projectileMotionCalculator.c program calculates the object travel distance, the object travel time and the object maximum height for any initial velocity of the object and any angle of elevation from the horizontal.

According to the flowchart, the user enters the object initial velocity in m/s and the angle of elevation from the horizontal in degree. After that, the program converts the angle from degree to radian as the input for sin function in C language should be a value in radian. The conversion occurs according to equation 1.

*(1)*

The program calls the travelDistance function which is responsible for calculating the object travel distance. travelDistance function has two inputs which are initial velocity of the object and the angle of elevation from the horizontal. travelDistance function has one output which is the object travel distance. travelDistance function depends on equation 2 for calculating the object travel distance.

*(2)*

The program calls the travelTime function which is responsible for calculating the object travel time. travelTime function has two inputs which are initial velocity of the object and the angle of elevation from the horizontal. travelTime function has one output which is the object travel time. travelTime function depends on equation 3 for calculating the object travel time.

*(3)*

The program calls the maxHeight function which is responsible for calculating the object maximum height. maxHeight function has two inputs which are initial velocity of the object and the angle of elevation from the horizontal. maxHeight function has one output which is the object maximum height. maxHeight function depends on equation 4 for calculating the object maximum height.

*= (4)*

After calculating the output data which are the object travel distance (), the object travel time () and the object maximum height (), the program prints these output data.

The program also has the feature of exporting the output data to excel file for further analysis. If the program fails to create the excel file, it will terminate and return with value of 1 according to the flowchart.

To test the program, a comparison was made between the output data from the previous equations (2,3 and 4) and the output data from the projectileMotionCalculator.c program which is shown in figure 1. The comparison is shown in table 1 and it was tested based on that the initial velocity of the object is 100 m/s and the angle of elevation from the horizontal is 30 degrees.

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| Table 1. Comparison between equations result and program results | | |
|  | Equations result | Program results |
| Object travel distance () | 883.6993916 m | 883.699392 m |
| Object travel time () | 10.20408163 s | 10.204082 s |
| Object maximum height () | 127.5510204 m | 127.551020 m |

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| A screenshot of a computer screen  Description generated with very high confidence |
| Figure 1. projectileMotionCalculator.c program result |