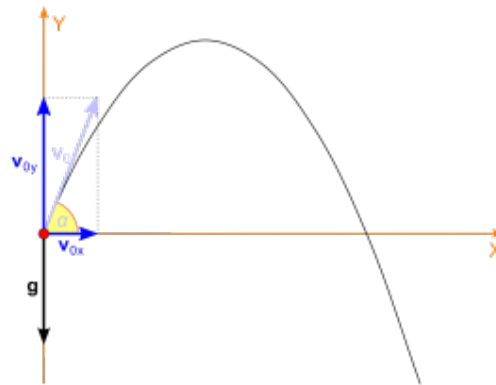


## Assignment 1: Fundamentals

This lab must be completed Individually. Discussing ideas and communication between students is encouraged but sharing any part of the code is prohibited and will be considered as plagiarism and a major breach of College's Academic Integrity policy which is defined in ACAD-101.

In this project you will create a simple Java console application that will have the user enter several values and will use these values to calculate the position of a projectile after a specific period.

Our program will calculate the projectile motion by neglecting air resistance to simplify the calculations. The below diagram represents a projectile's motion under the influence of gravity.



The provided formulas are used to calculate the projectile position at a given instance in time.

Position at time t	$x = (v_0 \cos\theta_0)t$ $y = (v_0 \sin\theta_0)t - \frac{1}{2}gt^2$
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$V_0$ : represent the value of the projectiles initial speed.

$\Theta_0$ : represent the initial angle in which the projectile was launched at.

t: represents a given instance of time

g: represent the value of gravitational force.

## Requirements:

Your program should prompt the user to enter the initial angle of the projectile in degrees. It will then prompt the user to enter the initial velocity of the projectile. The program will also ask the user to specify the instance of time in which the position of the projectile will be calculated at. After that the program will use the user inputs and provided formulas to calculate the coordinates of the projectile.

- $g$ : gravitational force is a fixed value (unchangeable) of  $9.8 \text{ m/s}^2$
- All user inputs can have decimal values
- Since the user might enter a negative value, program needs to use the absolute values of any user input
- Assume user will only enter numeric values (no validation is needed)
- Output all numbers to two decimal point

## Program Specifications

The full program will be in the main. No functions are required at this point. Once the user enters the values, your program should calculate and print the coordinates of the projectile in a meaningful output. Your program only needs to run once and will terminate after it calculates the required values.

## General Requirements

- Include an opening comment with your name, the name of the program, the date, and a short description.
- Follow the style guide! Use descriptive names and sensible datatypes for variables, constants, arrays, functions, etc. that follow our naming conventions. Use good spacing and make sure braces (`{}`) are located where they are supposed to be.
- Output messages must be meaningful. Displaying values is not enough, the user must understand what he is seeing.
- Your design should implement strong encapsulation rules
- Your design should implement modularity concepts

## Demo

To demo the lab, you can choose one of the following two options (Lab submission will not be accepted without a demo):

- Option 1: Demo in person during the lab session on the day the lab is due. The Lab should be ready by then and should be running perfectly. No updates are allowed to the code after the demo. If you choose this option, your demo will be your submission and no further steps are needed. Before your demo, you must submit your .java files to DC Connect.
- Option 2: Create a separate 3-to-5-minute video to demo the code, testing it with different values/scenarios and explaining the code included. Make sure to state your name and id at the beginning of the video. An acceptable video will include detailed explanation of the code/logic used and discussion of any functions built or used in the program. Running the code is not enough for this demo to be acceptable.

## Submission (Lab submission will not be accepted without a demo):

Process to submit the lab will depend on the choice you followed to demo your work:

- If you decide to demo in person, no further steps are needed, and your grade will be calculated according to the code you show, and how smooth the demo process goes. Grades will also be granted according to class coding guidelines, professionalism, output clarity and solution ingenuity.
- If you decide to use video submission as demo process, then you will be responsible for submitting all the files (coding files and both videos) on dc connect. Few things to be aware of before submitting:
  - o Make sure to submit your work on DC Connect before due date
  - o Submit your .java files (not the full project, just the .java files you used to code your work) and the video you created as separate files, no zip files please.
  - o Up to 25% deduction if you decide to submit a zip or compressed file
  - o Grades will be granted according to class coding guidelines, professionalism, output clarity and solution ingenuity.
- Late Penalty will be applied according to the course outline policy.