**3-D Printing and Volume Project Name:**

***Goal:*** *To learn about 3-D printing from the perspective of an engineer/entrepreneur, while using Volume concepts learned class. Further, to implement business concepts such as Research & Development costs and how they relate to the Profit & Loss of a small business.*

***Tools:*** *Computer, Tinkercad, 3-D printer, and your brain!.*

**Requirements:** You and your group will design, build, and calculate the Total Volume of a Fidget Toy with the following minimum properties:

* Use at least one of each of the following:
	+ Cone
	+ Pyramid
	+ Sphere (or hemisphere)
	+ Prism
	+ Cylinder
* Use at least one *concave* and one *convex* shape
* Use copious amounts of imagination

**Part I: Design:** Please sketch a picture below of your final design. Include as many measurements as possible and a brief description of the different parts of your fidget toy. *(You may use a separate piece if necessary)*

**Part II: Volume:** *Calculate the volume of each individual part of the toy and combine them to determine the total volume.*

**Calculating Total Volume:** In order to calculate the total volume of your fidget toy, it will be very important to keep track of the dimensions of each shape as you go, please do so in the spaces below:

|  |  |
| --- | --- |
| **Shape** | **Dimensions** *(Don’t forget your units!)* |
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**What is the total volume of your fidget toy?** *Please show all work and include units.*

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**Part III: Costs:** *To determine the cost of a new product, an entrepreneur must consider the Research & Development Costs (including hours spent designing), desired profit, and expected number of units sold.*

**Hours:** Keeping track of the hours spent designing a new product is critical to calculating its final price, this is part of the *Research and Development* Cost. Assume that you would like $25/hour for designing. Please keep track of the hours spent below and calculate your labor cost:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Date** | **Hours** | **Date** | **Hours** | **Date** | **Hours** |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

**Total Hours Spent:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Total Labor Cost** (@$25/hr)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **Other costs:**

* 3-D printer $300
* Filament (plastic) cost per 100 printed units $100
* Electricity per 100 printed units $15
* Failed attempts during R&D $20

**Part IV: Profit:** *Assume that you plan on selling 100 units and would like to make a profit of $1,000.*

1. Use all of the information above to determine how much each Fidget Toy that you produce should cost.
2. What percent of the price of the toy is your profit?
3. If you happened to design the hottest Fidget Toy on the planet and sold 1,000 units, would your profit percentage go up, down, or stay the same? Explain.