

Test 2 Reflection:

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I feel that on this test I worked towards understanding fluid dynamics in pipes and fittings, particularly through calculations involving Forces, cavitation, and hammer flow. By applying Bernoulli's equation, I used the principle of conservation of energy in fluid flow systems. Additionally, my attempts to compute Buoyancy and open channel flow demonstrates my effort to align with that course learning objectives.

For my Purpose statement I was more concise and direct that I could have been. I could have provided a more detailed breakdown of the steps and included more information. In a similar manner my Procedure is also very light on details.

For the Calculations I used the excel sheet from the first test to calculate the pressure at the surface of the tank at 150 gpm. Then I used the gamma h equation to calculate the effect of the fluid depth then added the pressures. I did this differently than the posted solutions (no piezometric head) but I believe that the solution was close enough, within 5%.

In part 2 I did not account for the loss of the entrance when calculation P1. Thus my reaction force in X was off by 15% My reaction force in Y was exactly correct.

Part 3 was perfect, with no errors.

Part 4 I just neglected to specify why I reached the conclusion about cavitation, but really it was very obvious.

For Part 5 I used very similar assumptions as the solution, with slightly higher water levels and a narrower width. Thus my flow rate was higher.

In Part 6 I made a mistake and used the area of the channel instead of the child and thus my value was way higher than it should have been.

For Part 7 I calculated the buoyancy force and the depth the tube would sink properly, but completely forgot what the metacenter was or how to find it.

For my summary and analysis sections I feel that I had good observations and conclusions based on what I found in my calculations.

Grading:

After working out my grade in excel and including the homework scores the lowest grade I would give myself is 85% per the rubric. I have an excel sheet with the breakdown:

1. Purpose	0.5
2. Drawings	1
3. Sources	1
4. Design considerations	1
5. Data and variables	0.5
6. Procedure	2
7. Calculations	1
8. Summary	0.5
9. Materials	0.5
10. Analysis	1
Subtotal	90%
Force on the flange	
Pressure above fluid	1
Force magnitude	0.8
Force location	1
Pipe-elbow forces	
Free body diagram and correct forces	1
Force in x solve for Rx	0.8
Force in y (weight) solve for Ry	1
Flow-nozzle flowmeter pressure drop	
Right equation and A1/A4	1
C value	1
Water hammer and cavitation	
Wave velocity (units?)	1
Pressure increase and Pmax	1
Pipe thickness	1
Chance of cavitation	1
Flow in the open channel	
Lazy river dimensions	1
Correct equation	1
Area and hydraulic radius	1
Drag force on the child	
Correct equation to use	1
Correct area and velocity	0.5
How Cd was obtained?	0.5
Lazy river tube floating stability	
Realize $F_b=W$ and solve for h	1
Compute metacenter location	0
Metacenter will always be above cg	0
Correct results?	3
Final Grade	85%

Discussion Points:

- a. Issues Encountered and Troubleshooting: I should have realized that the drag force was excessive especially for a small child.
- b. Steps Taken to Complete the Test: I ran through the test about a few times, moving things around, and recalculating whenever I found an error.
- c. New Concepts Learned: I have learned how to take a whole system into account for reaction forces.
- d. Application in Engineering: I learned how to design an open channel.
- e. Personal Application: I will use these skills in my career and for any personal projects I do.
- f. Importance in Professional Career: Engineers have to look at the big picture, and at all the small details when designing or maintaining a system.
- g. Future Use of Information or Skills: I have learned not only fluid mechanics principles but also how to look at a problem as a comprehensive whole. This will be invaluable in all aspects of life.
- h. Application in Work or Other Courses: I'm sure you will make me use this in my senior design project.
- i. Areas of Success or Improvement: I have strengths in analysis and conclusions while there is always area for improvement in my calculations and procedure.
- j. Intersection with Field or Career: I have no idea if I will be working in an industry where I will need to know Fluid Mechanics, but if I do I will know who to call, and what book to reference.
- k. Time Management: I spent about 2 hours on the pretest, and then a couple more here and there over the week after the feedback email, with the most time being spent on Friday, as I had the day off work.

In summary, I feel that I did alright in this test despite having to redo sections multiple times and making some simple mistakes.