Student 1 Name: _____ Date: _____

Student 2 Name: _____ Class: _____

PART 3: BECOME A DESIGN ENGINEER

In Part 3 we will be competing against the other groups and classes to design a custom surface that will hold the most liquid on its surface. As engineers you are being given the task to design your own surface. The objective is to MAXIMIZE the volume while MINIMIZING the total cost.

To accomplish this you have the following options:

1. you can use EITHER a coin or a penny.

Surface	Description	Cost
Penny	Copper penny (heads-up)	$0.01 each
Coin	Plastic coin	$0.04 each

2. you can use ONE of the liquids tested.

Liquid	Description	Cost
Water		$0.001/drop
Salt Water		$0.002/drop
Soapy Water		$0.004/drop

3. you use ONE of the following materials (but do not have to)

Surface Treatments	Description	Cost
Hairspray	Single coating, dried. Cost based on area being coated.	$0.04/mm^2
Sandpaper	Single use of sandpaper. Cost based on area being coated.	$0.02/mm^2
Spray Paint	Single coating, dried. Cost based on area being coated.	$0.04/mm^2
Paraffin Wax Paper	Cost based on length (mm) of wax cut used.	$0.02/mm

Engineering Design Considerations

- Determine the cost for each of the configurations you tested yesterday. This will give you a good idea of the "base cost" before you begin making any modifications to your surface.
- You want the most for your money. Therefore, minimize the value of ($/mL)
- Notice that your liquid will cost you ($/drop) but you want to minimize ($/mL)

Values from Part 1:

Liquid	$\overline{m}_{drop}$ (g)	$\overline{V}_{drop}$ (mL)	$\overline{d}_{drop}$ (mm)	ρ (g/mL)

Values from Part 2:

	$N_{Average}$	Film Height (mm)	M_{Liquid} (g)	V_{Liquid} (mL)
Penny w/ ☐				
Penny w/ ☐				
Penny w/ ☐				
Coin w/ ☐				
Coin w/ ☐				
Coin w/ ☐				

Data Collection

- Be sure to record all relevant data for each test (create your own tables and graphs). Your design MUST be reproducible.

Summary

Describe the best design (include: surface, liquid, modification, # drops, volume, cost). Attach all data collection sheets. Be sure to discuss cohesion, adhesion, and surface tension, and how these relate to the goal of the project.