



**TA201P: Introduction of Manufacturing Processes**

## **Mangalyaan**

**Project Report  
SECTION: S7 GROUP: 9**

### **GROUP MEMBERS**

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- DIVYANSHU ASERI [ 190315]
- DIVYANSHU GANGWAR [ 190316]
- DIVYANSHU NARANG [ 190318 ]
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## **Introduction**

After considering a lot of options for our project, we stumbled upon this idea which we unanimously decided to choose. Mangalyaan is one of the biggest glories of our country and hence the reason the backside of the 2000 Rupee note has a picture of it around Mars. Mars orbital mission (MOM) also called Mangalyaan is a space probe orbiting Mars since 2014. It made India the first Asian nation to reach the Martian orbit and the First Nation in the world to do it in its maiden attempt. One of the most impressive fact about MOM is the cost it took to make it. The total cost of the mission was ONLY 73 million USD making it the least expensive Mars mission to date. The low cost of the mission is ascribed to K. Radhakrishnan, Chairman of ISRO, and continues a legacy of our frugally innovative minds.

## **Motivation**

We came across the idea while we were looking for some inspiration for our TA201 project. When we saw the animated image of this idea, we were amazed. It captured our attention, and we were filled with astonishment by the concept of its workings. In that moment, we decided that we will apply our concepts and understanding to make this project.

We were amazed by the image of the project, that we wondered how it would feel to have this experience, sadly not in physical, but nonetheless in theory. We thus embarked on this route to feel how will it work out to be.

## **Work Distribution**

SN.	Name	Work Contribution
1.	Divyanshu Gangwar	Modelling - Solar Panel Cost Analysis,, Group Presentation
2.	Pranjal Khatri	Modelling - Reflector, 2 Reflector Stands
3.	Divyanshu Aseri	Modelling - Extension Sheer Web and Fuel Tank Cost Analysis
4.	Divyansh Sati	Modelling - Bottom 4 Thrusters, Writing of Introduction
5.	Devesh Kumar	Modelling - TTC antenna,Medium gain antenna and High Gain antenna
6.	Dhruv Shikhar	Modelling - Propulsion System Cost Analysis
7.	Sai Ashwith Dharoor	Modelling - MSM and MENCA Cost Analysis
8.	Dhruv Goyal	Modelling - 4 Reaction wheels, Writing of Motivation
9.	Ganta Abhimithra	Isometric views and Drawings of the components
10.	Divyanshu Narang	Modelling-Pressurant Tank and its fitting.

## Components, Material and Manufacturing processes used

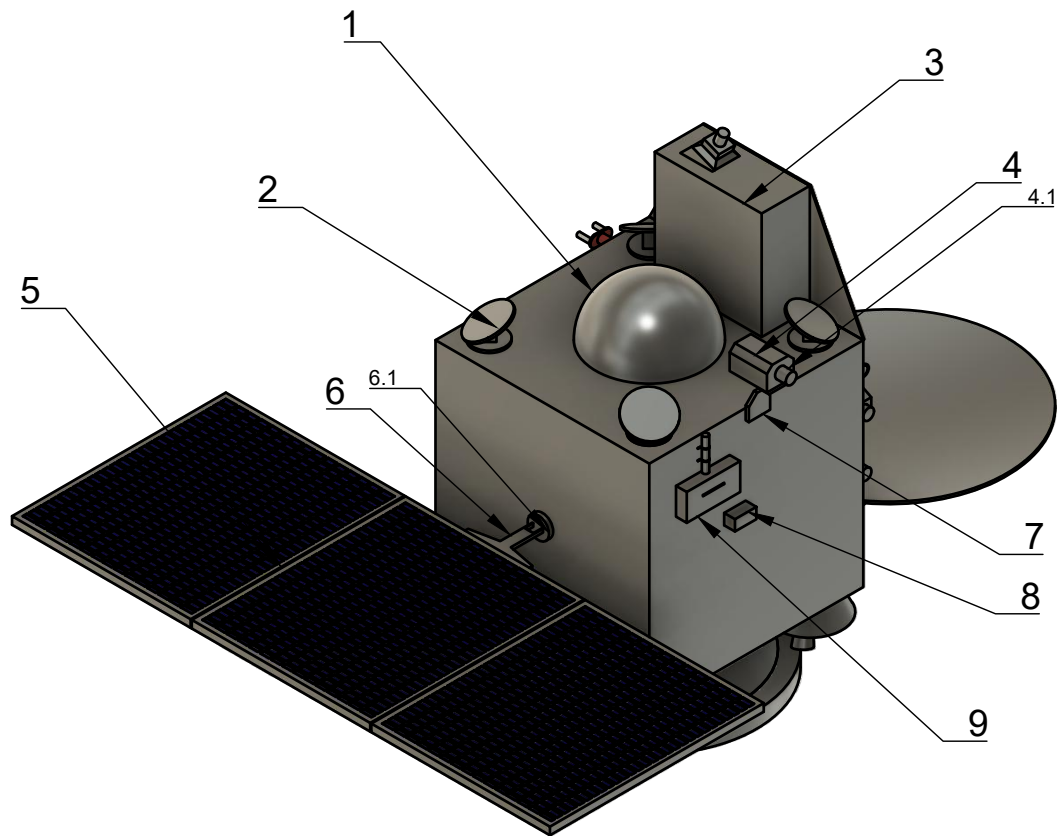
1	Propellant Tank	1	GI Sheets	Sheet Metal Cutting and Bending	Welding
2	Reaction Wheels	4	Mild Steel Sheets 0.5 mm thick	Sheet Metal Cutting and Bending	Soldering
3	Extension Shear Web	1	Mild Steel Sheets 1 mm thick	Sheet Metal Cutting and Bending	Welding
4	Lyman Alpha Photometer(LAP)	1	Aluminium	Sheet Metal Cutting and Bending	Soldering
5	Solar Panel	3	GI Sheets	Sheet Metal Cutting and Bending	Welding
6	MENCA	1	Mild Steel Sheets 0.5mm thick	Sheet Metal Cutting and Bending	Soldering
7	Medium Gain Antenna	1	Mild Steel Sheets 0.5 mm thick	Sheet Metal Cutting and Bending	Soldering
8	TTC Antenna	1	Mild Steel,	Soldering and Sheet Metal Cutting	Soldering
9	High Gain Antenna	1	Mild Steel Sheets 0.5 mm thick	Sheet Metal Cutting and Bending	Soldering
10	Pressurant Tank	1	GI Sheets	Sheet Metal Cutting and Bending	Welding
11	Reflector	1	GI Sheets	Sheet Metal Cutting and Bending	Soldering
12	Thermal Infrared Spectrometer(TIS)	1	Mild Steel Sheets	Sheet Metal Cutting and Bending	Soldering
13	Methane Sensor for Mars(MSM)	1	Mild Steel Sheets 0.5mm thick	Sheet Metal Cutting and Bending	Soldering
14	Mars Colour Camera(MCC)	1	GI Sheets	Sheet metal cutting and Bending	Soldering
15	Interface Ring	1	Mild Steel Rod	Bending	Welding
16	Thrust Propulsion System	1	Mild Steel Square Rod	Casting	Welding

17	Thrusters	4	Mild Steel Sheets 0.5 mm thick	Cone made using Sheet Metal forming	Welding
18	(-)Pitch Panel	1	Mild Steel Sheets 1 mm thick	Sheet Metal Cutting	Welding
19	(+)Pitch Panel	1	Mild Steel Sheets 1 mm thick	Sheet Metal Cutting	Welding
20	(+)Yaw Panel	1	Mild Steel Sheets 1 mm thick	Sheet Metal Cutting	Welding
21	(-)Yaw Panel	1	Mild Steel Sheets 1 mm thick	Sheet Metal Cutting	Welding
22	Bottom Deck	1	Mild Steel Sheets 1 mm thick	Sheet Metal Cutting	Welding
23	Top Deck	1	Mild Steel Sheets 1 mm thick	Sheet Metal Cutting	Welding
24	Reflector Stand	2	Mild Steel Sheets 0.5 mm thick	Sheet Metal Cutting	Soldering

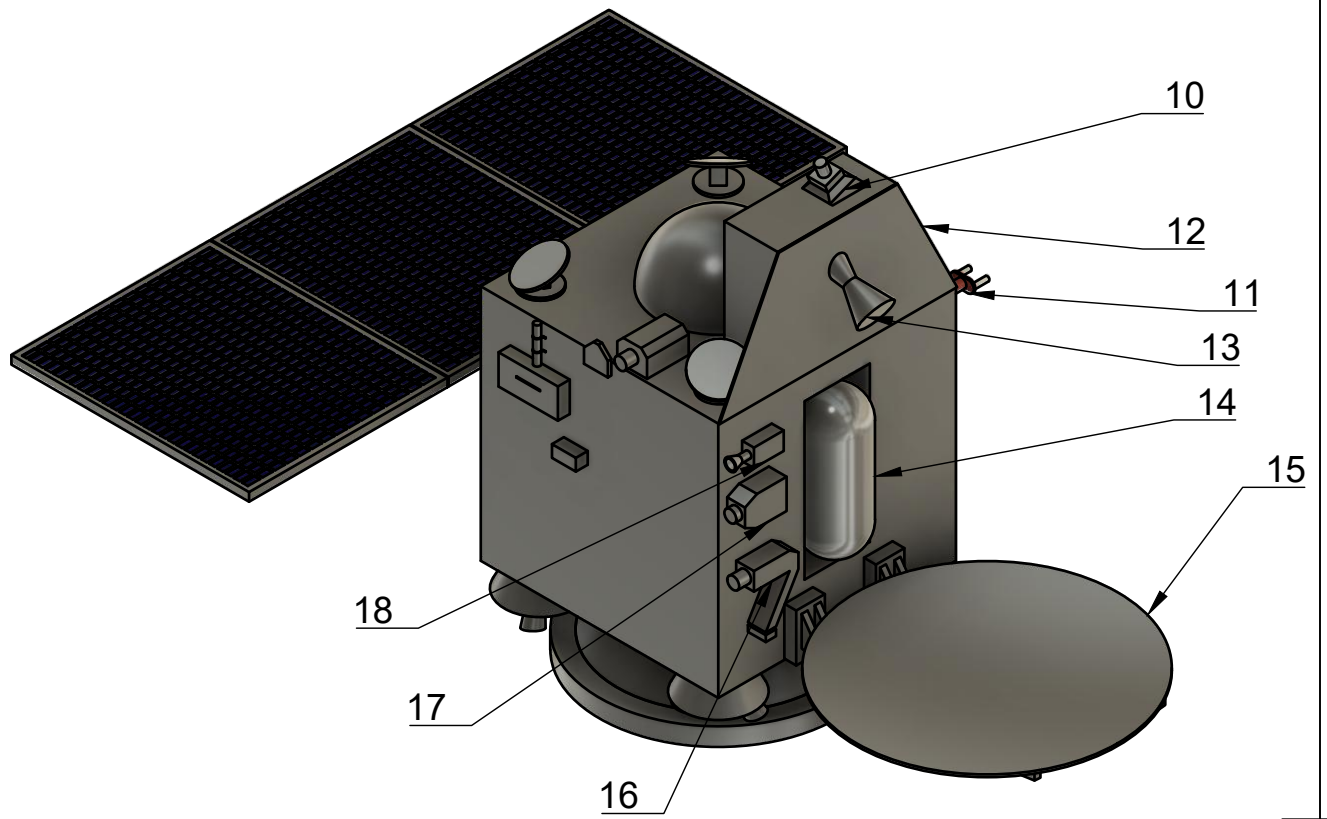
## Detailed Cost Analysis

<u>S.No</u>	<u>Component Area</u>	<u>Material</u>	<u>Cost</u>
1	2400 cm <sup>2</sup> (Centre cube)	<u>Mild Steel Sheet (4 ft x 8 ft x 0.5 mm) at Rs. 945 / sheet</u>  <u>Total Area Required = 4 Feet sq.</u>	<b><u>Rs 120</u></b>
2	78.54 cm <sup>2</sup> (Reaction wheel)		
3	100 cm <sup>2</sup> (Antena)		
4	485 cm <sup>2</sup> (Extension sheer)		
5	350 cm <sup>2</sup> (Sensors)		
7	500cm <sup>2</sup> (Solar panel)	<u>Galvanized Iron Sheet (3 ft x 8 ft x 0.5 mm) at Rs. 820/sheet</u>  <u>Total Area Required = 2 Feet sq.</u>	<b><u>Rs 70</u></b>
8	160 cm <sup>2</sup> (Fuel tank)		
9	200 cm <sup>2</sup> (Pressure tank)		
10	400 cm <sup>2</sup> (Antenna)		
11	100 cm <sup>2</sup> (Reflector stand)		
12	229.6+43 cm <sup>3</sup> (Propulsion system)	Aluminium at Rs. 380/Kg	<b><u>Rs 280</u></b>
13	60 cm (Interface ring)	Mild Steel Square pipe 15x15 at Rs. 300/20ft length	<b><u>Rs 30</u></b>
		<b>Total Cost-</b>	<b><u>Rs 500</u></b>

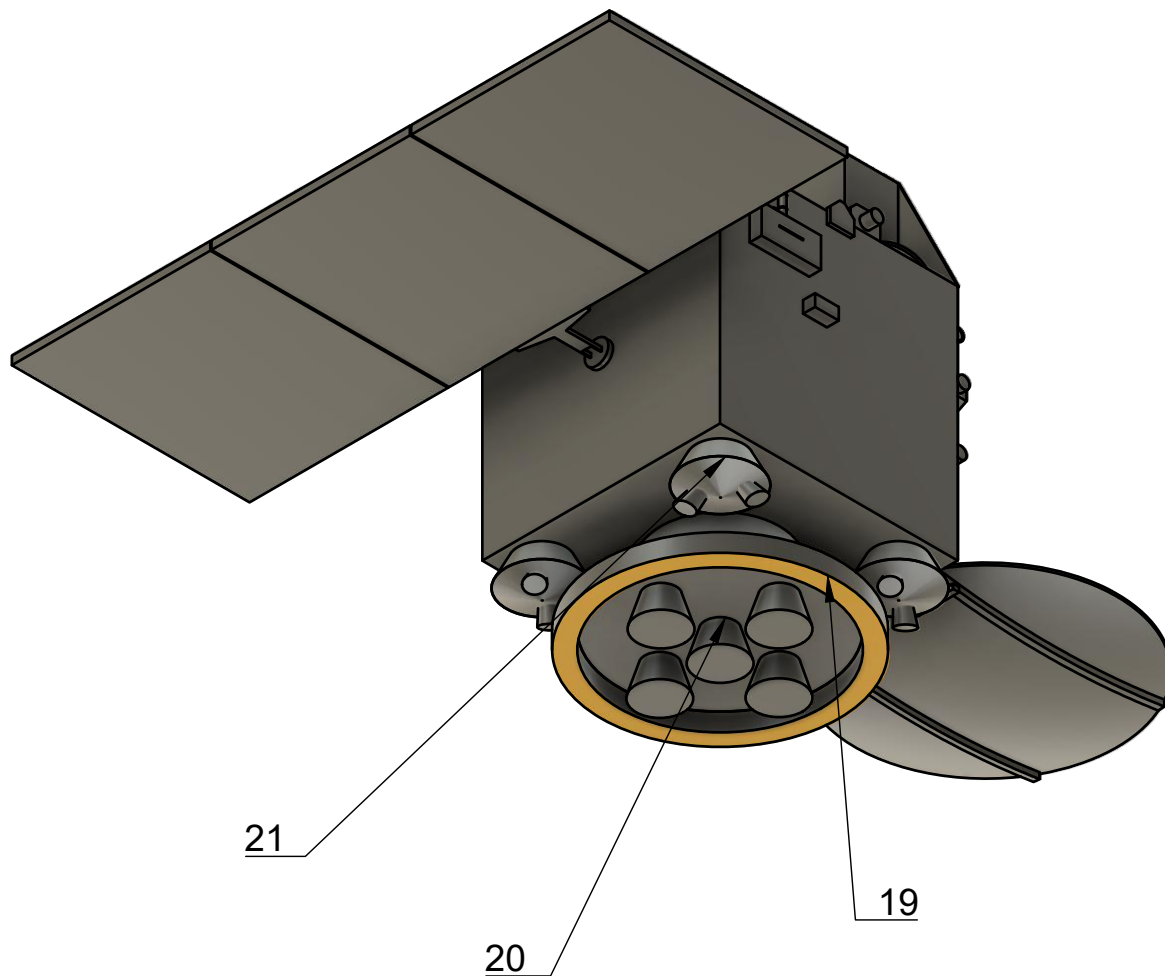




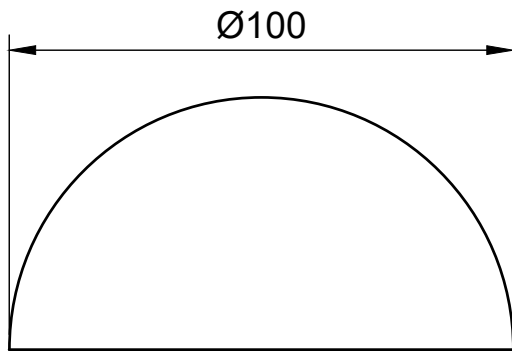
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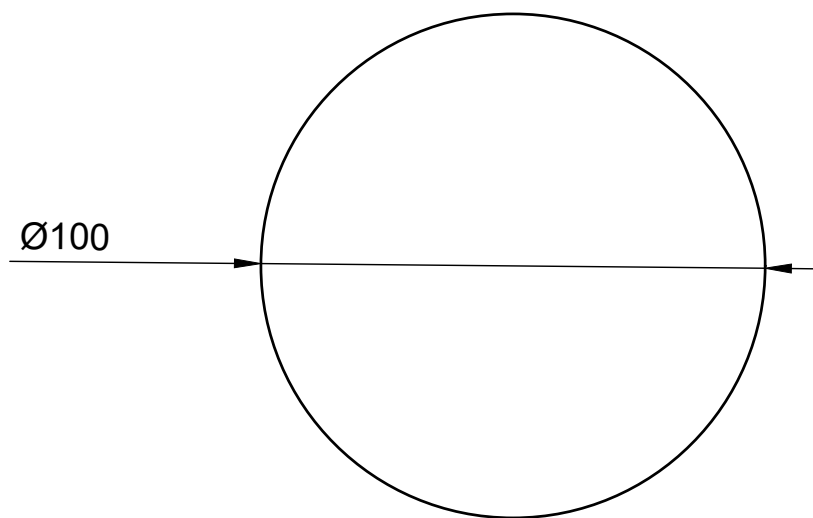
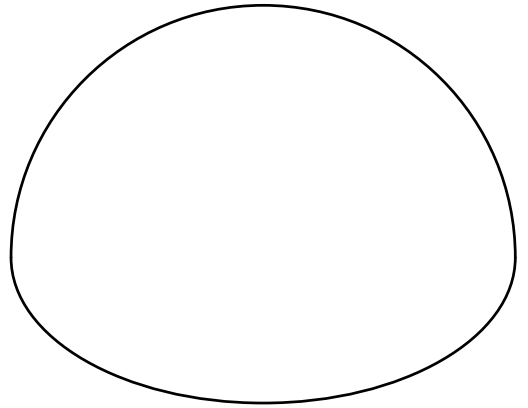
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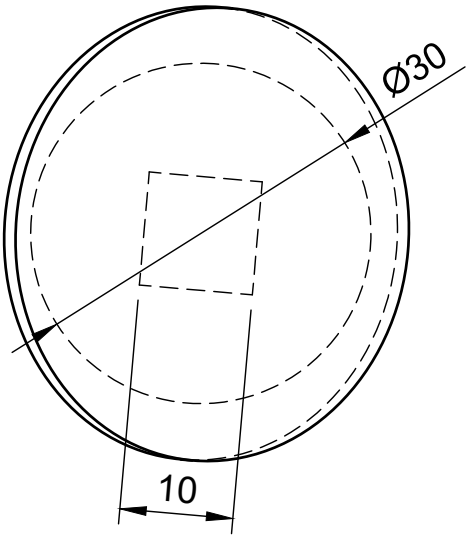
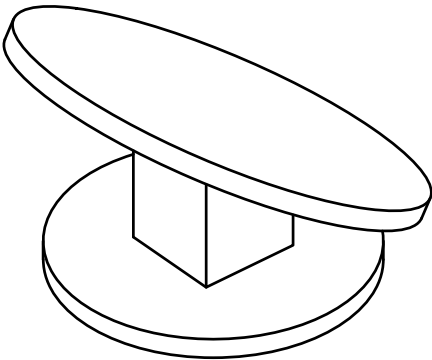
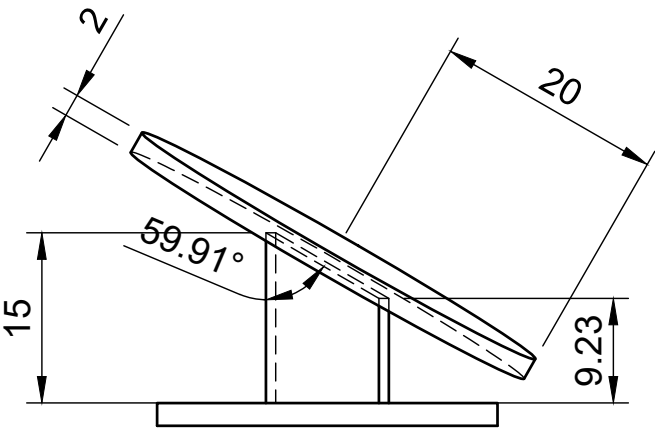
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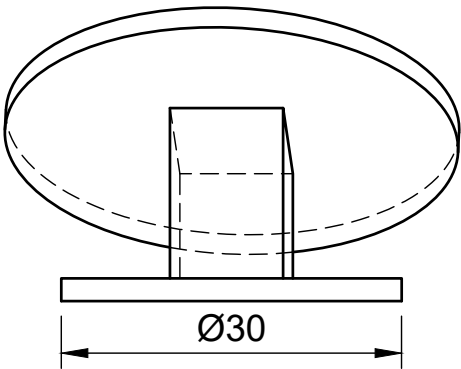
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Front view



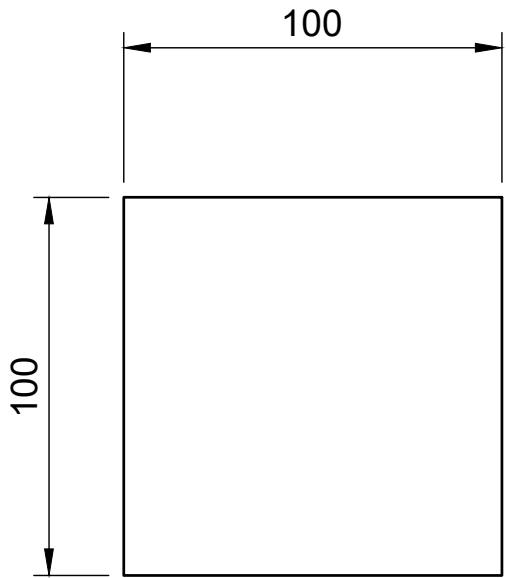
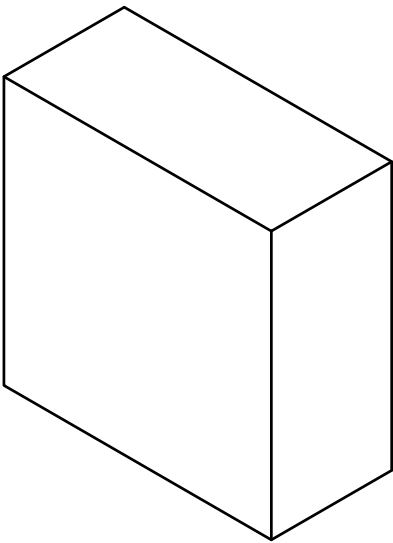
Top View



Side view

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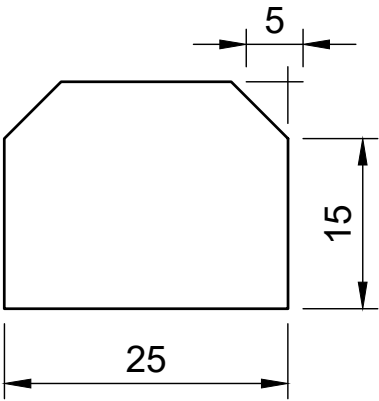
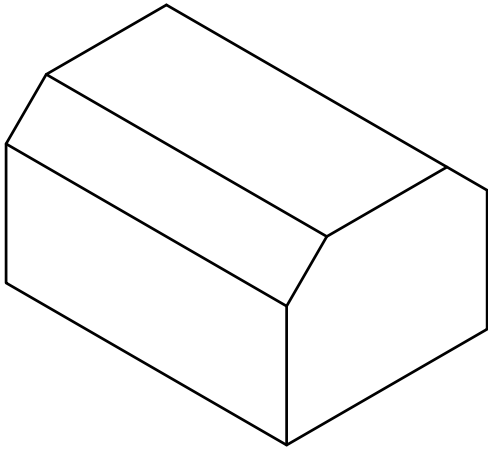
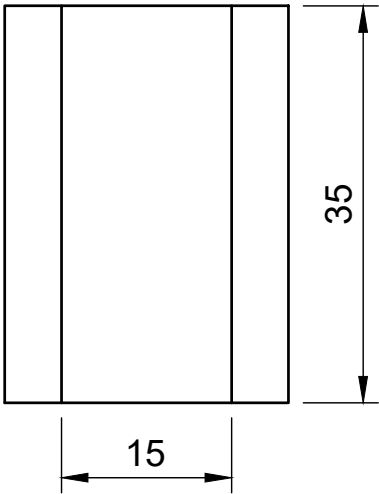
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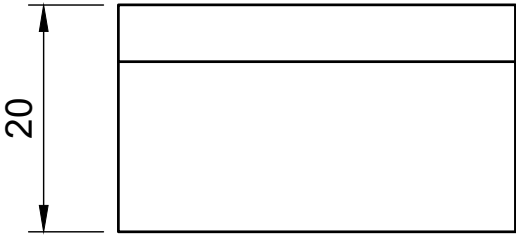
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Top View



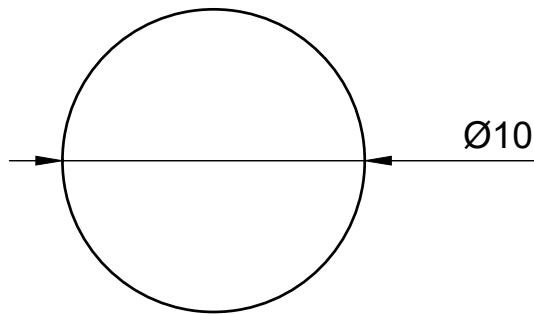
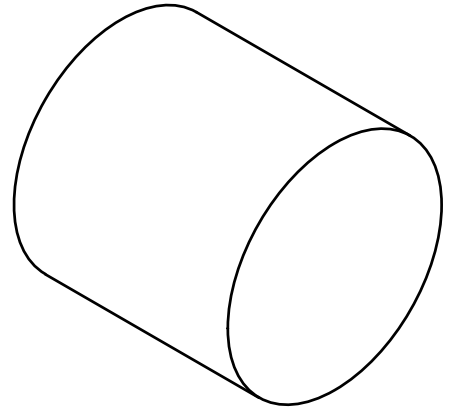
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Top view

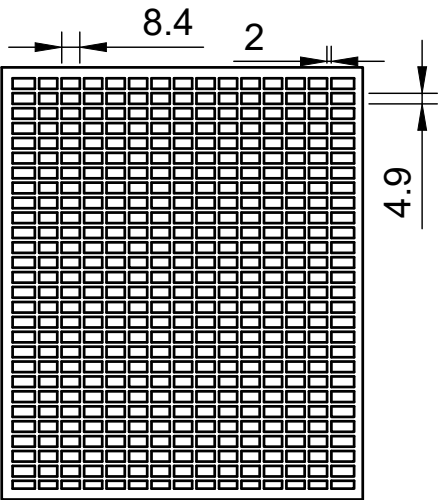
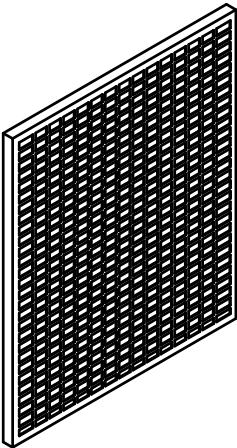
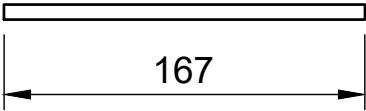


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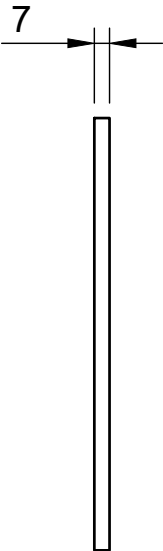
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Top View

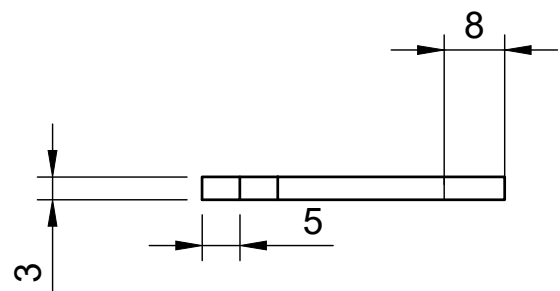
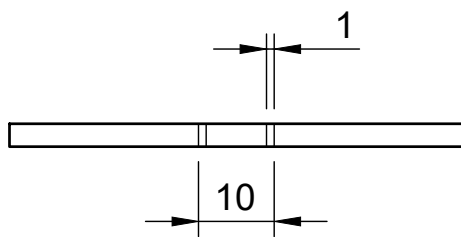
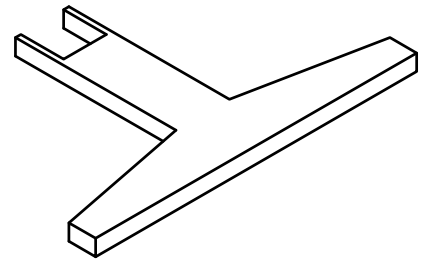
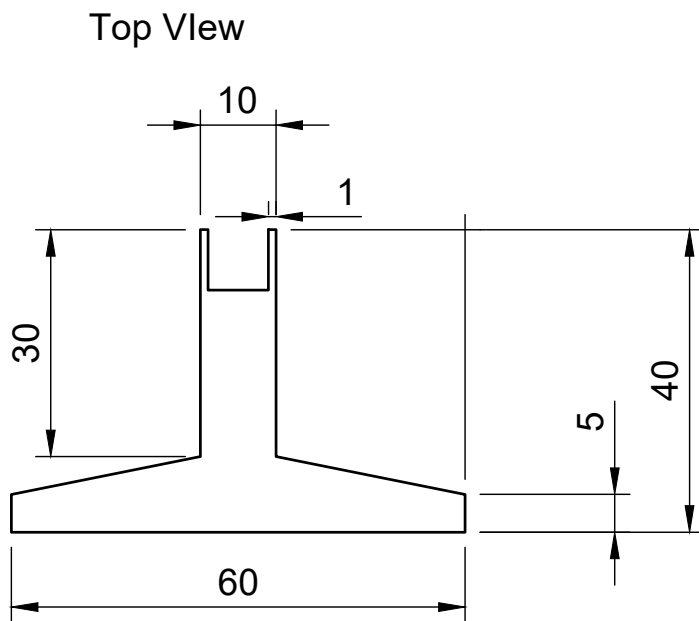


Front View



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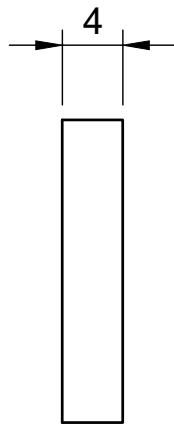
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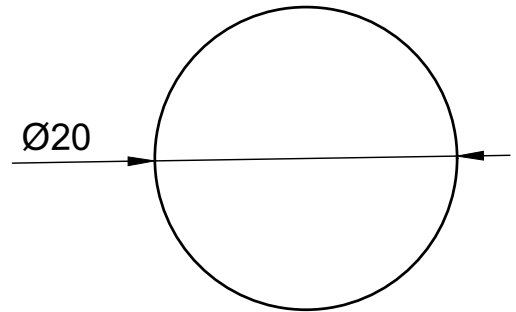
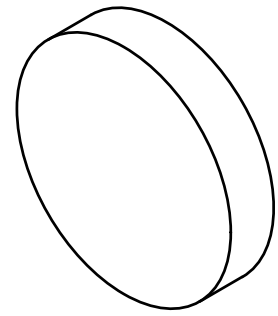
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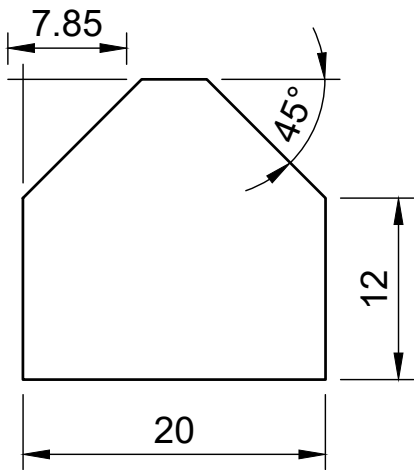
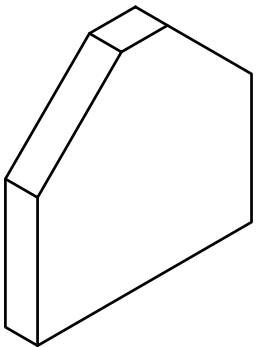
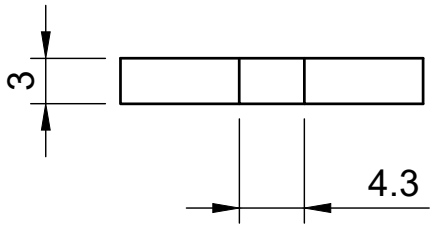
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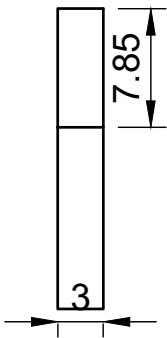
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Top View



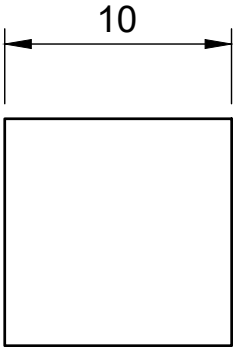
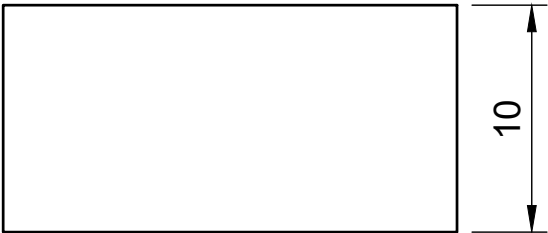
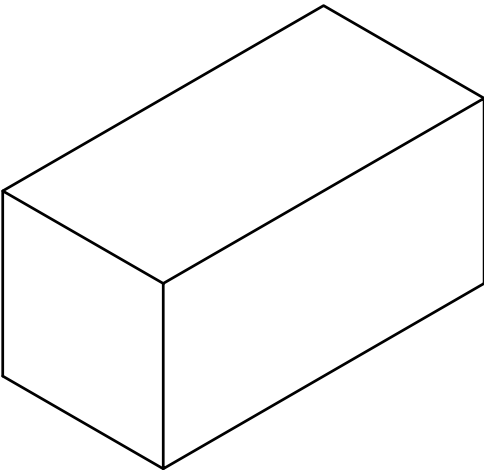
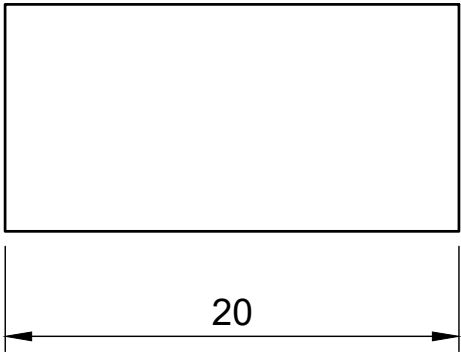
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Side View

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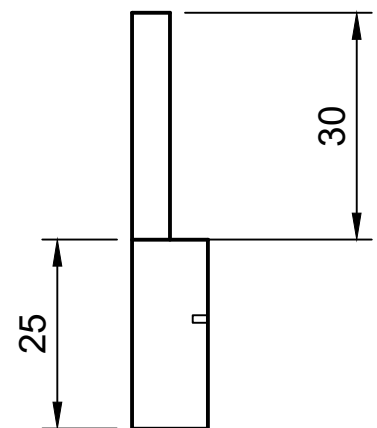
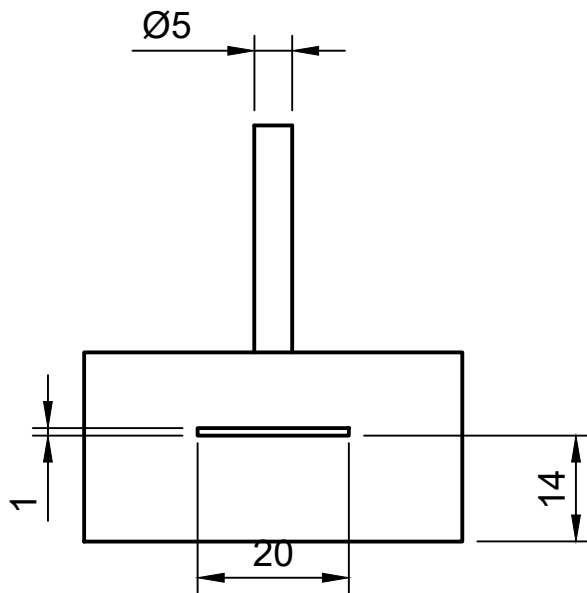
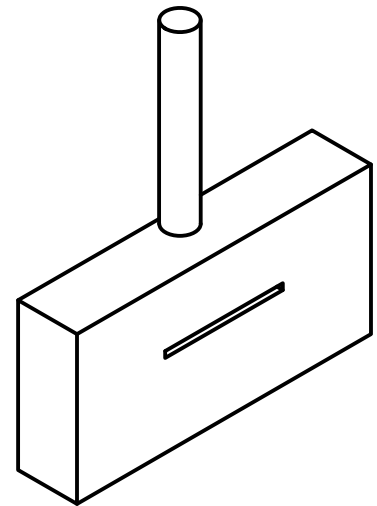
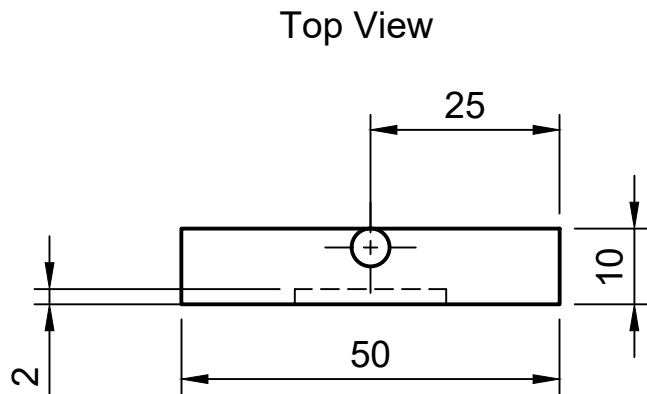
Top View



Front view

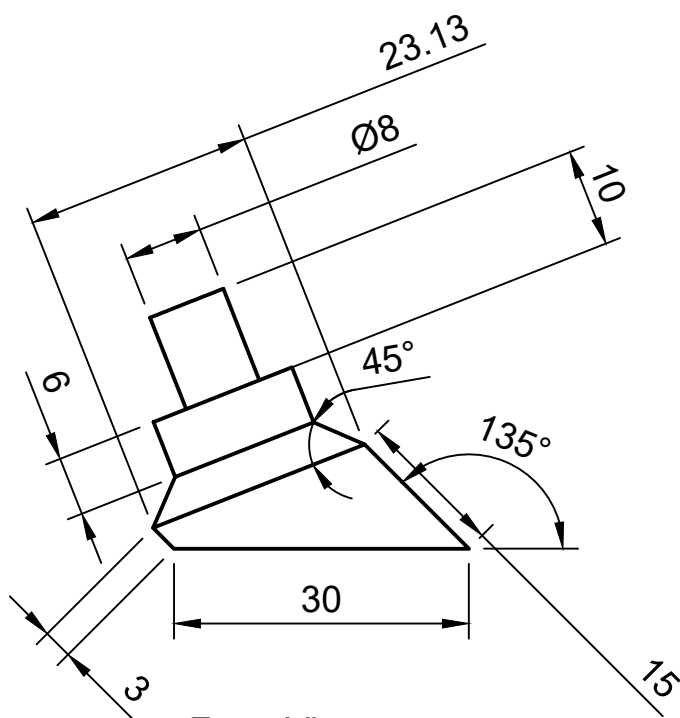
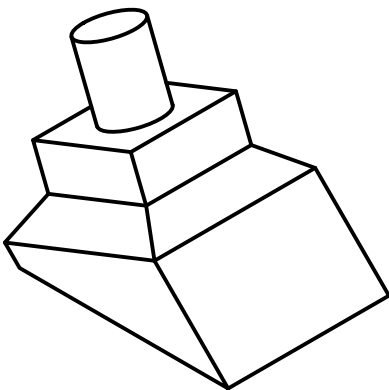
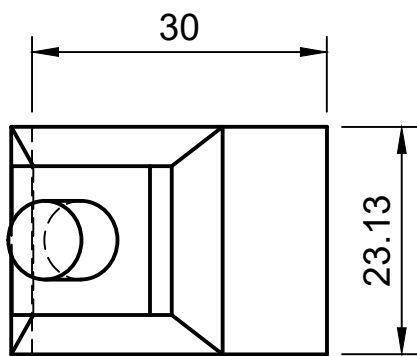
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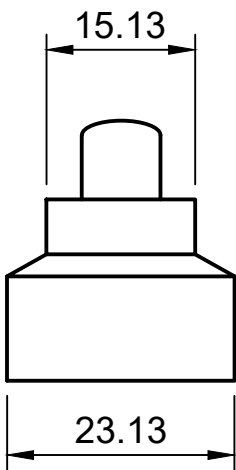


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Top view

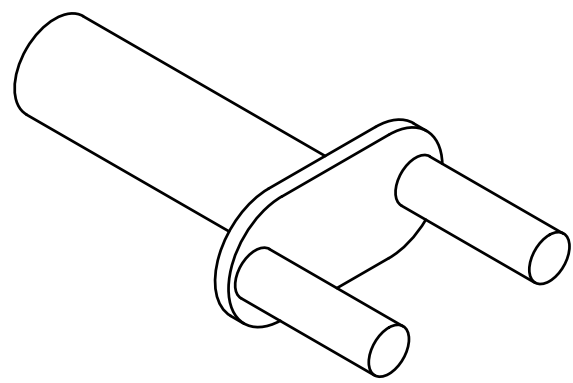


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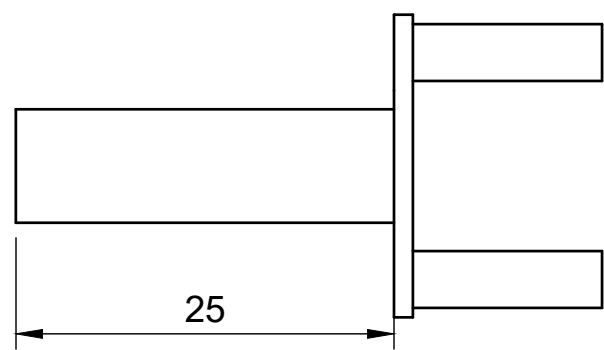


Side View

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Top View

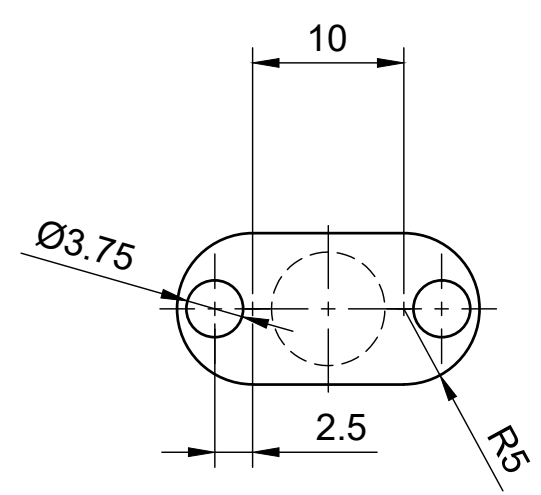
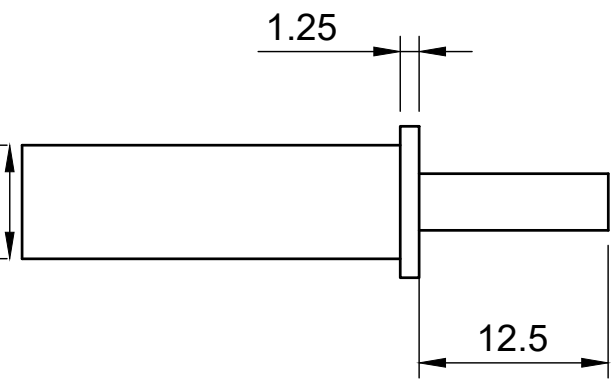


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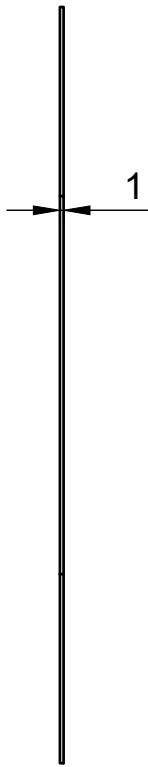
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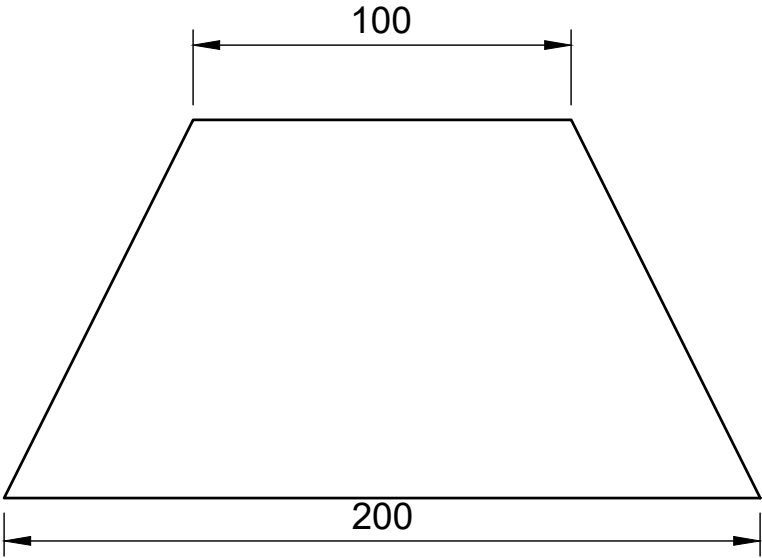
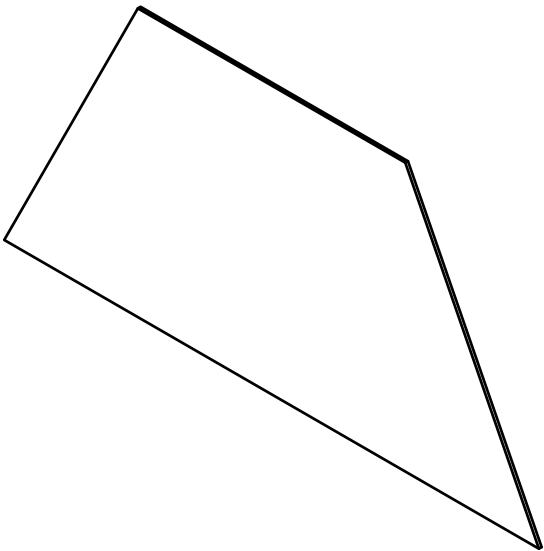
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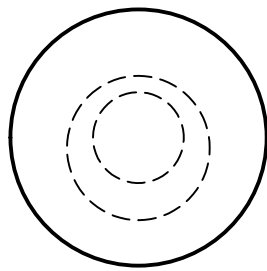
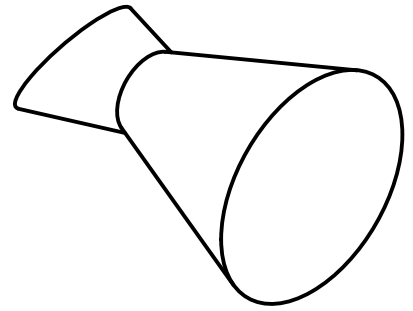
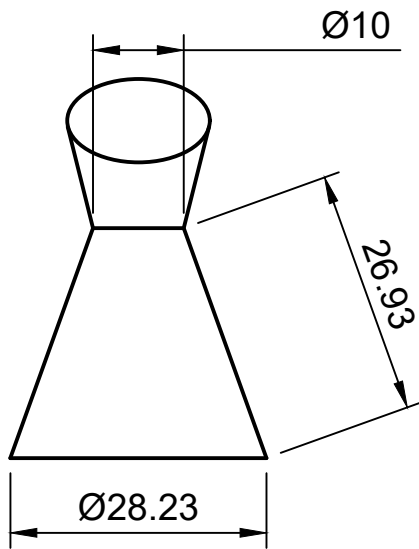
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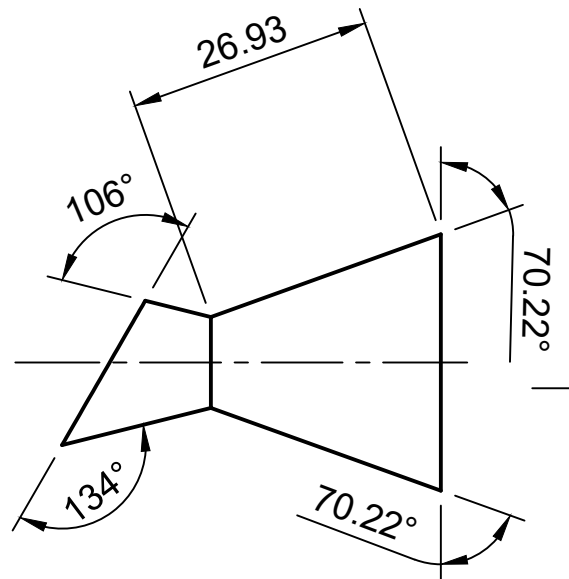
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Top View

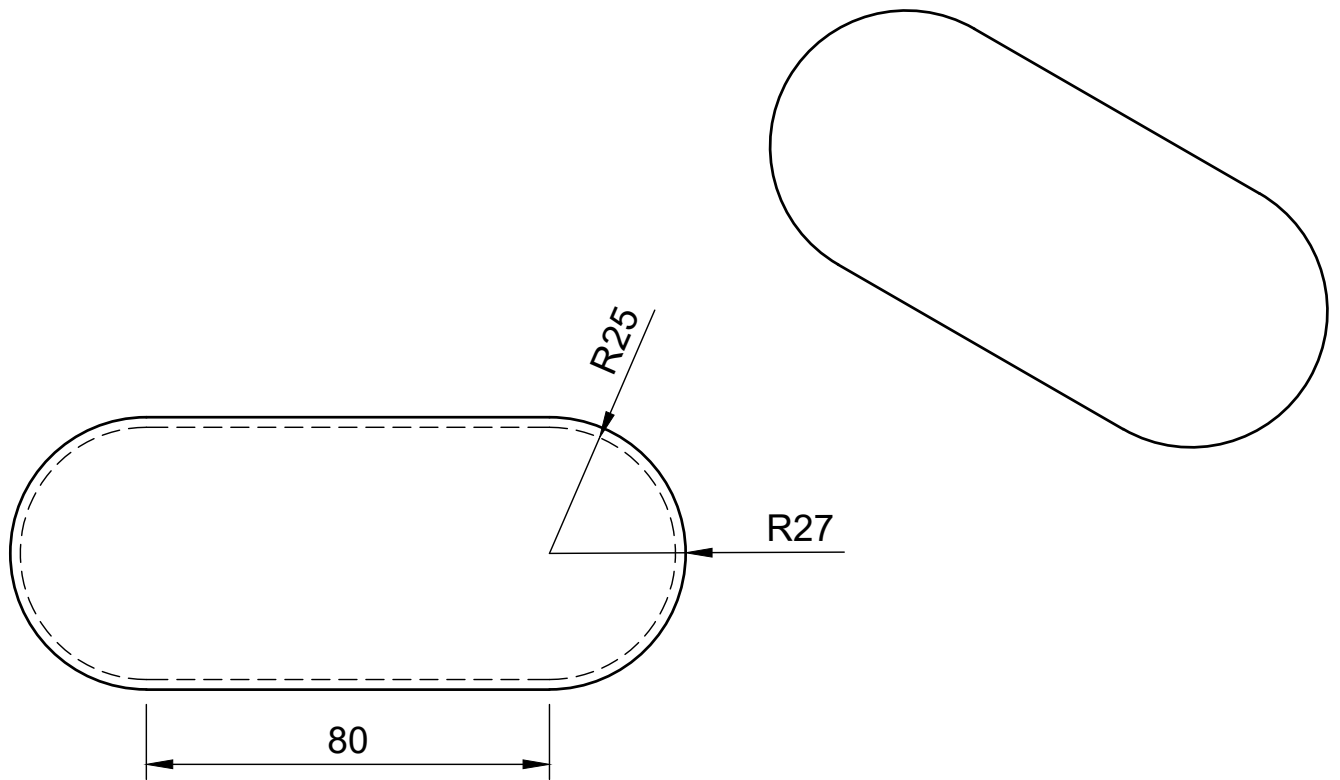


Front View



Side View

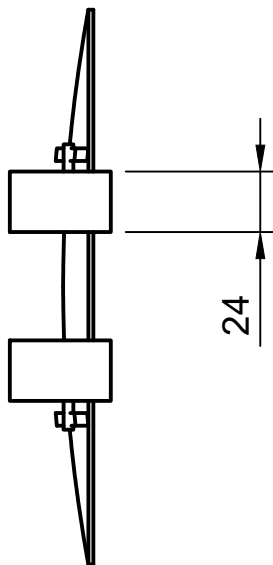
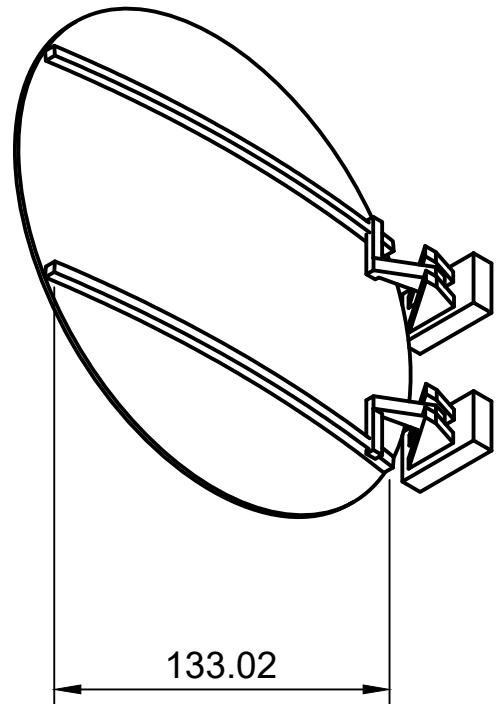
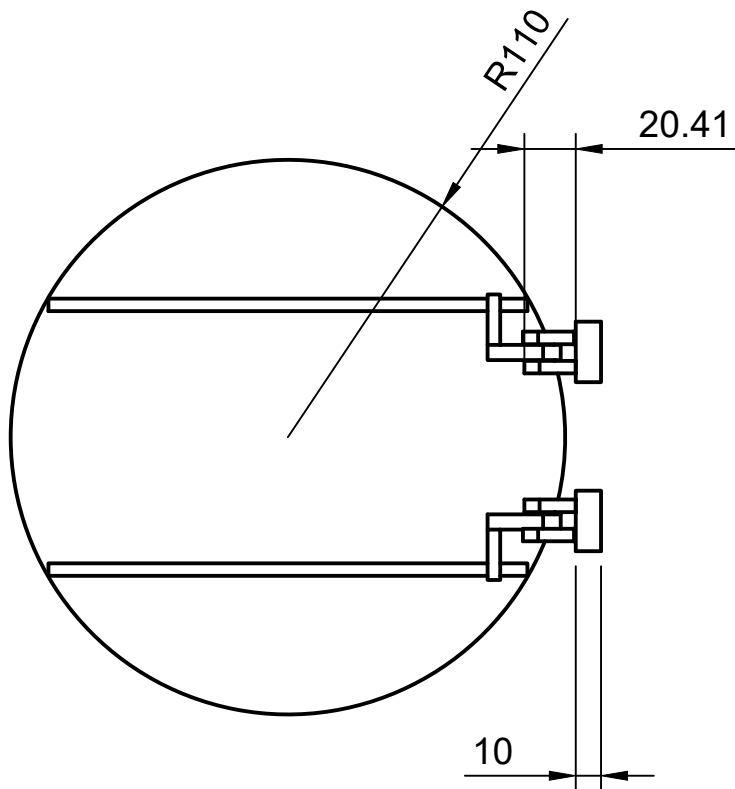
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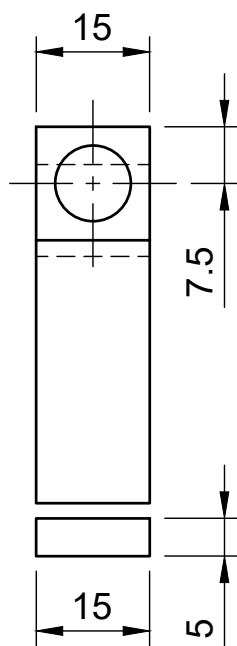
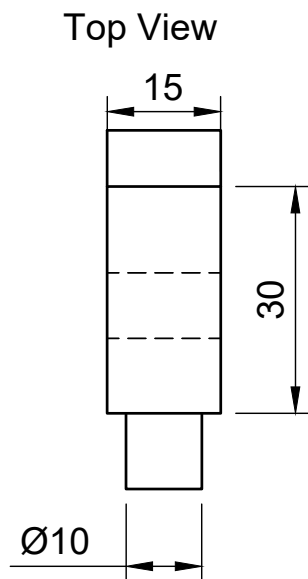
Side View

Front View

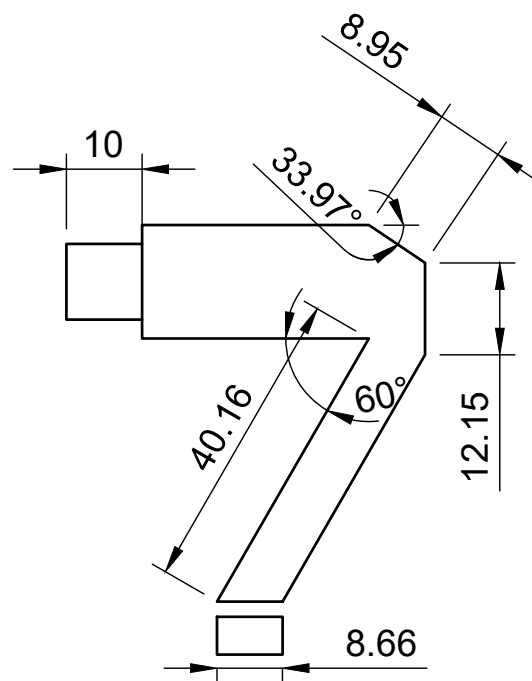
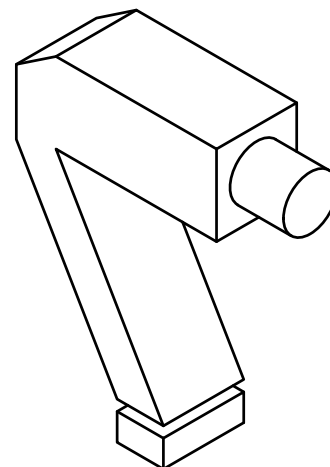
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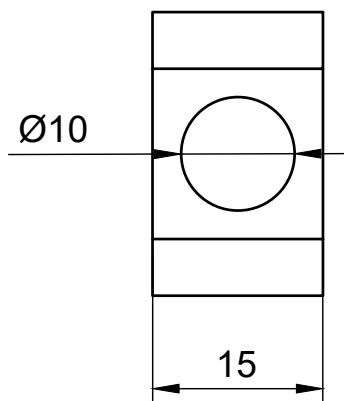
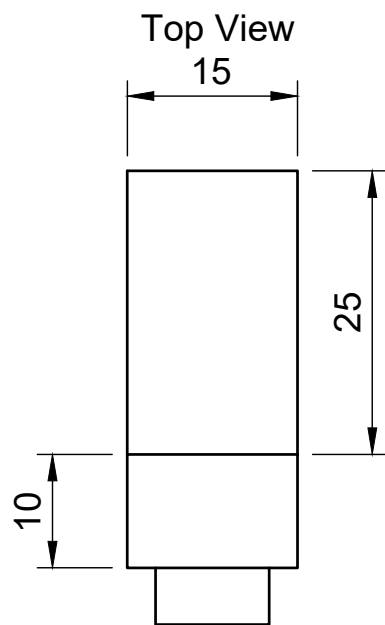


Front View

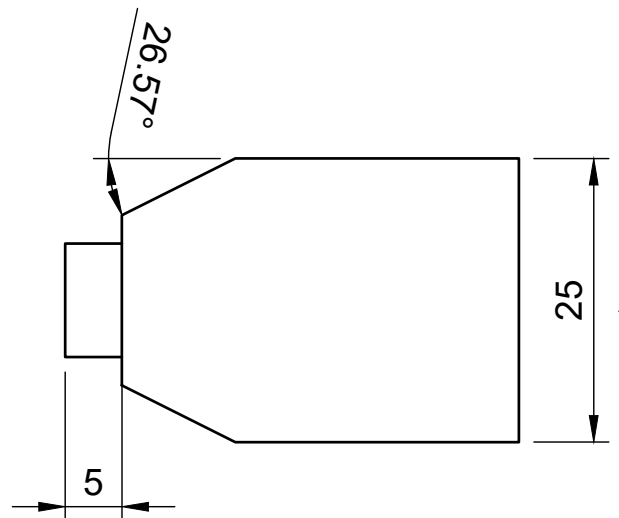
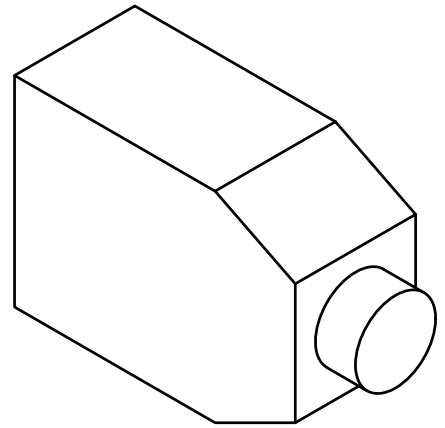


Side view

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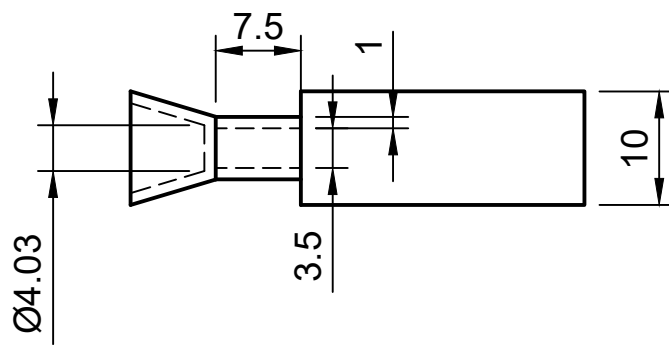
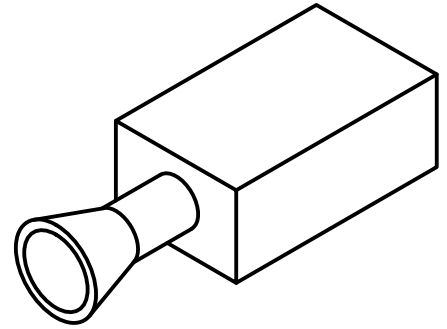
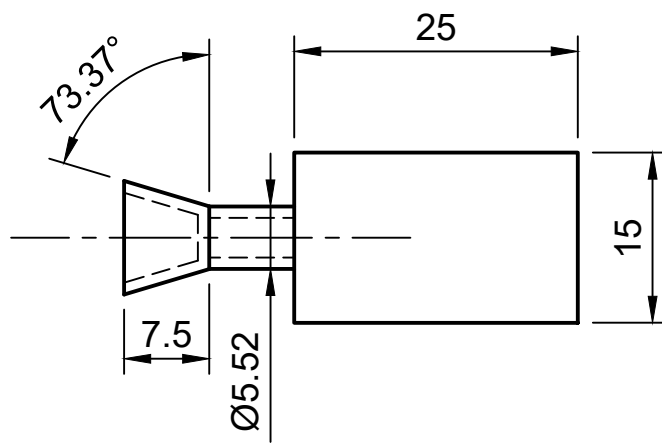
Front view



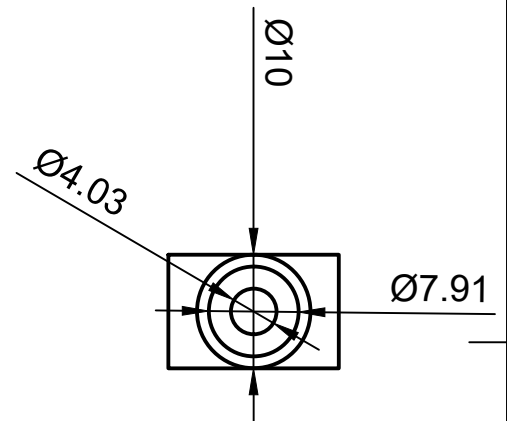
Side View

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Top view

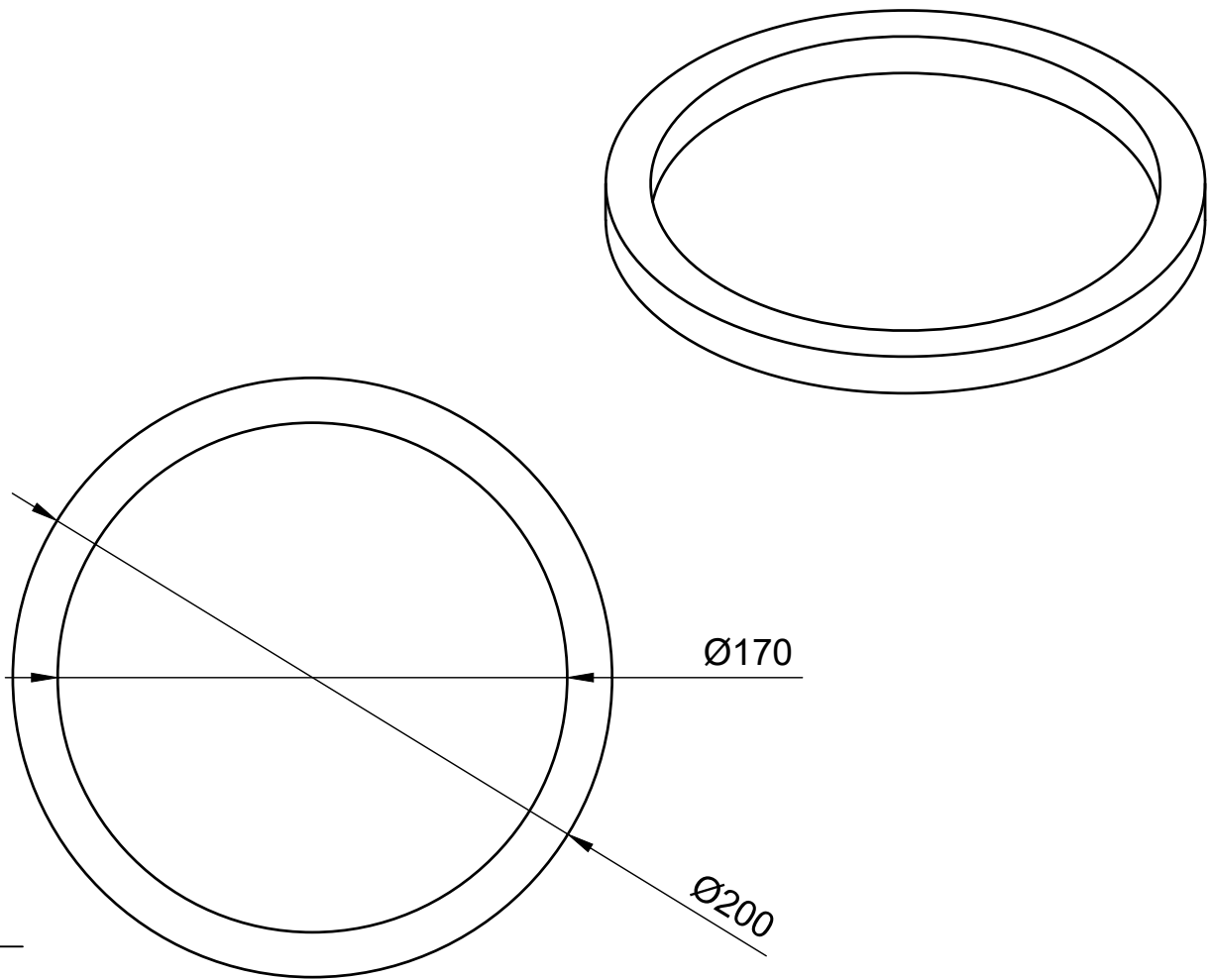


Front View



Side View

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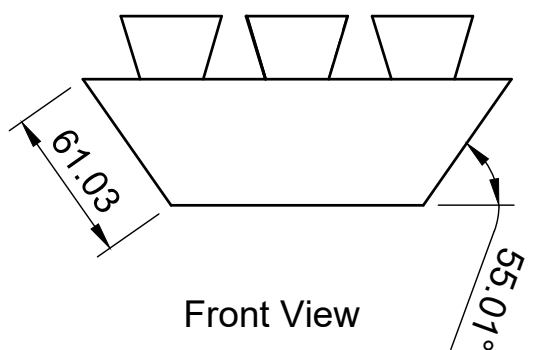
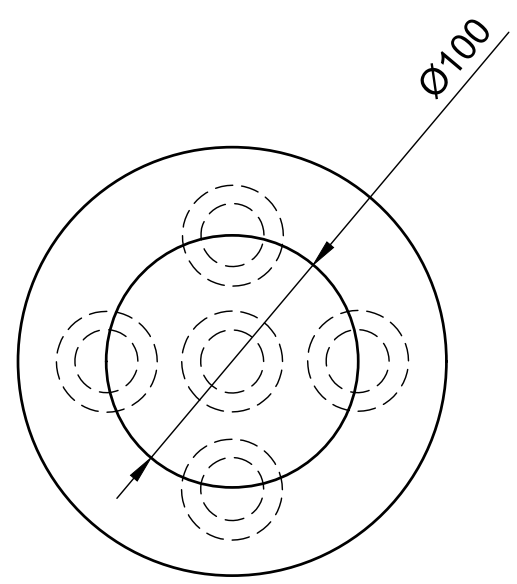
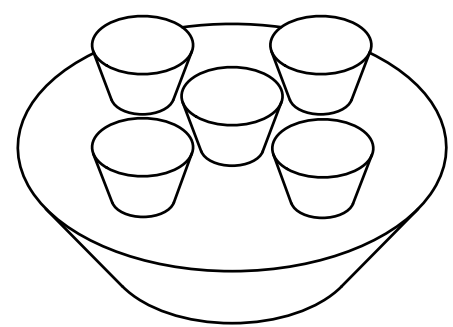
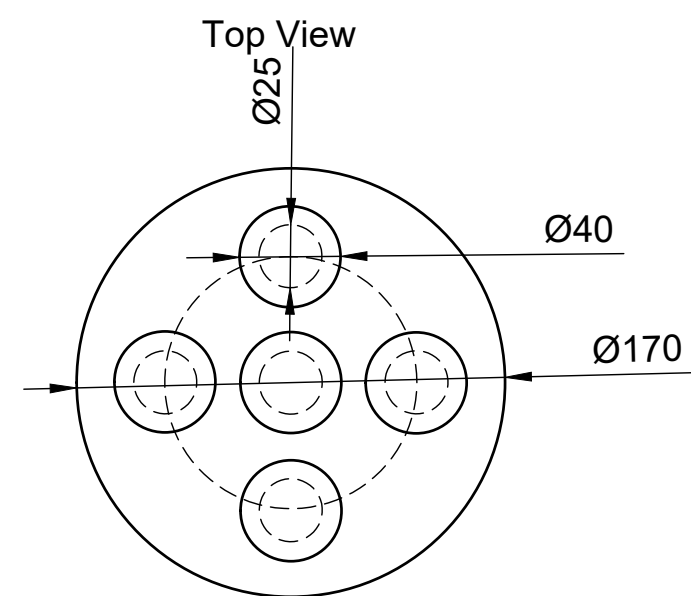


Top Vlew

Front view

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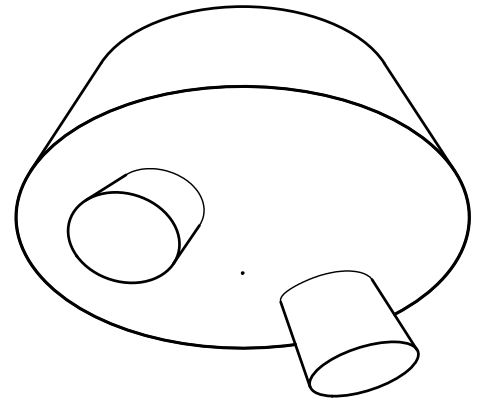
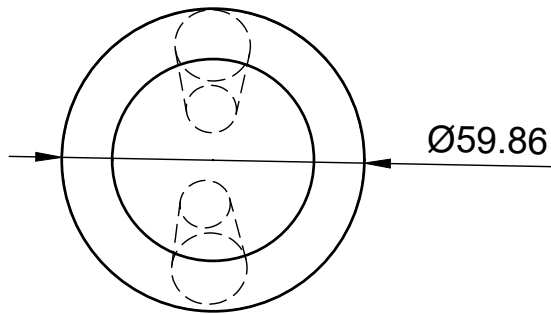


Bottom View

Front View

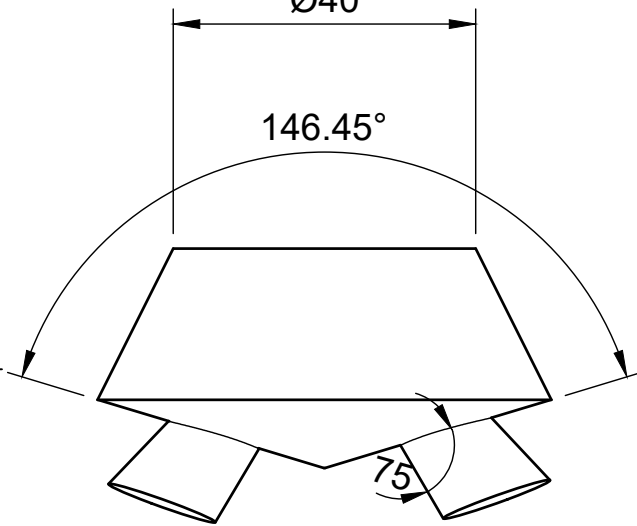
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Top View

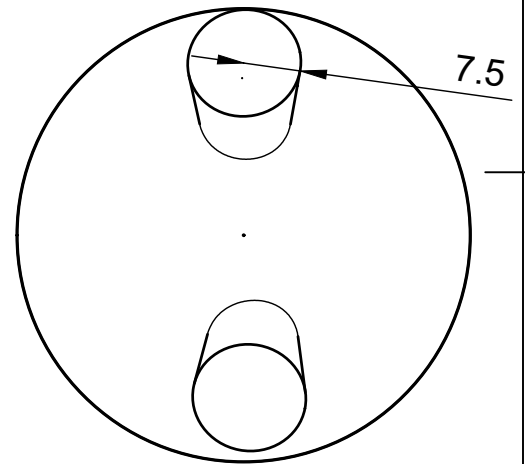


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146.45°



Front View



Bottom View

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		THRUSTER	21		
		Rev.	Date of issue	Sheet	
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