**Assignment 1: Flow and Friction**

This exercise is for you to show your understanding of water flow and of friction. Also, think through the interaction of water flow in pipes and friction. Understand how friction (a pressure loss) is influenced by flow (pipe cross-sectional area x velocity) through a pipe.

Watch your units of measure. Write out the units (inches/foot, gallons per cubic foot, square inches/ square foot) for all numbers and be sure they cancel to give the correct final units in your answer.

This is where many mistakes are made.

**1.  Using the flow equation for pipes, estimate the gallons per minute of water flowing in a nominal 10 inch pipe if the water velocity in the pipe is 200 feet per minute. Note, I said estimate so the nominal 10 inches diameter can be used instead of knowing the actual inside diameter.**

**2.  If the above pipe is straight and you tied a ribbon around the pipe (a point on the outside), the water passing that point at time zero would be how far away one minute later?**

**3.  By rough estimate, how much more water does this 10 inch pipe carry than a 6 inch pipe? The water velocity is assumed to be the same in both pipes.**

**4.  What is the potential danger of high velocity water in a pipeline, particularly if someone closes a valve downstream quickly?**

**5.  Review the discussion on pipe friction and energy loss. Gravity is a positive downward force that creates pressure (weight of water applied to a surface area) in a static water column. Now, if that column of water starts to flow and the flowing water is dragged over the rough surface on the inside of the pipe, some of the energy is lost. What happens to the amount of friction loss if the water flows faster and faster through the pipe? What is the resultant effect on pressure?**

 **Note:**Gravity is a positive force on water flowing downhill but is a negative force on water flowing uphill.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Download the assignment as a word file and then answer the questions.  Once you have completed this, please **save your file with your name in the filename (e.g. DavidSmith\_Assignment#1)** and then upload the file.  I will then grade and give you feedback to your answers.

***Note that you will not be allowed to upload assignments after the due date, and you will lose any points associated with this assignment for your final grade.***

**Also note that you can resubmit your corrected answers for additional points before the assignment deadline -- but only if you have submitted them early enough so I have time to correct them -- which I will attempt to do within 24 hours of receipt.**