Workshop on Designing an Automatic Hand Sanitiser Dispenser (version 2)
設計自動消毒潔手裝置工作坊 (版本 2)

STEM Education Centre
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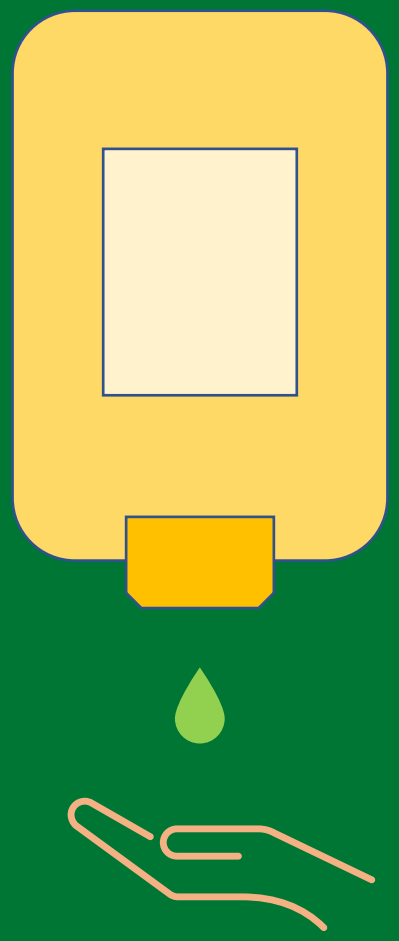
Advantages of an automatic hand sanitizer dispenser:

- Non-contact:
  No direct touch and no bacterial colonies will be left behind
- Dispenses pre-measured quantity:
  Dispensers will only distribute a set amount of sanitizer
- Can work for different kinds of liquids:
  The mechanisms of the dispenser that work for soap may also work for other liquids
- High-quality environmental protection:
  Good recycling



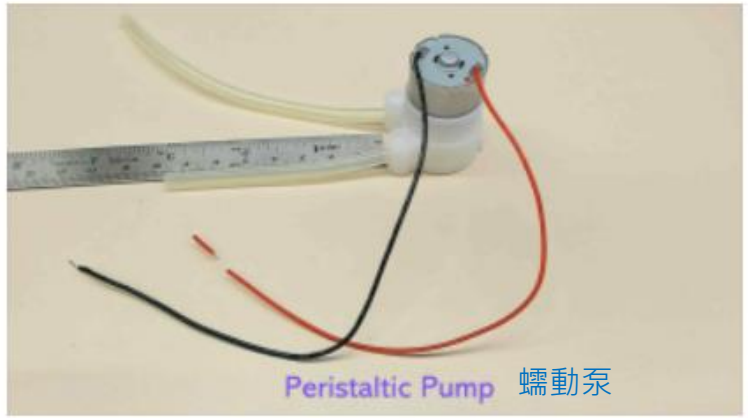
Workshop on Designing an Automatic Hand Sanitiser Dispenser

設計自動消毒潔手裝置工作坊

List of major pieces of equipment

紅外線避障傳感器模組
Infrared Obstacle Avoidance Sensor

1路繼電器模組
1 Channel Relay Module



Peristaltic Pump 蠕動泵

Dispenser Head

Plastic Bottle

9V battery

與科技教育學習領域相關的學習元素

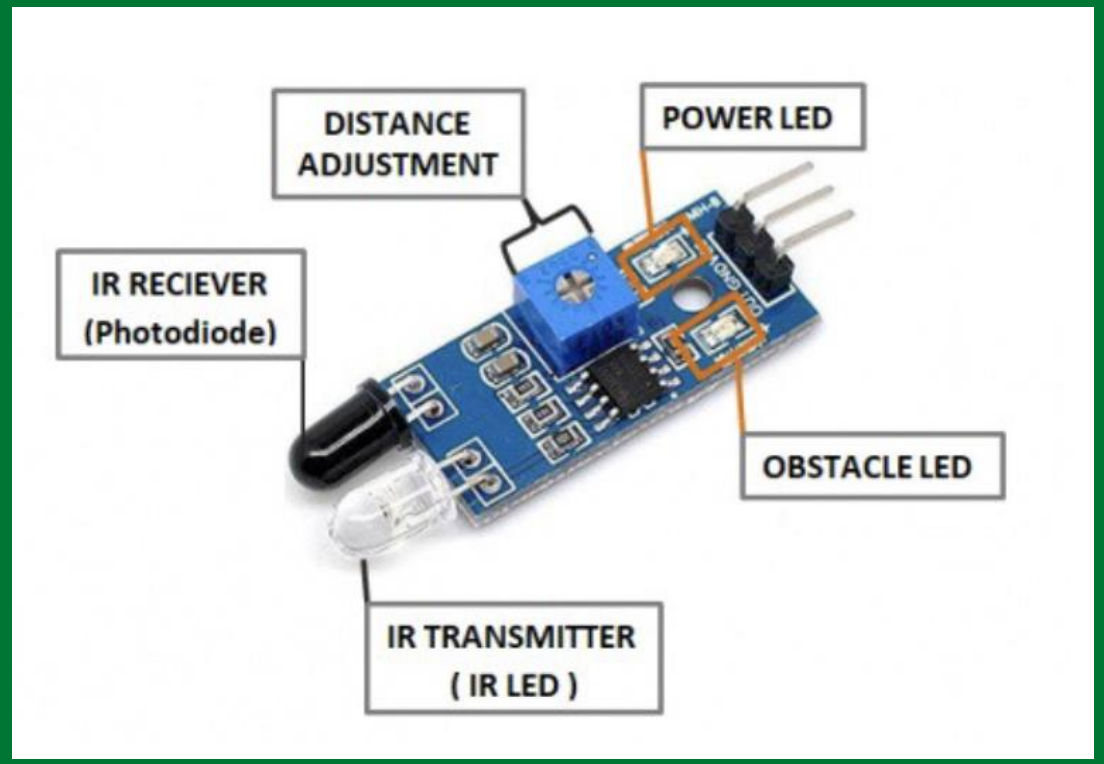
(第三學習階段 中一至中三)

知識範圍	學習元素	學習重點
共通課題	設計及應用	• 根據功能、美學及其他方面的標準，設計和評鑑一些產品或系統。
營運和製造	工具及儀器	• 運用工具、機器或設備來實踐設計方案。
系統和控制	系統應用	• 理解機械、電力、電子和氣動工具在控制系統中的功用。
	控制與自動化	• 認識到控制和自動化科技在現有產品上的不同應用。 • 使用電子、微型處理器及電腦，來達致控制自動化。 • 理解電腦輔助製造的各項優點與限制。

WORKING PRINCIPLE

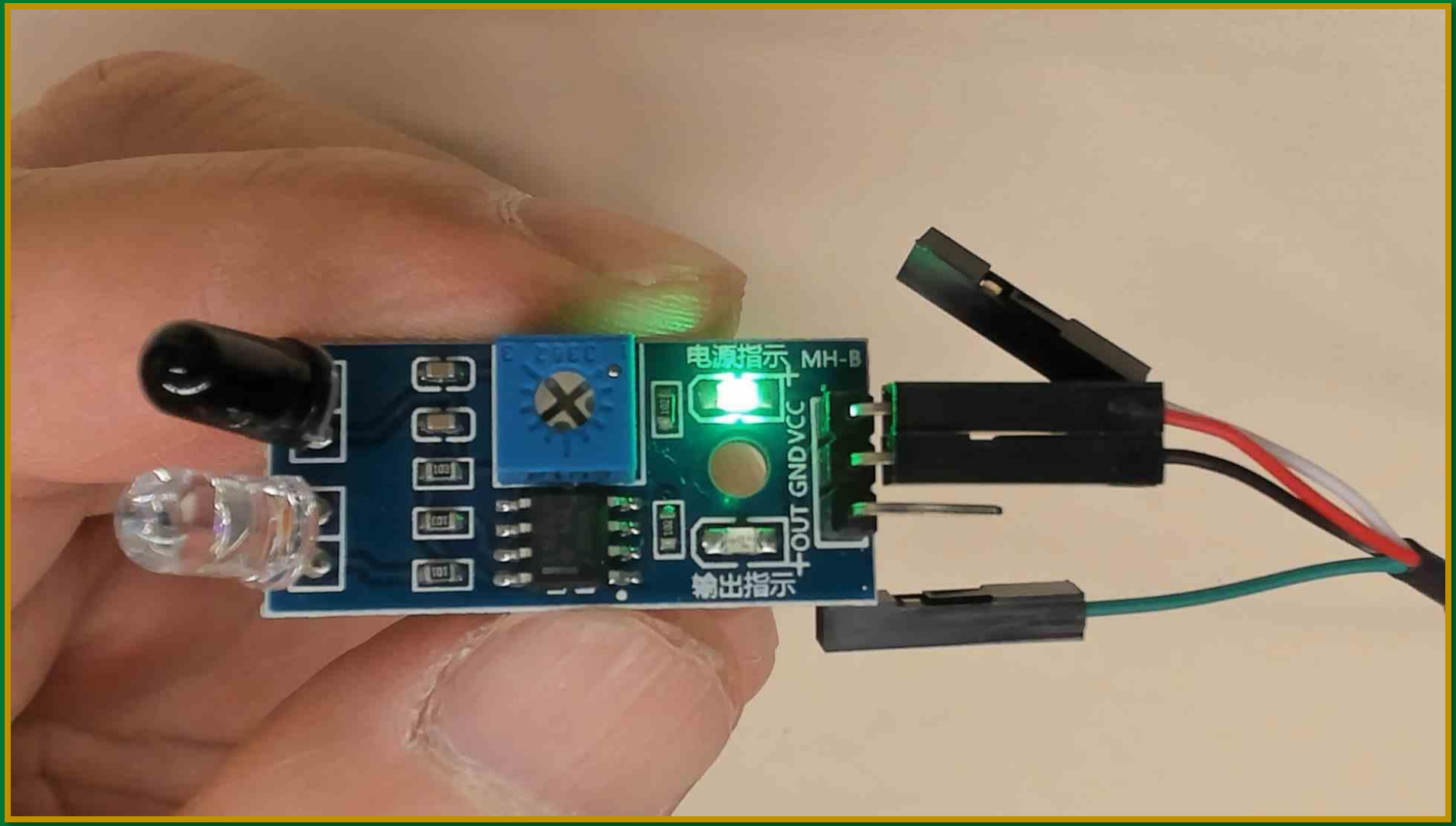
1. When we use sanitiser to wash our hands, we should place them under the nozzle and in front of the Infrared Obstacle Avoidance Sensor Module of the dispenser

Infrared Obstacle Avoidance Sensor Module has a built-in IR transmitter and IR receiver that sends out IR energy and looks for reflected IR energy to detect the presence of any obstacle in front of the sensor module.
When the signal module detects obstacles ahead, the green indicator light on the circuit board will be on and at the same time the OUT port will output low level signal



Demonstration

Calibration: Modify the sensitivity of the Infrared Obstacle Avoidance Sensor



WORKING PRINCIPLE

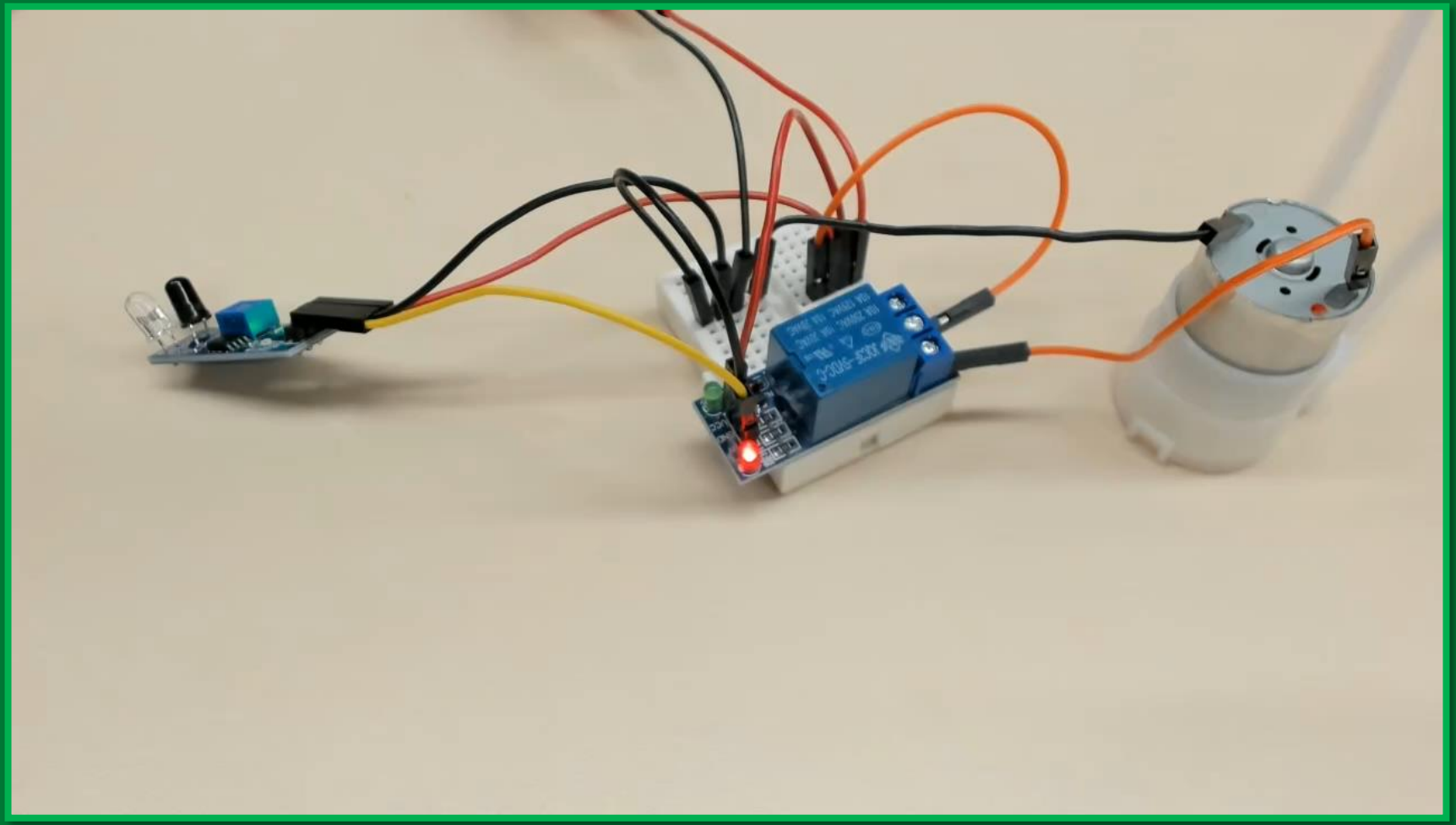
2. When the One Channel Relay Module receives a signal from the Infrared Obstacle Avoidance Sensor Module

The relay is broken out to 3 blue screw pin terminals. The terminals are labelled for their function: “common”, “normally closed” and “normally open” and they explain the state of the channel with relation to the switch at rest.
A normally open configuration (常開) is used and the relay is always open and remains open until the infrared obstacle avoidance sensor module sends a signal to it to close the circuit.

Demonstration

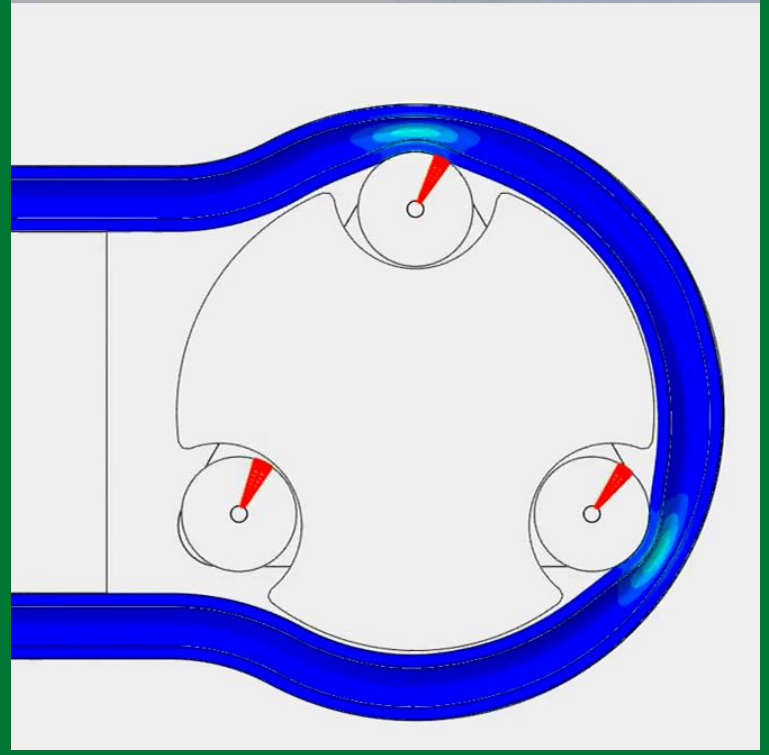
WORKING PRINCIPLE

3. When the circuit is closed by the One Channel Relay Module, the Peristaltic Pump connected will be turned on



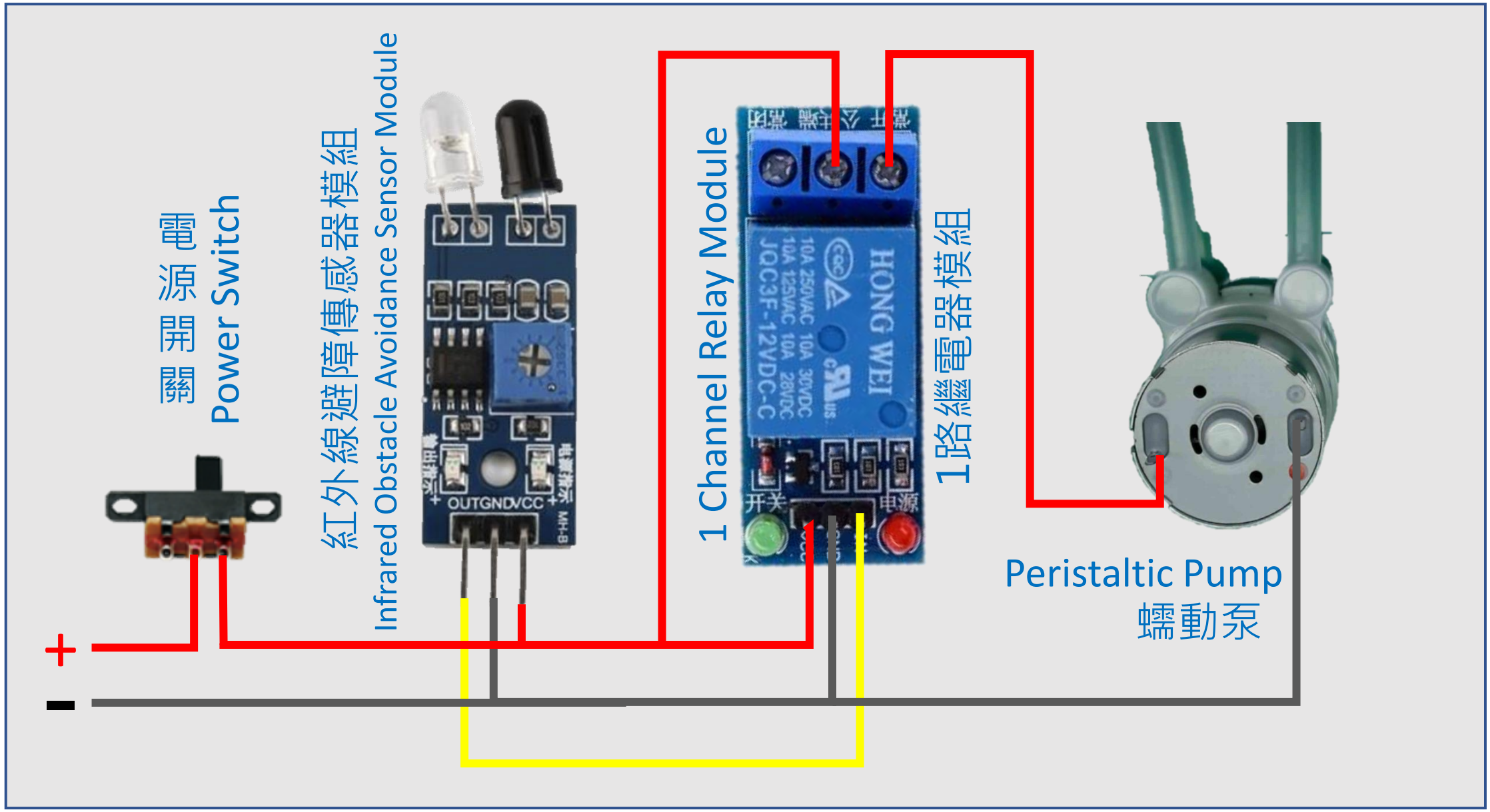
How Do Peristaltic Pumps 蠕動泵 Work?

- Liquid is fed through the tubing by rollers that rotate squeezing a flexible tube against the pump housing.
- As the roller moves over the tubing, it creates a vacuum to allow more liquid to enter.
- These rotating rollers block the tube, creating a temporary seal between the liquid inlet and the outlet.
- As the rotor turns, the sealed pressure segments will move along the tube, forcing the liquid into the discharge outlet.



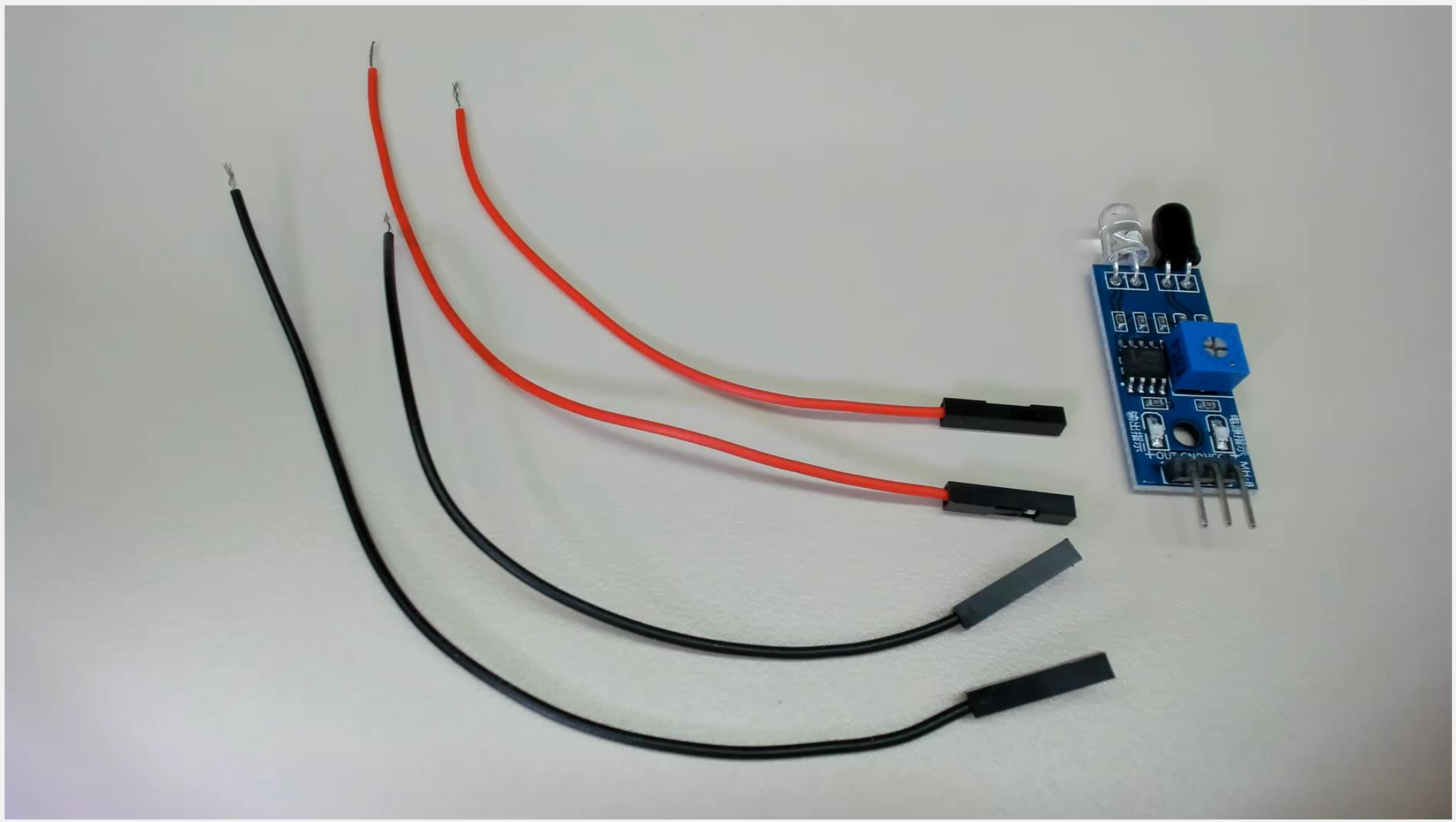
https://www.youtube.com/embed/IuKRNki-Vxo

Simple Wiring Diagram



Hands-on activity: Wiring electronic components

1



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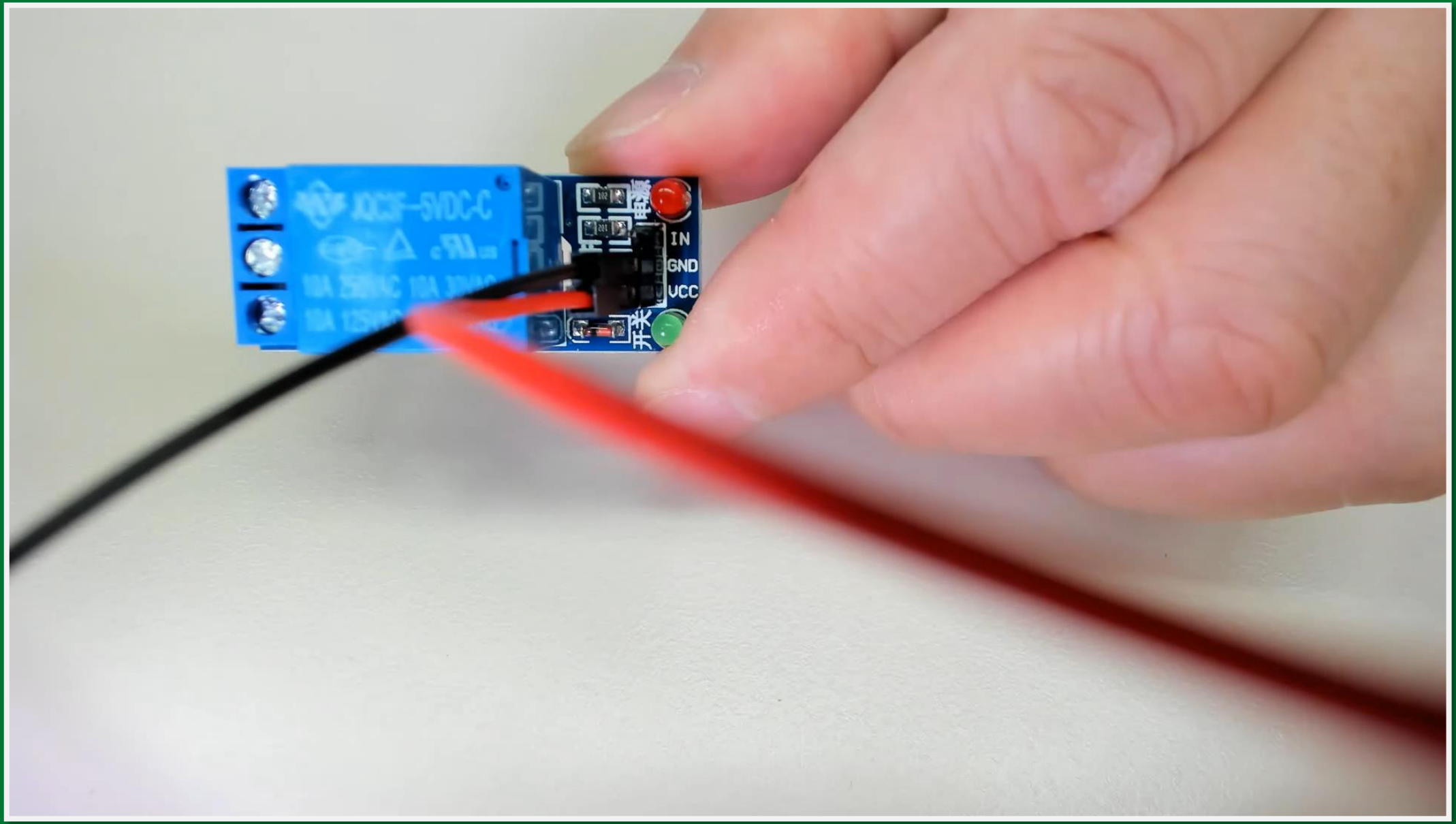
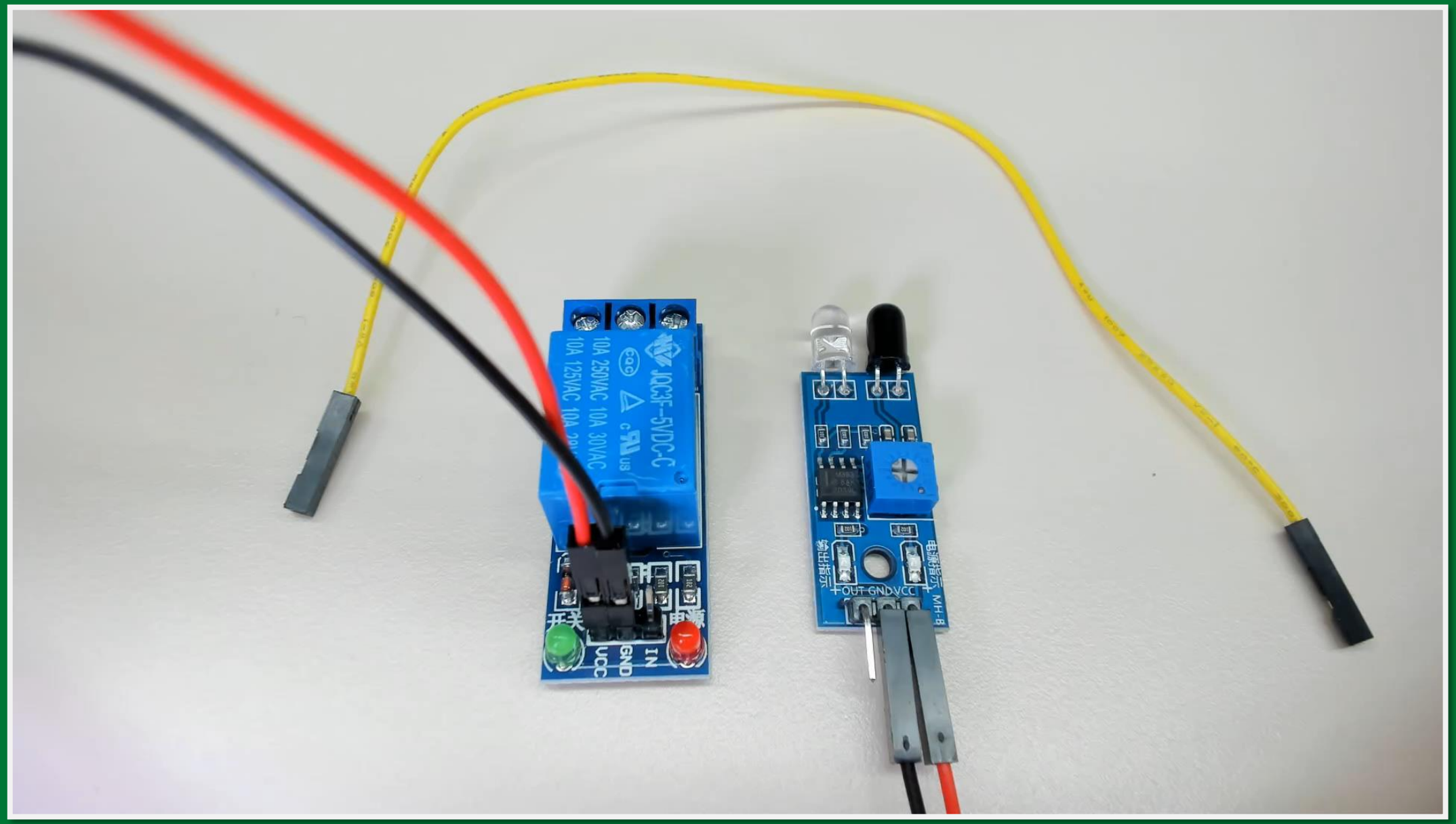
2



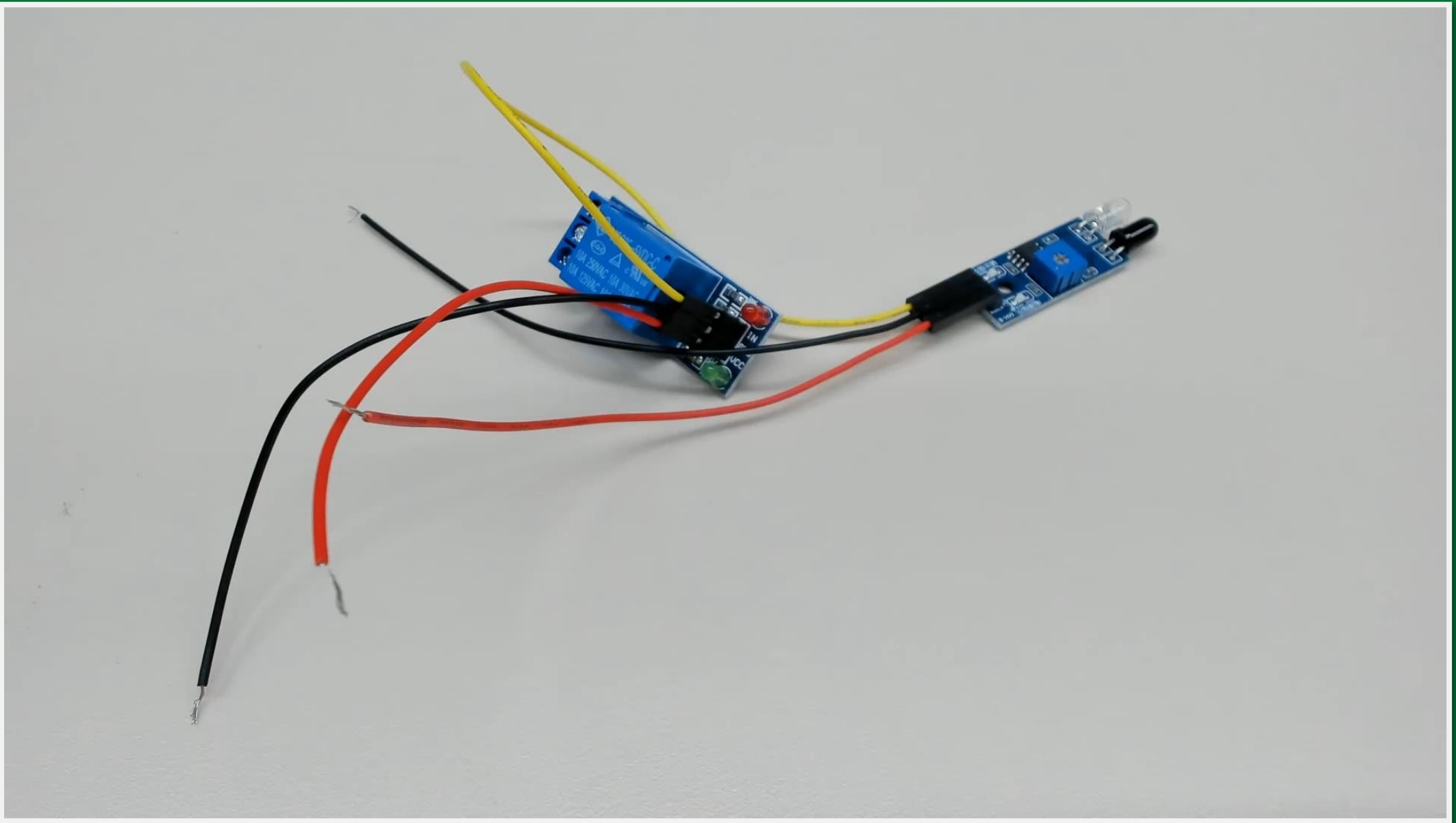
Hands-on activity: Wiring electronic components

3a



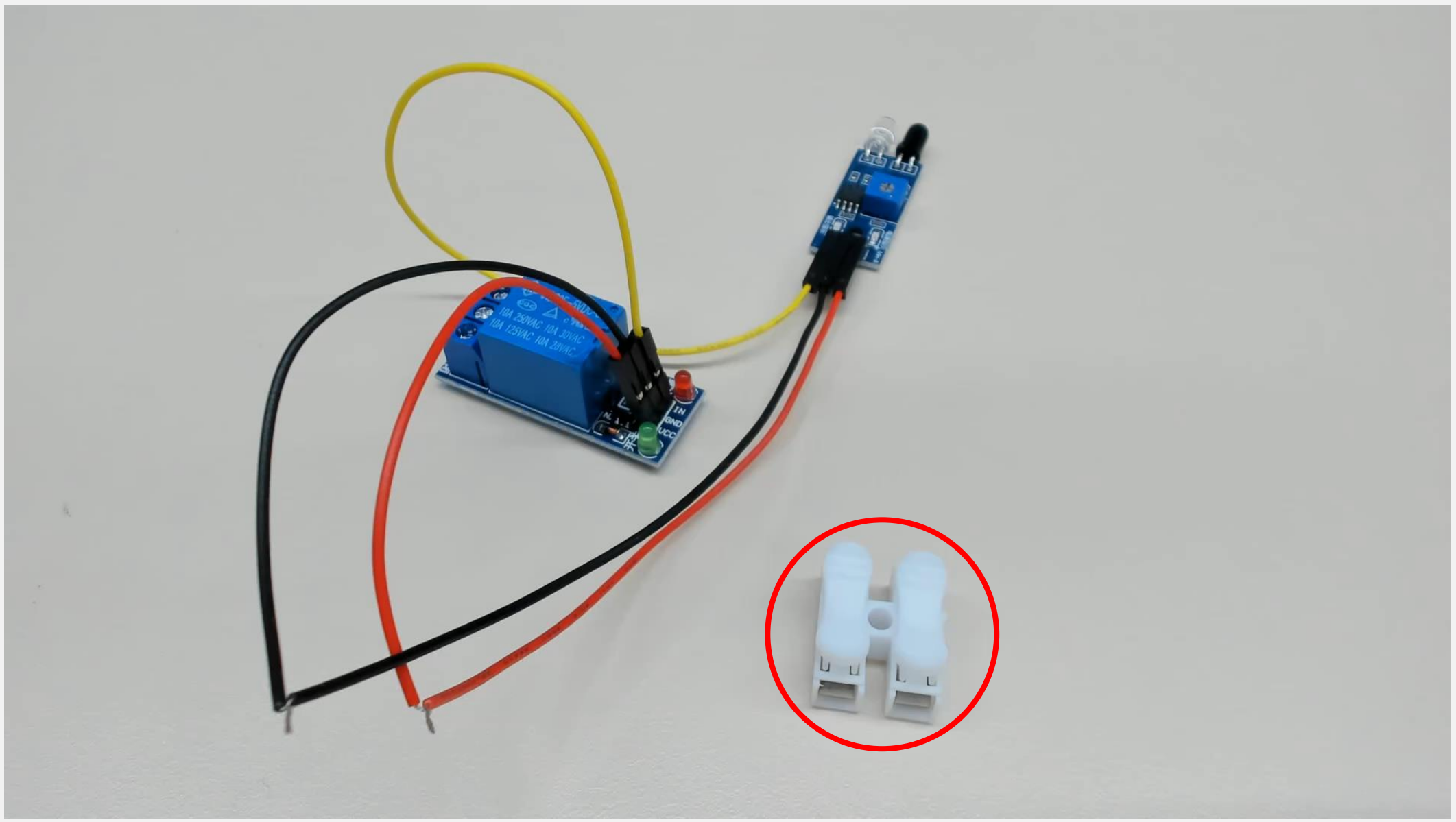
Hands-on activity: Wiring electronic components

3b



Hands-on activity: Wiring electronic components

3c



Hands-on activity: Wiring electronic components

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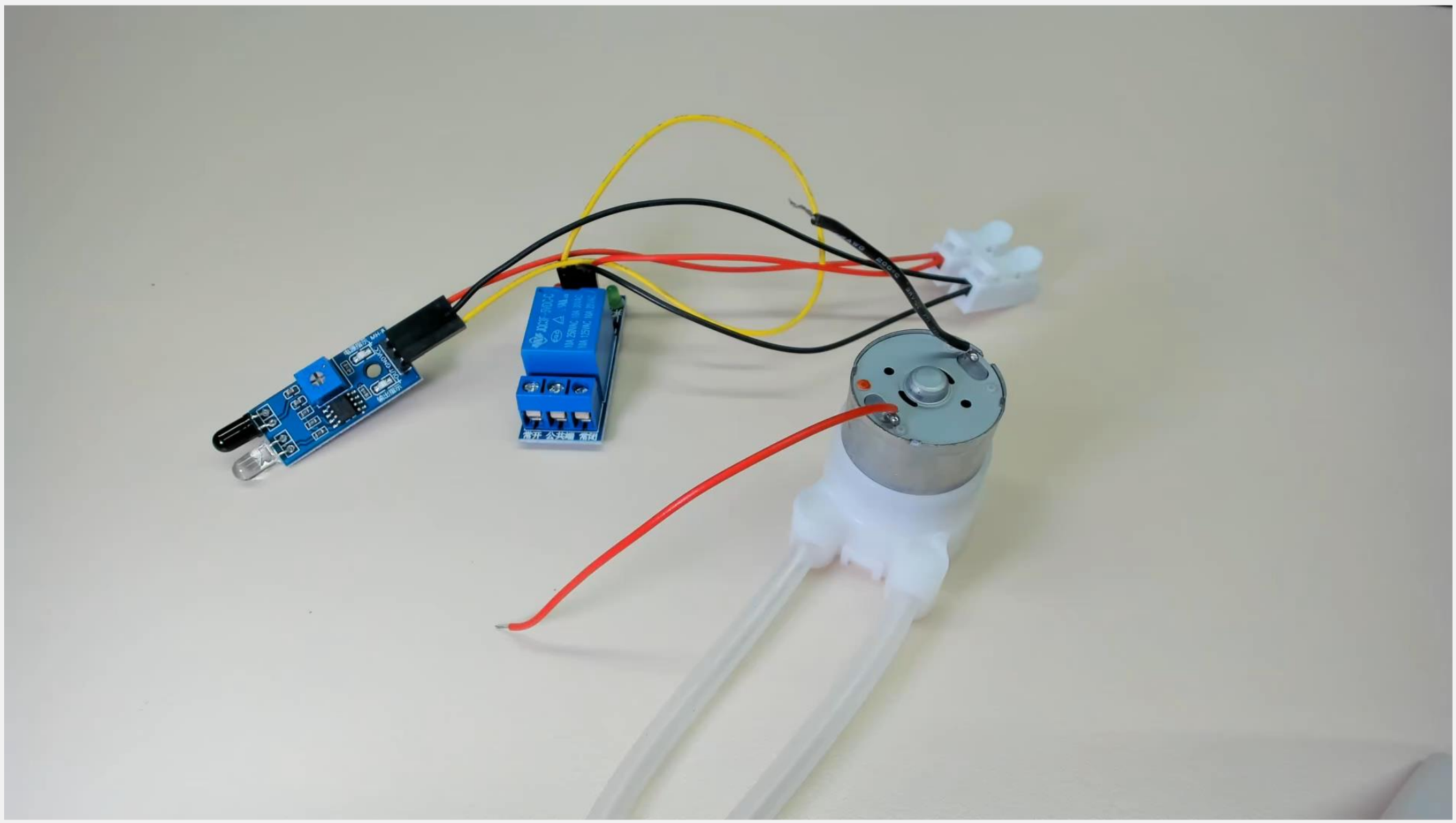
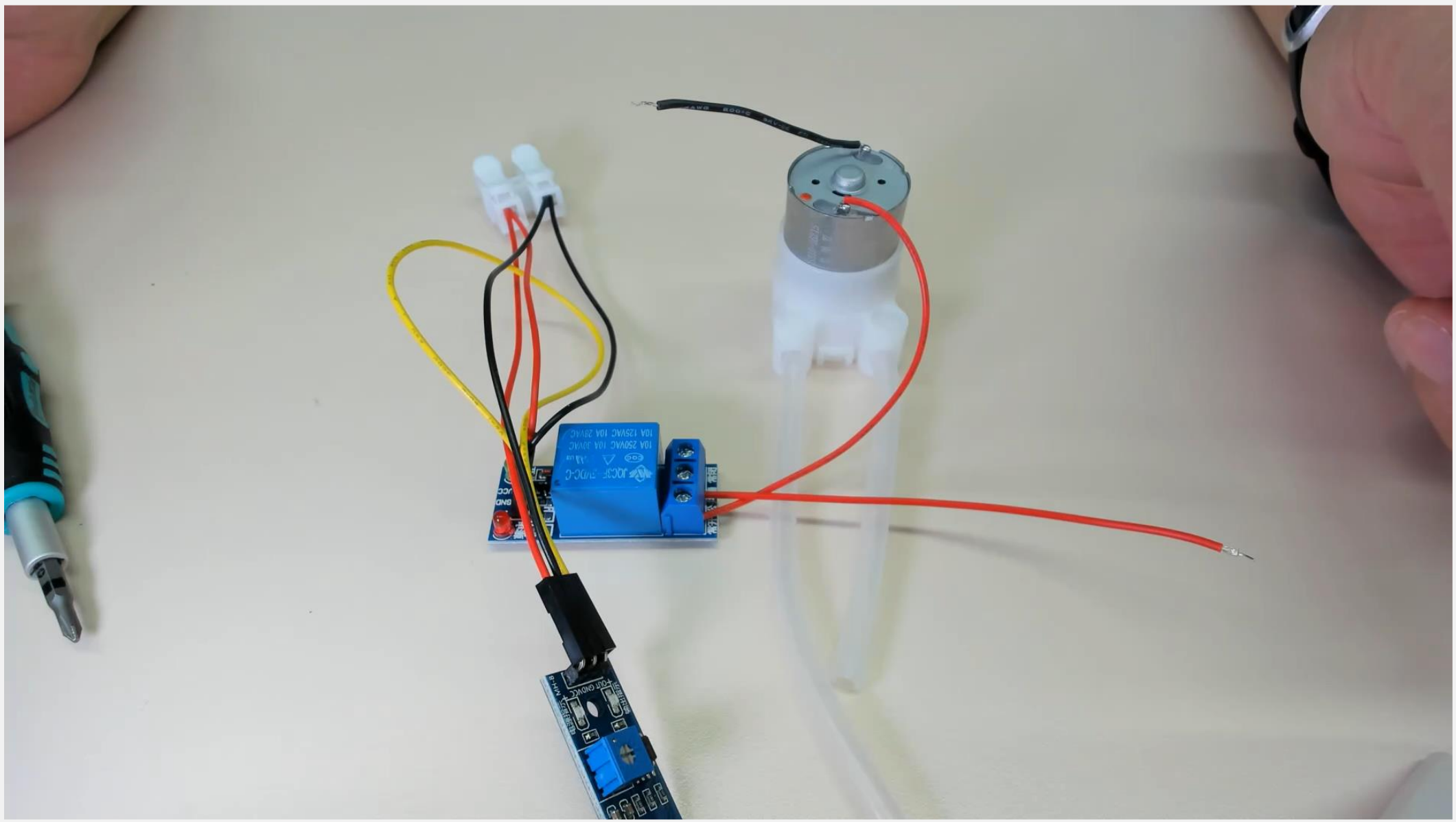


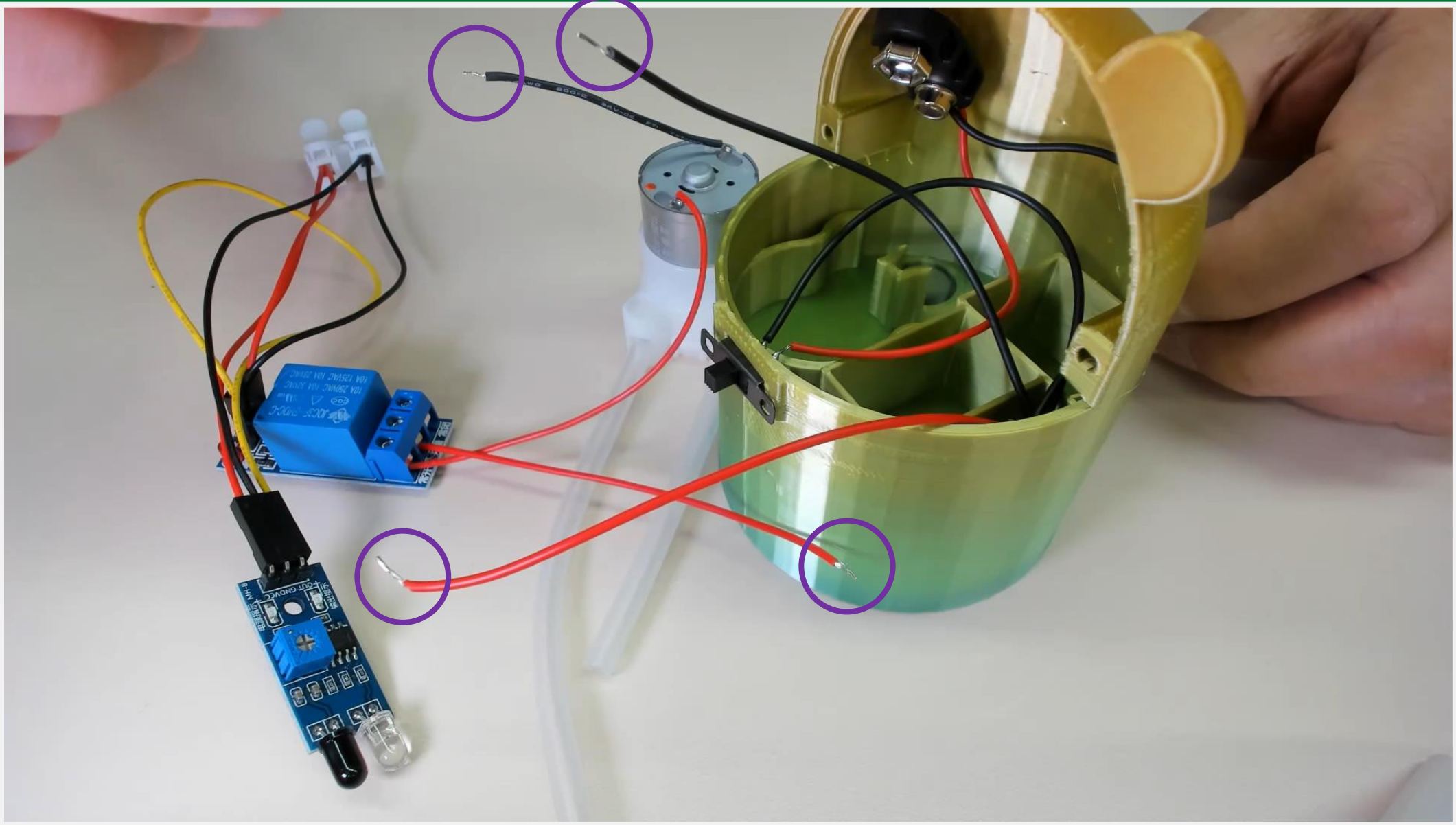
Hands-on activity: Wiring electronic components

4b



Hands-on activity: Wiring electronic components

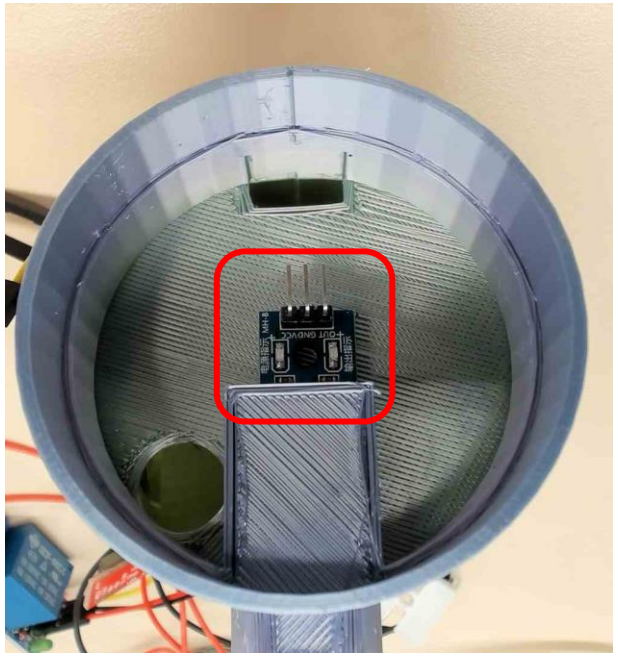
4c

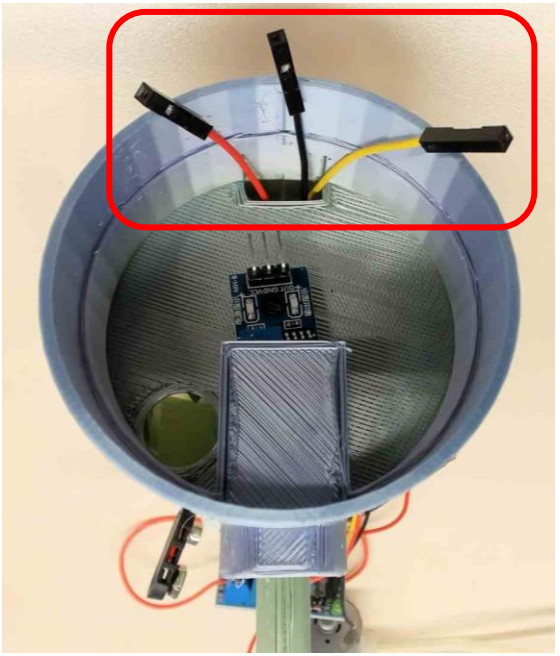


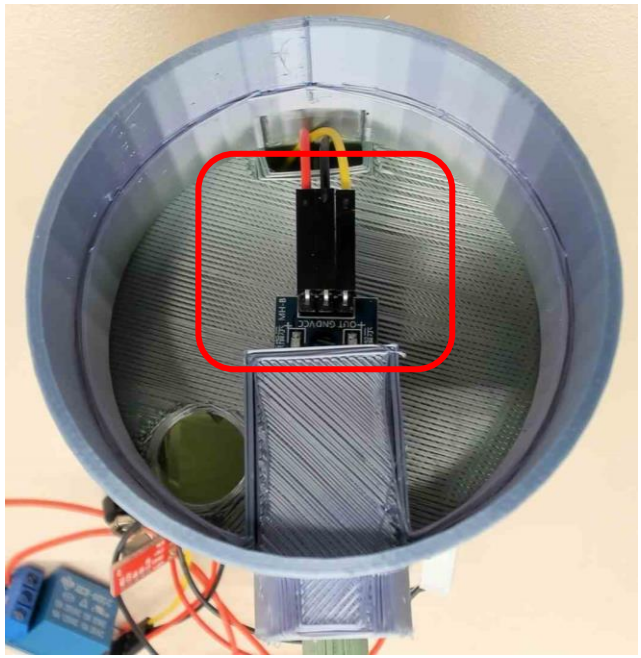
Circuit

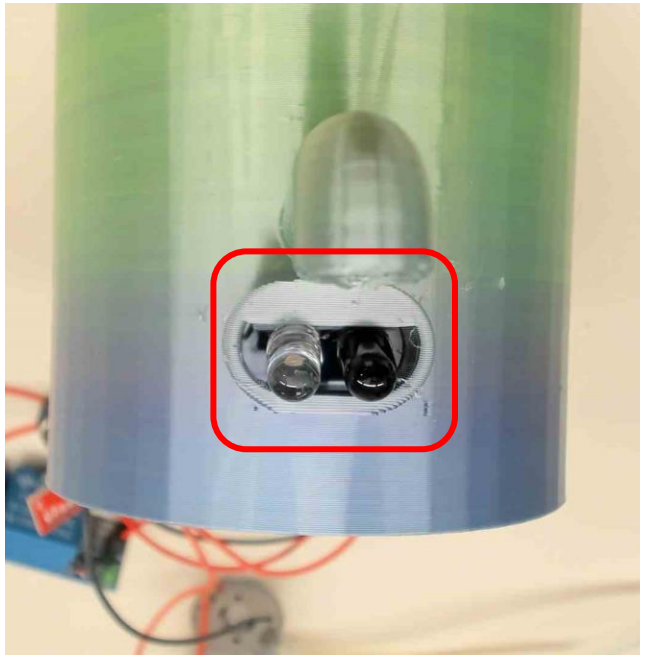
Hands-on activity: Assembling various components

5a



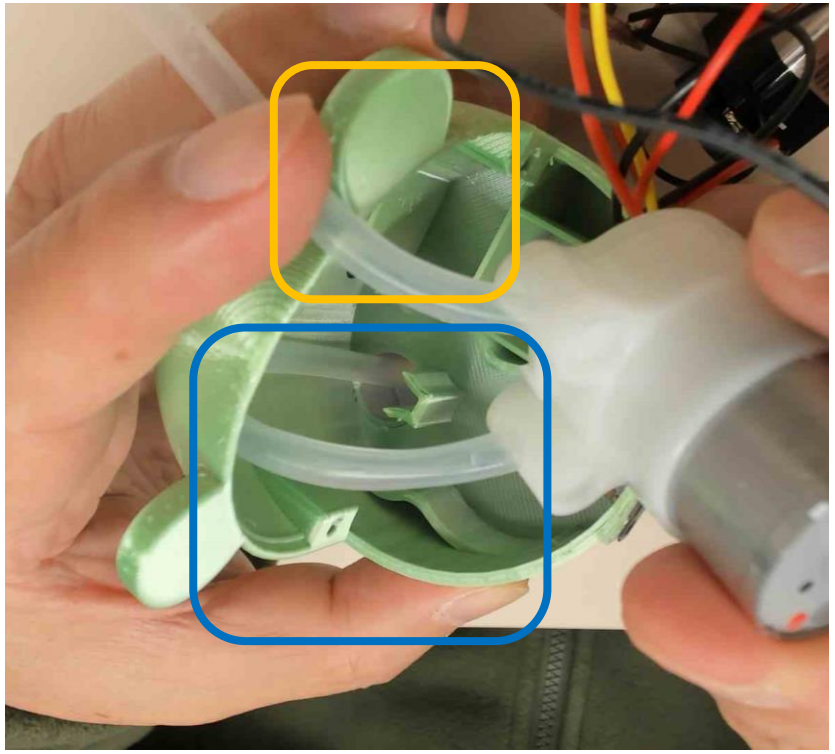


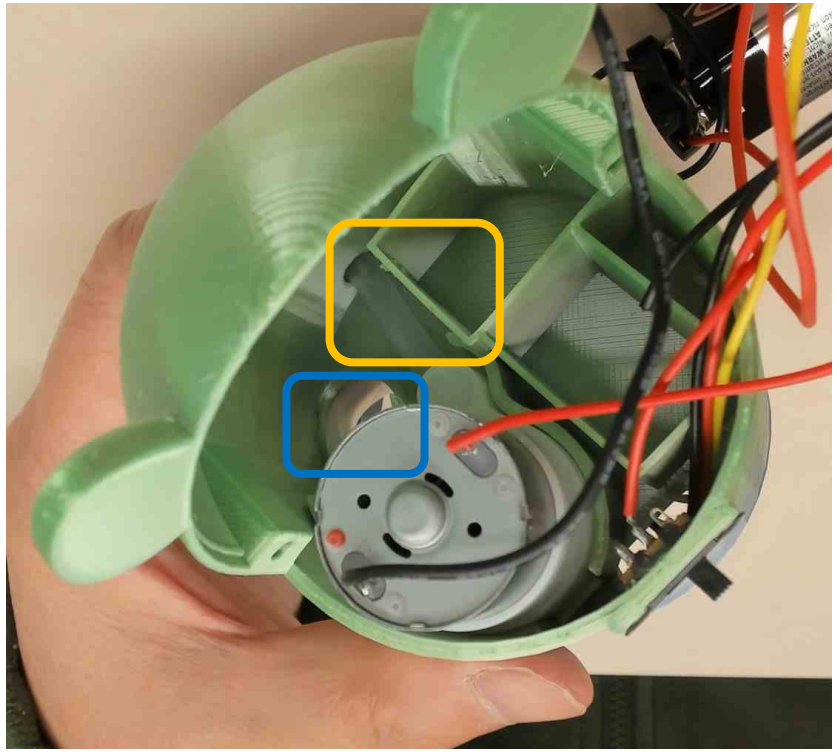




Hands-on activity: Assembling various components

5b





Hands-on activity: Assembling various components

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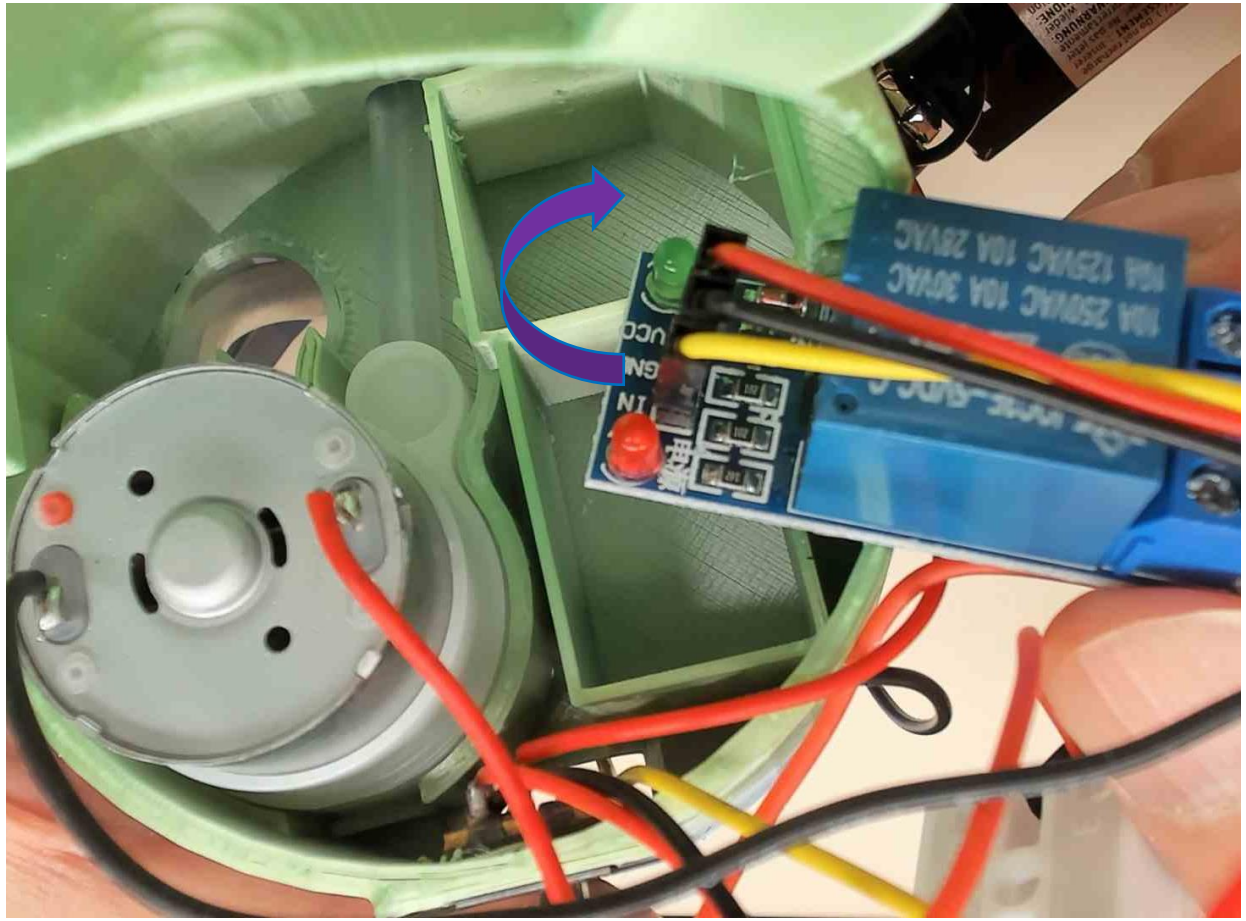

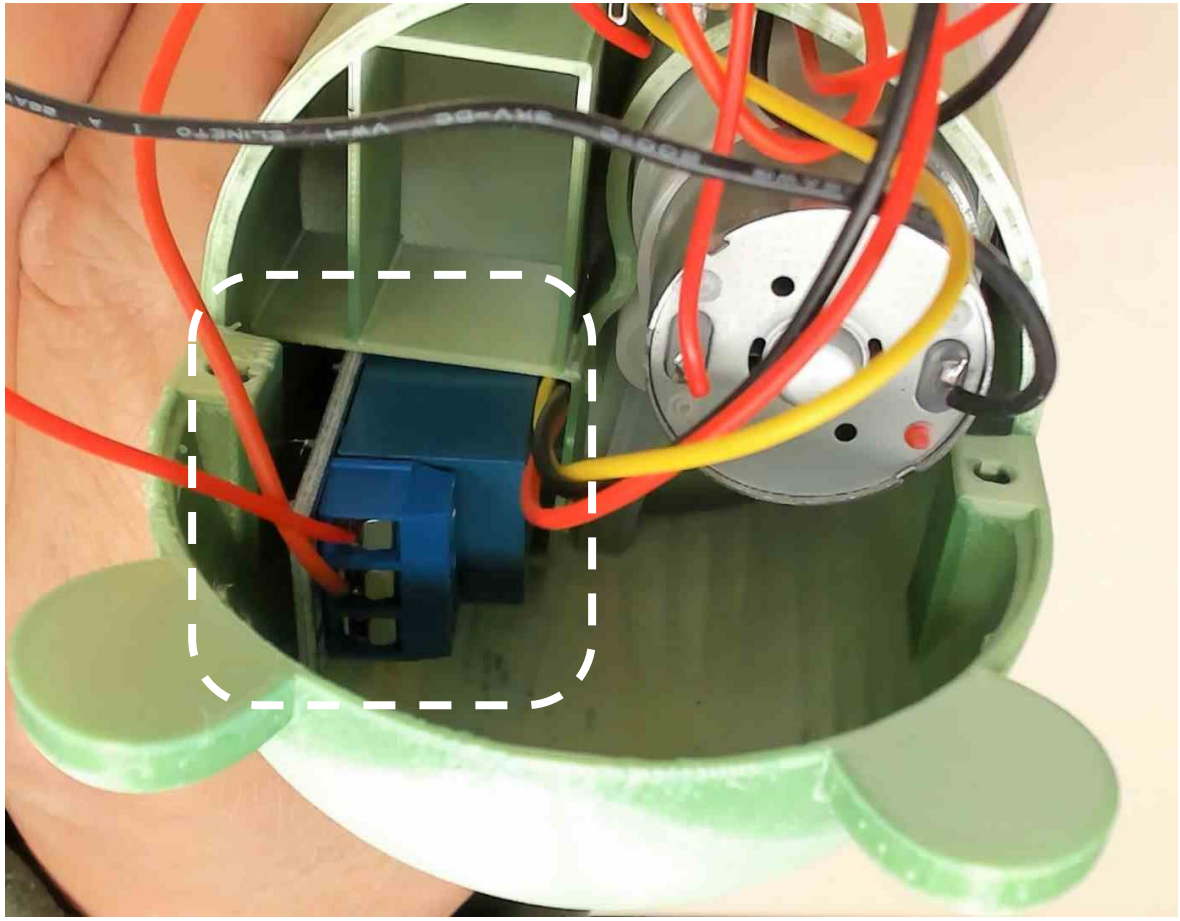

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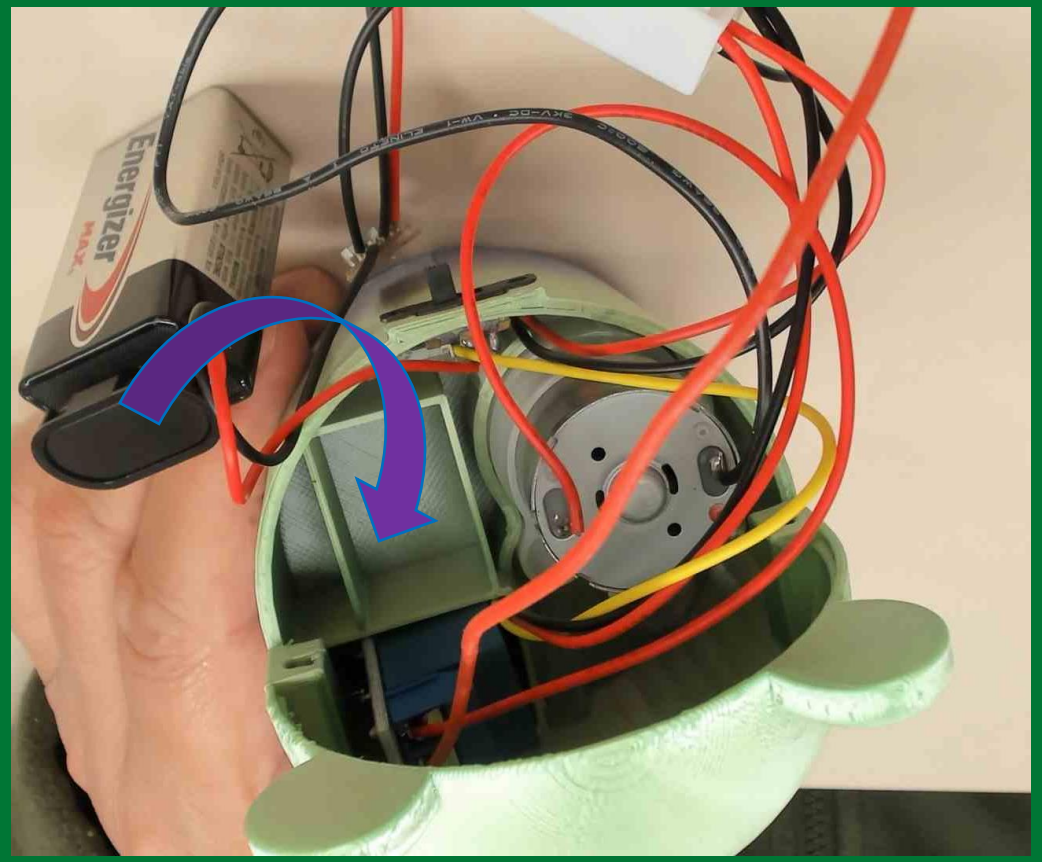

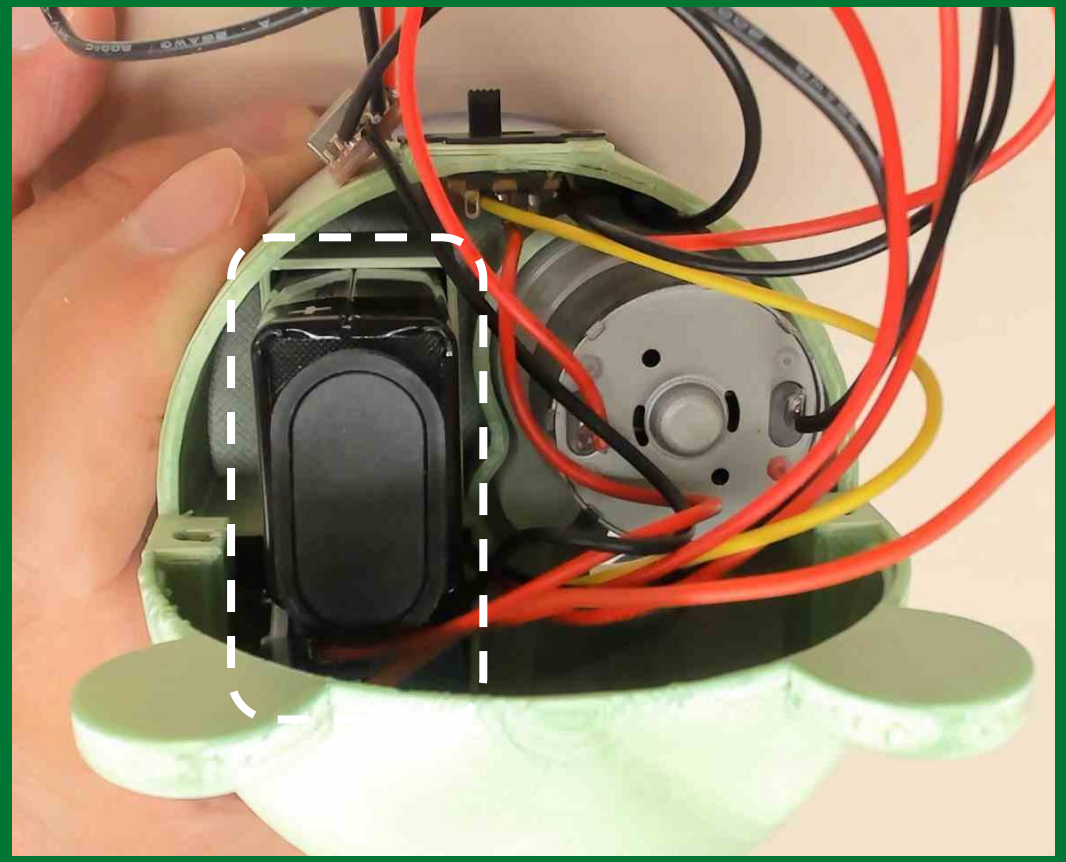

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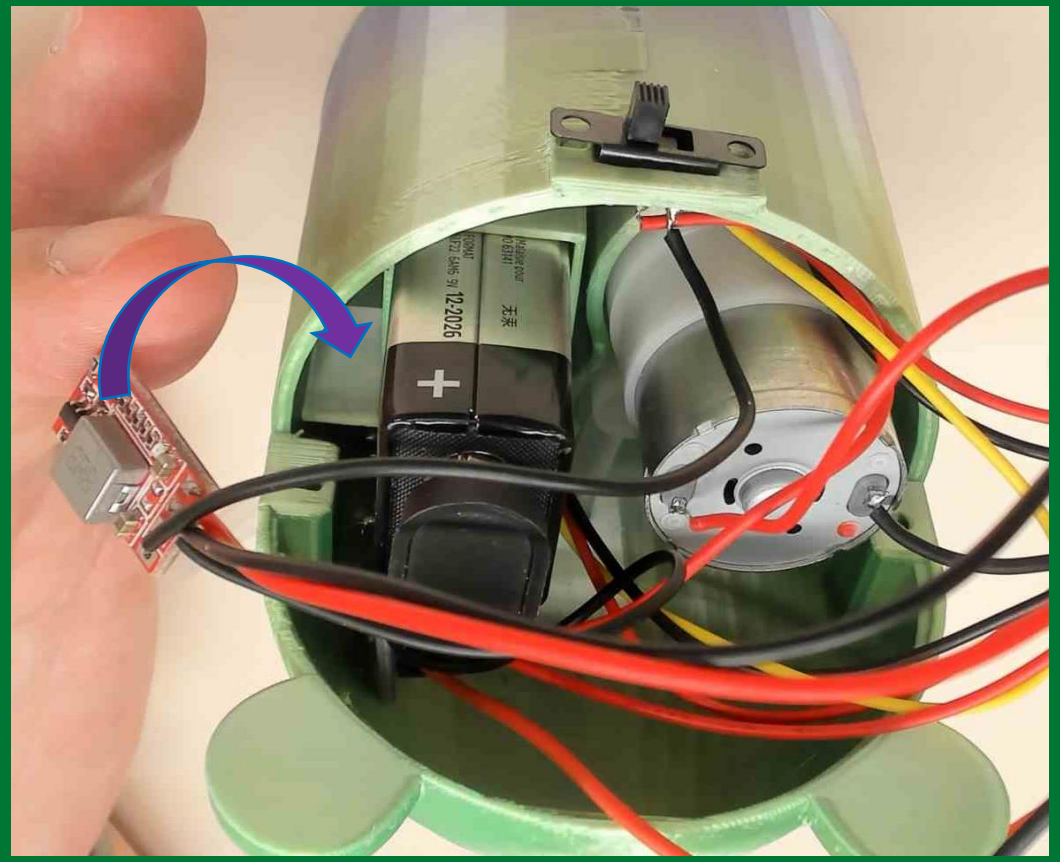

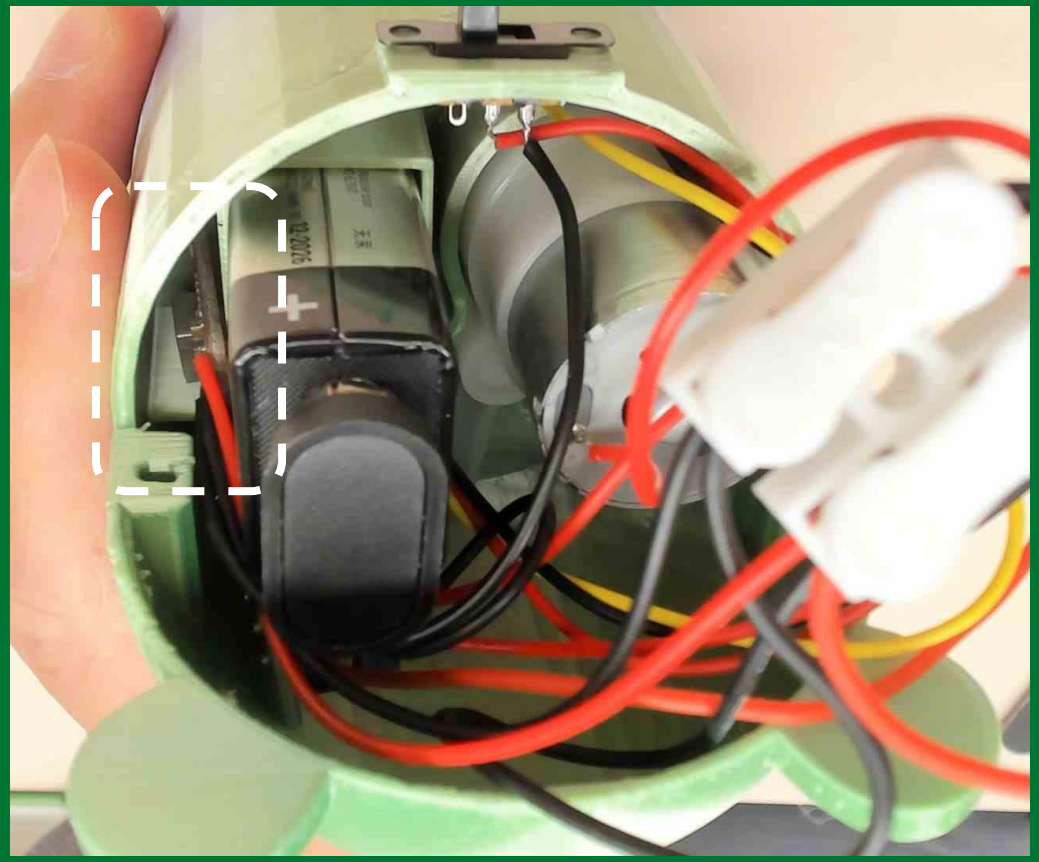

Hands-on activity: Assembling various components

9

The Design of the Outer Shell of the Hand Sanitiser Dispenser

Using TinkerCad to demonstrate the design of this component

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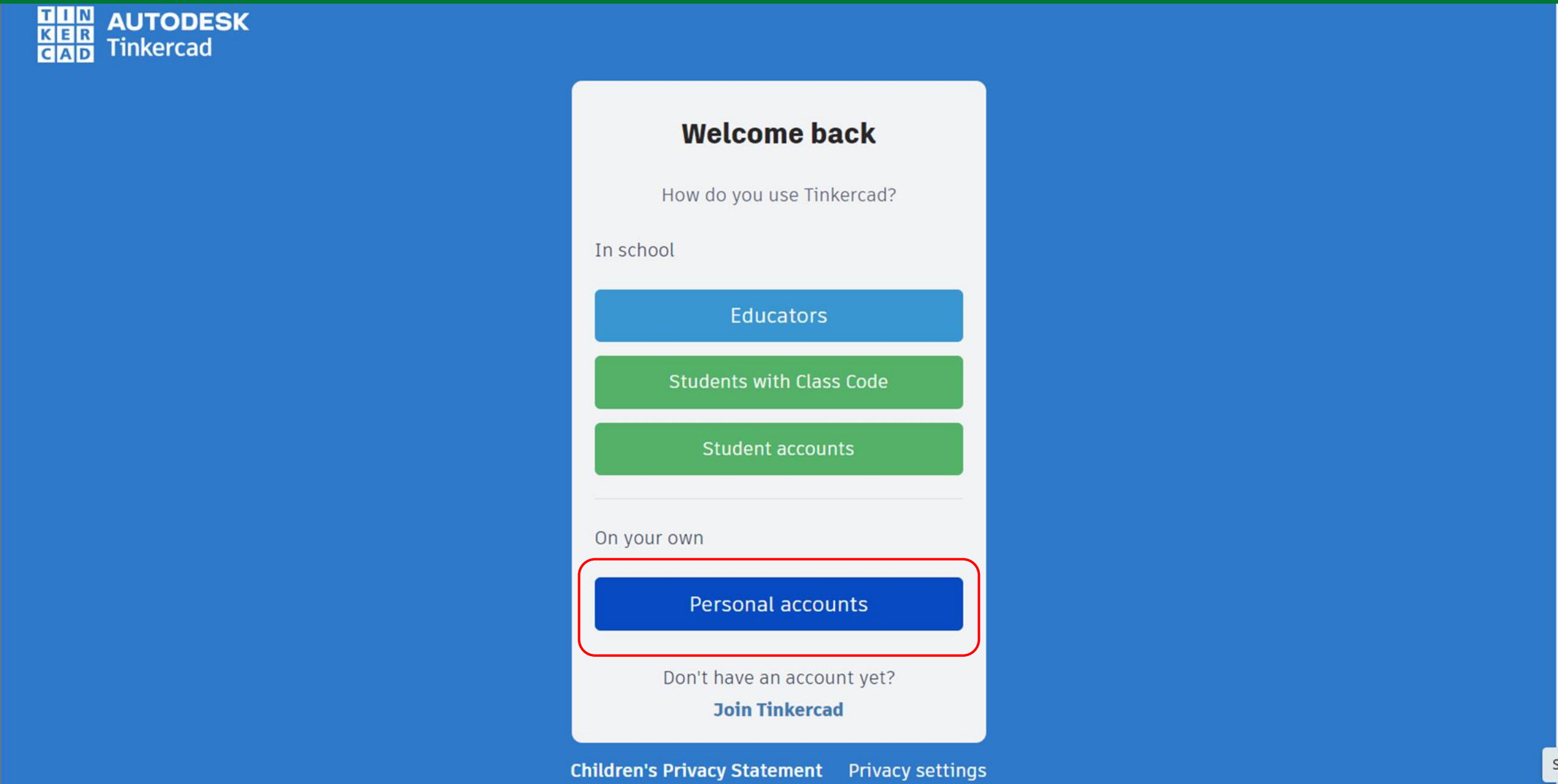

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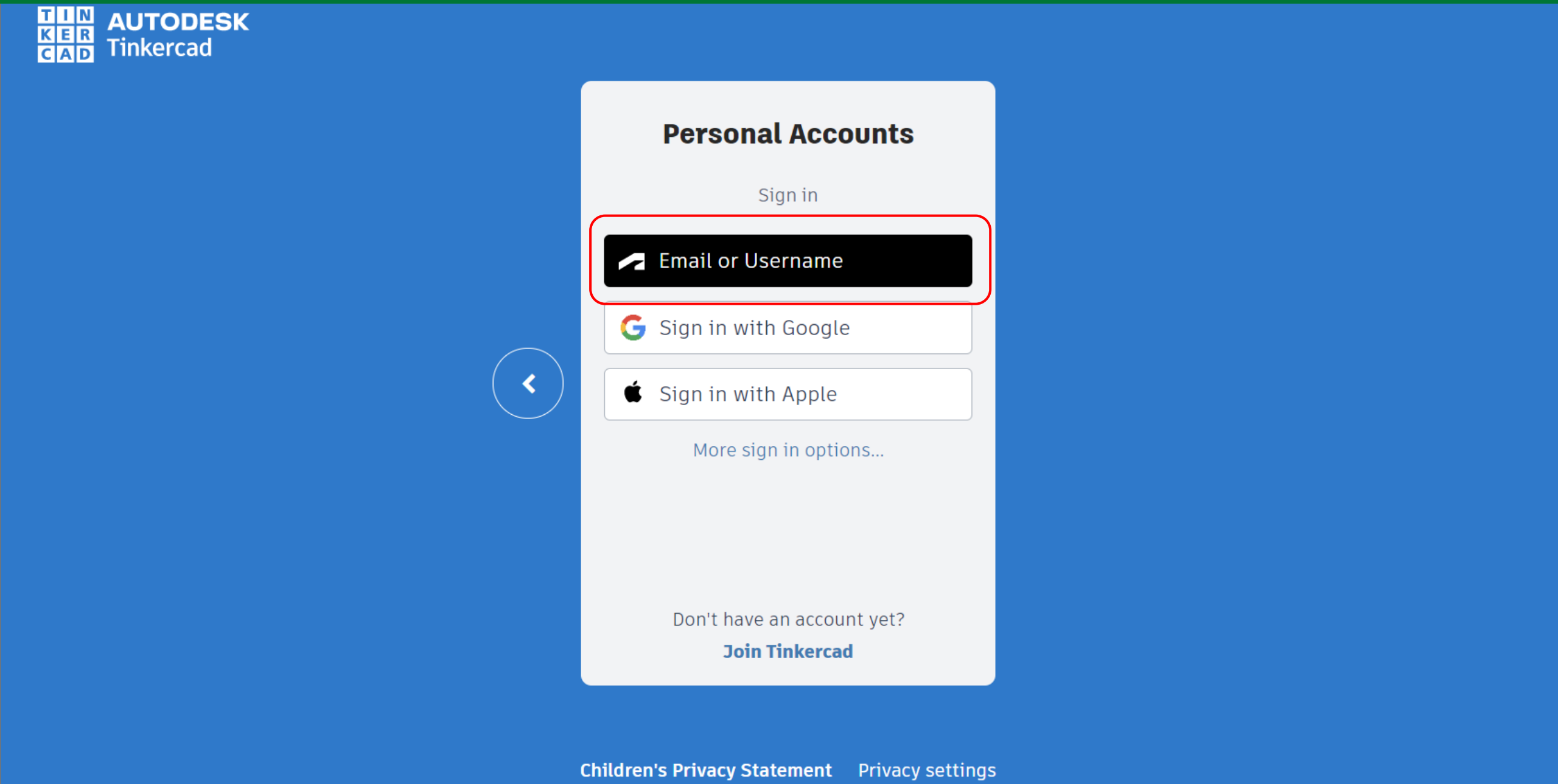

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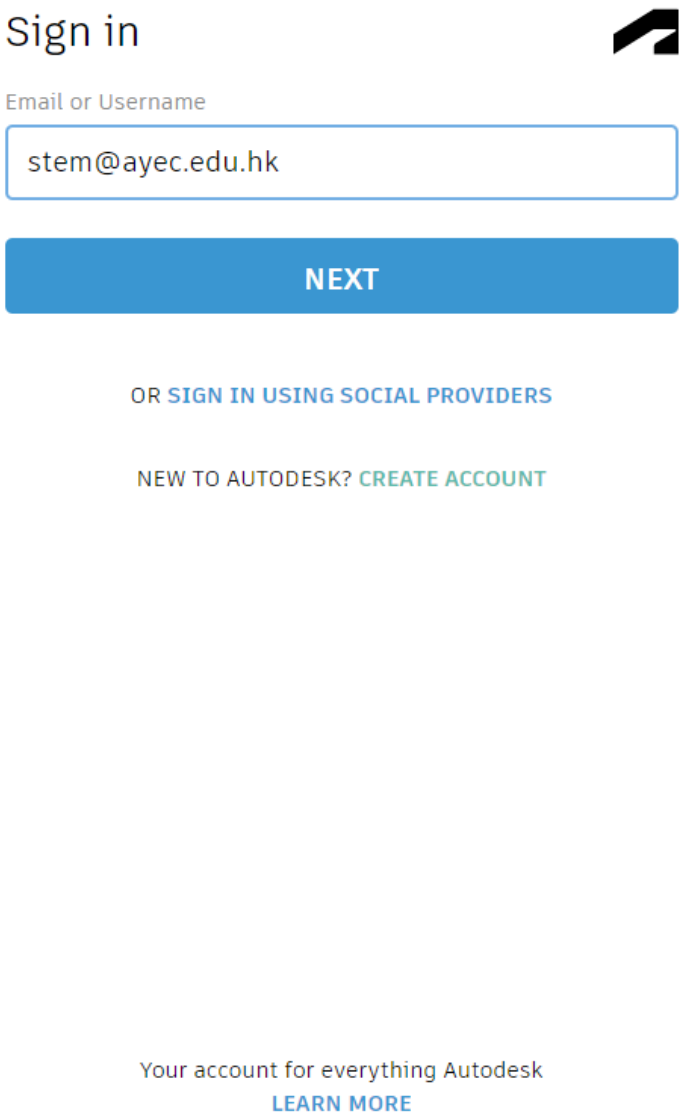

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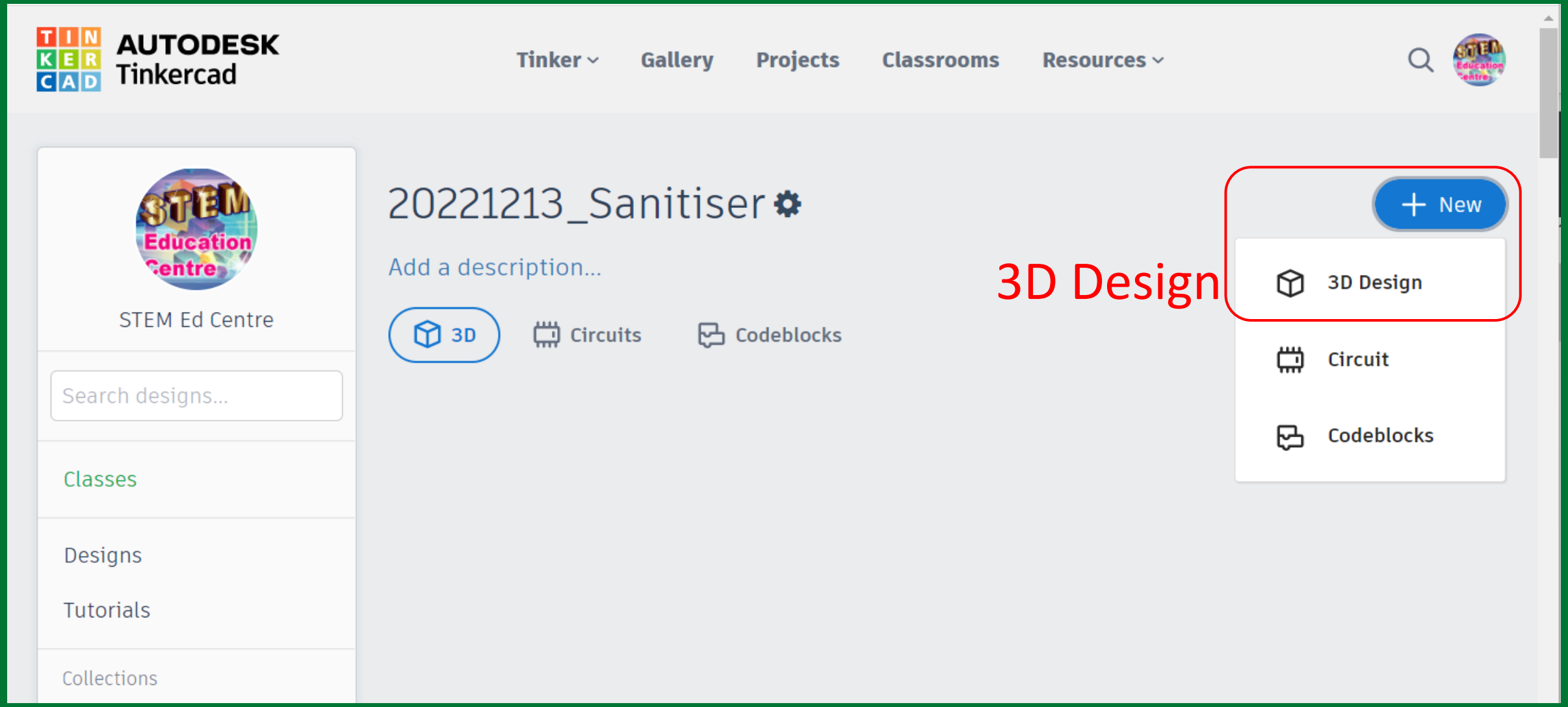
利用 Tinkercad 網上軟件繪畫殼身



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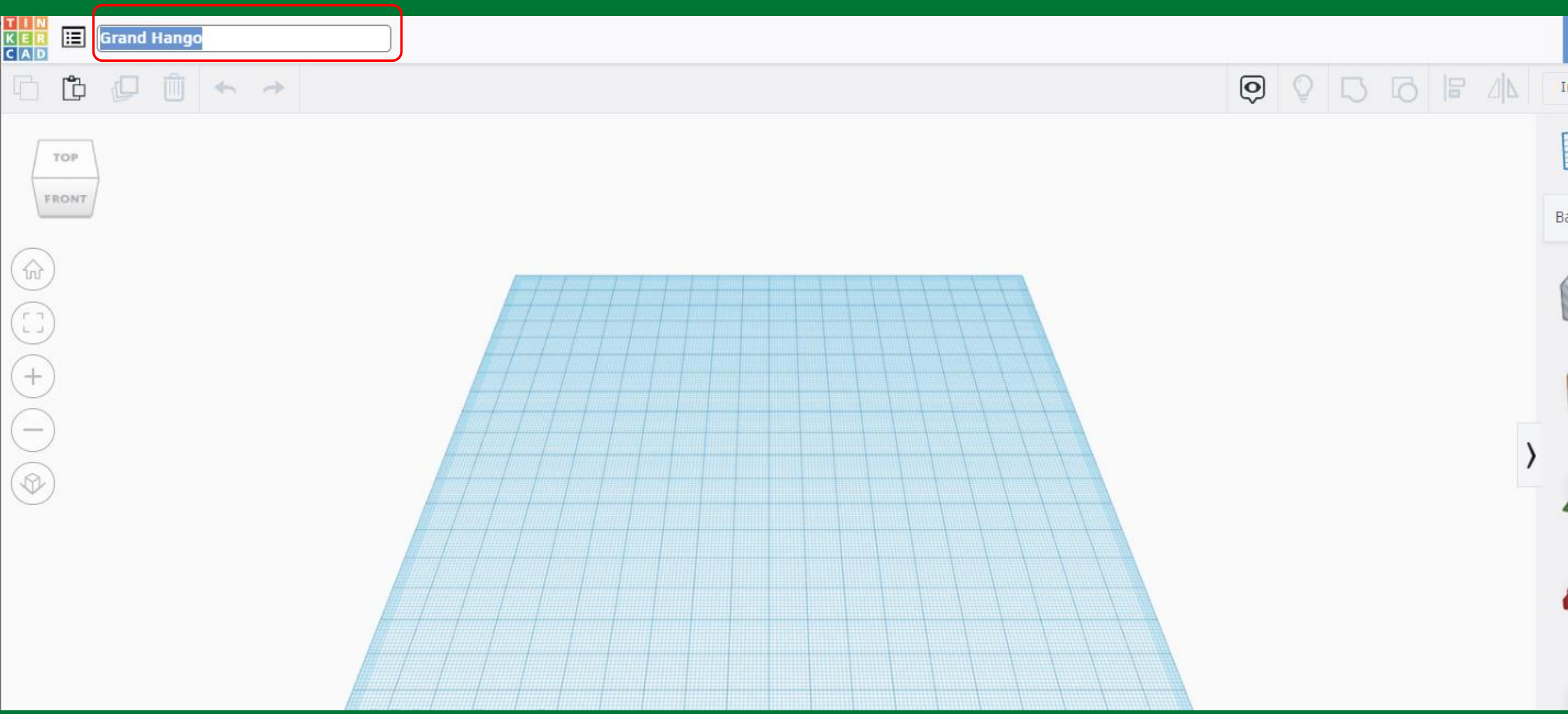

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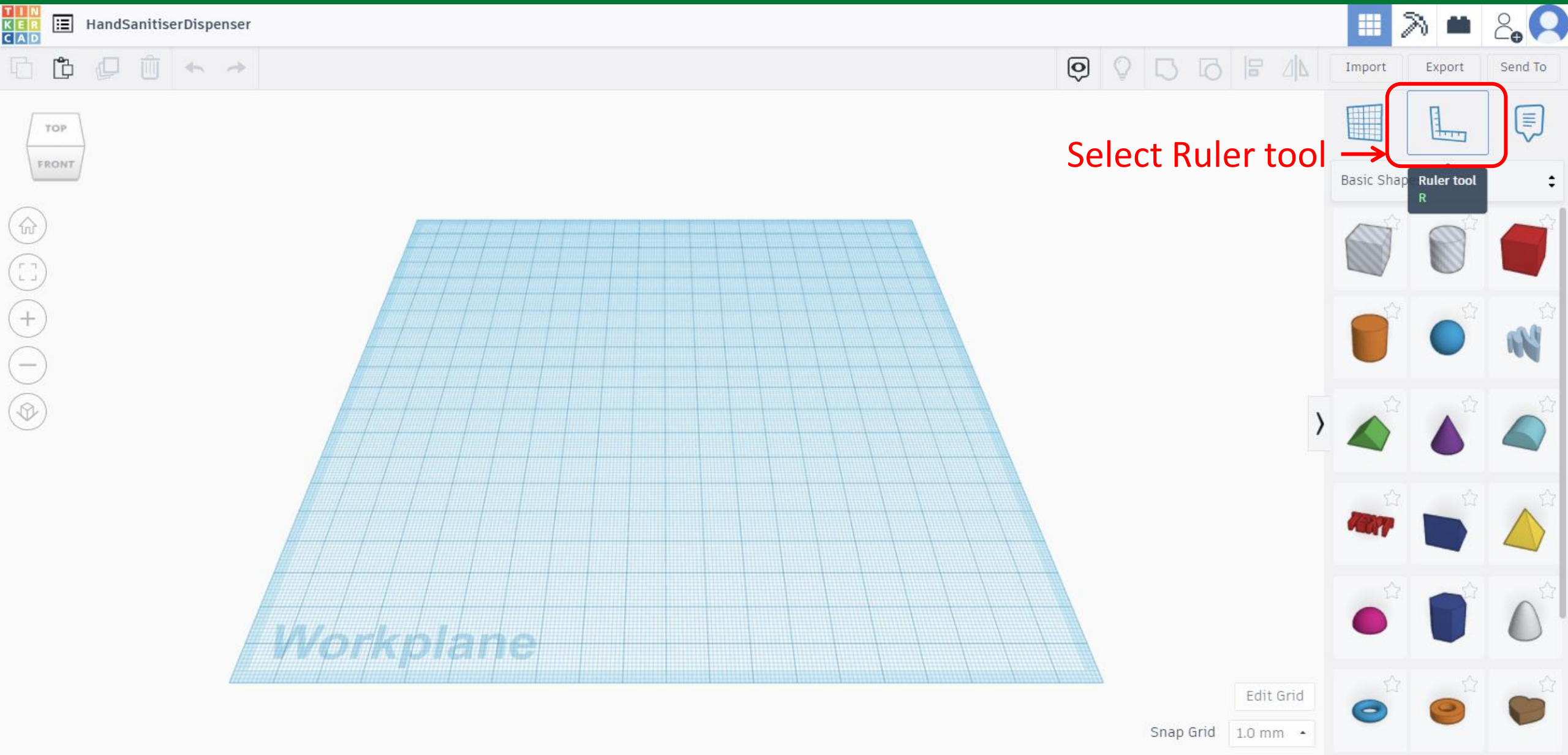

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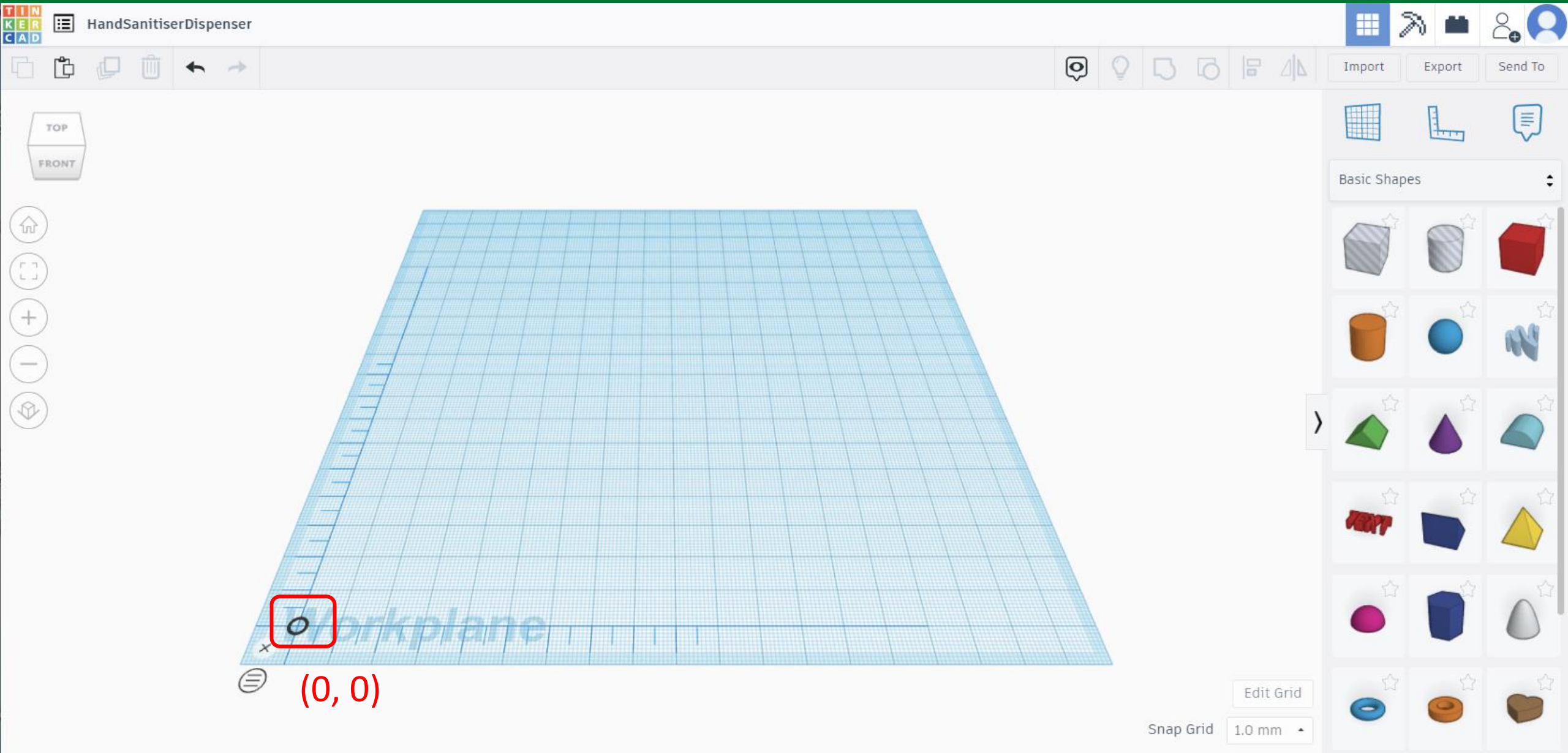

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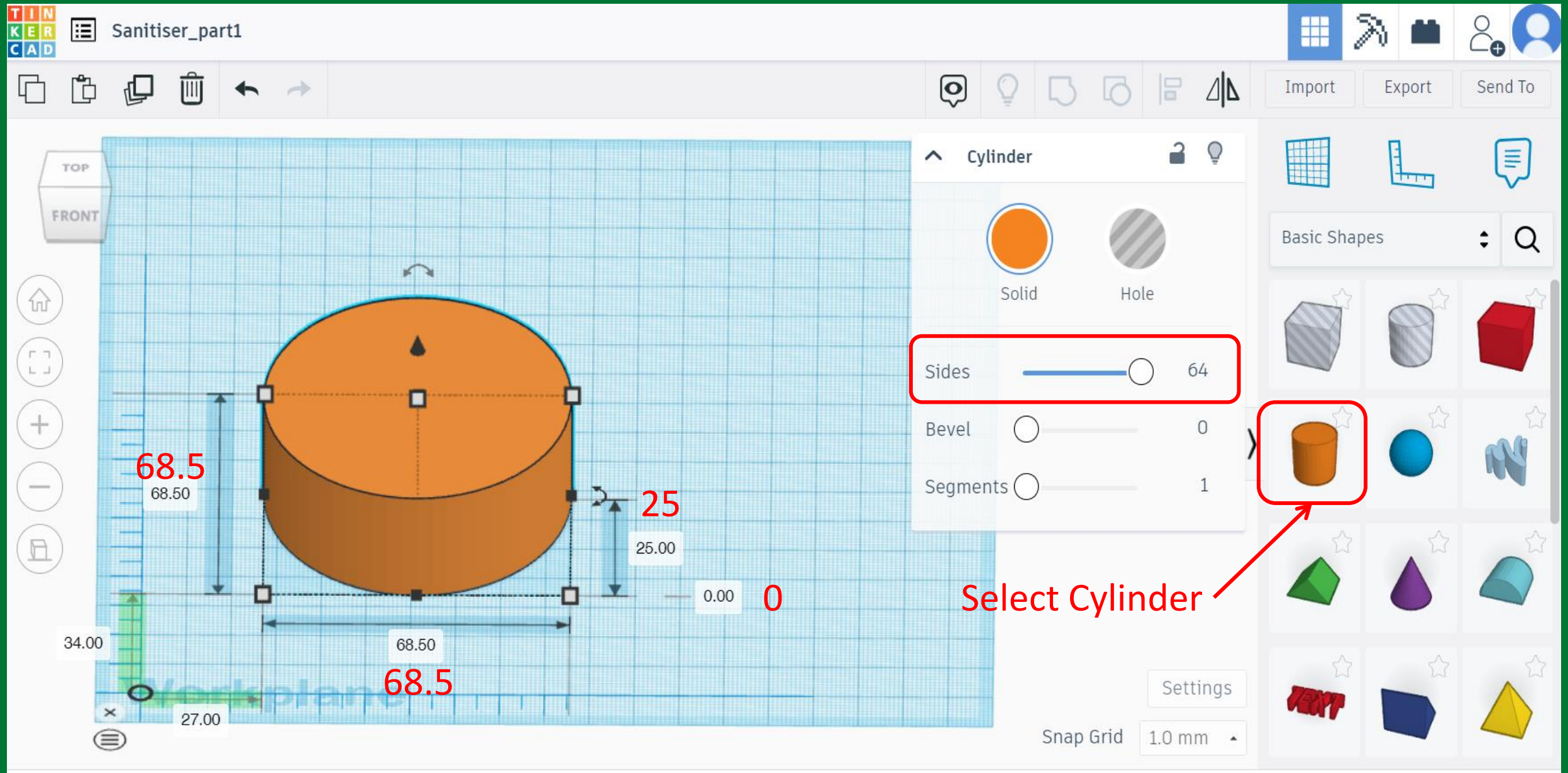

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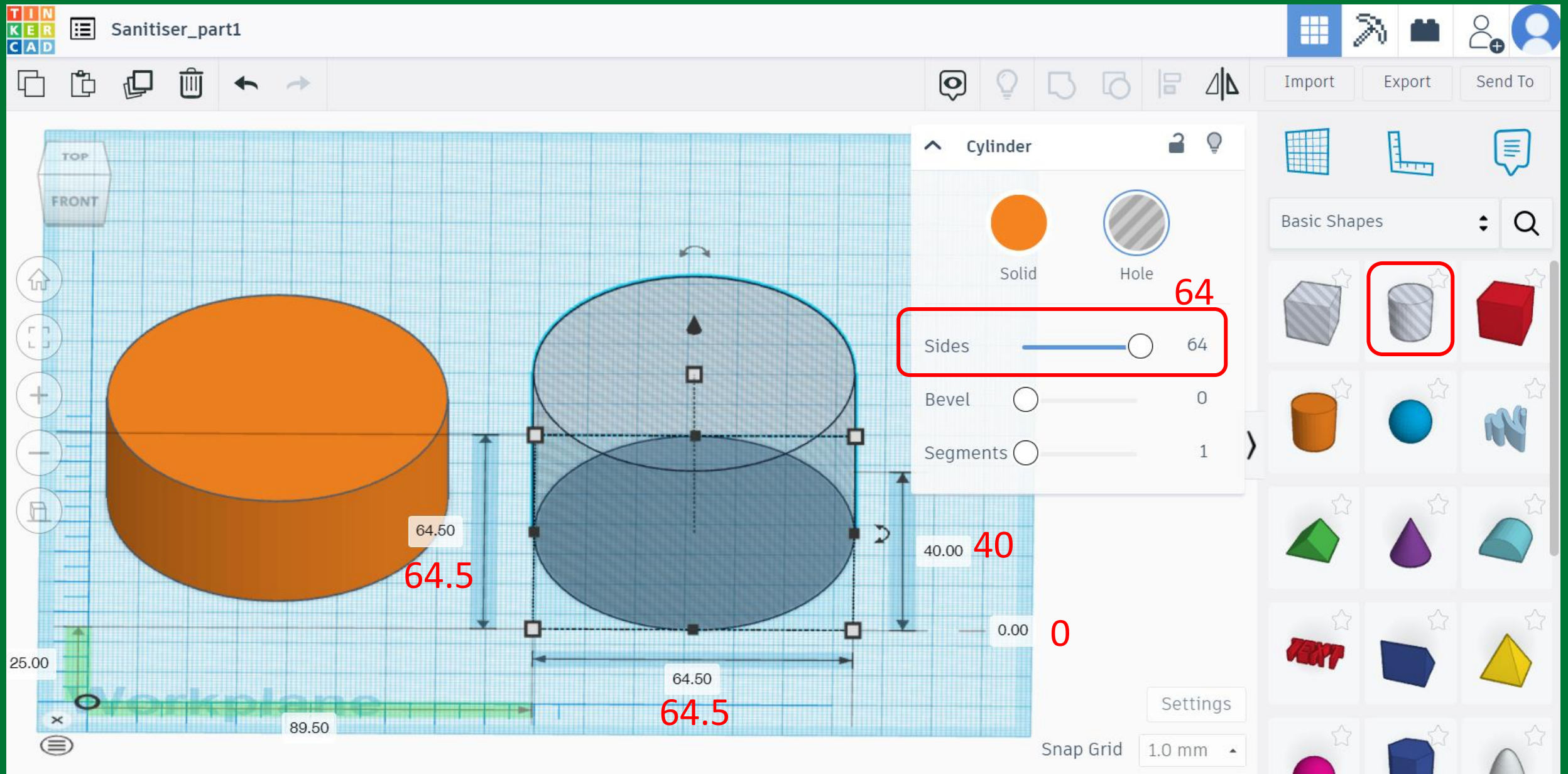

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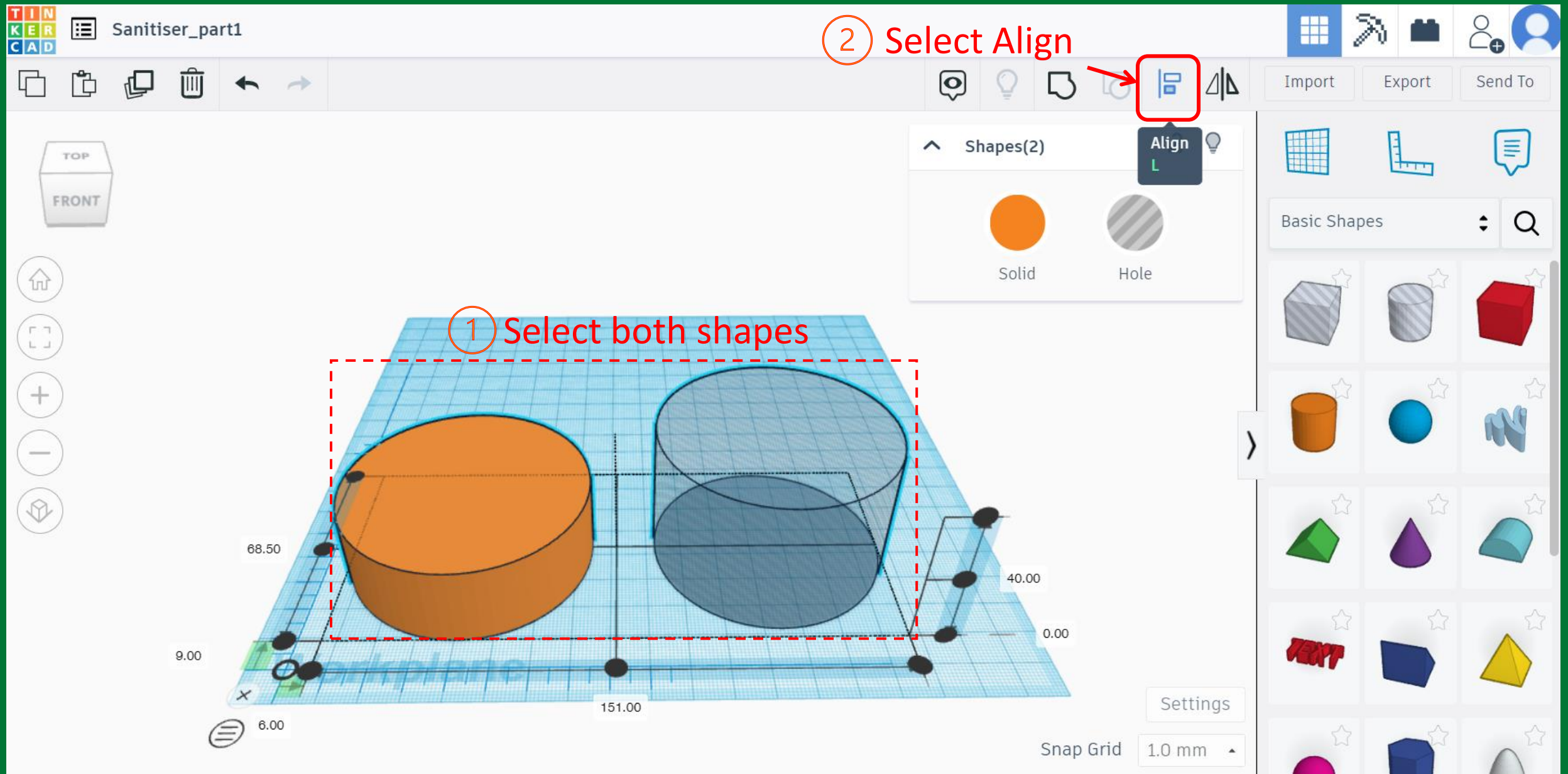

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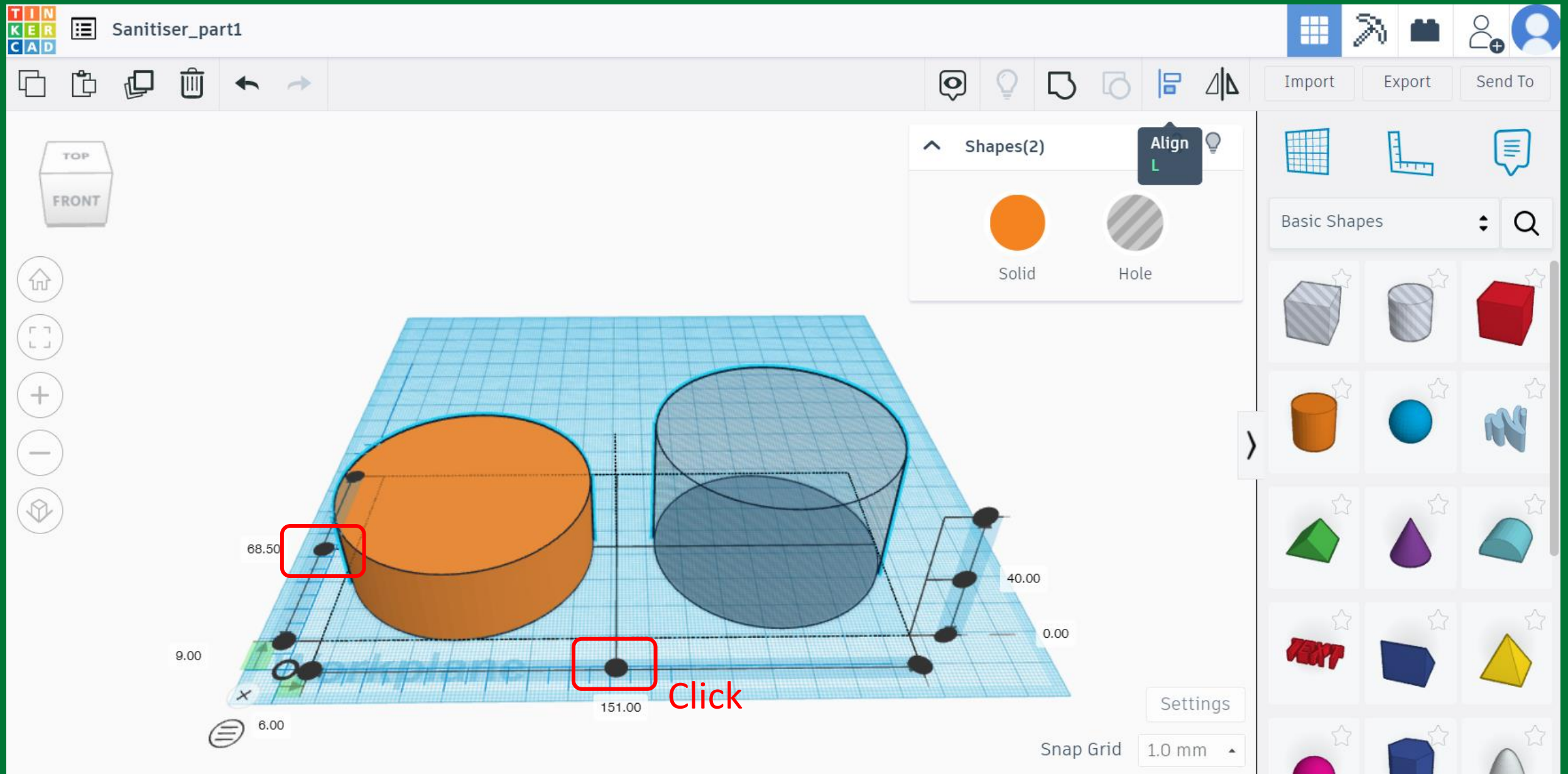

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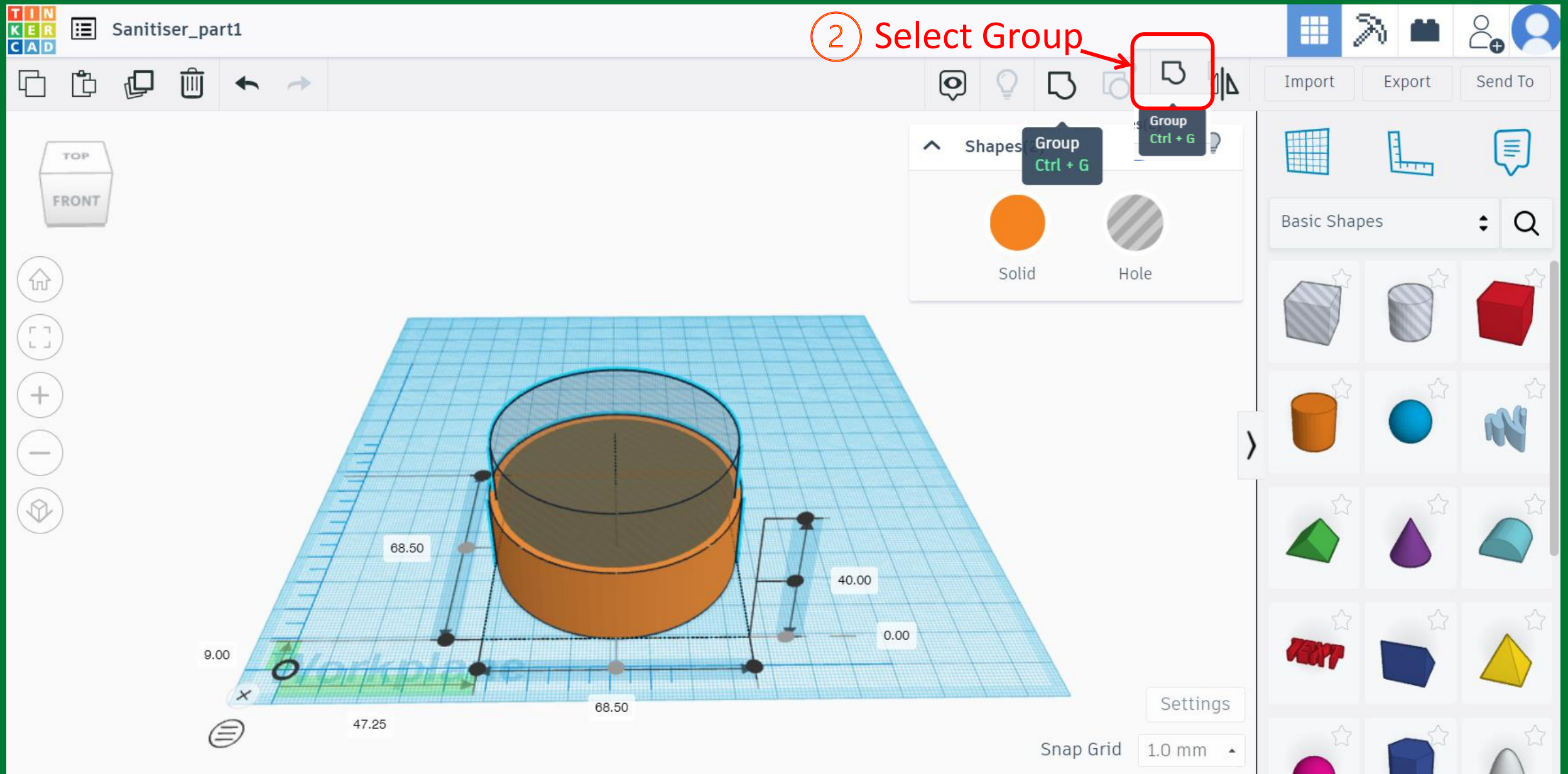

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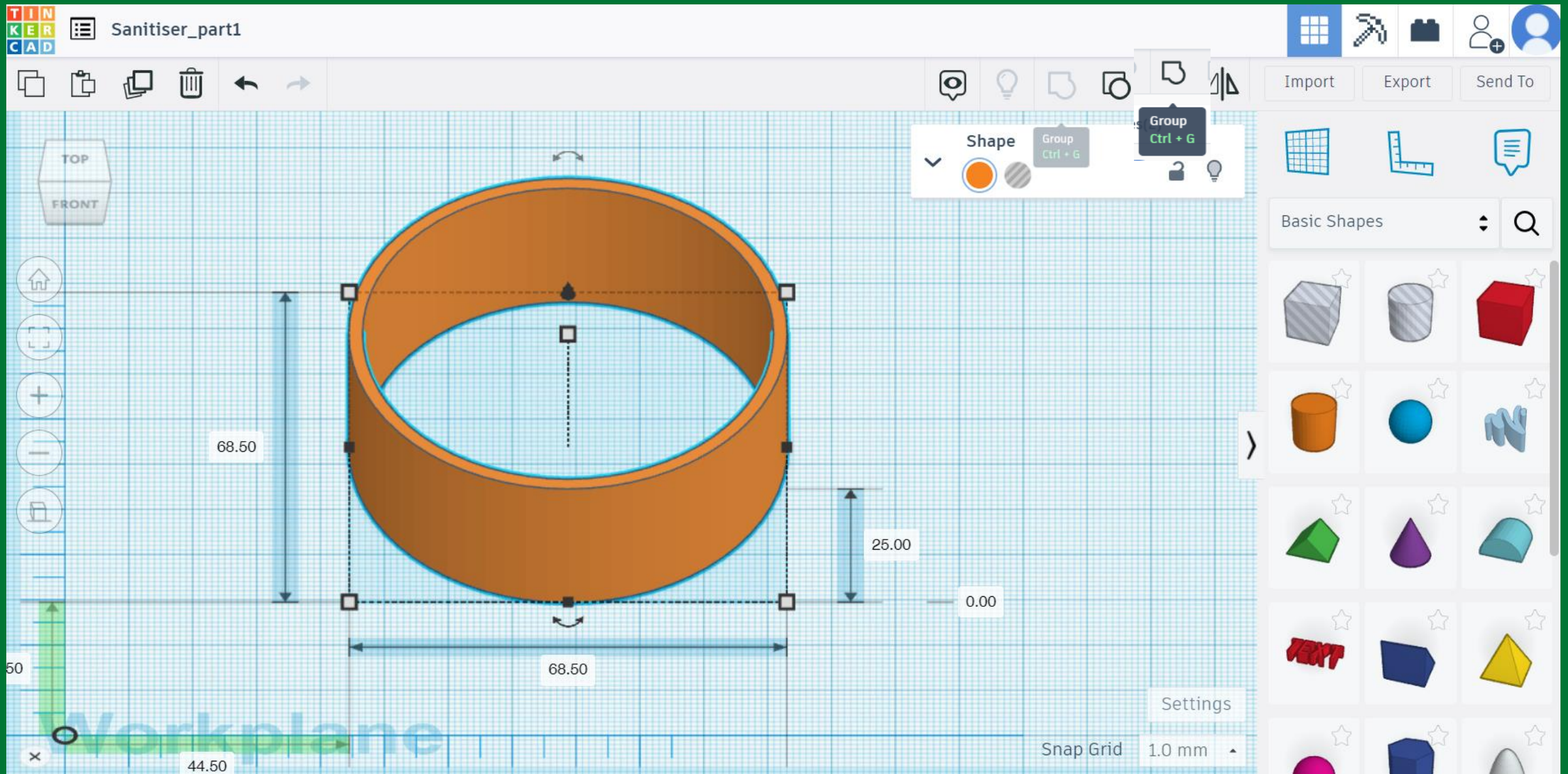

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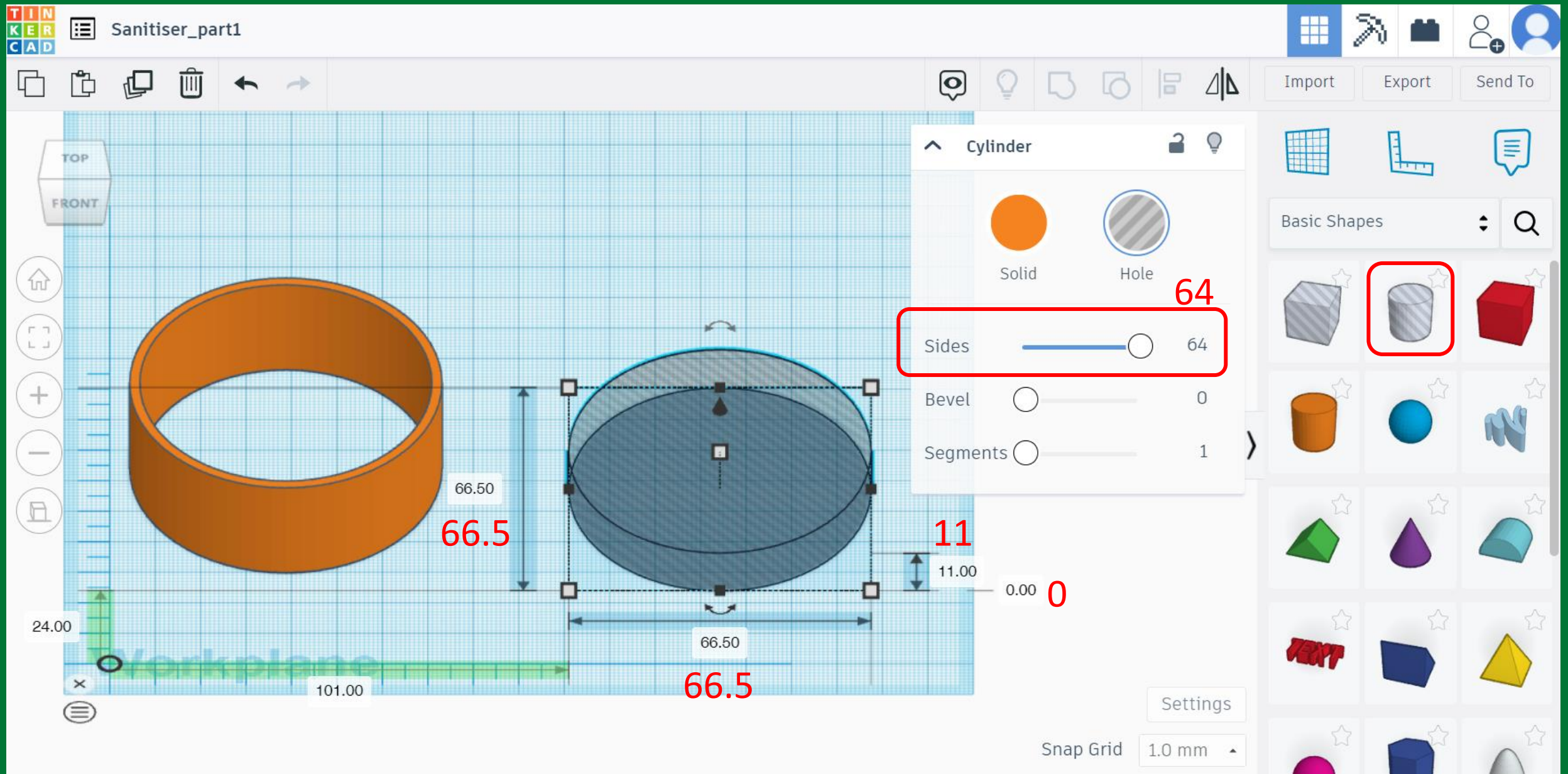

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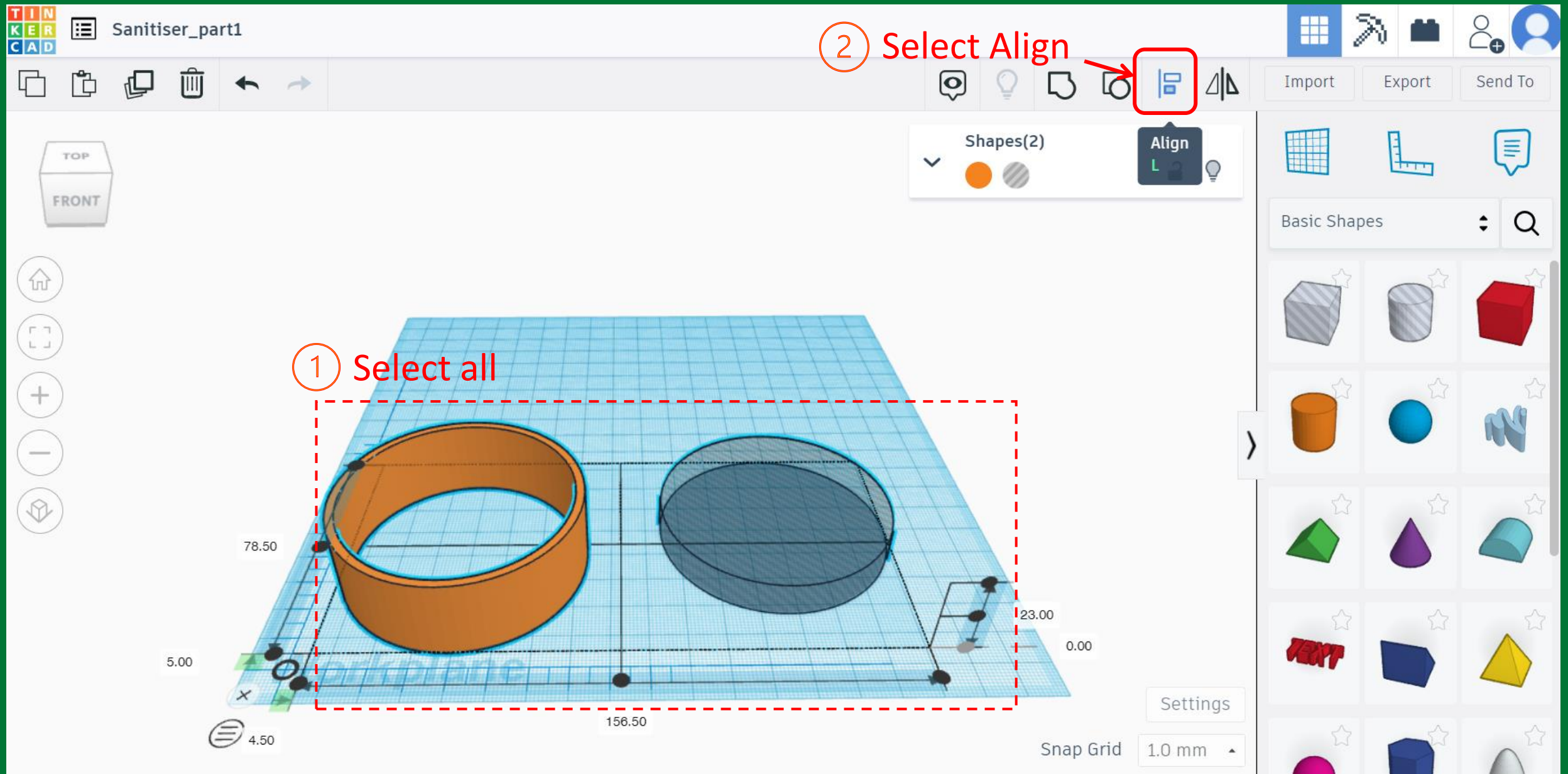

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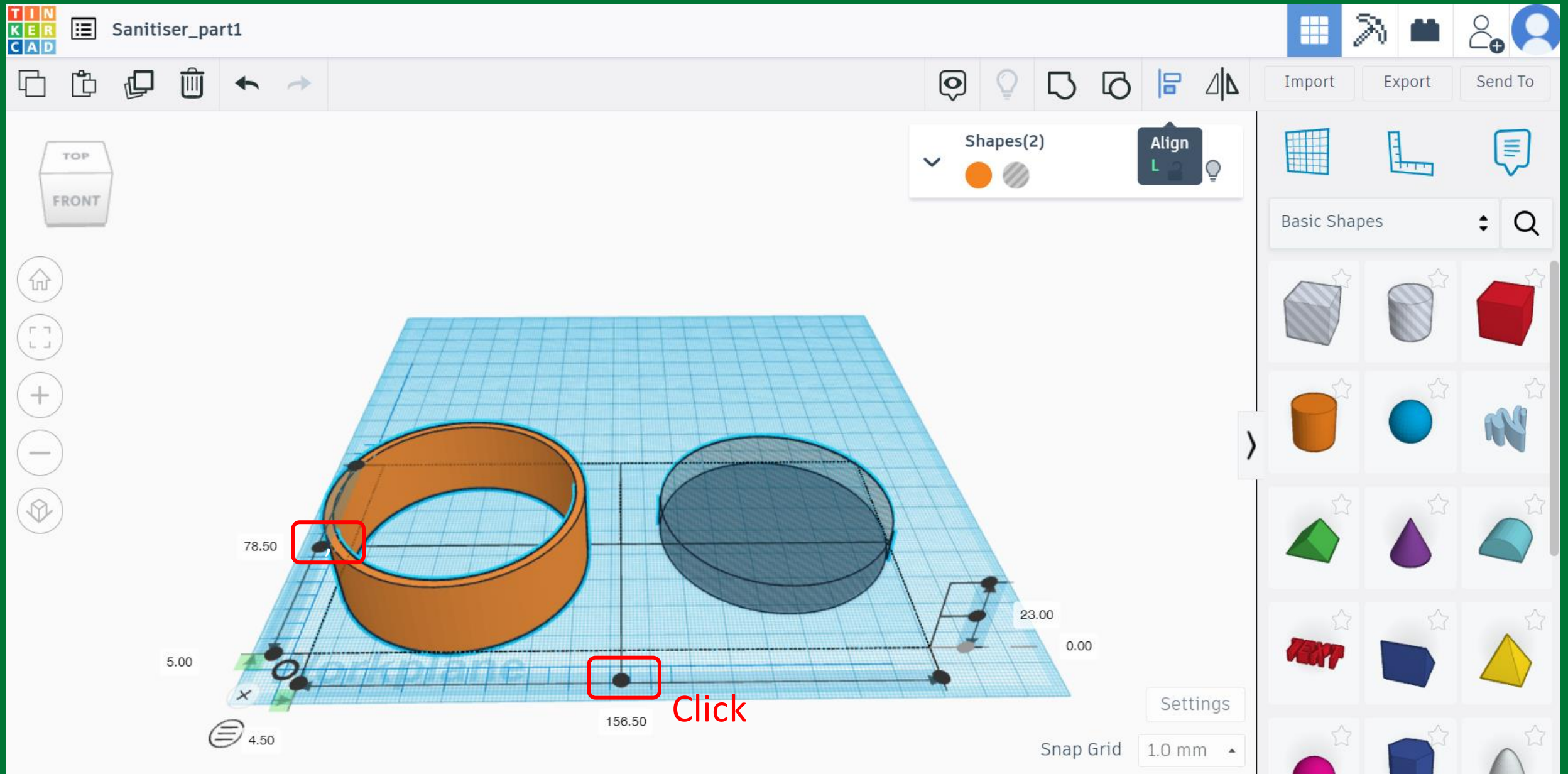

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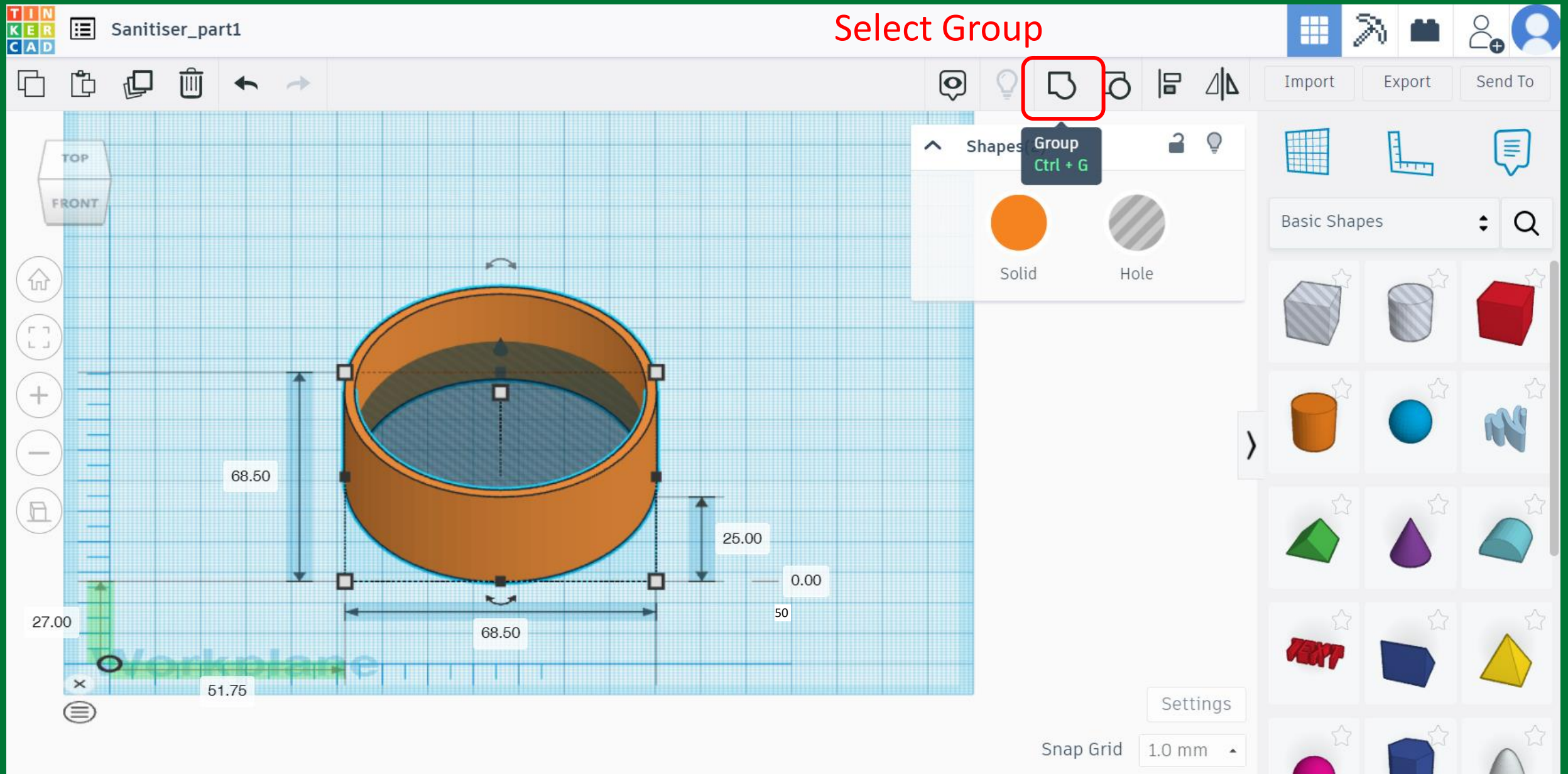

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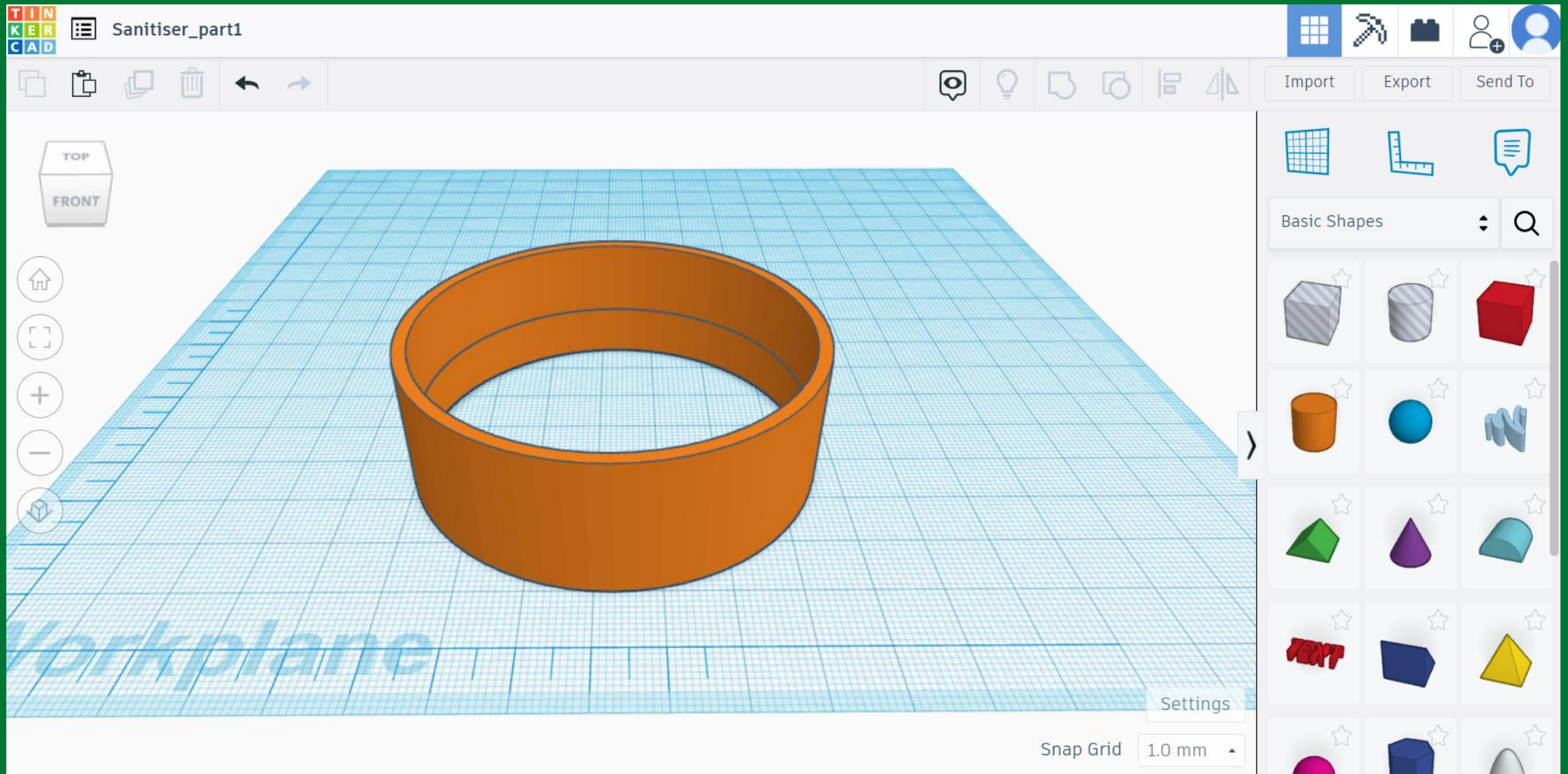

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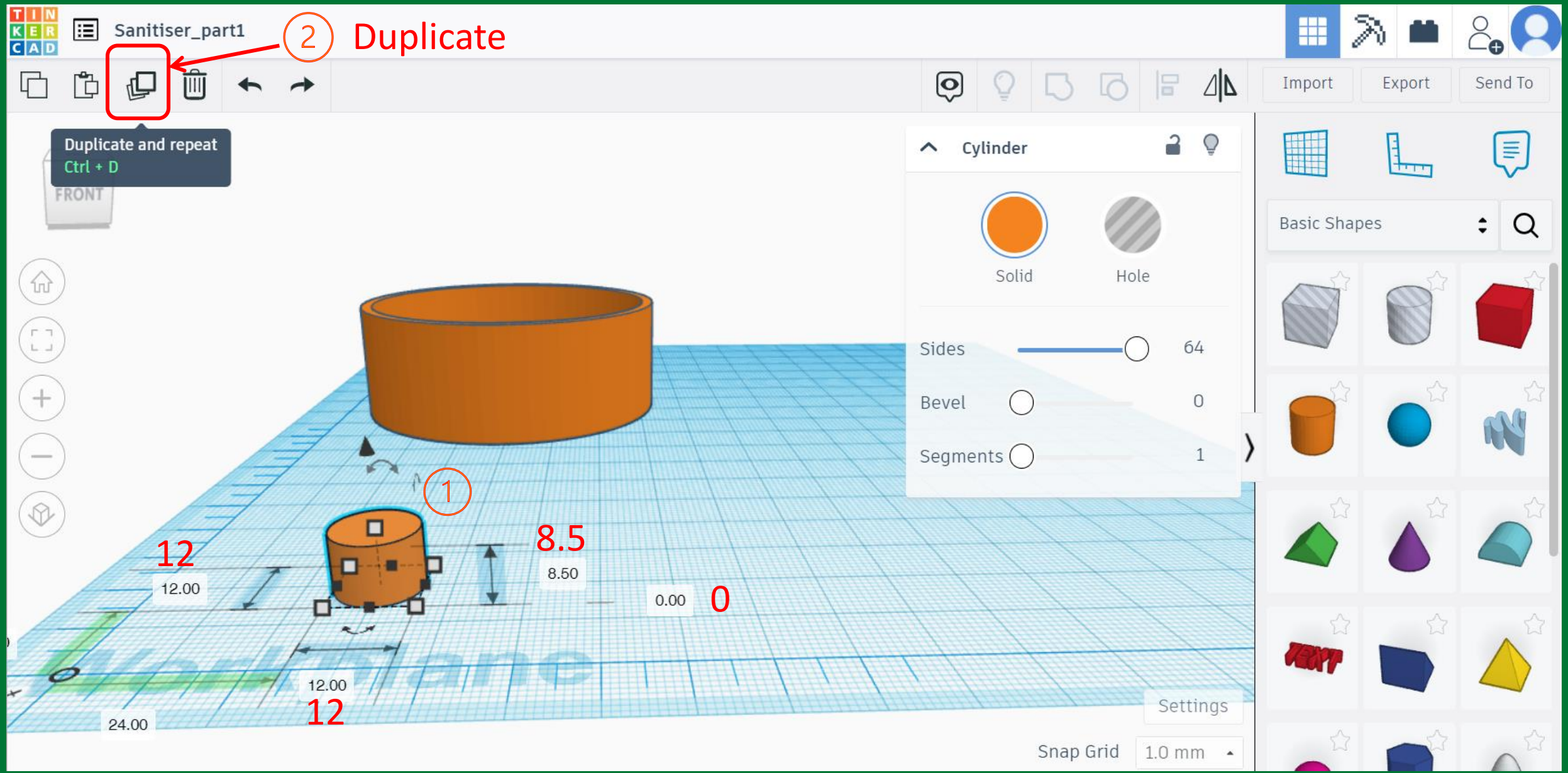

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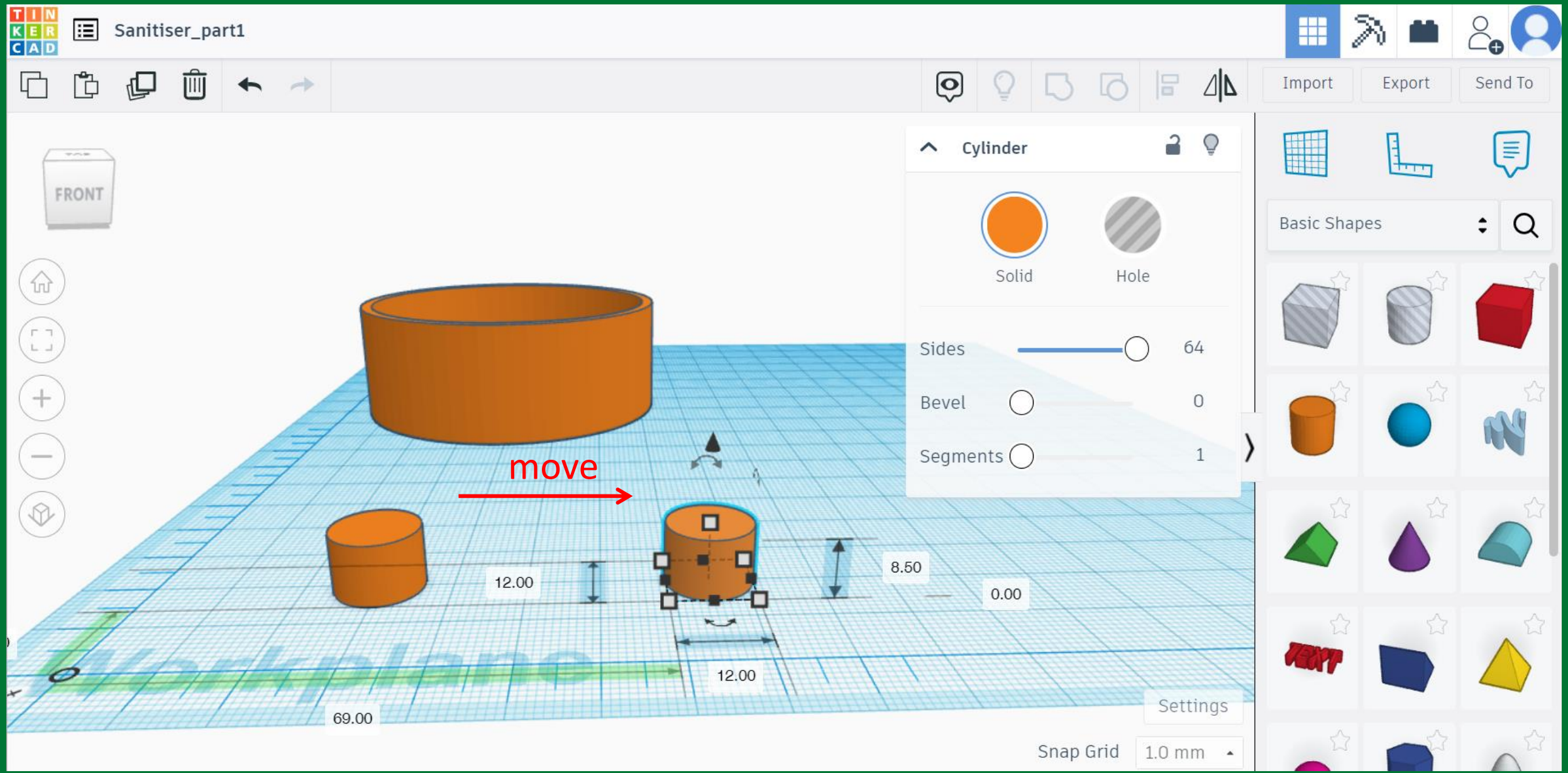

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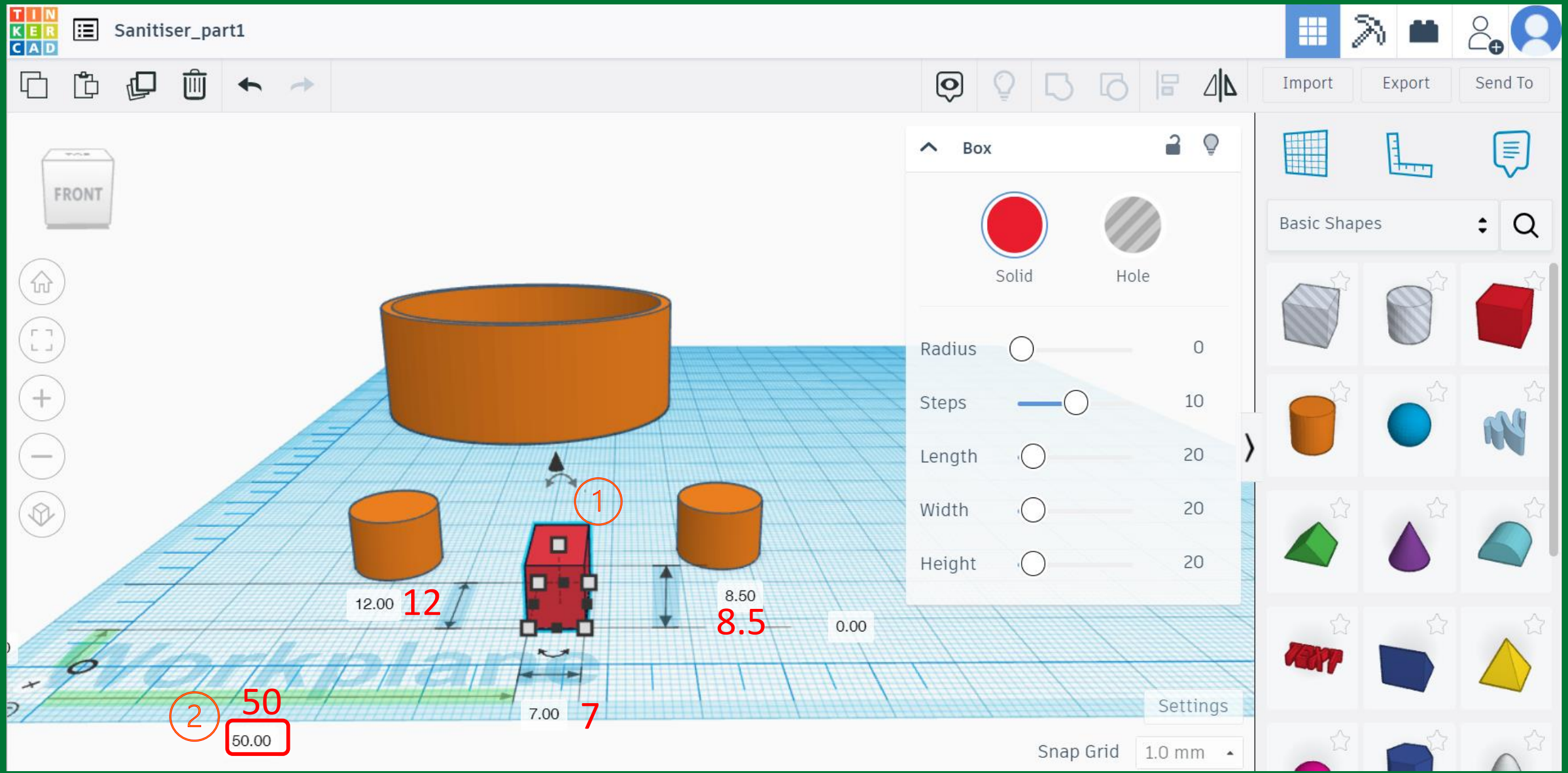

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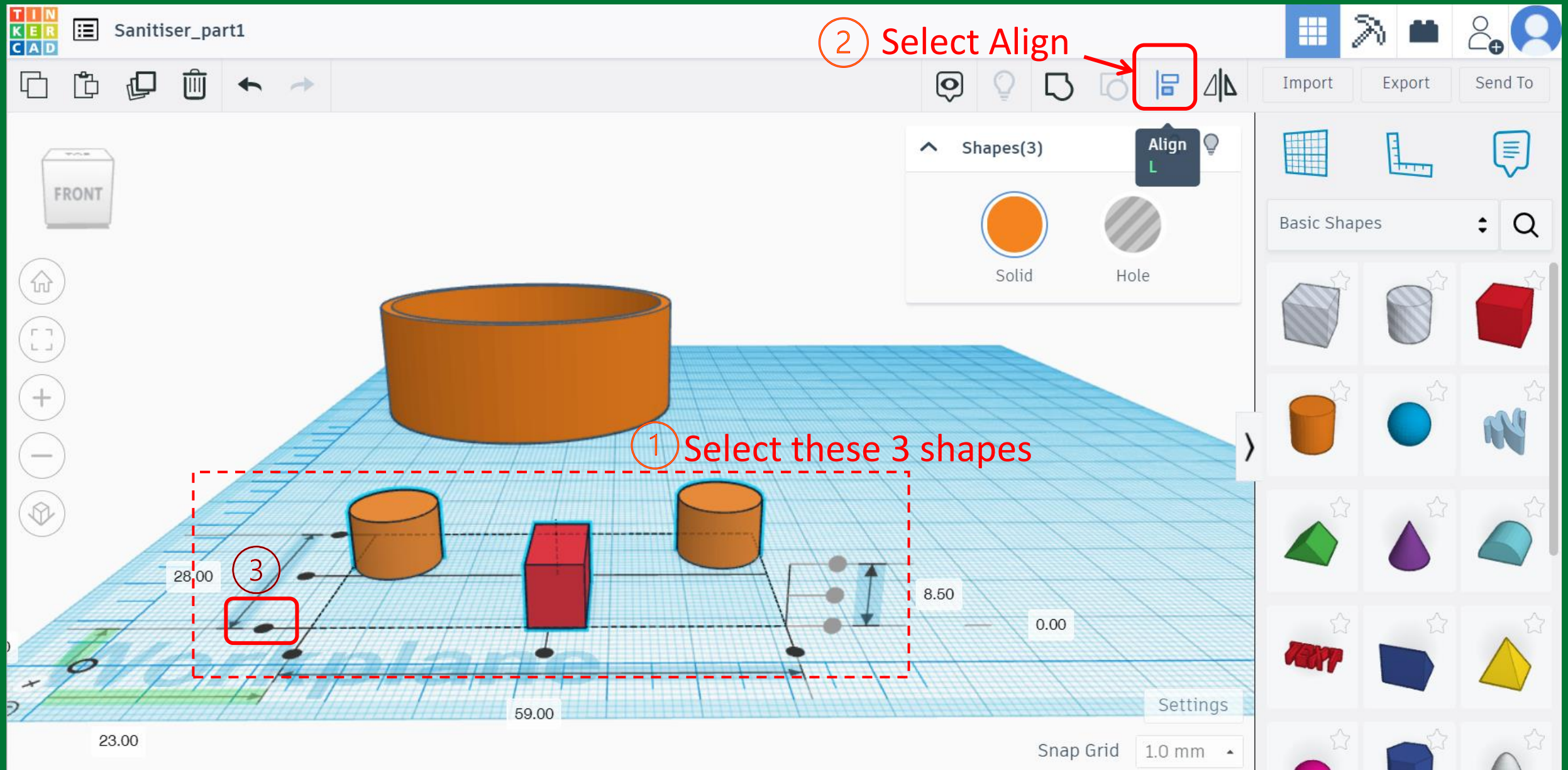
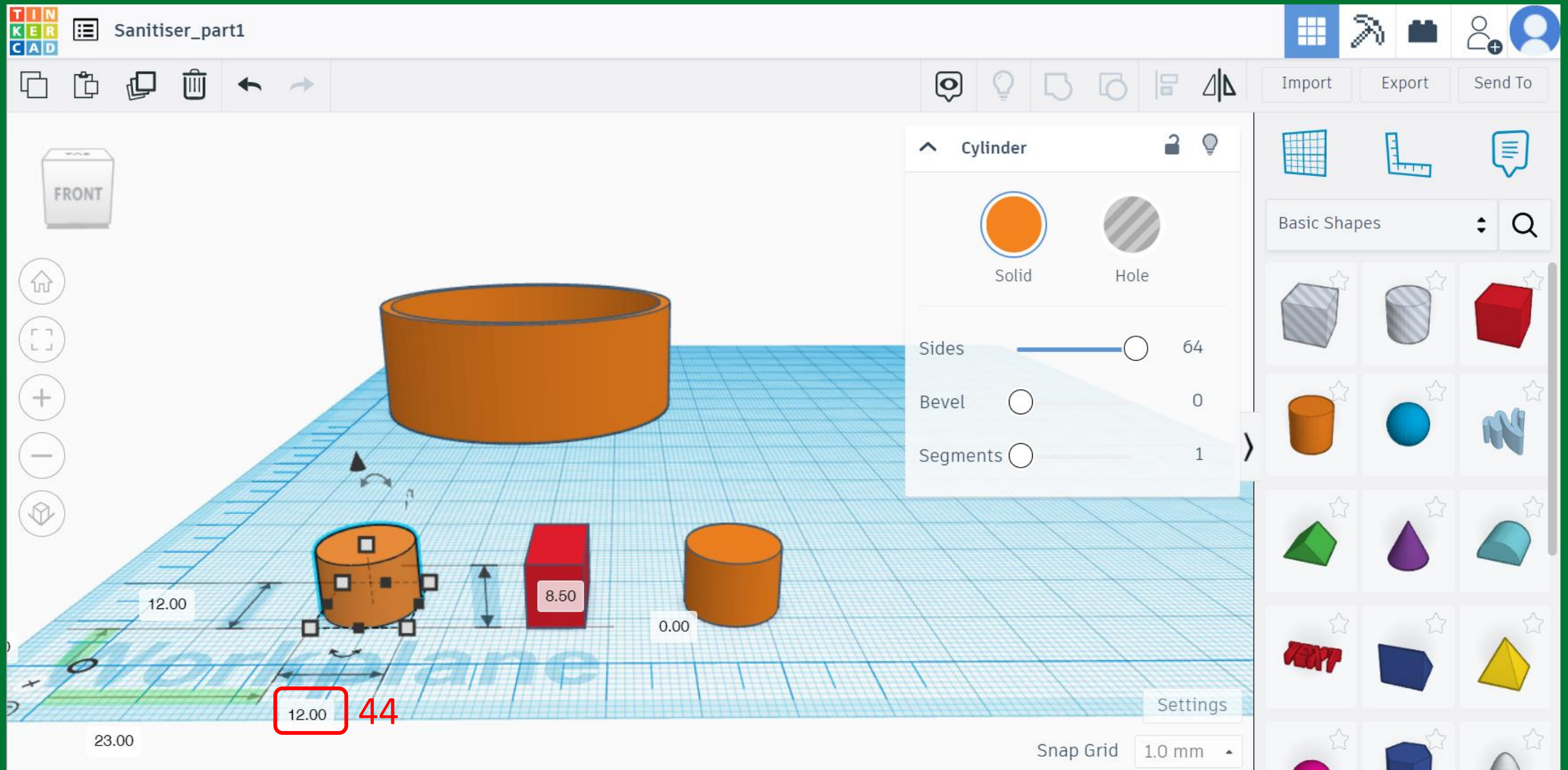


The Design of the Outer Shell of the Hand Sanitiser Dispenser



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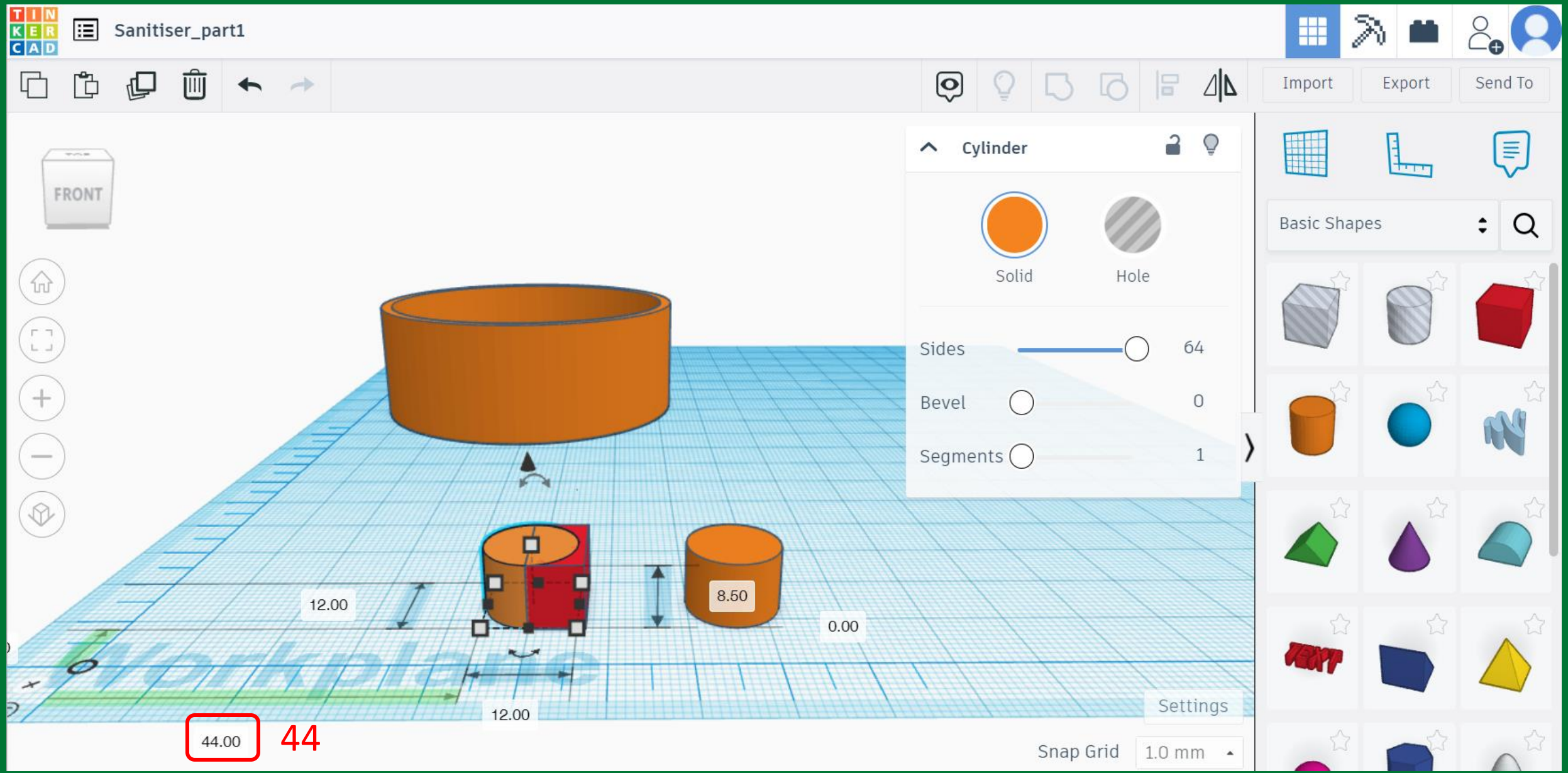

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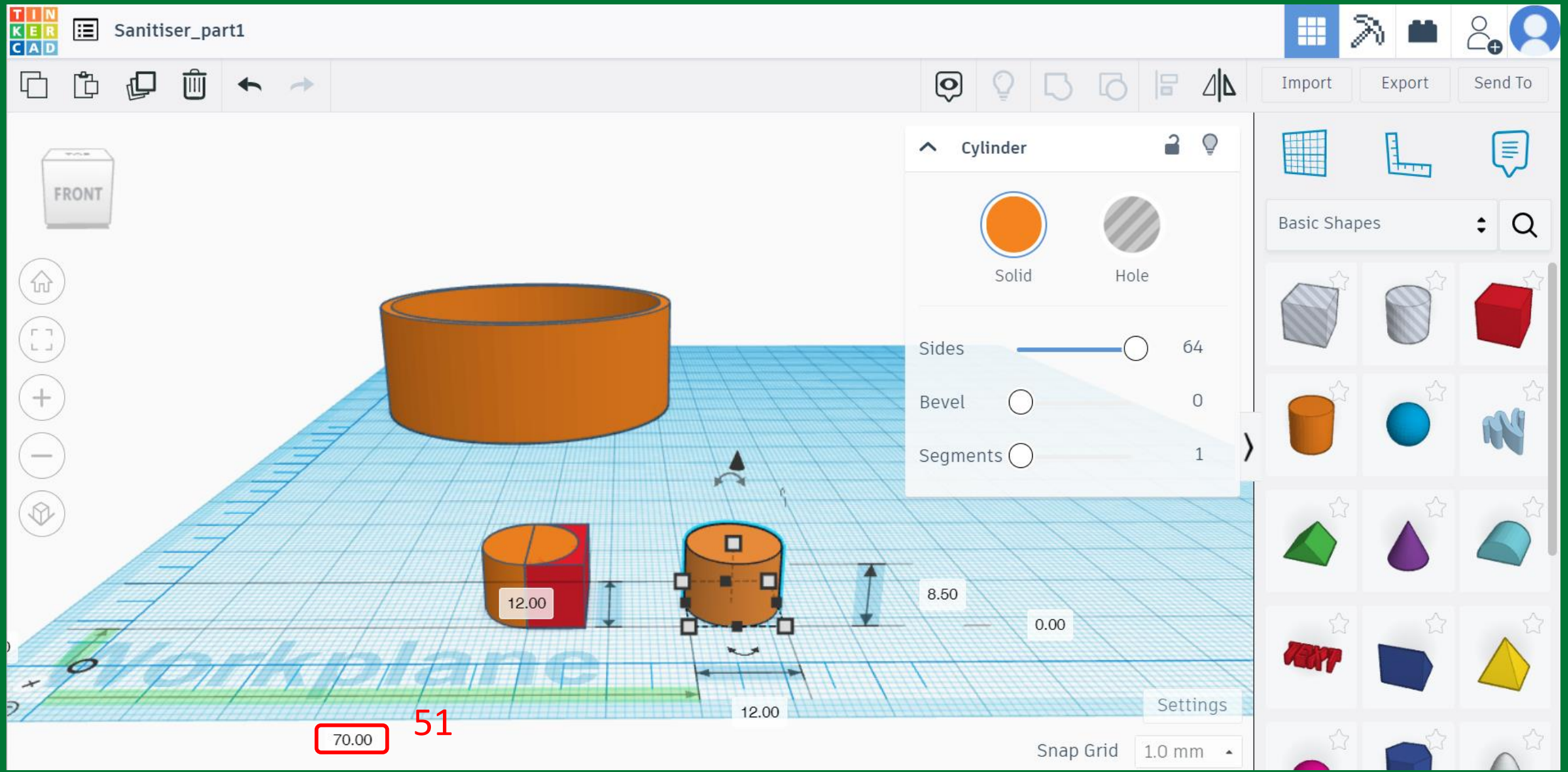

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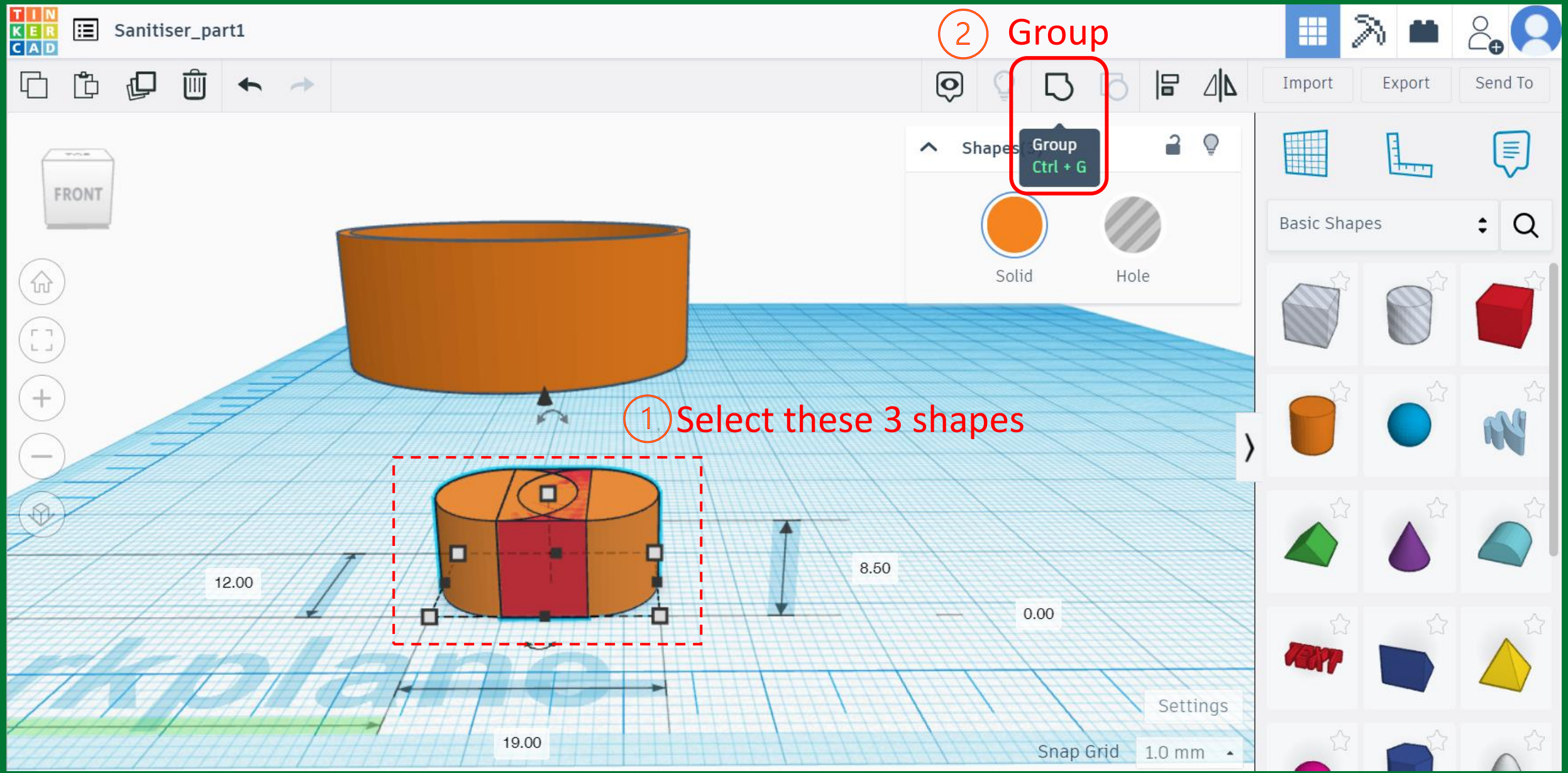

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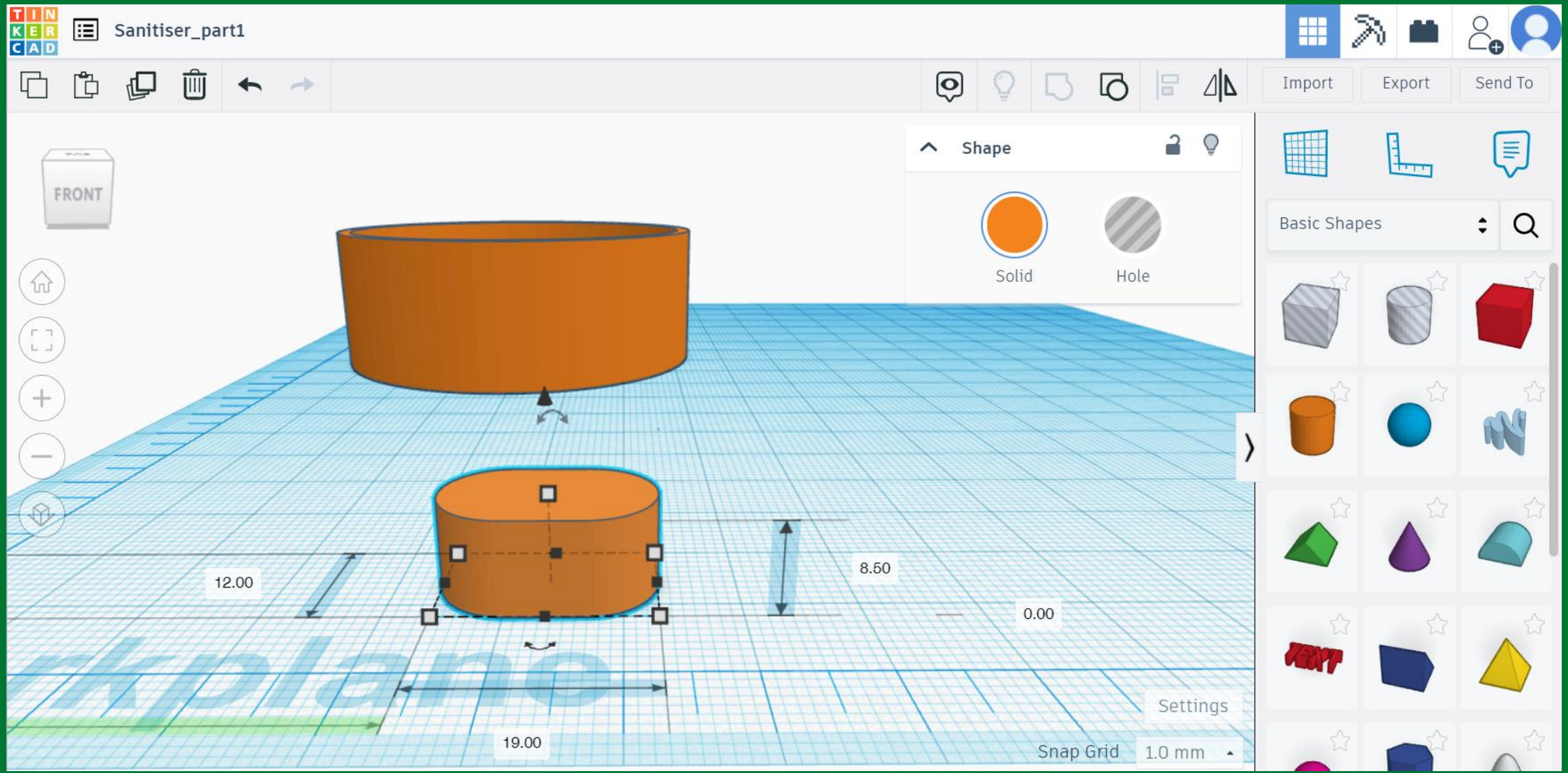

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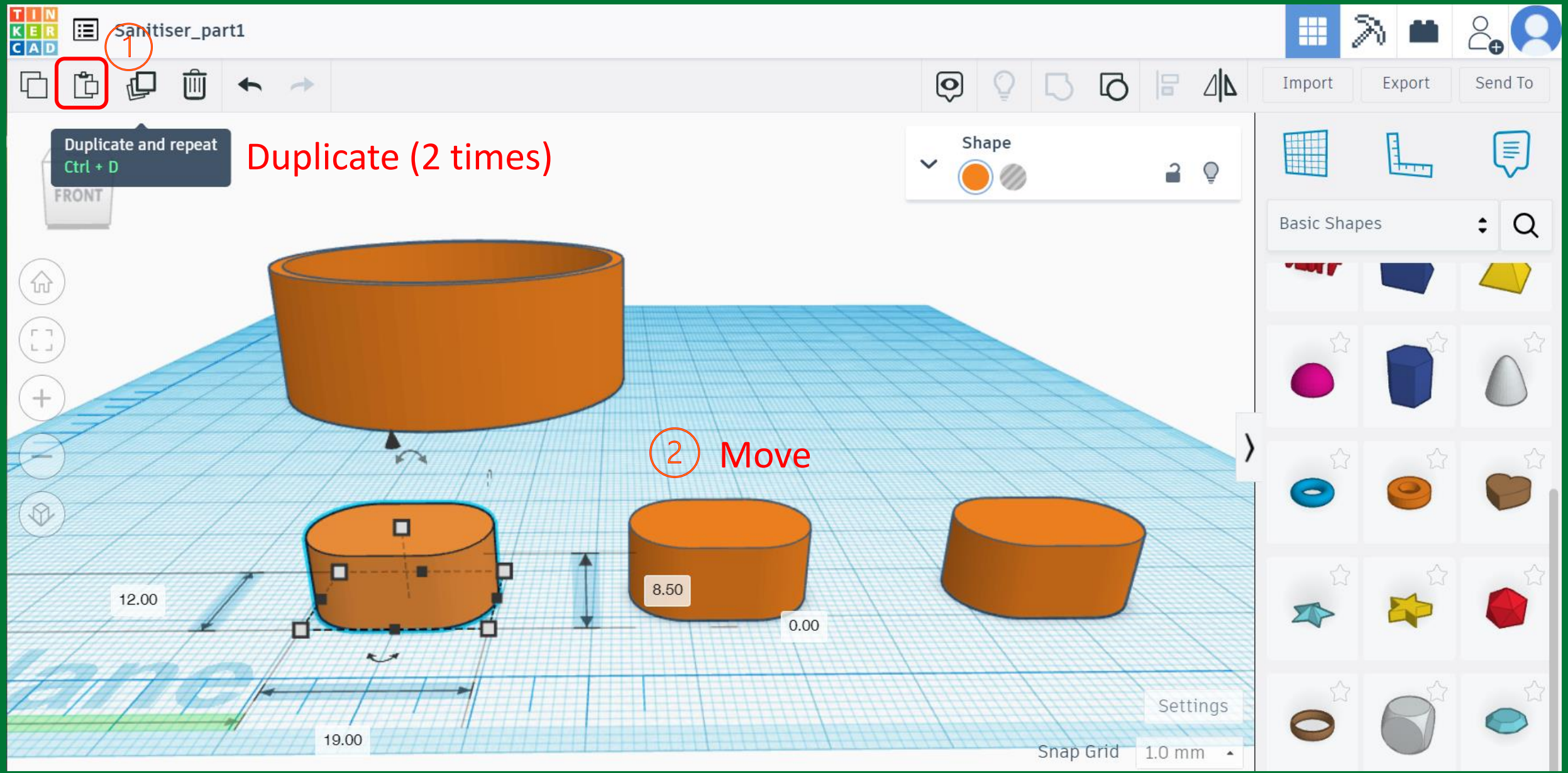

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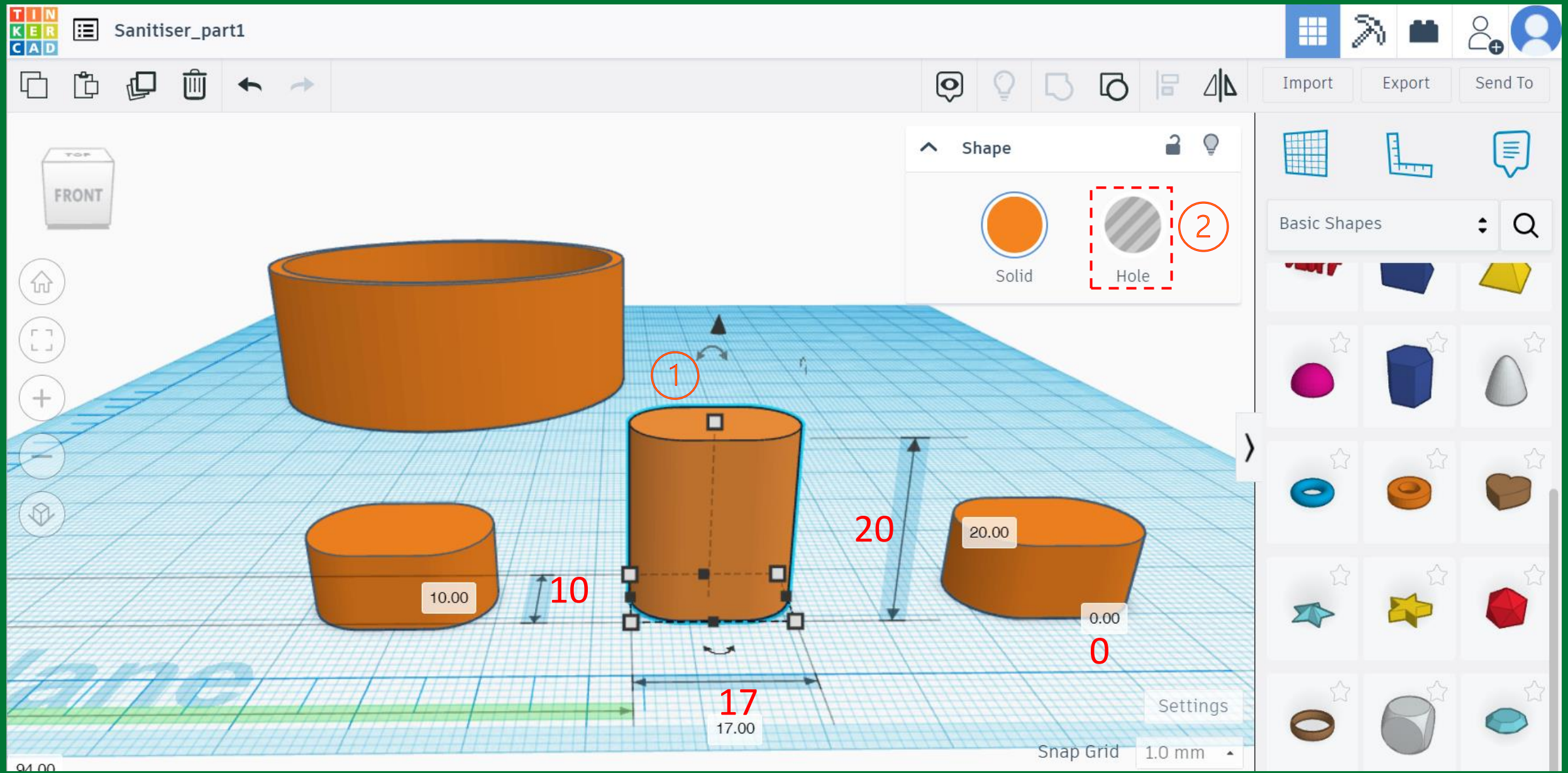

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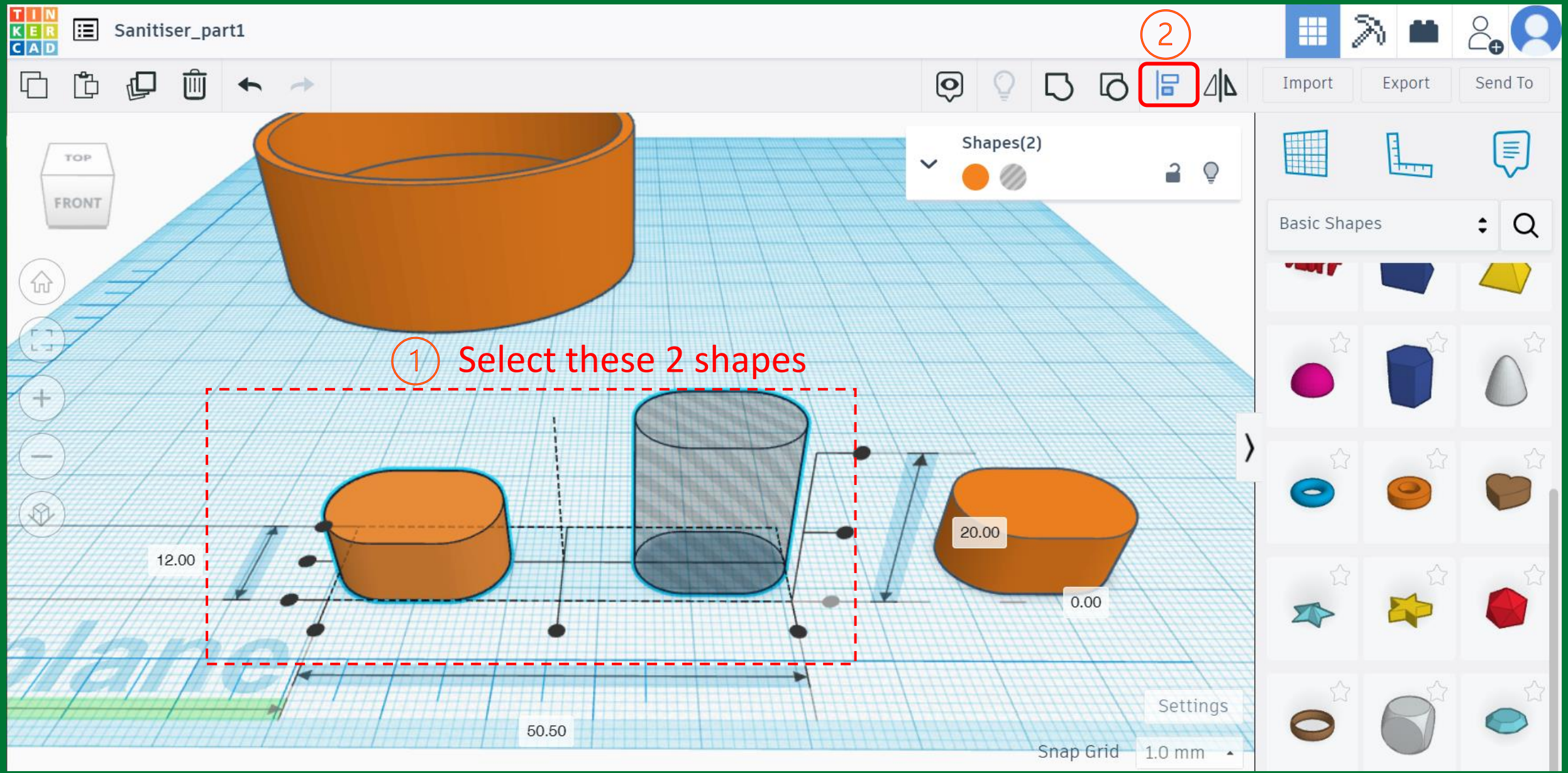

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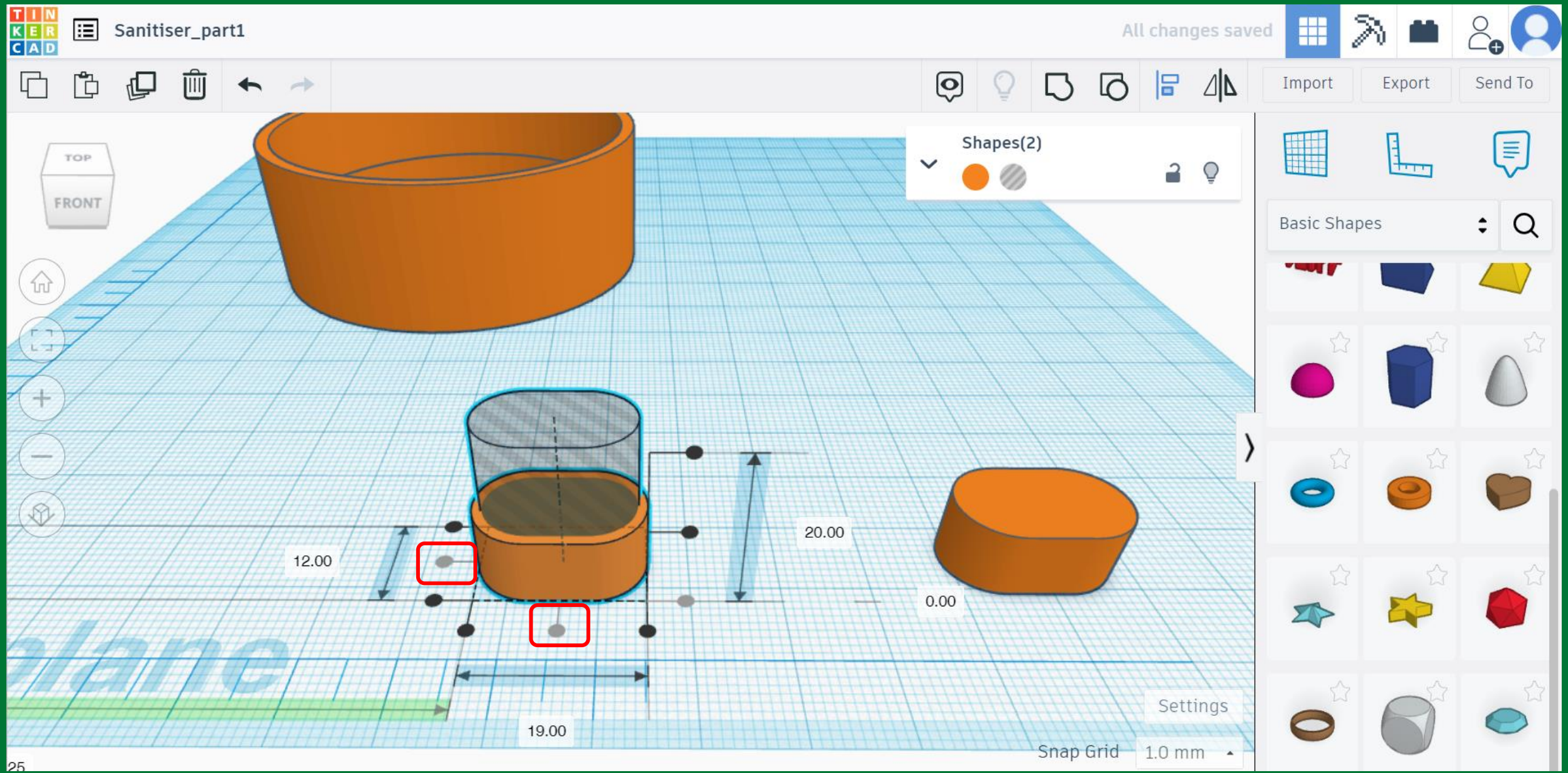

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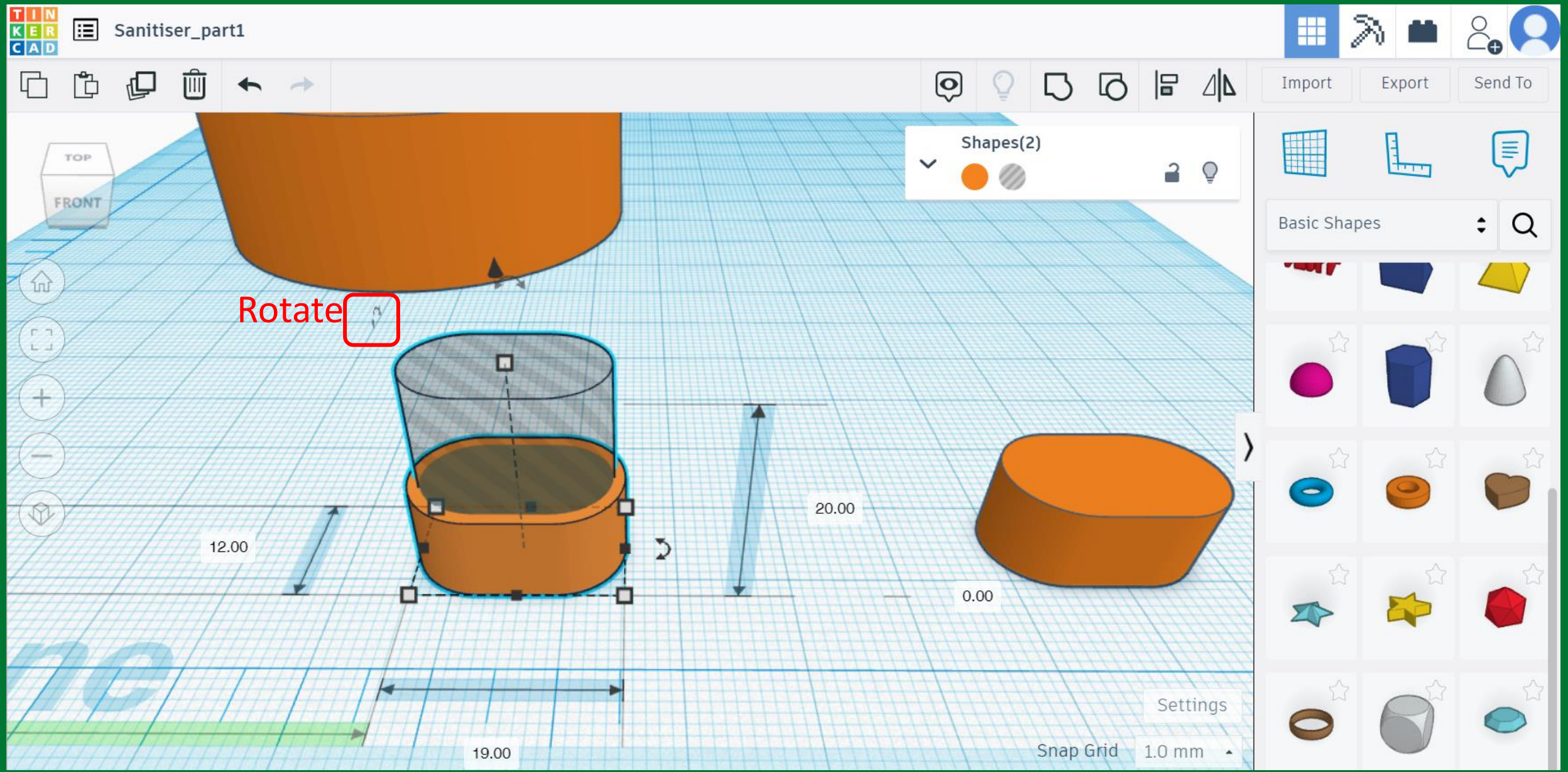

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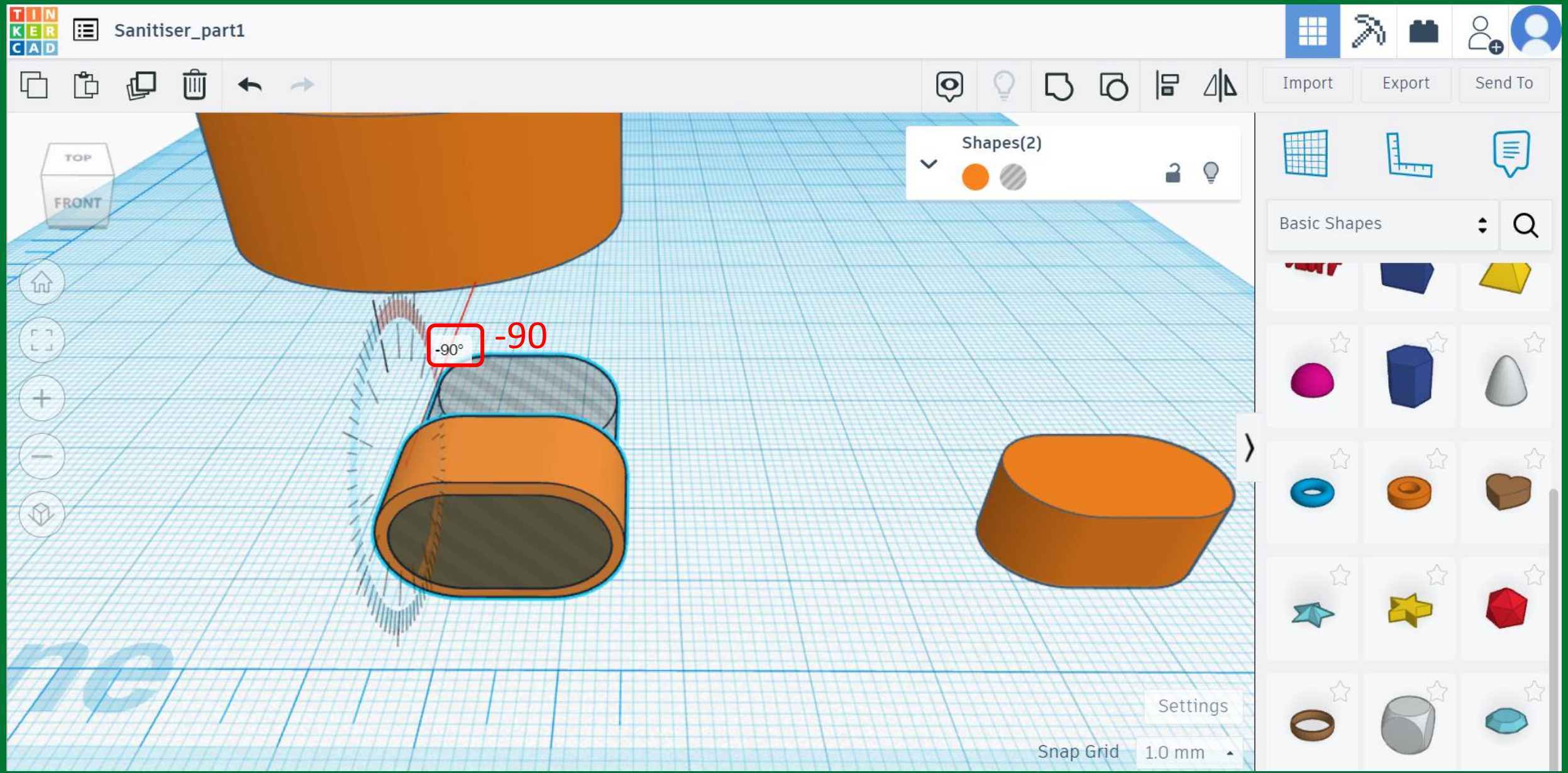

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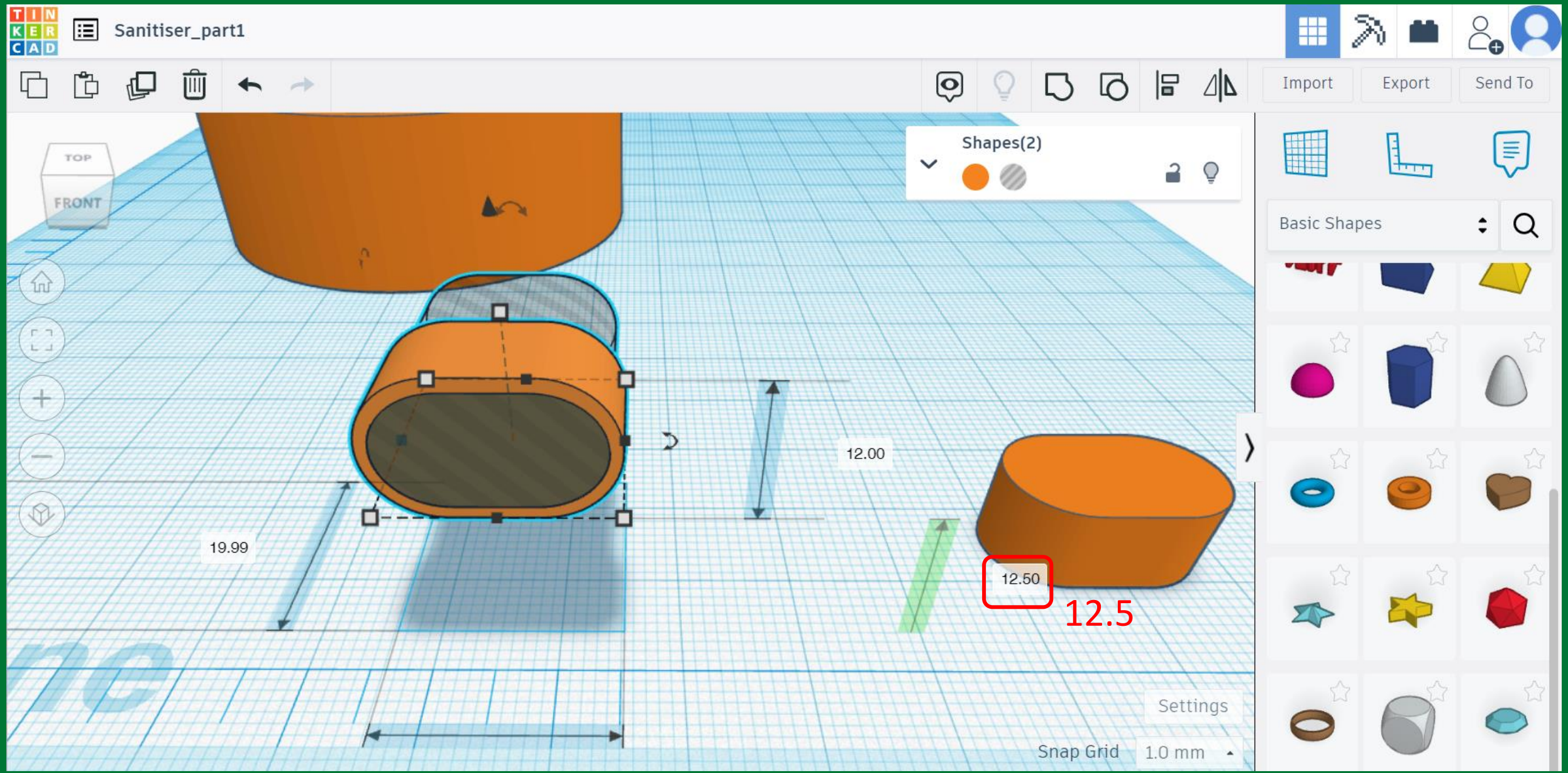

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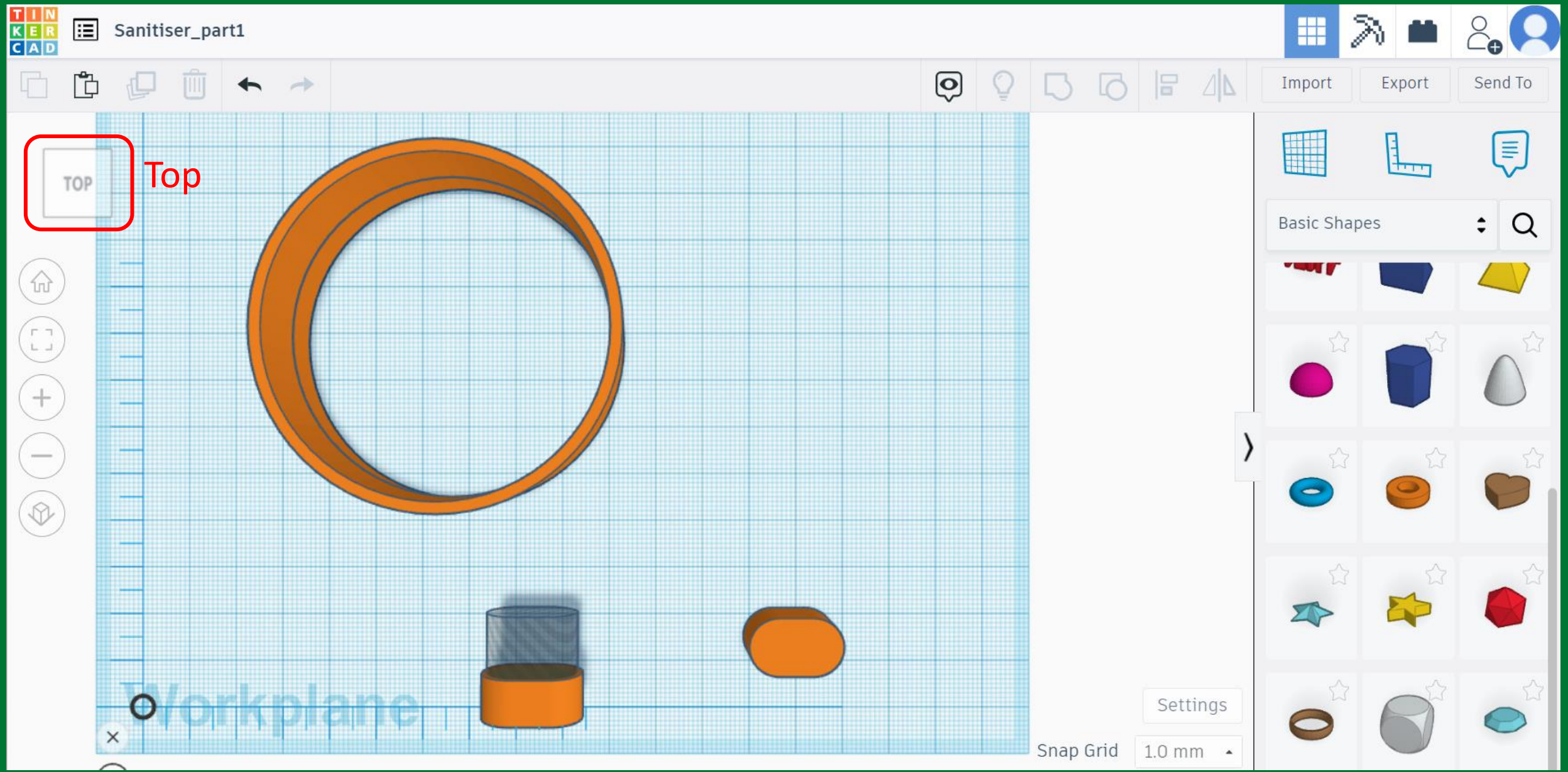

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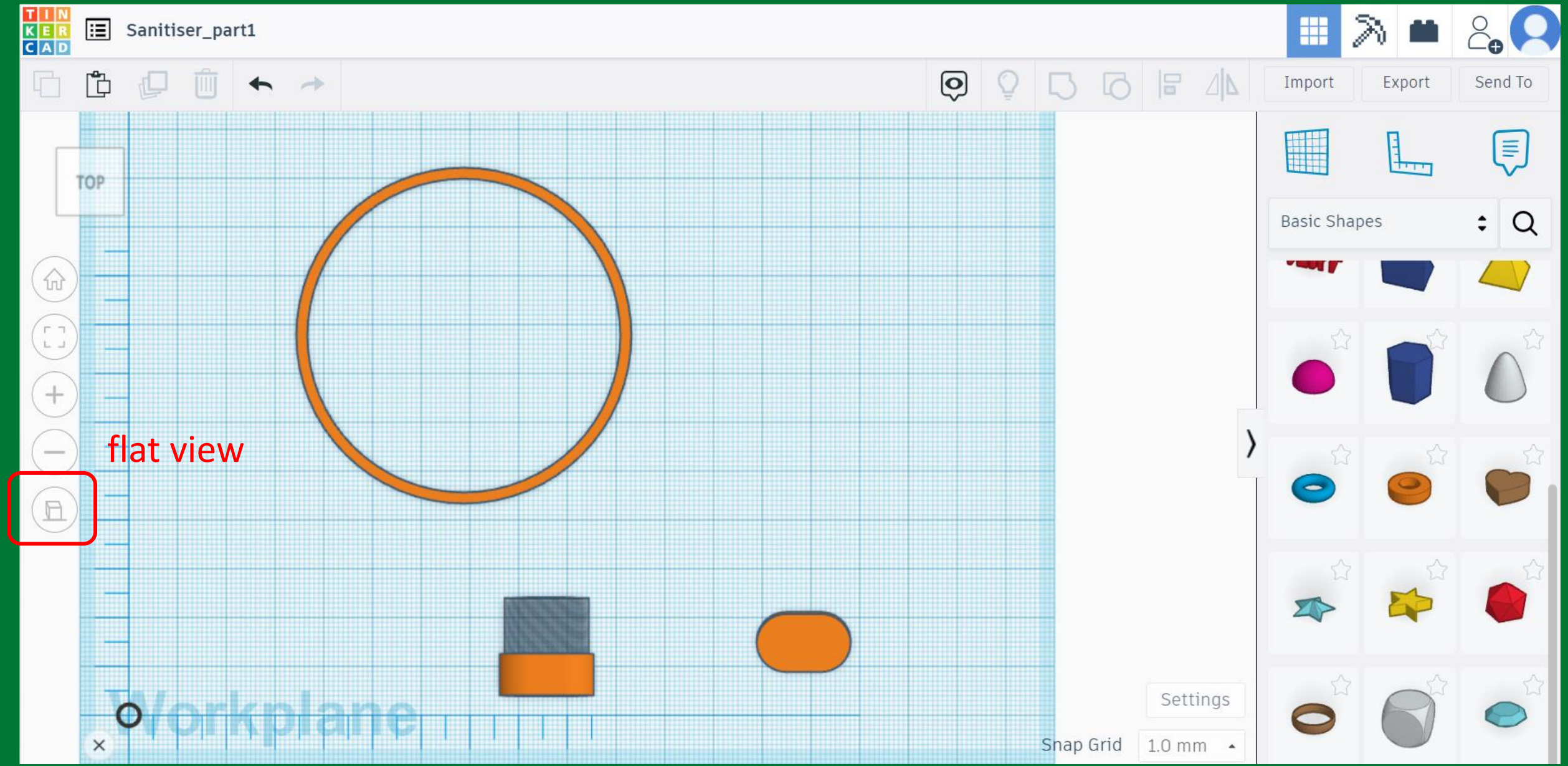

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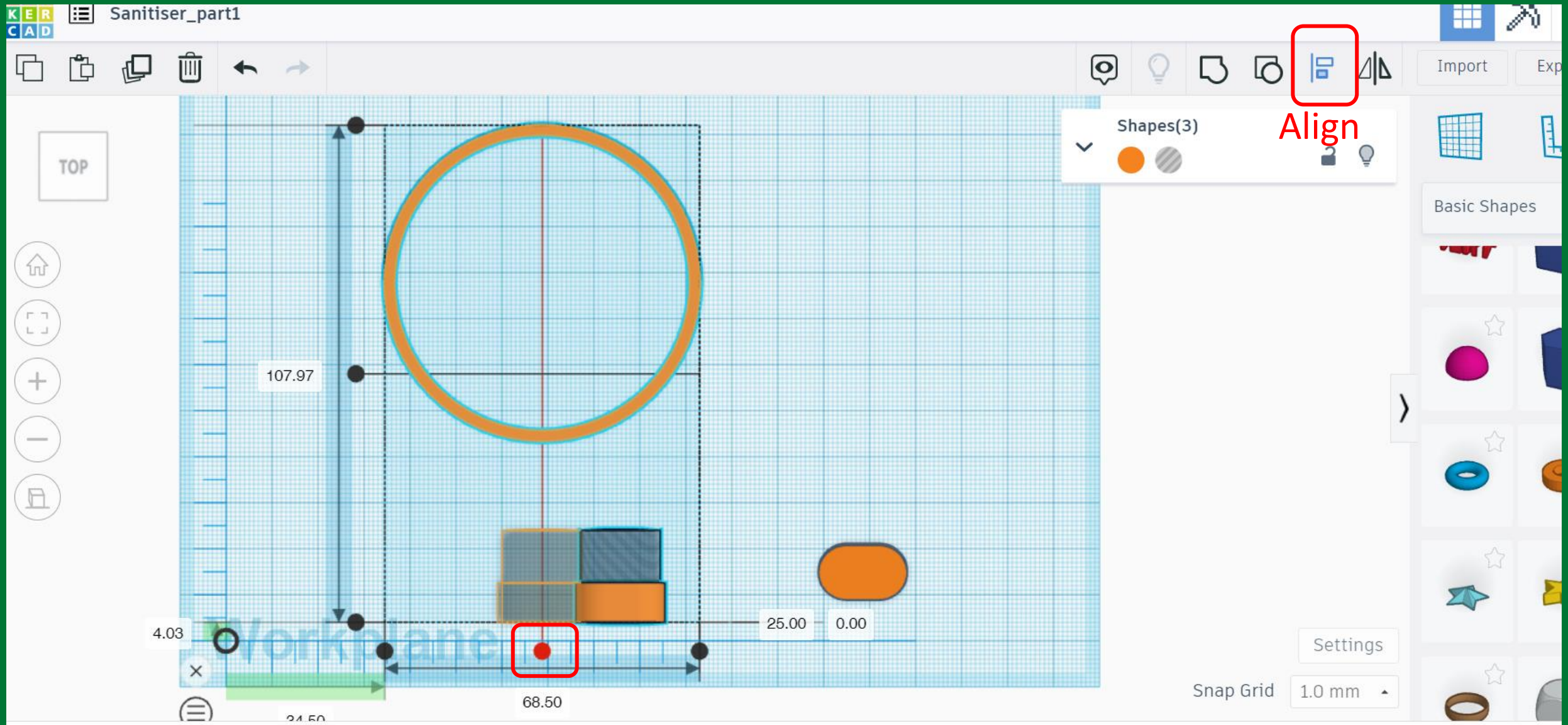

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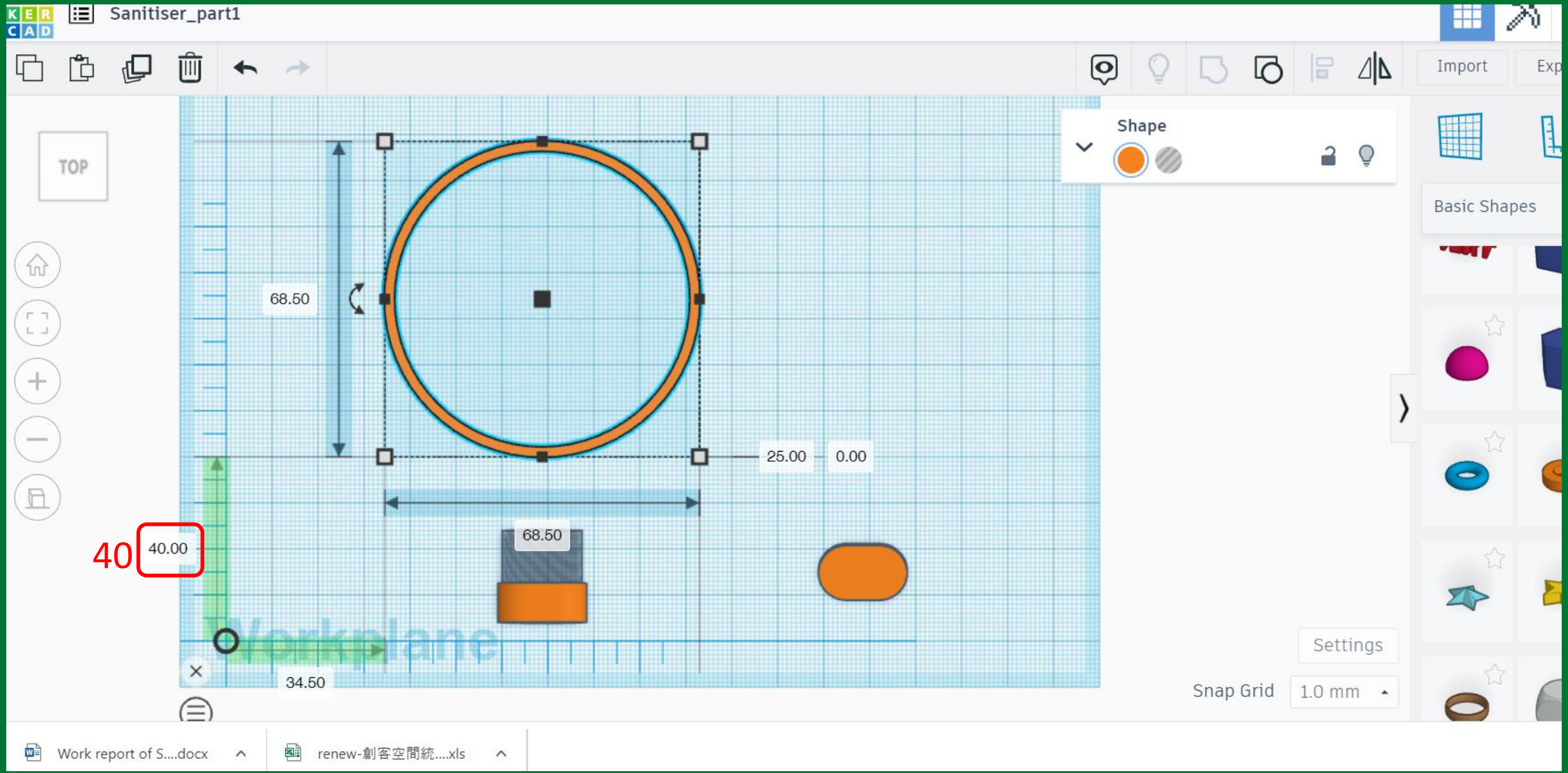

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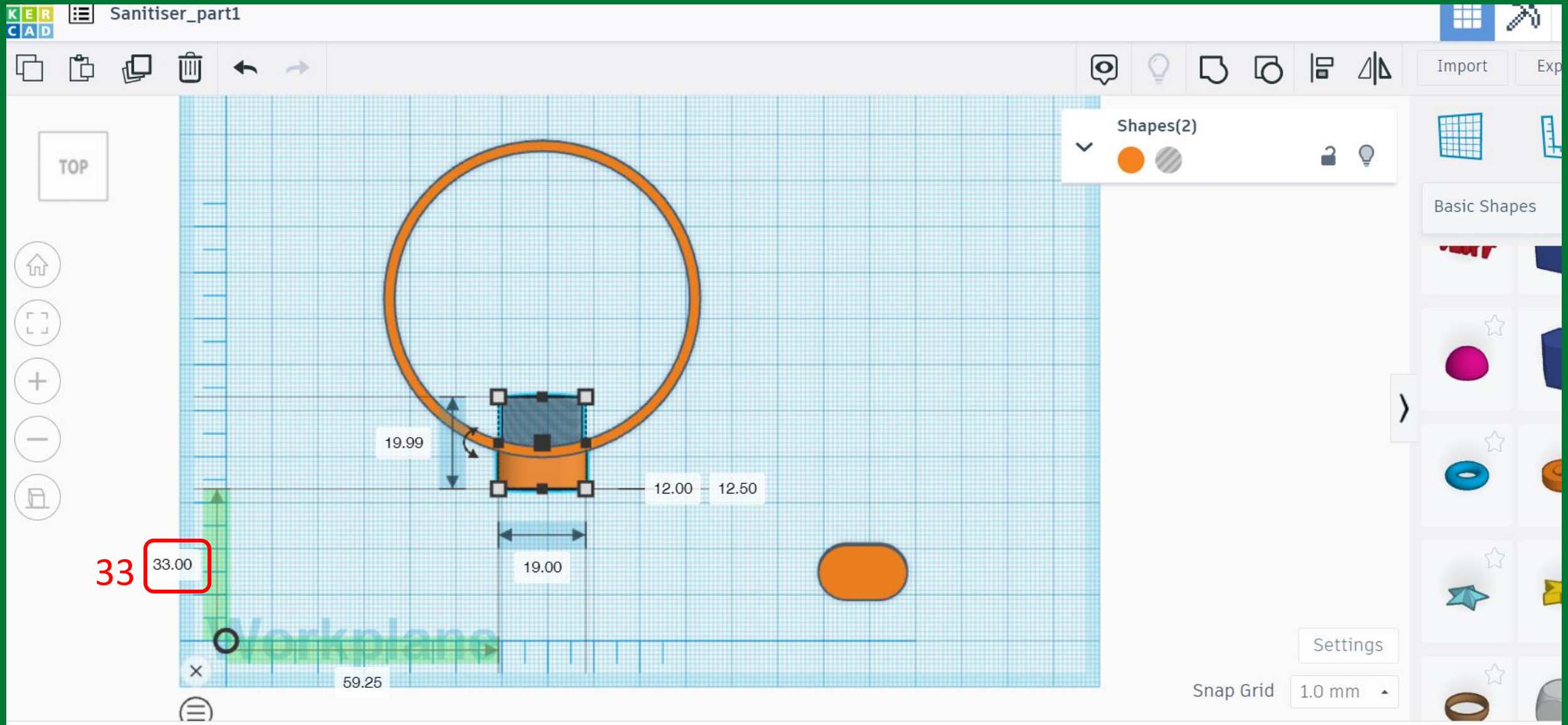

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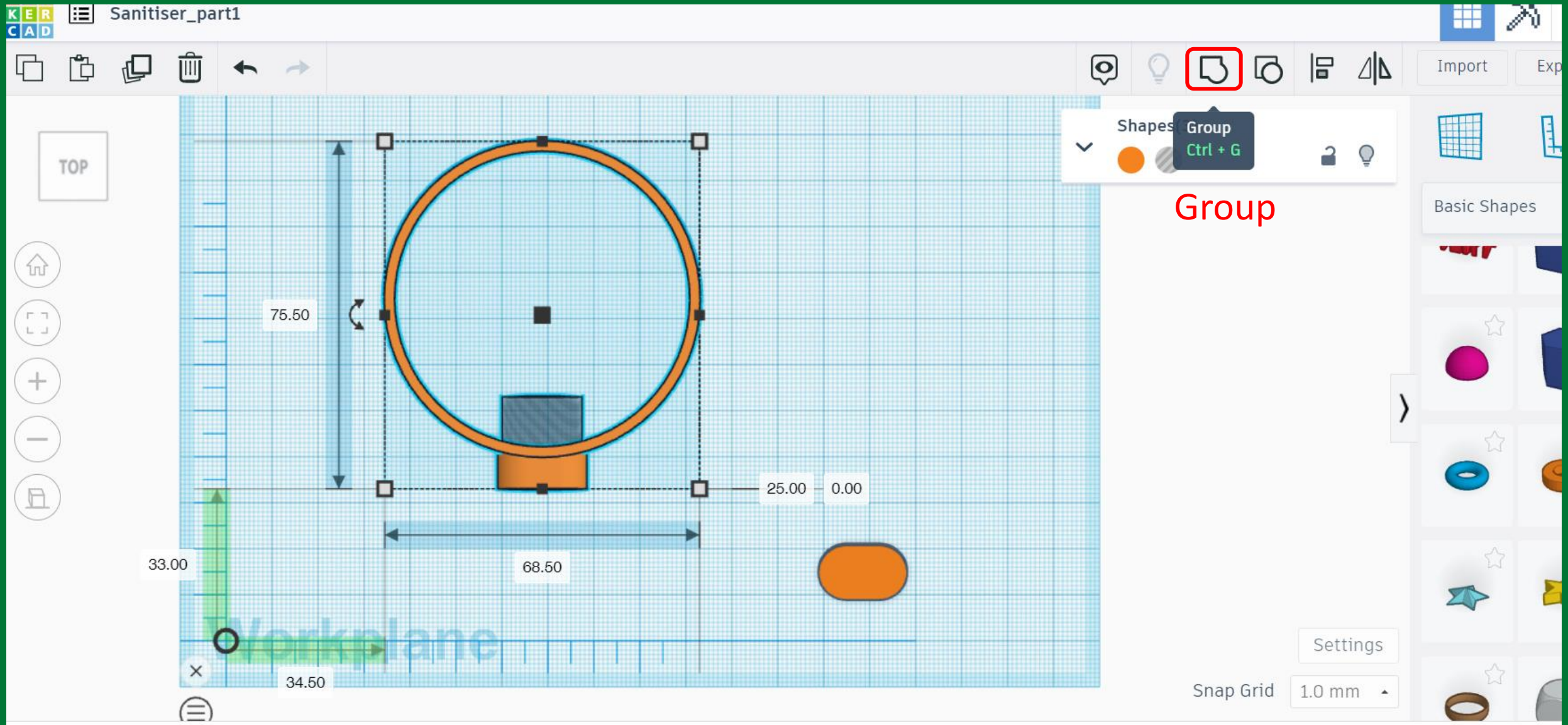

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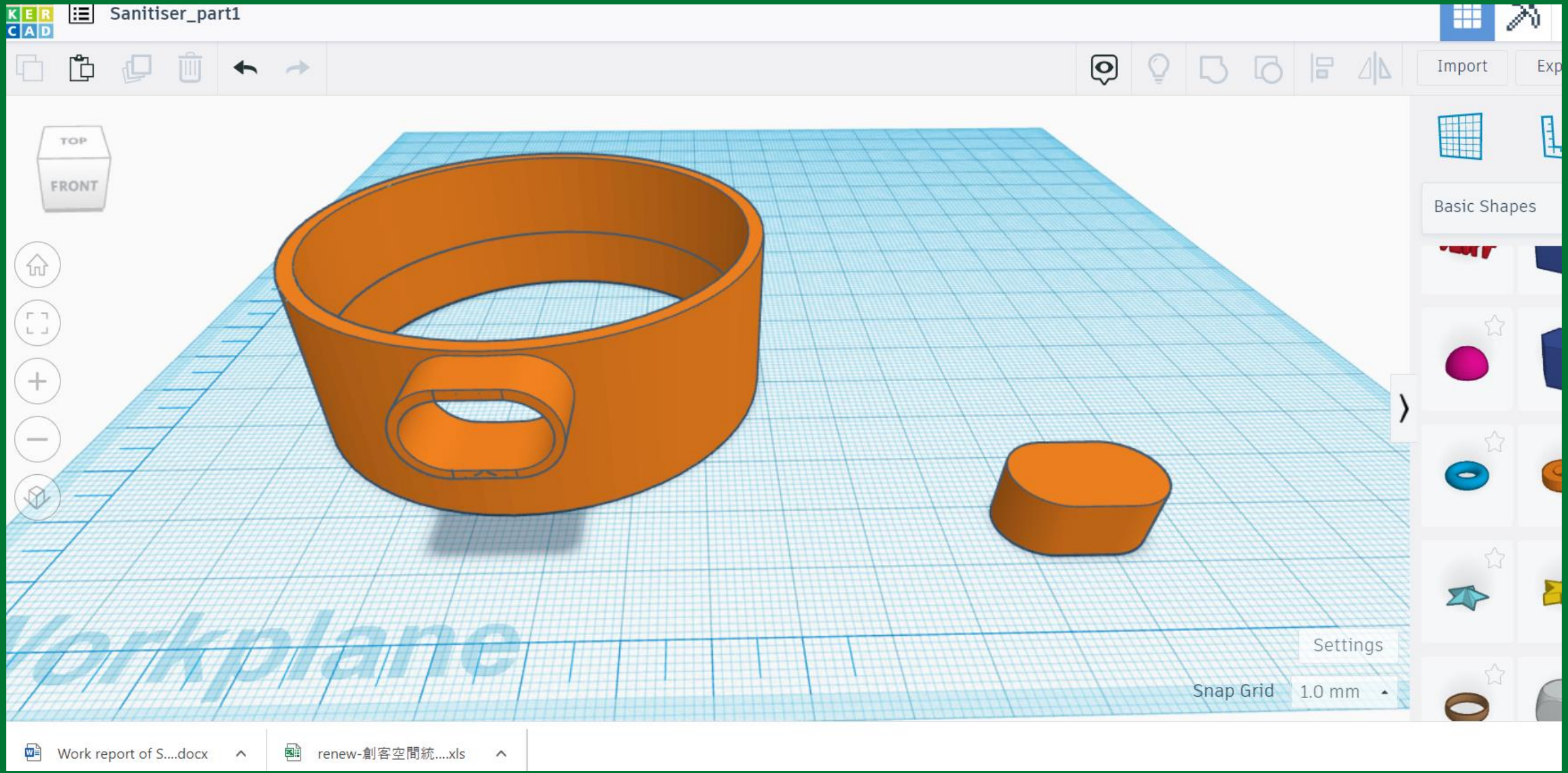

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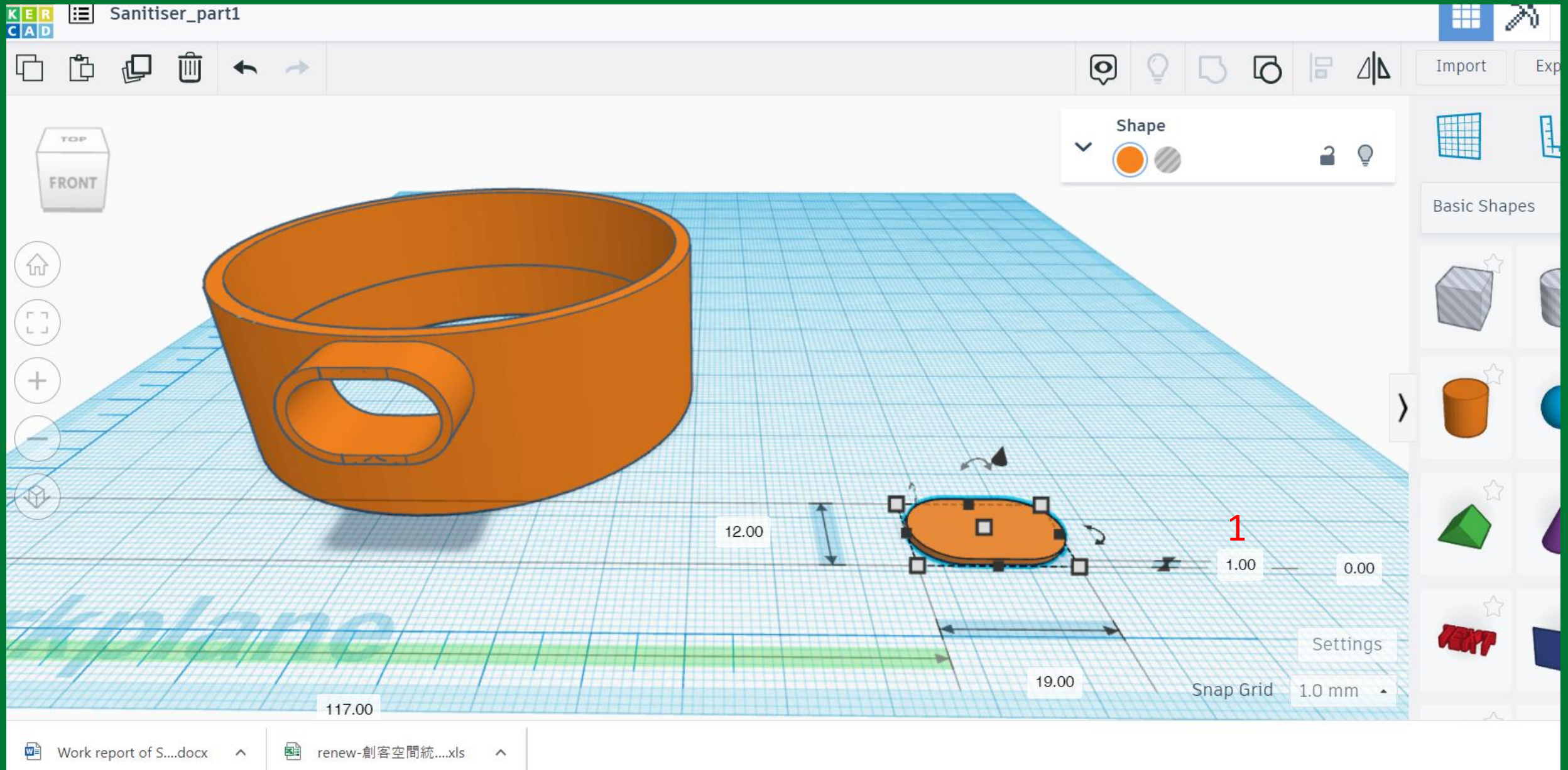

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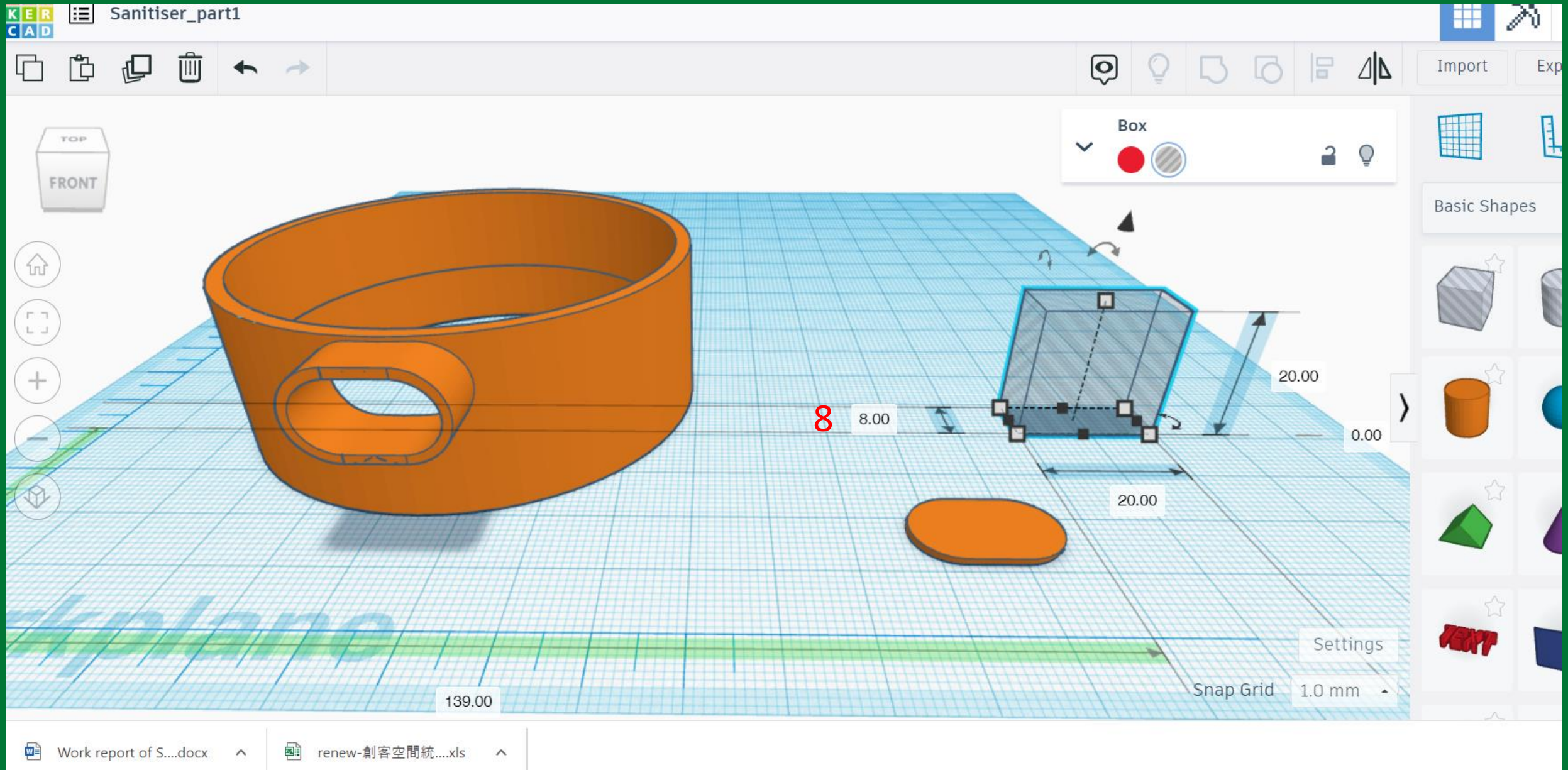

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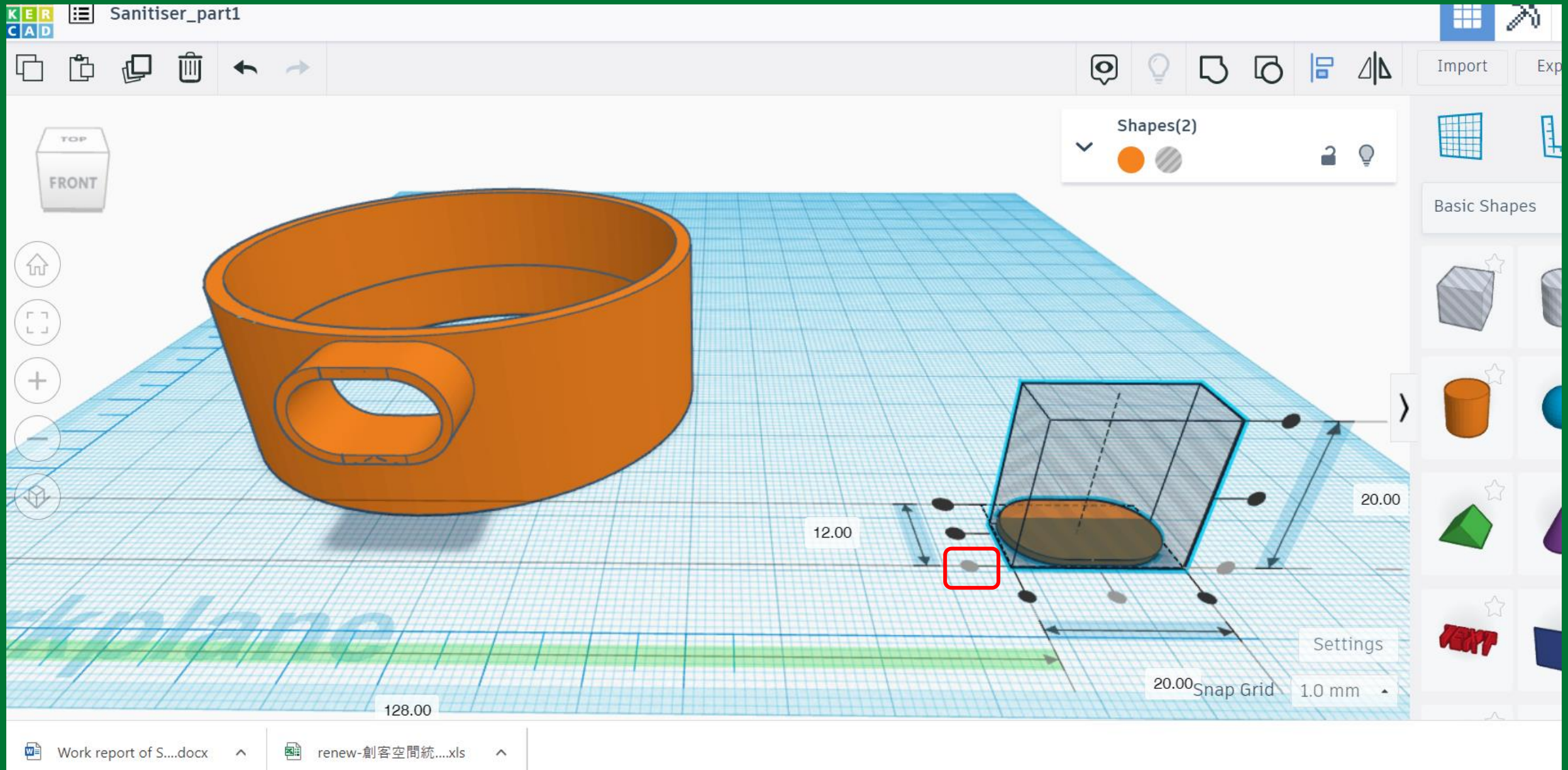

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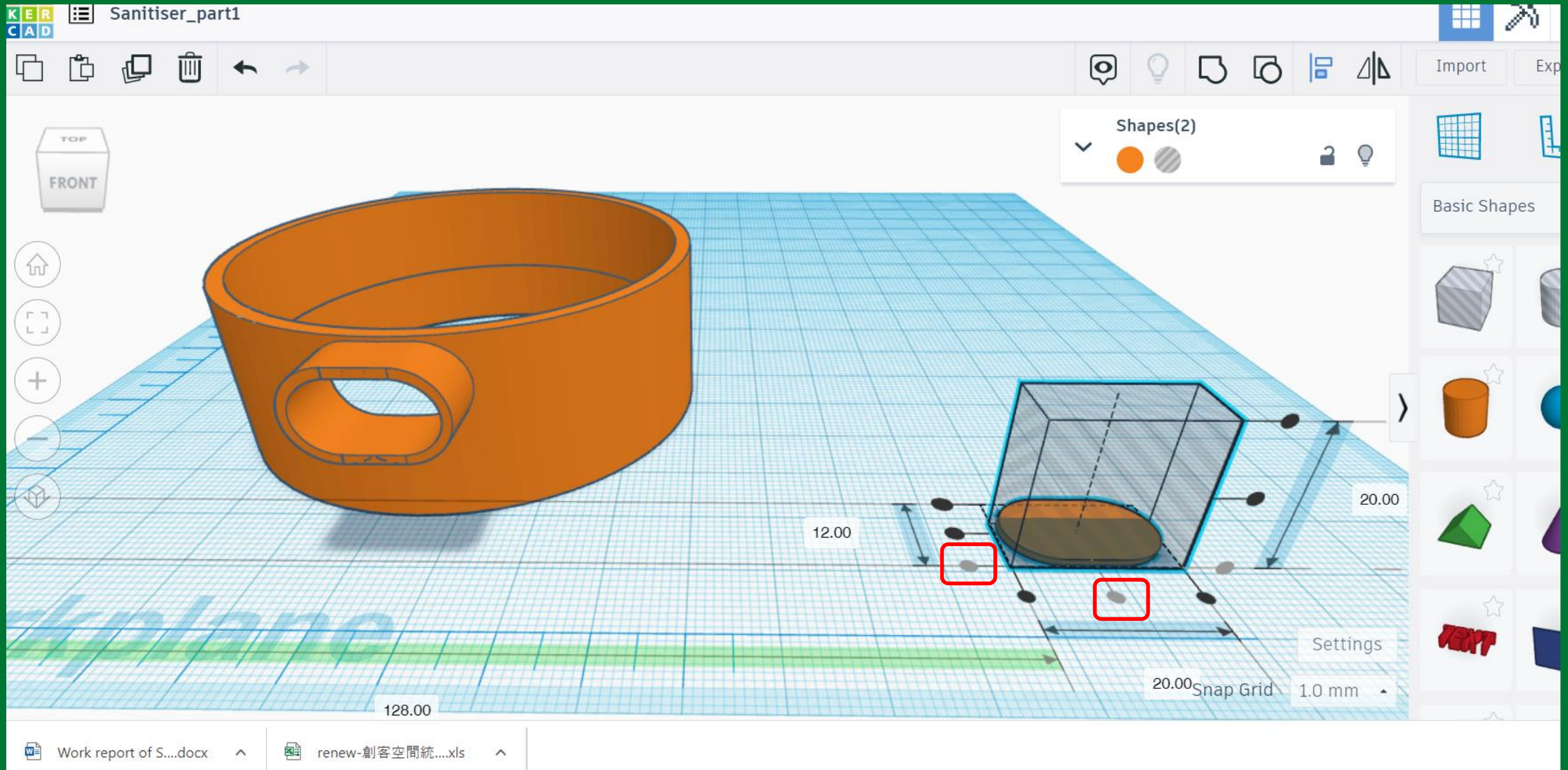

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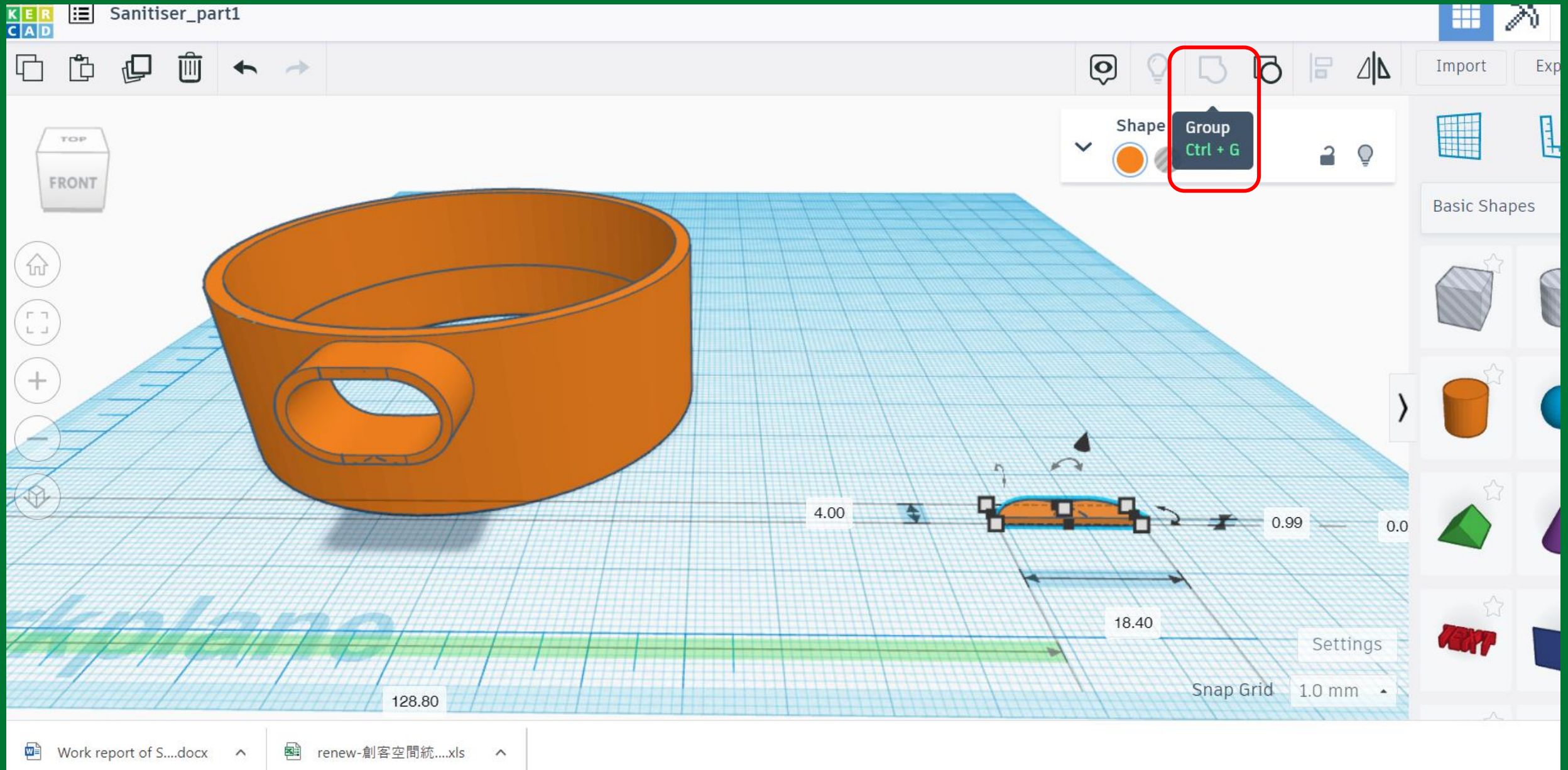

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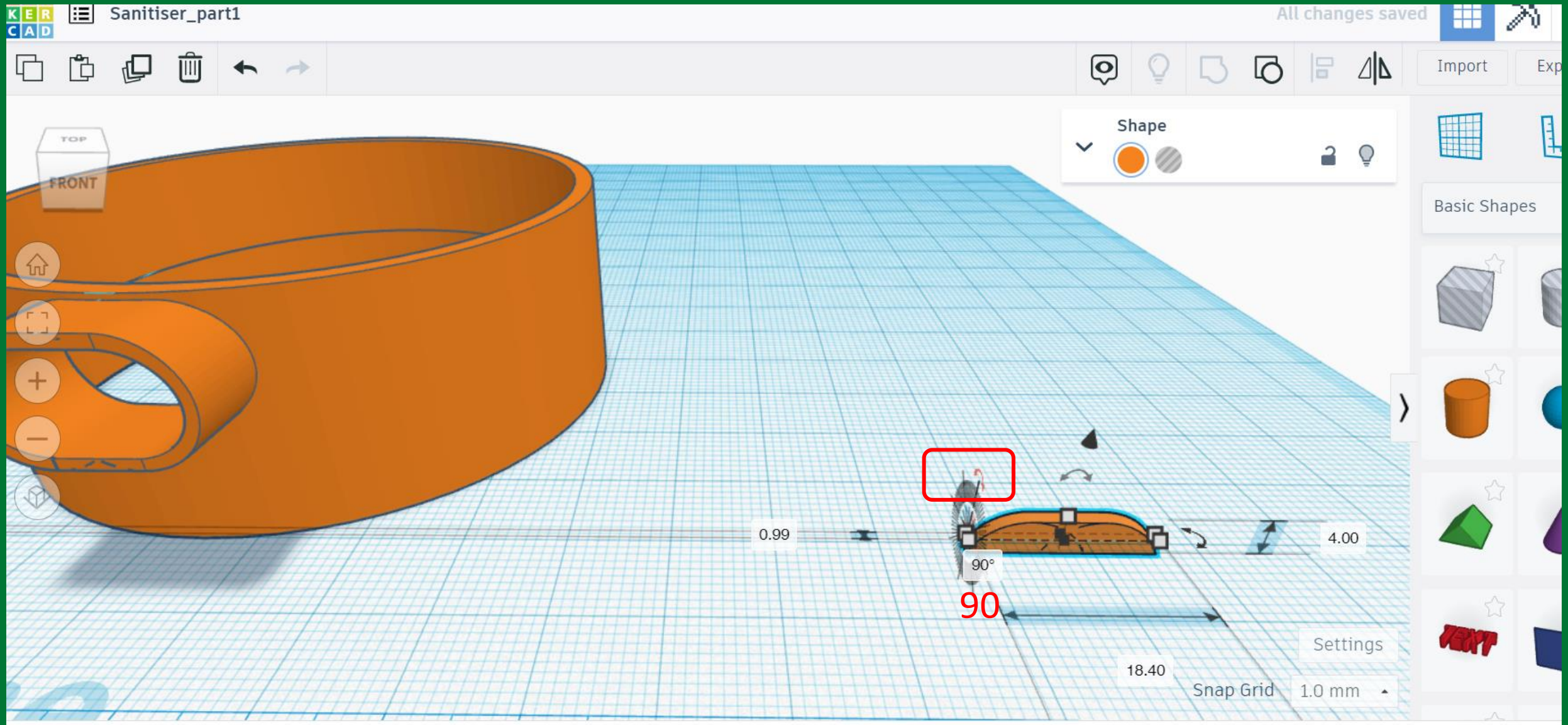

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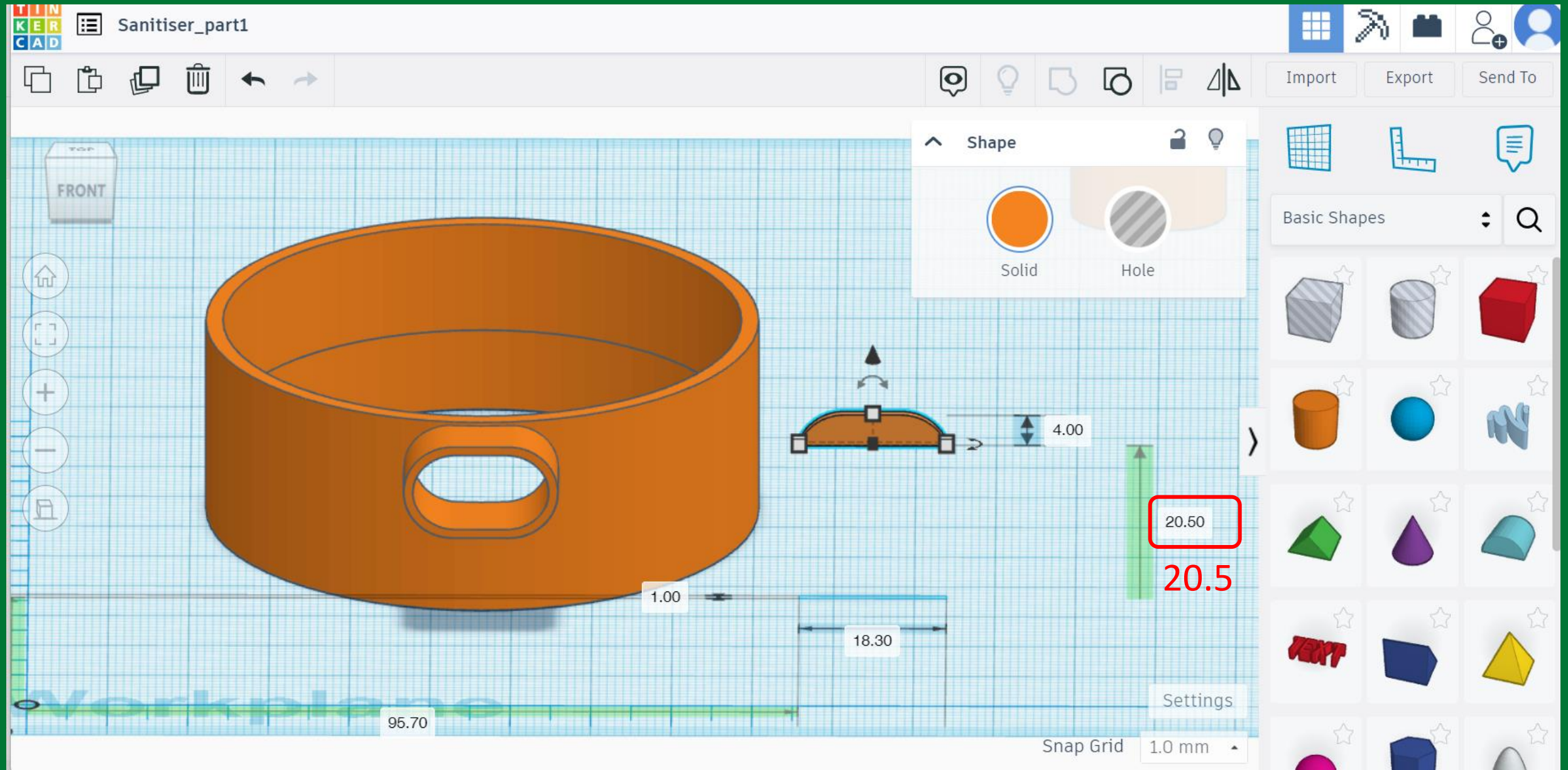
The Design of the Outer Shell of the Hand Sanitiser Dispenser



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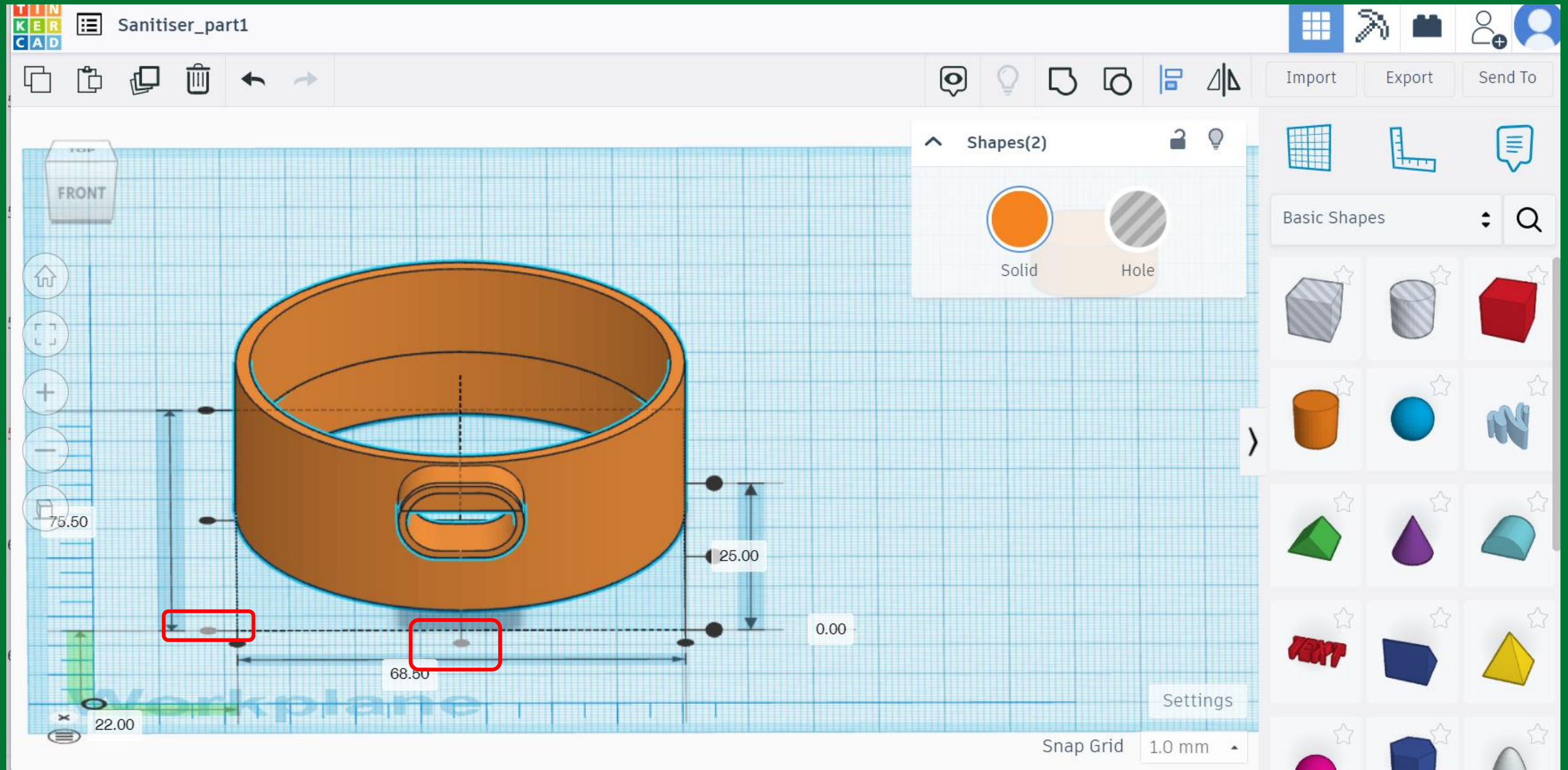

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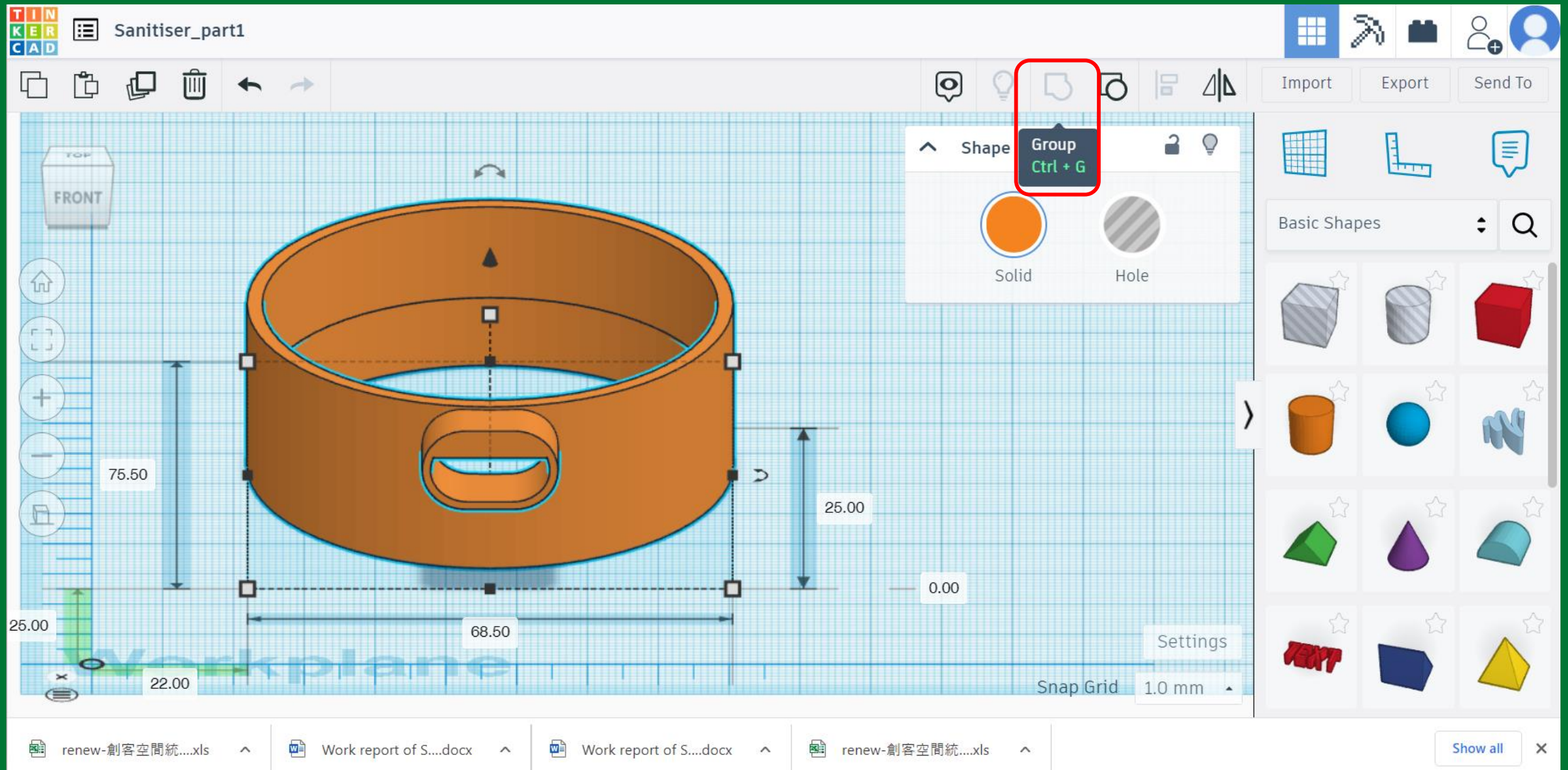

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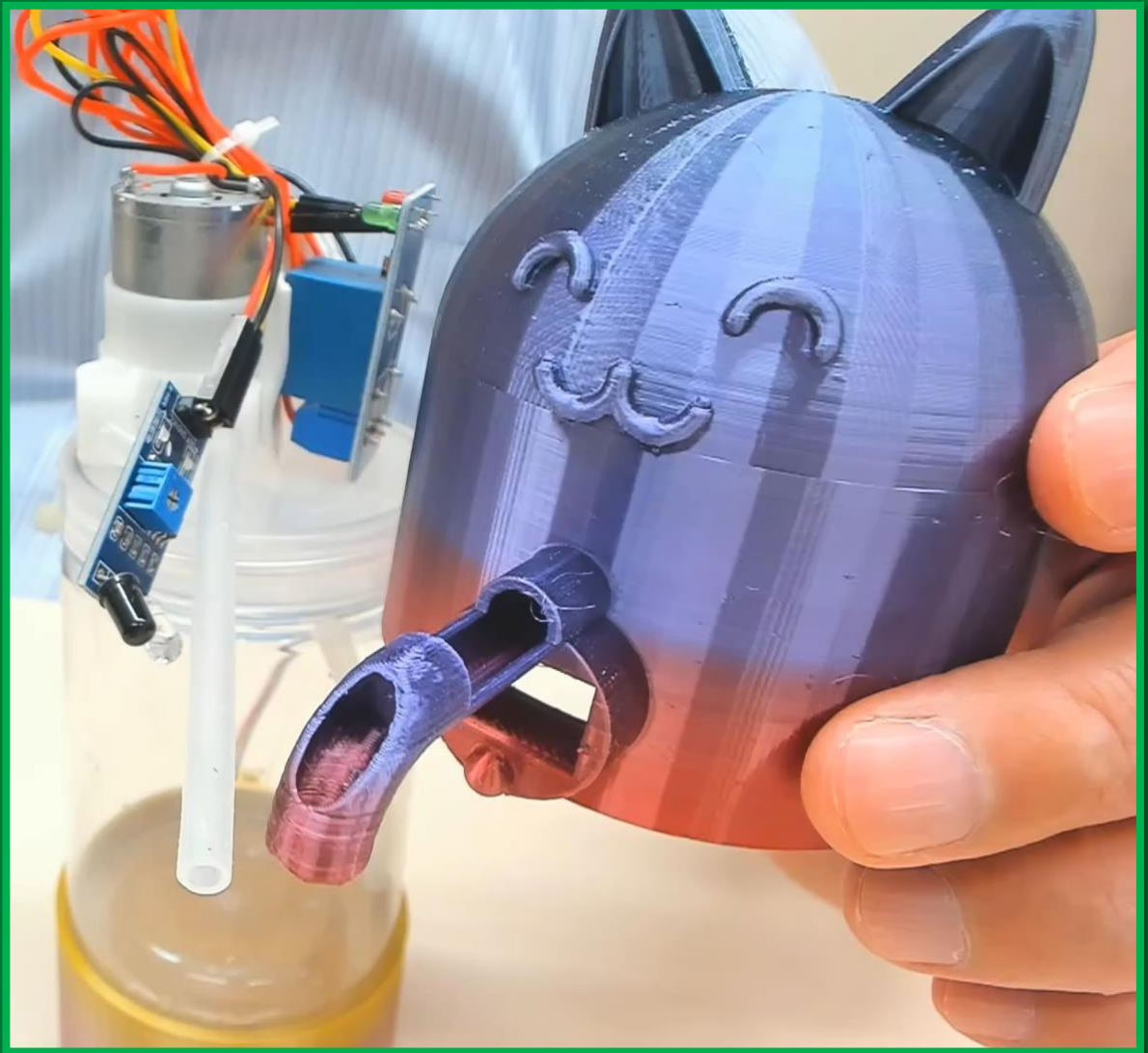

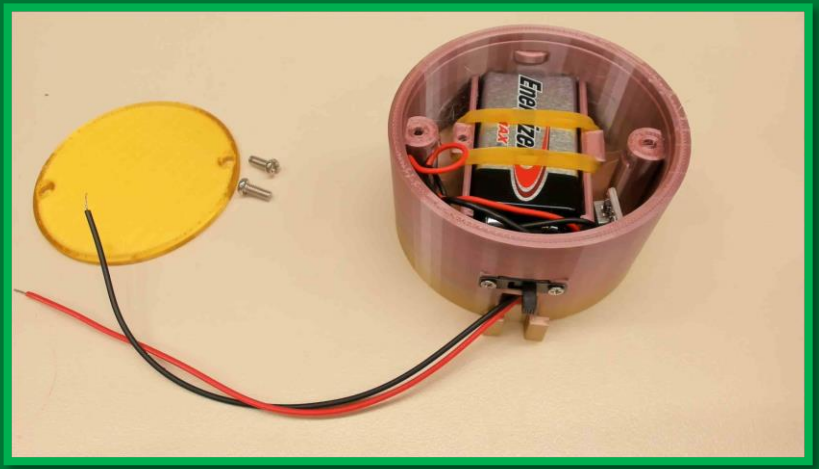

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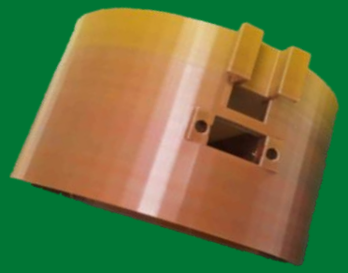
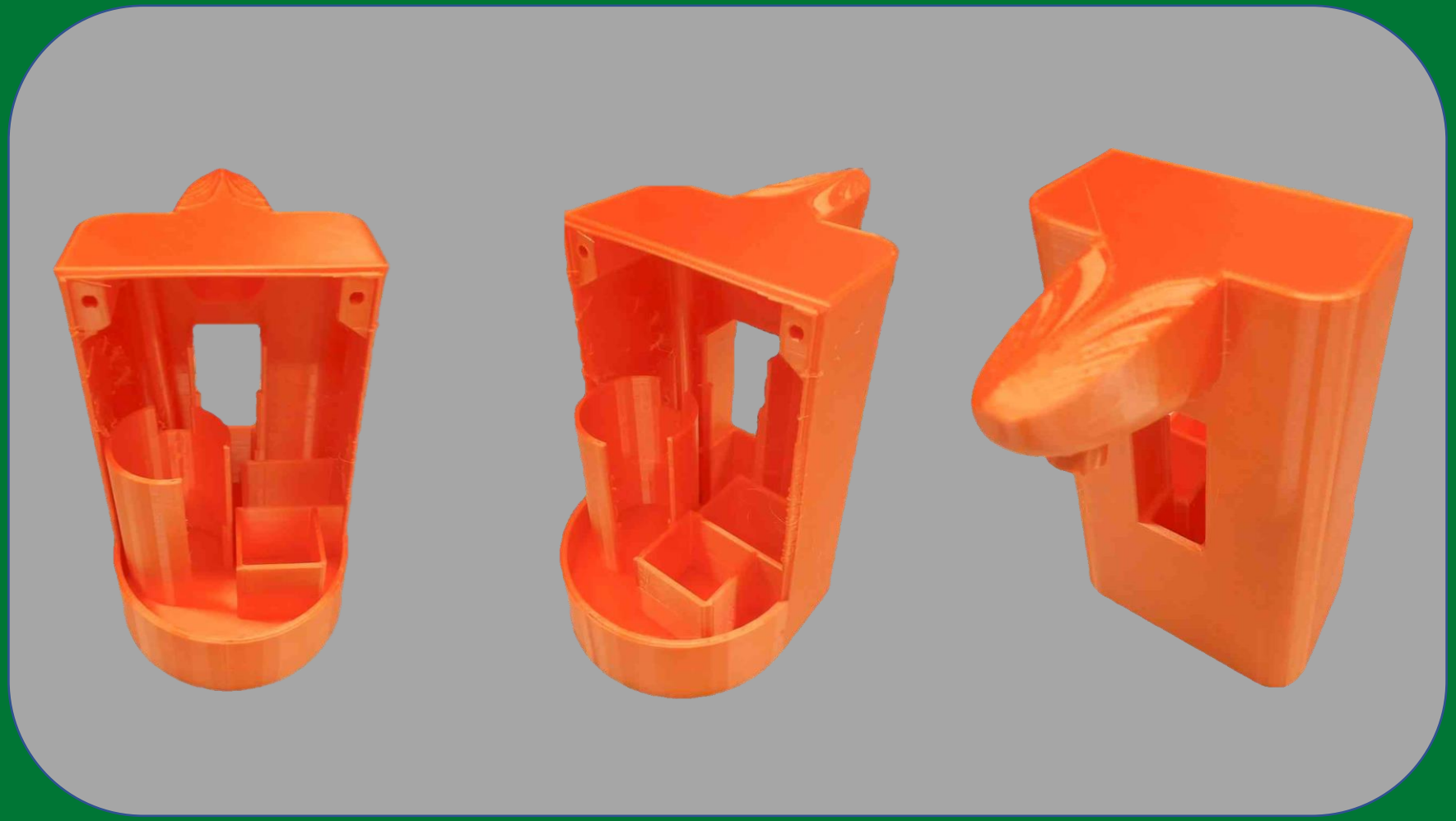
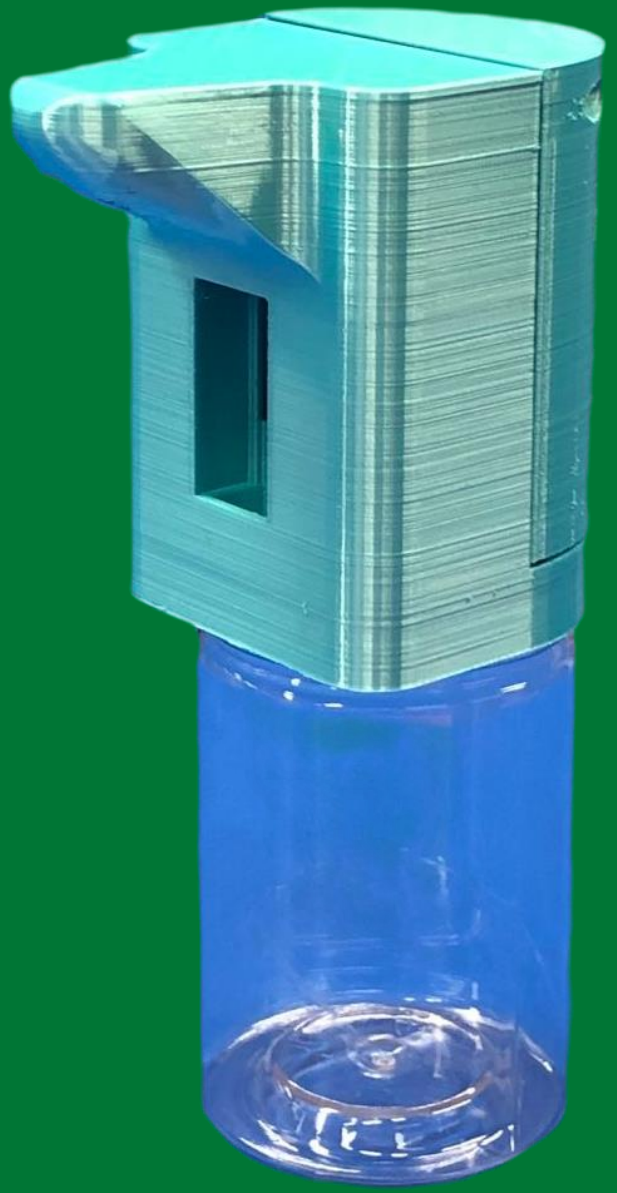
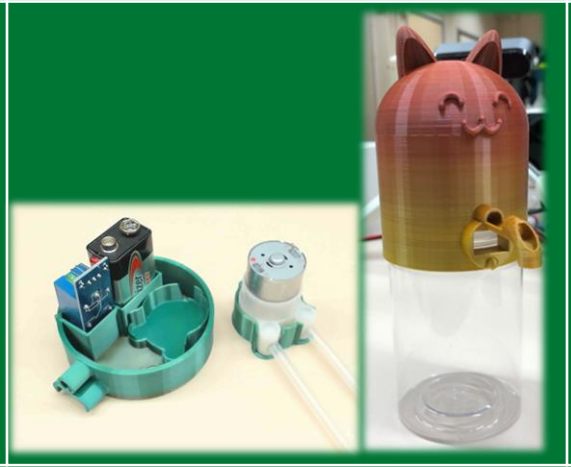
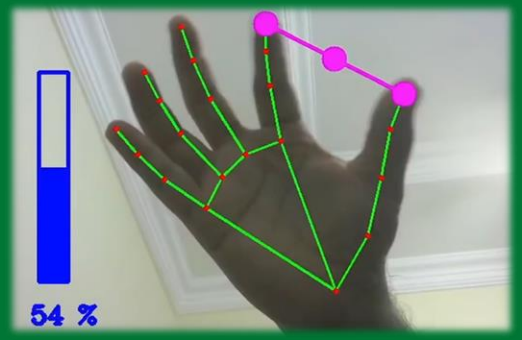


New version is on the way:





"Design and construct an Automatic Hand Sanitizer Dispenser" as a school STEAM project

Stage	Stage 1	Stage 2	Stage 3	Stage 4 (Extra)
Operation mode	• Workshop • Video	• Group work • Modify stage 1 design	Enquiry study: from liquid to foam soap	Application of AI Technology
Training provided	Working principle of the dispenser	Tinkercad design	Dissection of a foam provided device	Machine Learning programming
Main strands	• Technology • Science • Art	• Art • Mathematics • Science	• Science • Technology	• Technology • Mathematics • Science
Expected outcome				Gesture foam volume control  Additional measurement: Hand Temperature