

Read all instructions
before beginning your work.

COMP1200-C - Assign 05
Due midnight – Thursday – March 5, 2015
Submit assign05.c via Canvas

NOTE:
Your submitted file(s) MUST be
spelled and cased as instructed.
[-5 points for not doing so.]

Before you start writing your program:

Download the `balloonValues.txt` data file from the [Assign05 Announcement](#) and save in your `COMP1200/assign05` folder. If you do not have folders set up for your assignment files, this is a good time to start. Your `assign05.c` will look in the folder where it is saved for the data file. A development plan is a process that guides you through solving a problem and creating an algorithm. Create your own algorithm and use it as comments throughout your program. Use section comments to group your statements as well as comments from your algorithm.

Problem:

Program: assign04.c

On a hot Saturday afternoon, you and your friends notice an empty baby swimming pool on the lawn of your apartment complex. So, why not see if you can fill it with water from water balloons thrown from your second floor balcony.

You will find out how many balloons it takes to fill the pool. To process a large number of balloon throws, you will run your program in **batch-mode** by reading the values needed to compute the distance each balloon travels as well as the diameter of each balloon from the `balloonValues.txt` data file. The file columns are theta, velocity, thrower's height, and diameter. The balloon diameter determines the amount of water in each balloon.

You will calculate the distance a water balloon will travel given the balloon launch angle (theta) in degrees, balloon launch velocity (v) in min/sec, and thrower's height in feet. Note that the height y_0 is the sum of the balcony height and thrower's height.

$$d = \frac{v \cos \theta}{g} \left(v \sin \theta + \sqrt{(v \sin \theta)^2 + 2gy_0} \right)$$

You will continue "throwing" balloons while the end of the file has not been reached. After ALL the data in the file has been read, your program should display

- the total number of balloons thrown
- the number of balloons that hit the pool
- the percent of hits
- the number of the balloon that caused the pool water to reach capacity
- a message saying how many gallons spilled over the edge of the pool

Problem Constants:

```
BALCONY_HT    12           // balcony height in feet
G             32           // gravitational acceleration
PI            3.14159
POOL_DIAMETER 2           // diameter of pool in feet
POOL_CENTER   35           // distance to the center of pool in feet
CAPACITY      7           // pool capacity in gallons
FILENAME      "balloonValues.txt" // input data file
```

Problem Inputs:

balloon launch angle (theta) in degrees
balloon launch velocity (v) in ft/sec
thrower's height in feet
balloon diameter

Problem Outputs:

See the instructions above.

Other variables:

As needed

Balloons	
diameter inches	volume gallons
3	0.1
4	0.2
5	0.3
6	0.55
7	0.8
8	1.25
9	1.7

Instructions:

- ☐ See Standards for Documentation of C Programs on the Resources page on Canvas.
- ☐ Insert comments at the top and throughout each file.

- Include the follow comments at the beginning of this (and ALL) files.
// submitter's name, **GROUP #** **Grade of ZERO for files with submitter name not part of Canvas group**
// other group members' names **Type "none" if submitting alone.**
// assignment number **Zero points for comments if no collaboration statement**
// date you completed the assignment
// **statement(s) about collaboration**
// a short narrative about what the file does

-5 points for absence of any of these required comments at the top at the top of each file.

- Use the algorithm given as comments throughout your program.
- ☐ Use descriptive variable names.
- ☐ Use Sample Input/Output as a guide.
- ☐ Use **Generate CSD** to ensure correct indenting.
- ☐ Represent ALL given values as constants.
- ☐ Format the angle with 1 decimal place.
- ☐ Format the building height with 2 decimal places.
- ☐ Label output using the `printf()` function in sentence form.

If you do not submit individually, there will be a 5 POINTS PENALTY for not joining a group. Groups can be 2-4 students. DO NOT join a group unless you have worked with the other members. If you do, you will be removed from the group and given the grade of zero.

- ☐ Use a while loop to read the `balloonValues.txt` data file until the end of file has been reached.
- ☐ Think carefully about what needs to be done before the loop, in the loop and after the loop.
- ☐ Use the switch/case structure to determine the amount of water in the balloon for a given balloon diameter.
- ☐ Compute conversion: degrees to radians.
- ☐ Compute distance.
- ☐ Print the output with appropriate labels and decimals as shown.
Print % with the percent of hits.

New commands:
while
EOF
FILE, fopen, NULL
file pointer
fscanf
switch/case

Sample Input/Output:

```
6 balloons hit the pool.
103 balloons were thrown.
5.83% balloons hit the pool.
Balloon #97 filled the pool.
60.05 gallons of water spilled over the edge of the pool.
```

Submit via Canvas:

assign05.c C program file

NOTE: Your submitted file(s) MUST be spelled and cased as instructed. [-5 points per file for not doing so.]

Rough algorithm -

INITIALIZATION

```
while more data, get balloon input values from the data file one balloon at a time
    count balloon
    use balloon diameter to determine volume
    add balloon volume to total water
    compute distance
    is it a hit?
        add balloon volume to pool water
        count hit
        remember balloon number that finished filling the pool
```

OUTPUT