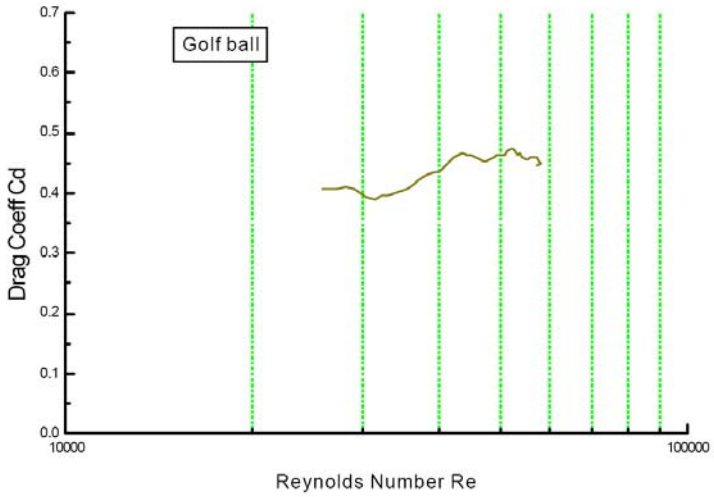
SRT 3 - PACE 1 – Scientific Visualization

Objectives:

- You will visualize the results from your programs and draw conclusions.
- You will determine the optimal angle to hit a golf ball.

Directions:

- You will be using your 2nd and 3rd projectile programs, Excel, and Word.
  - Use your program to generate the data.
  - Use Excel to visualize the data.
  - Use Word to organize the visualizations and conclusions.
- Task 1
  - Pick 2 trials from the data below.
  - Calculate the Reynolds number using the Excel spreadsheet found on www.scienceandmathacademy.com.
  - Using the graph below and the Reynolds number, find the drag coefficient and use that with the data from the table to calculate the trajectory.
  - Create a graph from the data of the position of the golf ball.
  - Copy that graph into Word and give a description of the graph, a comparison to the actual data, and any other conclusions you can draw.



Trial	v_0 (m/s)	y_0 (m)	θ (deg.)	Measured distance
1	26.5	1.19	39	51.9
2	21.3	1.17	35	35.8
3	24.1	1.17	34	41.0
4	27.1	1.19	44.5	52.9
5	30.5	1.19	44	68.0

- Task 2
  - Keep the following initial data constant
    - v_0 = 30 m/s
    - y_0 = 0 m
    - ρ = 1.2349 kg/m^3
    - Diameter of the ball = 42.61 mm
    - Mass = .045 kg
  - Find the initial angle that maximizes the range of the golf ball.
  - In Word display the graph of the optimal case.
  - State what the optimal angle is, and describe the process that you used to arrive at this answer.

- Task 3
  - How does changing the initial velocity change the optimal angle?
  - How does changing the density of the fluid change the optimal angle?
  - How does changing the mass of the object change the optimal angle?
  - In Word, explain your finding and the justification behind your findings.
- Task 4
  - Write a paragraph explaining what you have learned from PACE 1.
  - Write a paragraph describing your overall opinion of PACE 1, as it was presented.