

Activity 6.2 Visual Analysis Automoblox

Introduction

What is it about an object that captures a person's attention? Is it the color of an object that emphasizes its presence? That might explain why a kindergarten classroom is full of reds, yellows, and blues. Is it the organic curves of an object's form, like the body of a sports car? Could it be a repeating series of shapes, such as a tile pattern in a bathroom? Is it the visual rhythm of the wood grain that makes a person purchase a fine piece of furniture? Perhaps it is a matter of symmetry, or a lack of it. Sometimes the sheer scale of an object or a space within it demands attention. Could that be another reason why people are attracted to cities?

In this activity, working in a team of two or three, you will act as an engineering team for a novelty toy company. Your company has noticed the skyrocketing sales of the Automoblox vehicles and would like to design accessories or enhancements that can be purchased separately but will work with the existing toys. As a first step, your team has been assigned the task of reverse engineering one of the Automoblox vehicles. This will begin with a visual analysis to identify the visual design principles and elements that give the vehicle its visual appeal, or lack thereof. You will use a digital camera to aid you in your visual analysis. And, finally, you will describe the Automoblox vehicle using the language of visual design principles and elements.

Equipment

- Engineering notebook
- Digital camera
- Automoblox vehicle

Procedure

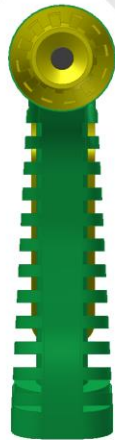
Perform a visual analysis of the Automoblox vehicle using the following procedure:

1. In your engineering notebook, identify the product and the manufacturer.
2. Using a digital camera, take at least three pictures of the product from different angles.
3. Print out the images on a color or laser printer, and neatly secure them in your engineering notebook.
4. Create a caption under each image that identifies the particular view – front view, right side view, isometric view, etc.
5. Next to each image, write a description of the visual design principles and elements that are evident from that particular view.

Example Visual Analysis

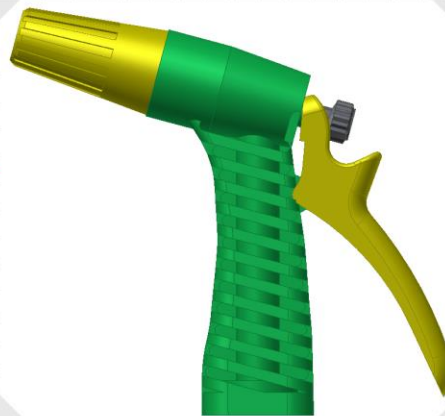
Activity 3.12 - Visual Design

Principles and Elements Study: Hose Nozzle



left side view
of Hose Nozzle

This view of the Hose Nozzle shows the **contrast** between the yellow and green **colors** of the plastic parts. The yellow component is a conical **form**, but appears as a circular **shape** from this view. It has a **textured surface pattern** that is **balanced radially** around the point where the water exits the nozzle. The yellow **color** and the circular **shape** give **emphasis** to the piece, and is the first place that the eye is drawn to. The green handle is a tapered **shape**, like a trapezoid, and shows **symmetry** across an imaginary vertical line that splits the object in half. The repeating notches on either side of the handle taper from bottom to top, and provide both visual **texture** and **rhythm**.



front view of Hose Nozzle

The amount of yellow **color** is equally **proportioned** between the **shapes** of the two extreme components, which are **asymmetrically balanced** on either side of the green handle. The **patterned** angled slots in the handle provide visual **texture**.

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SIGNATURE

Richard Blain

DATE

May 15, 2005

DISCLOSED TO AND UNDERSTOOD BY

Richard Blain

DATE

5-15-05

PROPRIETARY INFORMATION

6. Submit your engineering notebook to your instructor for evaluation.

Conclusion

1. How has this study affected your understanding of visual design principles and elements?

This study affected my understanding of visual design principles and elements because it caused me to realize that certain elements and principles can be apparent in an object, however only be viewed from one angle. It also made me understand that there is a meaning behind each type of line, color, etc.

2. How will you look at products differently from now on, based on your understanding of visual design principles and elements?

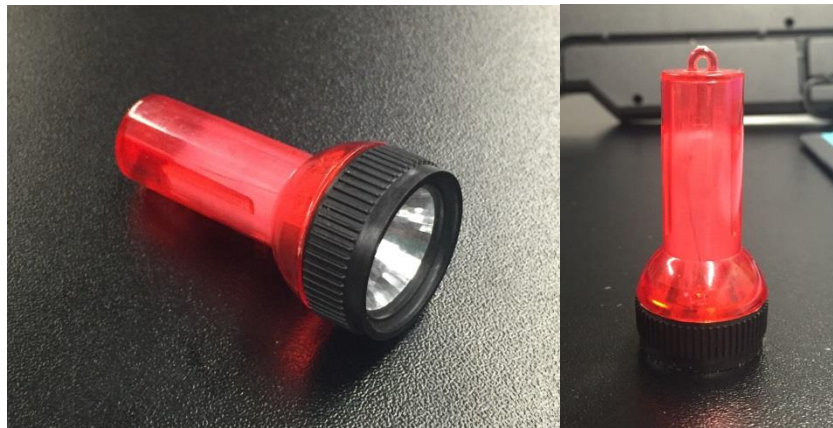
After this study, I will now look at products from a design standpoint instead of just simply looking at it. Now, I'll see the lines and shapes that go into each product. Also, I'll be able to identify the kinds of rhythm and balance in the product since I now know what each is due to this project.

3. How do visual design principles and elements relate to the natural world?

Even in the natural world, design principles and elements will appear. In flowers, there is rhythm and symmetry in the petals. In anything, one can view the colors and values of those colors. Some things in nature have shapes and any number of the other design principles and elements can be shown.

4. How do visual design principles and elements impact the commercial appeal of a product?

Visual design principles and elements impact the commercial appeal of a product because some aspects of those principles and elements can cause certain feelings in a person. For example, if a company wants to sell something and wants to make it stand out, they'd use a warm color with a slight tint to make it brighter. Or, some lines can make people feel calm or at peace which are useful when trying to market some products.



Elements	Principles
<p>Line The product above has straight lines and curved lines. From this specific view, the straight lines are diagonal and vertical which represent action and dignity.</p>	<p>Balance There is both a radial balance and a symmetrical balance. The symmetrical balance is also a horizontal balance.</p>
<p>Color There are main colors used on this product, red and black. Red is a warm color and black is a neutral color.</p>	<p>Rhythm This product has no rhythm other than a slight regular rhythm made up of the ridges on the black.</p>
<p>Form/Shape Although not seen from these angles, there is a circle on both ends of the product.</p>	<p>Emphasis The black and the silver (where the light comes from) are emphasized and larger.</p>
<p>Space There is nothing written or depicted on the product so it is a pretty empty space. However, (not depicted) there is a button on the side. Also, while it is and open and empty space, it is still a good use of space.</p>	<p>Proportion and Scale The part of the product where the light comes from is larger and wider than the rest of the object.</p>
<p>Texture The product is very smooth which reflects the light. The black, is slightly textured with slight ridges.</p>	<p>Unity The entire product is made up of two basic colors and the entire product is made out of different but still reflective materials.</p>
<p>Value The red doesn't have much value which indicates a tint, making the red slightly paler. The black also doesn't have a deep value and is a somewhat tinted version of what would generally be considered a very dark color.</p>	

Activity 6.3 Functional Analysis Automoblox

Introduction

You have performed a visual analysis of your Automoblox vehicle to identify the visual design principles and elements that give the object its visual appeal, or lack thereof. The next step in the reverse engineering process involves the study of the object's function. This is done through careful observation of the object's sequential operation before it is disassembled. By first observing the product, you can hypothesize how a product operates and then compare your predictions to your actual findings after the part is dissected.

In this activity, you will perform a functional analysis of your Automoblox vehicle

Equipment

- Example product observation
- Engineering notebook
- Pencil
- Automoblox vehicle

Procedure

Before measurement and dissection, theorize how the various sub-systems of the toy function through non-destructive observation. Study the toy and then respond to the following.

Product Name: N/A

Company Name: N/A

1. What is the purpose or primary function of the object?

The primary function of the object is to produce light. Also, due to its small size, it could also be made for the purpose of being a portable light for people.

2. Sketch an isometric pictorial of the product in your engineering notebook and label the individual components. If you are not sure what a particular component is called, then make a logical guess.

The sketch is outside this file; look at the image next to this one.

3. Identify the system inputs, intended product function, and outputs in the table below.



Inputs	Product Function	Output
Wide open window	Product Function	More space for light to shine through
Ridges around circumference	Product Function	Better grip for unscrewing the top
Button with ridges	Product Function	Easier to press/turn on the light
Loop on the bottom	Product Function	Place to connect keychains and loops

Conclusion

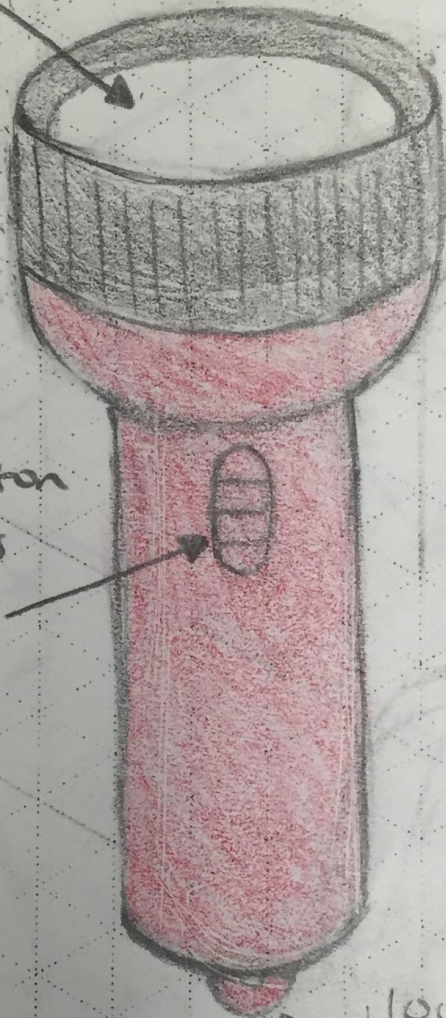
1. Why do engineers perform reverse engineering on products?

Engineers perform reverse engineering on products to find out how the product works and what the product is used for.

2. What does a black box represent in the system input/output model?

In a system input/output model, a black box represents a device or system that can be used in a model, however an engineer wouldn't need to know too much information about it, and the black box would change or alter the product in some way.

wider space
for light



ridges for
better grip
when unscrewing

simple button
with ridges
so light
can be
turned on

loop to
connect
rings for
a keychain

Activity 6.4 Structural Analysis Automoblox*

Introduction

You have already performed a Visual Analysis and a Functional Analysis of your Automoblox* vehicle. During this activity you will investigate vital product characteristics with regard to the structure of the product. You will research and document your findings using careful measurements, sketches, and notes which will complete the reverse engineering of your product. You will use the information you have gathered during the process in the next unit when you design an enhancement or accessory for the Automoblox* vehicle.

Equipment

- Engineering notebook
- Pencil
- Automoblox* vehicle
- Graph and isometric grid paper
- Product Disassembly Chart**
- Materials Usages Chart**

Procedure

Identify each part of the Automoblox* vehicle by name, quantity, size, function, material, finish, interaction of parts, and general notes using the **Product Disassembly Chart** to record your work.

1. Create pictorial sketches, as necessary, to communicate the internal operation of the product.
2. If you have not already done so, carefully measure each part using appropriate measuring devices.
3. If you have not already done so, create annotated sketches of each part including an isometric pictorial (at least) and orthographic projections (as necessary) to detail the part with dimensions, material, and other characteristics. You may simply need to add annotations to sketches that you have previously created.

ALL SKETCHES ARE OUTSIDE OF THIS DOCUMENT

4. Consider the choice of materials for the toy. For each part listed below, research the material used. Then either justify the choice of material or present an alternate material that you believe would be more appropriate for the part. Include mass, workability (in manufacturing), durability, strength, transparency, frictional properties, flexibility, and resistance to fatigue (failure due to repetitive use) in entries.

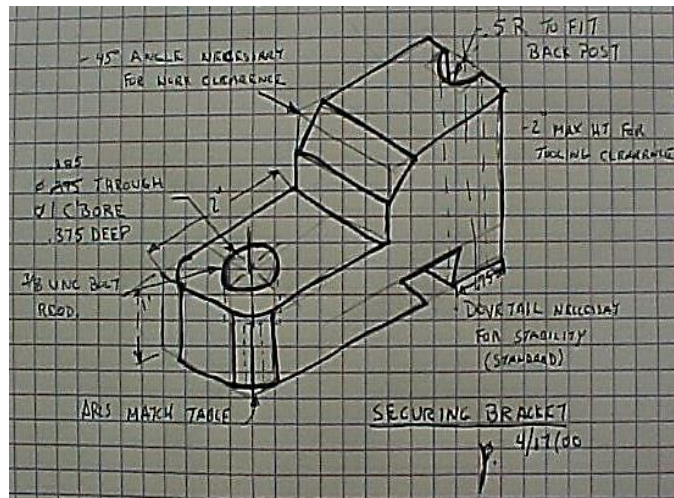
Part	Material	Justification or Alternate
Main Body	Polycarbonate	This is a common type of plastic that is hard and can be transparent. It is also very cheap.
Cap	Polypropylene	This material is durable and sturdy. This is also a somewhat heat resistant material.
Button	Polycarbonate	Same reason as the main body.
Reflector	Polymethyl Methacrylate Acrylic	This material is used for reflecting and illumination, such as in automobile lights or road signs.
Battery Compartment	Acrylonitrile-Butadiene-Styrene (ABS)	This is a material that is used, generally, for battery cases.

5. Complete the **Product Disassembly Chart** to detail important aspects of each part.

Part #	Part Name	Qty	Dimensions	Function	Material	Texture/ Finish	Interaction with Other Parts
1	Main Body	1	In images to the right	Main part of flashlight	See table above	Smooth, Shiny, Transparent	Holds all other parts
2	Cap	1	In images to the right	Holds reflector in place	See table above	Rough, Matte	Holds reflector in place
3	Button	1	In images to the right	To turn light on	See table above	Rough, Shiny, Transparent	Held in by the main body
4	Reflector	1	In images to the right	Make light brighter	See table above	Shiny, Smooth	Held by cap and main body
5	Battery Compartment	1	In images to the right	To power the flashlight	See table above	Smooth, Matte, Opaque	Completely inside main body

Sample Annotated Sketch of Part Documentation

The following is an example of a part documentation using an isometric sketch with annotated notes of fillet, hole location, materials, finish part location, and interactive parts.



Conclusion

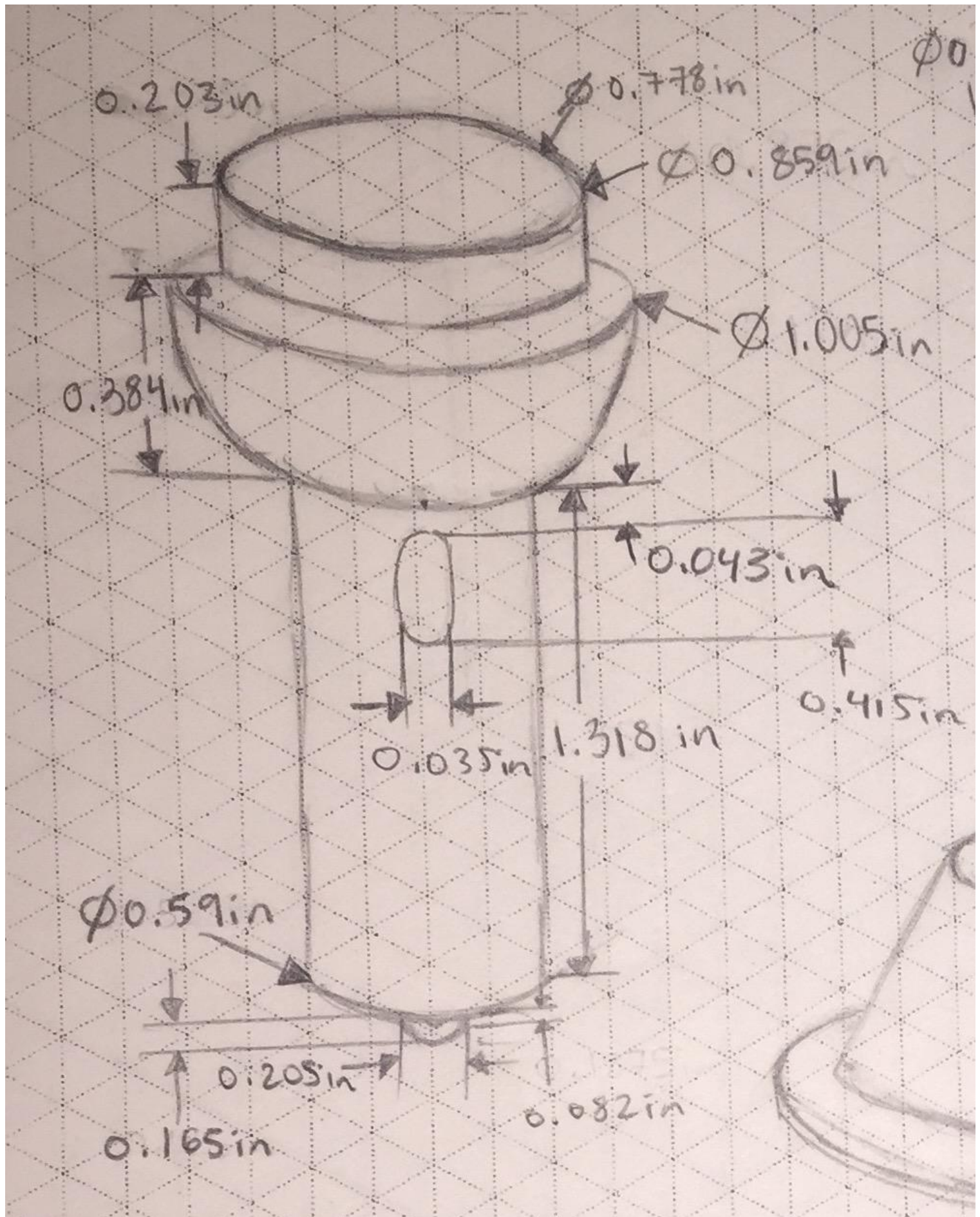
1. Describe the process of Reverse Engineering.

When reverse engineering, engineers will first analyze the outside of the object or product. Then, engineers will analyze the product to figure out the function of the object as a whole, along with the purpose and function of each part of the product. Lastly, engineers will take apart the object to further evaluate each individual part and they will also try to identify the materials used to make the part. Engineers can also sketch the parts of the object and even remodel the parts.

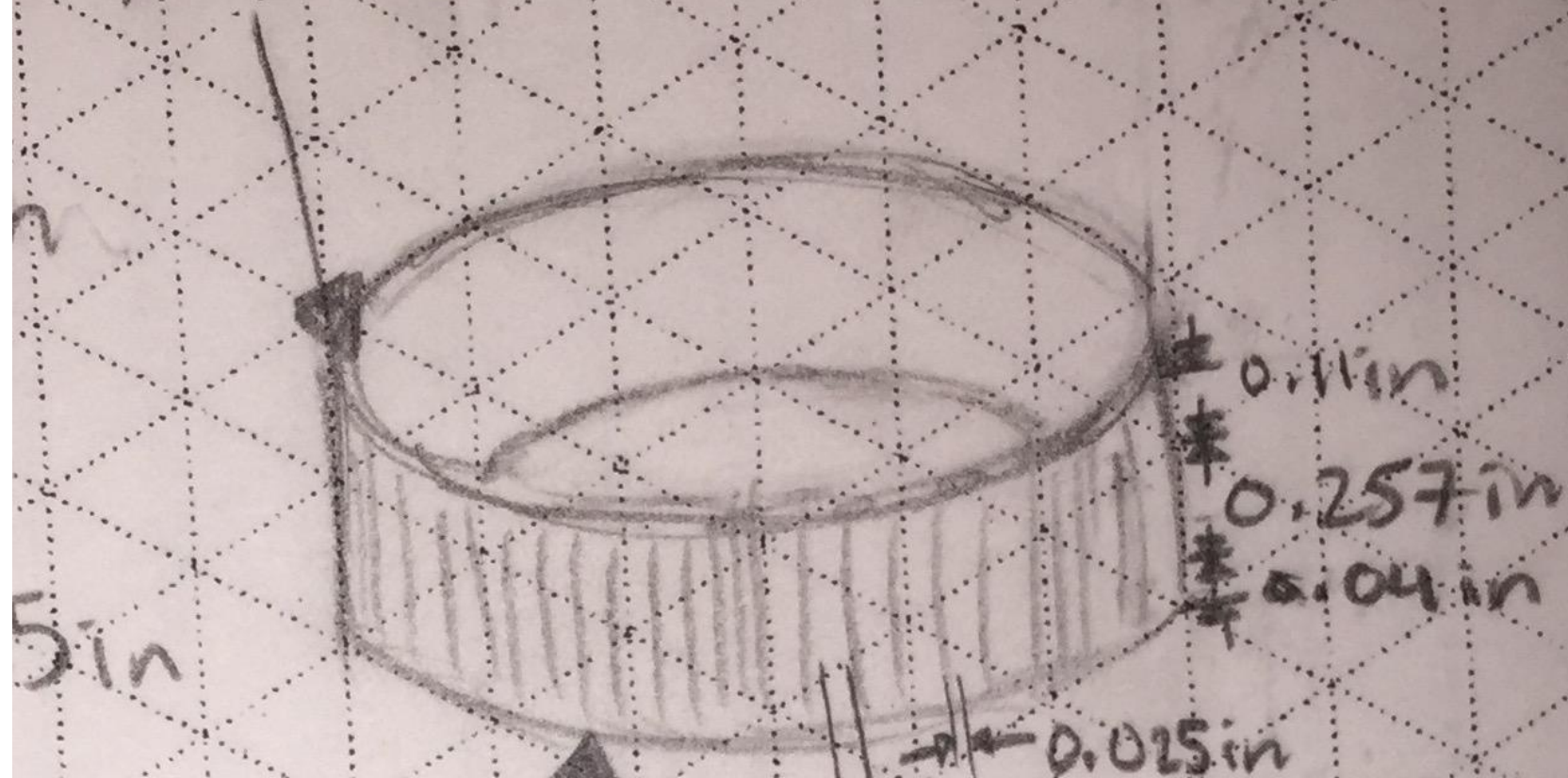
2. Part of the mission of Automoblox* is to “offer a high quality building system that will delight and inspire children while fostering the development of important skills and learning foundations.” If given the opportunity, how would you improve the Automoblox* design (visually, functionally, or structurally) while furthering the mission of the company at minimal cost?

Although the flashlight is made well and also produced at a very low cost, there is one thing I would like to change. I think that the outside (the main body) of the flashlight should be opaque and not transparent. Other than this one aspect of the product, everything is made well while still being very cost efficient.

*Instead of using the Automoblox car, we were instructed to use our own objects. In this case, a mini flashlight was used.



$\phi 0.93 \text{ in}$

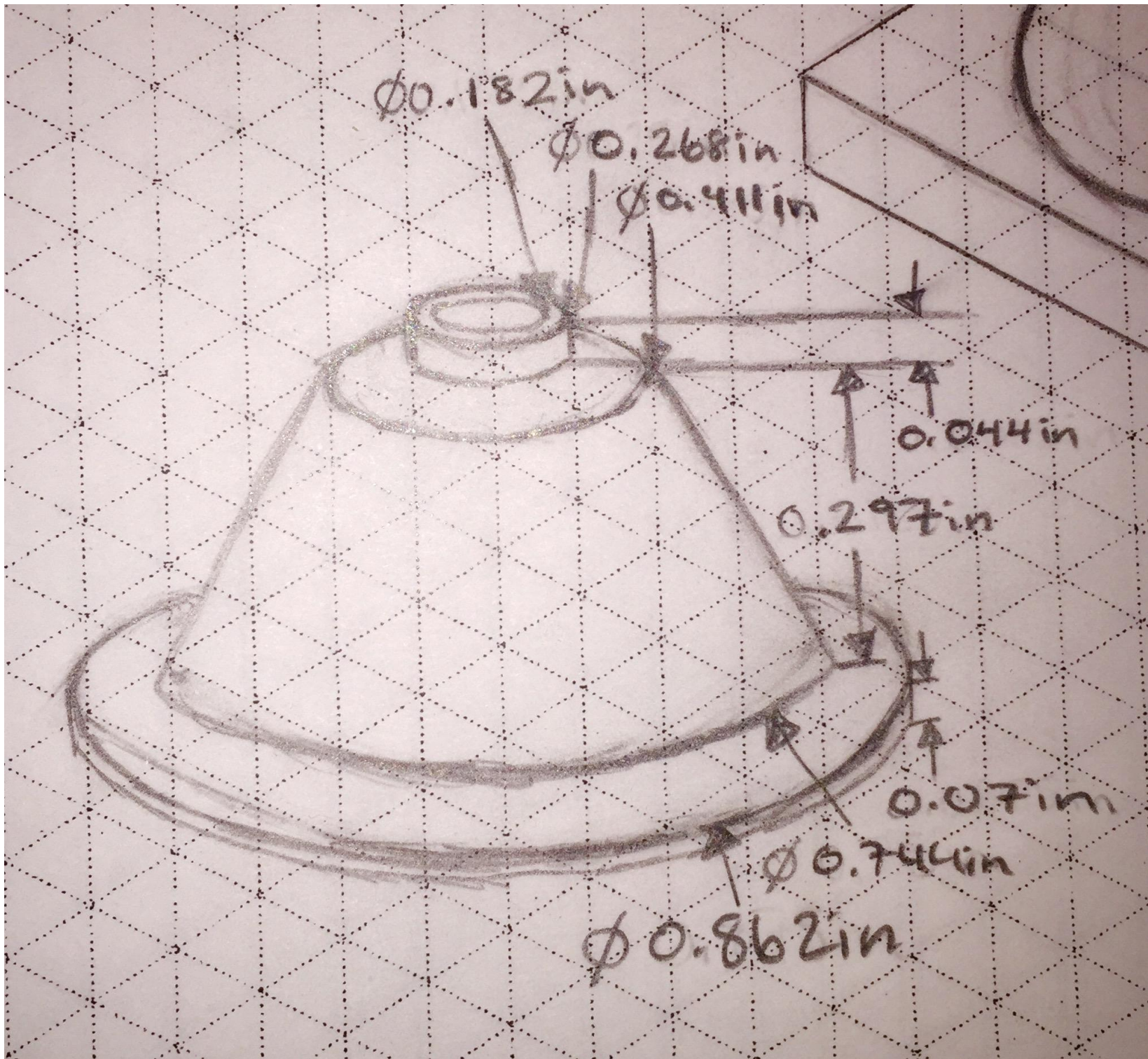


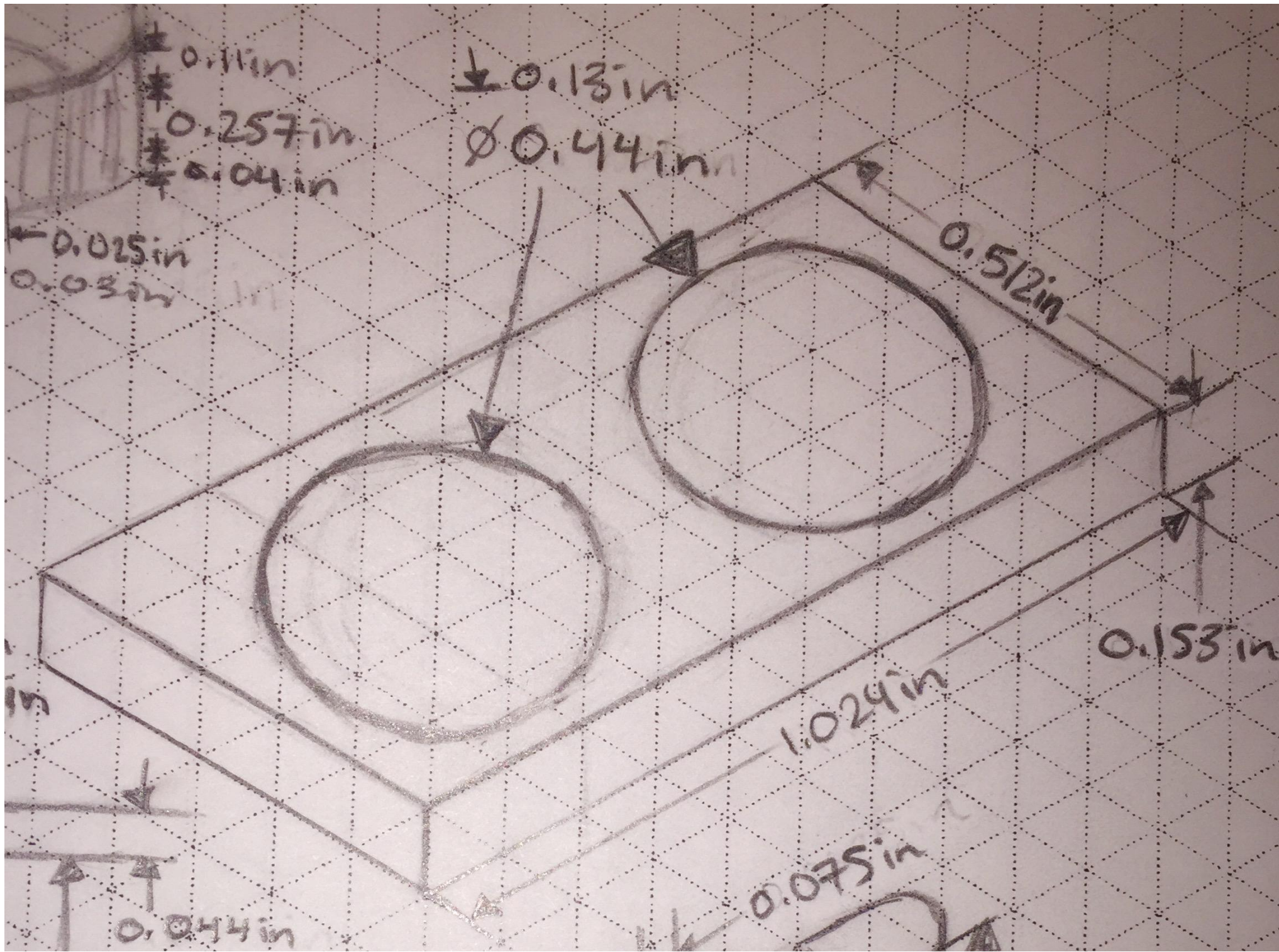
5 in

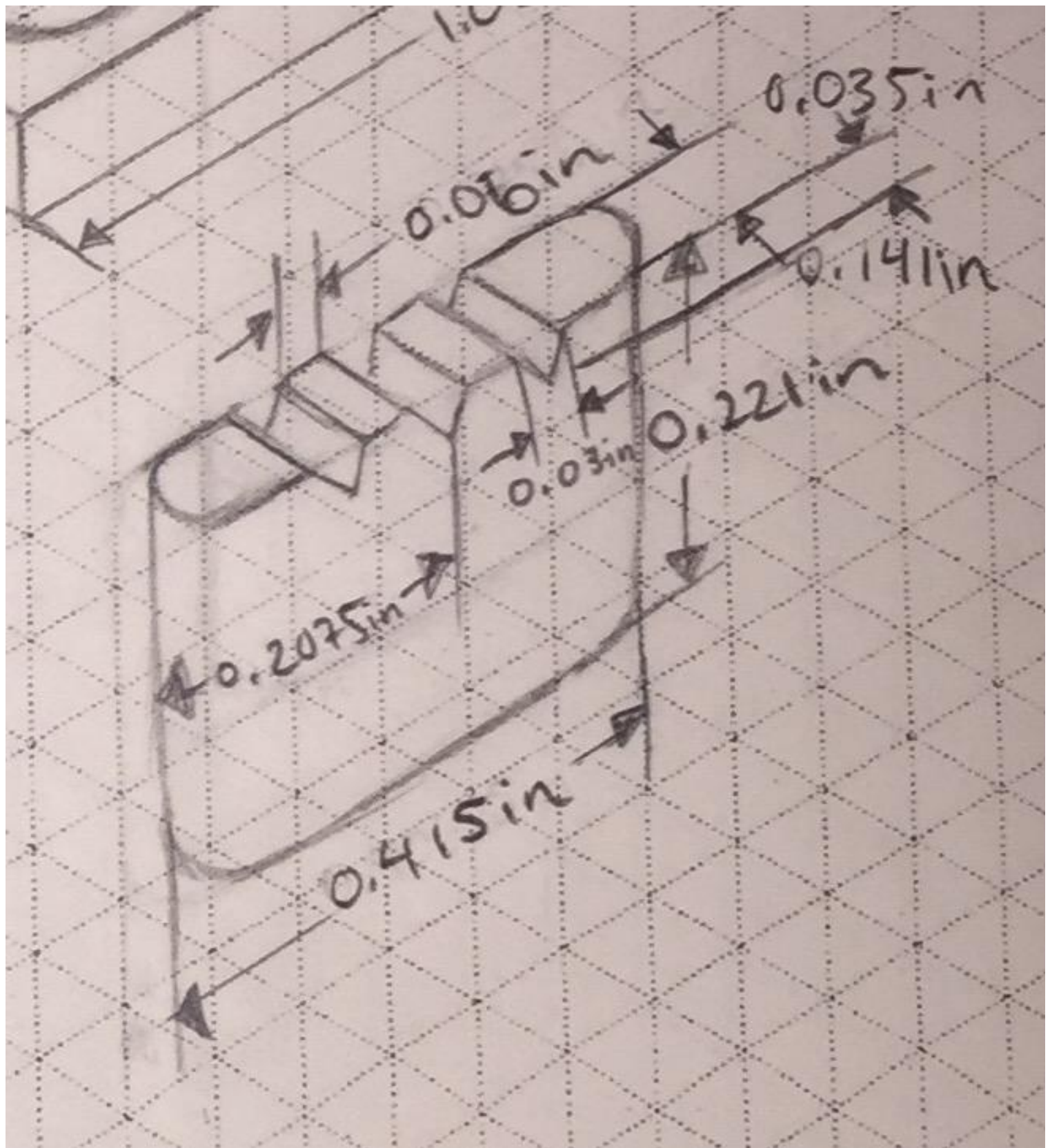
$\pm 0.11 \text{ in}$
 0.257 in
 0.04 in

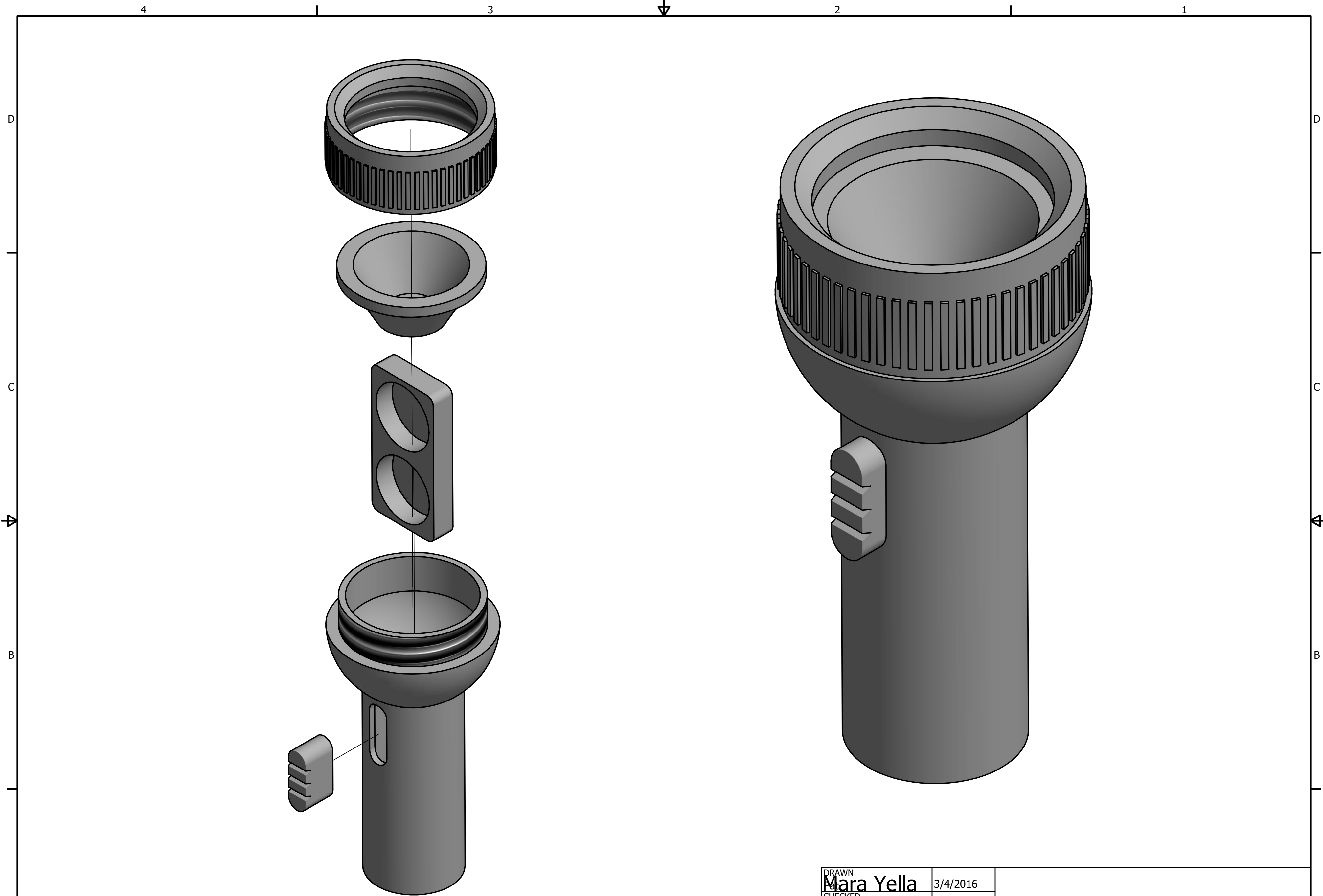
0.025 in
 0.03 in

$\phi 0.97 \text{ in}$



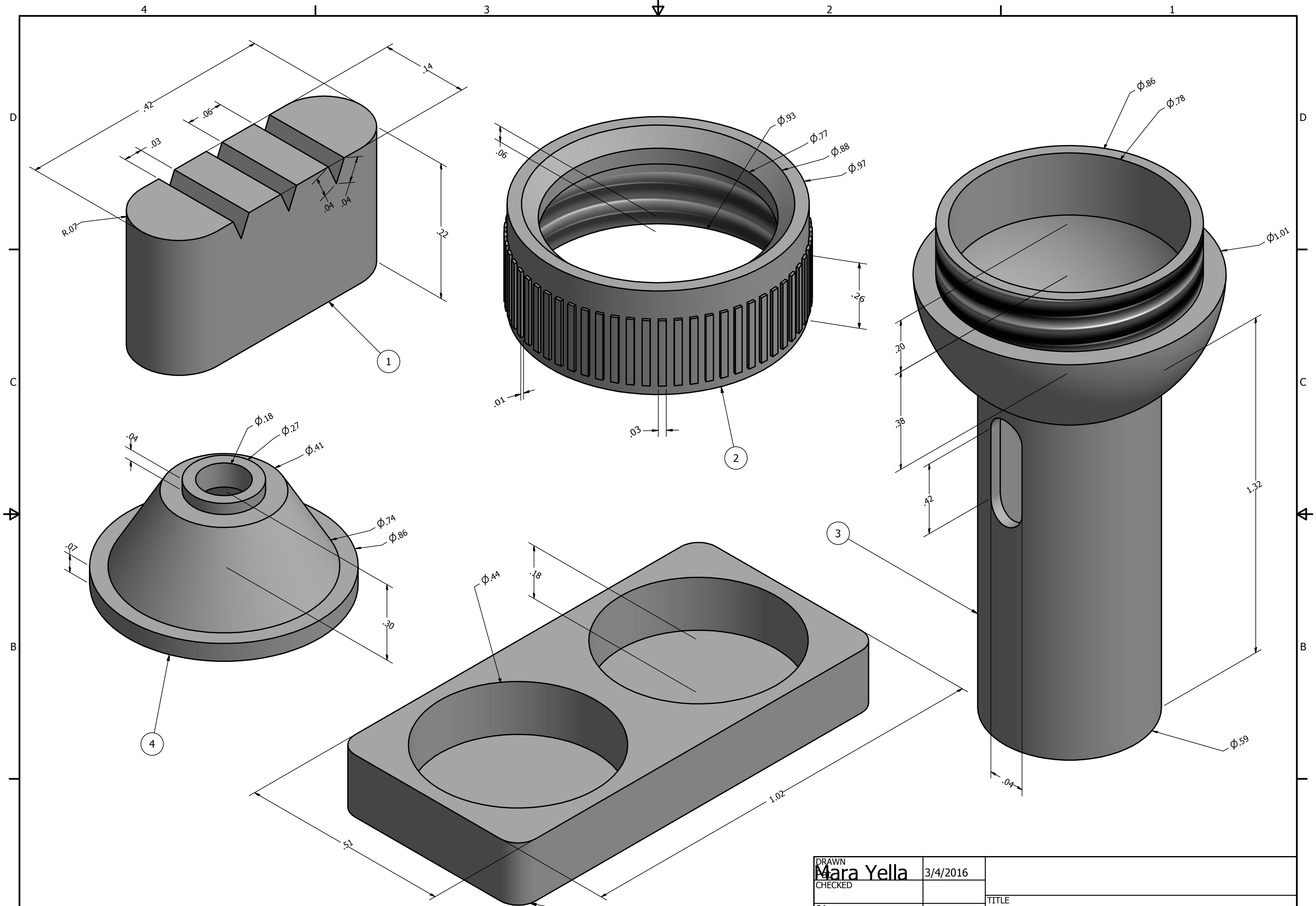






PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1		Button
2	1		Cap
3	1		Main Body
4	1		Reflector
5	1		Battery Compartment

DRAWN Mara Yella	3/4/2016	TITLE	
CHECKED		Flashlight Assembly and Exploded View	
QA		SIZE	DWG NO
MFG		C	Flashlight Assembly and Exploded View
APPROVED		SCALE	REV
			1
			SHEET 1 OF 1



PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1		Button
2	1		Cap
3	1		Main Body
4	1		Reflector
5	1		Battery Compartment

DRAWN Mara Yella		3/4/2016		TITLE	
CHECKED				Flashlight Parts	
QA				SIZE	
MFG				C	
APPROVED				DWG NO	
				Flashlight Parts Title Block	
				REV	
				SCALE	
				SHEET 1 OF 1	