
40
41 bird = new Bird(100,100);
42
43 var options = {
44   bodyA: bird.body,
45   bodyB: constrainedLog.body,
46   stiffness: 0.04,
47   length: 10
48 }
49
50 }
51
52 function draw(){
53   background(backgroundImg);
54   Engine.update(engine);
55   console.log(box2.body.position.x);
```

We used this option to create the constraint - a chain.

```
23 platform = new Ground(150, 305, 300, 170);
24
25 box1 = new Box(700,320,70,70);
26 box2 = new Box(920,320,70,70);
27 pig1 = new Pig(810, 350);
28 log1 = new Log(810,260,300, PI/2);
29
30 box3 = new Box(700,240,70,70);
31 box4 = new Box(920,240,70,70);
32 pig3 = new Pig(810, 220);
33
34 log3 = new Log(810,190,300, PI/2);
35
36 box5 = new Box(810,160,70,70);
37 log4 = new Log(760,120,150, PI/7);
38 log5 = new Log(870,120,150, -PI/7);
39
40
41 bird = new Bird(100,100);
42
43 var options = {
44   bodyA: bird.body,
45   bodyB: constrainedLog.body,
46   stiffness: 0.04,
47   length: 10
48 }
49
50 var chain = Constraint.create(options);
51
52
53 }
54
55 function draw(){
56   background(255,255,255);
```

We added this constraint to the physics world in the game:

```
25 box1 = new Box(700,320,70,70);
26 box2 = new Box(920,320,70,70);
27 pig1 = new Pig(810, 350);
28 log1 = new Log(810,260,300, PI/2);
29
30 box3 = new Box(700,240,70,70);
31 box4 = new Box(920,240,70,70);
32 pig3 = new Pig(810, 220);
33
34 log3 = new Log(810,180,300, PI/2);
35
36 box5 = new Box(810,160,70,70);
37 log4 = new Log(760,120,150, PI/7);
38 log5 = new Log(870,120,150, -PI/7);
39
40
41 bird = new Bird(100,100);
42
43 var options = {
44   bodyA: bird.body,
45   bodyB: constrainedLog.body,
46   stiffness: 0.04,
47   length: 10
48 }
49
50 var chain = Constraint.create(options);
51 World.add(world, chain);
52
53 }
54
55 function draw(){
56   background(backgroundImg);
57   Engine.update(engine);
```

We needed to display the constrainedLog. Since constrainedLog is created from the Log class, it already had the display() function defined. We called it inside the draw() function.

```
sketch.js + @ draw
55 function draw(){
56   background(backgroundImg);
57   Engine.update(engine);
58   console.log(box2.body.position.x);
59   console.log(box2.body.position.y);
60   console.log(box2.body.angle);
61   box1.display();
62   box2.display();
63   ground.display();
64   pig1.display();
65   log1.display();
66
67   box3.display();
68   box4.display();
69   pig3.display();
70   log3.display();
71
72   box5.display();
73   log4.display();
74   log5.display();
75
76   bird.display();
77   platform.display();
78   constrainedLog.display();
79 }
80
```

We coded to draw a line between the centre of the two bodies.

```
js sketch.js • draw
57 Engine.update(engine);
58 console.log(box2.body.position.x);
59 console.log(box2.body.position.y);
60 console.log(box2.body.angle);
61 box1.display();
62 box2.display();
63 ground.display();
64 pig1.display();
65 log1.display();
66
67 box3.display();
68 box4.display();
69 pig3.display();
70 log3.display();
71
72 box5.display();
73 log4.display();
74 log5.display();
75
76 bird.display();
77 platform.display();
78 constrainedLog.display();
79
80 strokeWeight(3);
81 line(bird.body.position.x, bird.body.position.y, constrainedLog.body.position.x, constrainedLog.body.position.y);
82
83
```



What's next?

In the next class, you will be learning about the slingshot effect in the Angry Bird game.