Todo:

Use Matter.Engine.update for user to select t =

Before “play,” you’re just drawing the items to canvas, but when press “play,” then you add all of the objects to the engine/world and apply everything (forces, velocity, etc)… I think

Use composites and connecting bodies for momentum! This might actually be genius

Javascript

MVP on Github Pages

Matter.js (Math, collisions, etc), p5.js (visuals/drawing)

Plugins to look at: matter-attractors by liabru

For springs: matter-springs by momentumworks

Feel like u can do this urself but check: matter-collision-events by dxu

Cool examples (like airFriction, constraints, events, gravity, etc): <https://github.com/liabru/matter-js/tree/master/examples>

<http://palmerpaul.com/p5-matter/>

On looks:

Some aesthetic sky background with sun, smooth grass(fricCoeff = 0) & ground (fricCoeff > 0);

Worry about trivial things like color scheme later XD Kipp is not an art teacher

Logistics:

Max force values able to be inputted; max objects in the world; etc

Difficult things you might want but don’t know how to do:

Different moments of inertias depending on object (more specifically that whacky double ring cylinder circle inner outer radius nonsense that was on the test

rolling down hills to see potential/kinetic energy transfers

Different screen sizes? Can this be a % responsive width/height?

Objects: Box (Cube; Rectangle); Car (simple), Disk (different sizes, radii, lengths, and hollow vs dense), Sphere, pendulum, 2 masses w light cord on frictionless pulley, pointed object (to place, let an object collide against and show collision against that one sharp point)

* Max 2 objects allowed (for collisions)
* Static/unmoving objects (For collisions) versus dynamic objects (move/react)

Free body diagram: Always displaying forces that will act on the object on “Play”; FBD is ON the object in the screen; how to display Fforce on FBD?

On play: Constant forces stay on there (color coded), instant forces disappear, but velocity vectors are shown (magnitude, direction)

Forces: Can select where on object to apply force (exactly what point, direction, and magnitude)

Torque: torque = rFsinθ so forces up top determine the torque being applied

Gravity: Can toggle on and off as a force; can change what g constant is equal to

Friction: Can adjust friction coefficient of surface; checkbox for static friction or not, and what that static friction coefficient should be (used in coef \* fN)

Air resistance: Checkbox to enable it (to program it, prob just slow down the velocity of an object based on what the air resistance is)

Surface: Smooth or friction; flat, incline (adjustable angle), downward circular hill, flat cliff with edge to fall off of

General: x-axis and y-axis labeled for measurements

Strings and tension forces need to be available as well!!! (obviously pendulum strings will exist, but I’m referring to like two blocks connected by a string, but the heavier one is pulled down by gravity and hanging on a pulley, etc etc

**Dashboard:**

Options: Trace object motion (highlights motion, ex for projectile motion) Pause, play, reset (to customizations b4 pressing play), clear (empties whole board/window)

On play: can edit forces incrementally or enter a force to change to at any time (this can help show static friction for example); can drag objects manually around (will prob have to base force on mouse speed?)

Values to display on screen/dashboard (can toggle on/off these values from dashboard): ΣF (magnitude, direction); velocity (dynamically changing), angVelocity, momentum, work, etc

After world functions:

Note collisions = perfectly elastic

Contact form for feature requests, bugs, etc

Some type of interactive tutorial

Way for Kipp to know you did it? (name/ID submit? etc)

Interactive problems (Ask Kipp on this — personally believe it’s a great idea + makes his lesson planning easier…):

What force is necessary to get object from pt A to pt B (person does math on paper, then puts in force # into program)? Visual dotted object at point b to show destination kinda thing (and can use the detector or whatever in p5 or matterjs to indicate success)

What torque is necessary to get circle object from pt a to pt b? (so person would need to know where to put the force vector on the screen — perpendicular and some magnitude).

What coefficient of friction necessary to stop object exactly 5 m away from bottom of ramp?

Extra features:

Dynamic graph drawing of velocity and position

Formula sheet (organized by units)

? help icons to explain physics concepts perhaps (ex on inclines w a square, ability to show component forces, how to calculate, etc in ? bubble, things like that)

Create your own objects (PhysicsEditor by Andreas Löw)

Create preset dashboards for forces, rotation, static equilibrium, etc

Add this as cool demonstration of forces (<https://www.youtube.com/watch?v=jsYwFizhncE>) (ask user to input how many digits of pi wants to approximate)

NOTES:

if ur gonna be a greedy capitalist… ads only and a donation button (which will literally get u 1 cent). THIS IS FREE!!!!! 無料!!!!