## Criterion A: Planning

## Defining the problem

My client is Ms. Alveena Naizam, a physics teacher at my school. In her teaching career, she often encounters topics that would be better taught if they were visualized and are difficult to visualize otherwise. She would like to be able to have a simulation on the computer to help students visualize these concepts and interact with the physics to improve their learning.

Some of the topics that Ms. Naizam mentioned would be useful to visualize are ones which “involve many small particles” – such as fluid dynamics, electrics (circuits) and rigid body mechanics.

I will provide a computer-based solution to this problem. My client and I agreed that the solution would be a web application, which can be accessed from many devices.

## Rationale

My client mentioned: “I don’t care how the application is accessed, as long as it’s available easily on all devices”, which led me to consider creating a web application. Additionally, although most students in the school use iPads as devices for learning, creating an iPad app has several difficulties, as my client said, “with an iPad app, we’d need to run that through administration to have it verified for installation on the iPads.

The web app will be created using JavaScript for the animations of the simulations, with HTML and CSS used for displaying the webpage. JavaScript was chosen as it has the best integration for web-based applications as well a large variety of available libraries for a variety of purposes, including modelling physical processes.

## Success criteria

1. The user will be able to input various variables in the simulation, such as the pressure, temperature and volume of a gas, the angle at which a projectile is fired, etc. through the use of sliders and buttons.
2. The program will update the simulation in real-time according to changes in the variable of the simulation.
3. The output of the program will be a visual display of various physical processes listed below.
   1. Series and parallel circuits with variable voltage, current and resistance.
   2. A gas in a container with variable temperature, pressure and volume.
   3. A projectile being fired at an angle to the horizontal plane in a gravitational field.
4. The program must be a web-based application, available on many devices.