Week 4 Hand-in Assignment

Answer the following questions by the end of the cycle Wednesday night and place the response in the assignment folder.  **You should use** the text, discussion (things you and your peers have said or uncovered that help you solve the problems) and/or other resources to formulate your answers - just remember not to directly discuss these questions until after I have posted the answers next week.  At that time, in the main folder for seminar 4, you may ask any lingering questions about the assignment for this week that you would like.

I would prefer it if you attach a Word or .java file with your coding answer to your assignment post rather than embedding the code in the message - attaching the Word or .java files make it much easier for me to check your code for any problems you may have encountered.

**Problem**

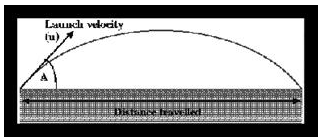
By day 7 of this week, post your solution to the following problem in the assignments folder.  Post whatever you have completed, even if it is not working.

This problem is designed to allow you to practice using the trigonometry methods in the Math class.  This is a fairly complex problem which you will find more taxing than our first two problems.  As a rule of thumb, design your program so that each method performs a single function.  If a method is more than 20 lines long, it is probably too long.  If it can no longer be viewed in its entirety in a single text editor window, it is definitely too long!

Produce a computer program, written in Java, which determines the distance travelled by a projectile (launched from the ground) given:

1.  The velocity at launch (*u*), and

2.  The launch angle (angle of elevation) above the horizontal (A).



**If the above text is not clear, the vector shown on the left side is (u) and is the Launch velocity, the angle on the left side is A, and the text on the bottom reads Distance travelled.**

Assume the following:

1.  The angle of elevation is given in degrees and is in the range of 0 to 90.

2.  Start velocity is given as a positive number.

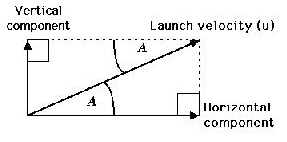
3.  Gravity (g) is equivalent to 10m/s ^ 2.

4.  Ignore air resistance.

Note also that to solve the above we must carry out the following steps:

1.  Calculate the vertical and horizontal components of u (the launch velocity) using the following trigonometric identities:

**Vertical component of launch velocity  (Vu) = u x sinA**  
**Horizontal component of launch velocity (Hu) = u x cosA**



2.  Calculate the time (t) taken for the body to return to the ground using the identity:

**t = (2 x Vu) / a**

where a (deceleration due to gravity) is equivalent to *g* (10m/s ^ 2 in this case).

3.  Calculate distance (s) travelled from the identity:

**s = Hu x t**

EXAMPLE:

A body is projected with a velocity of u = 200 m/s at an angle of elevation A = 30 degrees above the horizontal.  Determine the distance travelled by the projectile.

**Vu  = 200 x sin30 = 100 (m/s)**  
**Hu = 200 x cos30 = 173.2 (m/s)**  
**t = {2 x 100) / 10 = 20 (s)**  
**s = 20 x 173.2051 = 3464.1 (m)**

Remember to write the source code for each class in a separate file which must have the same name as the class name together with the extension **.java**.  Remember also that by convention, class names commence with a capital letter.

As with all programs you write, you should provide a well-structured solution that is easy to read.  You should use meaningful identifier names and should provide useful comments.  A large proportion of the marks for this assignment will be based on the structure of your classes, not whether they do or don't work correctly.

**The focus of the assignment is for you to familiarise yourself with the Java concepts introduced in this seminar (the Math class, type conversions, and Strings).** If you have difficulty with the assignment, you may discuss these problems in the discussion folder as long as you do not directly discuss the assignment problems.

**In the event of compilation problems (i.e. your program will not compile), do not post entire classes and ask what is wrong with them.**  This would violate the above stricture of not discussing the assignment problems in the main folder.  Instead, try and identify the source of the problem through a process of elimination (by commenting out chunks of the code).  You may discuss error messages you may receive, you may discuss compilation problems with the Circle, Rounding, Example and String applications found in the lecture, and perhaps these discussions will help you to figure out where your errors lie.  In addition, you may always contact me via private e-mail if you are having a specific problem and none of the above solutions seem to work for you.  Please use this option as a last resort, however!

It is a good idea to work in a step-by-step *top-down* manner.  For example, first define the general structure of a class with empty methods and compile the file.  Once it compiles successfully, then start adding further detail, recompiling after every few lines.  This way, the risk of getting a screen full of error messages is reduced, and you can be assured of handing in something that works by the end of the week.

Use the Safe Assign link below to submit your assignment.