

INSTRUCTIONS:

Goal of the Project:

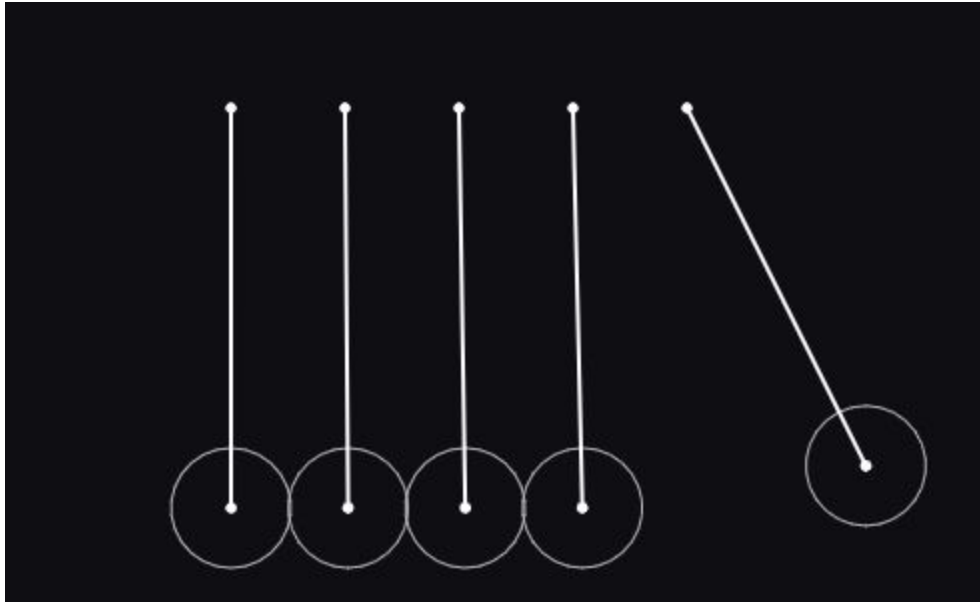
In class 34, you reviewed all the concepts we have covered so far in working with Matter.js and using Classes to create Angry Birds Game.

In this project, we will be creating our own Newton's cradle. You can look at what the Newton's cradle is by looking at the video [here](#).

Story:

You are a scientist investigating the behaviour of pendulums and how they transfer energy. You have been tasked to create a simulation for a sequence of five pendulums just touching each other. The pendulum can be moved by the mouse.

Create the simulation and observe how the pendulum balls interact with each other.



***This is just for your reference. We expect you to apply your own creativity in the project.**

Getting Started:

- Open your Code editor and add the libraries like p5 .play.js and matter.js to the project folder.

Specific Tasks to complete the Project:

1. Add the libraries to the index.html file.
2. Create a src folder and js folder inside it.
 - a. Inside the folder create a pendulum.js file.
 - b. Also create a sling.js file.
3. Inside the pendulum.js file create a class called pendulum which will take the x and y coordinates for the position and a color for the bob .
4. Add physics to the bob. And display it using the display function.
5. In the sling.js file create a class sling which will take a point and a body as it's parameters.
6. Add physics to the sling and display it using the display function.
7. Create a new file called sketch.js .
8. Import the constants such as
 - a. Engine
 - b. World
 - c. Bodies
 - d. Mouse constraints
9. In function setup create a canvas half of window width and window height
10. Create a new world using the physics engine.
11. Using the pendulum class create 5 bobs back to back.
12. Using the sling class create 5 string and attach the pendulum to it.
13. In function draw() , Code to update the engine and display all the bobs and slings.
14. Add the mouse function to drag the pendulum with the mouse.
15. Run and test the code using the code using the 200 ok server.

*Refer to the images given above for reference.

Submitting the Project:

1. Create a new repository on the github called newtons cradle.
2. Upload your code to the repo.
3. Activate the github pages
4. And share your link on the panel.

Hints:

1. Code to create a pendulum.

```
class Pendulum {
  constructor(x, y, color) {
    var options = {
      restitution: 1,
      friction: 0,
      frictionAir: 0.0,
      slop: 1,
      inertia: Infinity
    };
    this.body = Bodies.rectangle(x, y, 40, 40, options);
    this.x = x;
    this.y = y;
    this.color = color;
    World.add(world, this.body);
  }
  display() {
    var angle = this.body.angle;
    var pos = this.body.position;
    push();
    translate(pos.x, pos.y);
    rotate(angle);
    noStroke();
    fill(this.color);
    ellipse(0, 0, 60, 60);
    pop();
  }
}
```

2. Code to create a sling.

```
class Sling {
  constructor(bodyA, pointB) {
    var options = {
      bodyA: bodyA,
      pointB: pointB,
      stiffness: 1,
      angularStiffness: 1,
      length: 220
    };
    this.pointB = pointB;
    this.pointX = bodyA.x;
    this.pointY = bodyA.y - 250;
    this.sling = Constraint.create(options);
    World.add(world, this.sling);
  }

  display() {
    if (this.sling.bodyA) {
      var pointA = this.sling.bodyA.position;
      var pointB = this.pointB;
      push();
      strokeWeight(3.5);
      stroke("#fff");
      line(pointB.x, pointB.y, pointA.x, pointA.y);
      pop();
    }
  }
}
```

3. Code to create the engine , world and mouse constraints.

```
canvas = createCanvas(windowWidth / 2, windowHeight / 1.5);
engine = Engine.create();
world = engine.world;

let canvasmouse = Mouse.create(canvas.elt);
canvasmouse.pixelRatio = pixelDensity();
let options = {
  mouse: canvasmouse
};
mConstraint = MouseConstraint.create(engine, options);
World.add(world, mConstraint);
```

4. Code to add mouse events

```
function mouseDragged() {
  Matter.Body.setPosition(pendulum1.body, { x: mouseX, y: mouseY });
}
```

REMEMBER... Try your best, that's more important than being correct.

After submitting your project your teacher will send you feedback on your work.

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