

For high school students taking Physics classes during the school year, a large problem arises in which physics problems often confuse students dealing with many variables and types of formulas. In my own experience, I have seen many classmates stressing over Physics problems and tests because it is like nothing they have ever seen before, myself included. Especially during the pandemic, grades and tests often create unnecessary stress for students who are already suffering through quarantine and other classes. In our recent unit Kinematics, there were many multivariable problems in which you had to find a missing variable using the different formulas provided using skills from algebra. This unit especially had students complaining and confused over the different problems. Using my newfound skills in Java through my AP CSA class and my knowledge of physics, I decided to create a Physics Calculator GUI based on Kinematics to help students and solve homework problems or test problems they were stumped by, just to ease the stress even a little bit for my fellow juniors in high school who were having a hard time. In the program, I used two Java classes: Calculate and PhysicsCalc to create this calculator, the first doing the actual calculations and the latter a GUI. The Calculate class uses variables displacement, velocity, initial velocity, acceleration, and time. My constructor will set all the variables to null and I used setter methods for all the variables to set them to the numbers the user inputs. Finally we get to the different formula methods which help solve for the missing variable when the user chooses a formula. The PhysicsCalc class creates a GUI in another window which uses the objects and methods in Calculate to help the student solve a hard physics problem. Using Swing, AWT, and AWT Event, I created a calculator with complex components to create a user-friendly interface. I further added a try-catch method which will catch and display the user's error depending on the exception. Testing this calculator on actual problems from my Physics exams, it worked flawlessly to find and display the missing variable. If I forgot to put in a variable, it would display the error. As we get into newer units, I will definitely add more components to the calculator to further ease the stress of students.