設計及製作空氣質素顯示儀的外殼

- 空氣質素顯示儀包含多個電子元件，故需要製作外殼，整齊地將所有元件盛載起來；
- 由於儀器是用作感測空氣成分，故必須讓傳感器置於外殼的表面；
- 外殼亦需讓Arduino的供電輸入位外露，以便接駁所需電源；
- 利用平面向量設計軟件配合鐳射切割機，製作空氣顯示儀的底板及面板，並用立體設計軟件，配合3D 立體打印機，製作外殼的其餘部分；

利用CorelDraw向量設計軟件繪畫面板和底板

向量編輯方式跟一般點陣繪圖軟件不同，具有精確且放大不失真的優點

SVG 代表 Scalable Vector Graphics.

利用 notepad 及 chrome browser 了解 svg 的特性

circle.html - Notepad

File Edit Format View Help

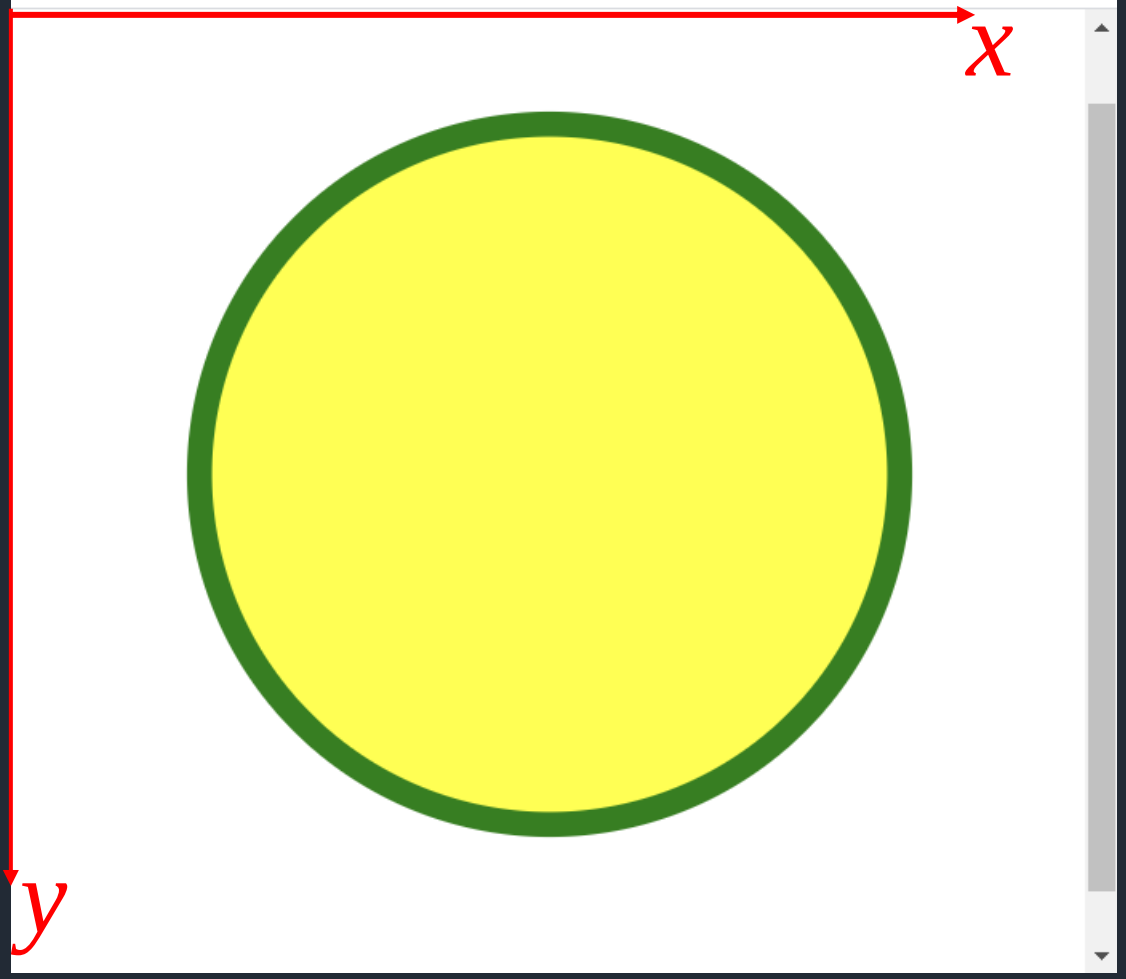
```
<!DOCTYPE html>
<html>
<body>

<svg width="200" height="200">
     <circle cx="100" cy="100" r="70"
     style="fill:yellow; stroke:green; stroke-width:5;" />
</svg>

</body>
</html>
```

Animation

尝試改變以上資料，看browser內的圖像有何反應。

circle.html

circle.html



利用 notepad 及 chrome browser 了解 svg 的特性

```
<!DOCTYPE html>
<html>
<body>
<svg width="300" height="200">
    <polygon points="100,10 40,180 190,60 10,60 160,180"
    style="fill:red; stroke:purple; stroke-width:5; " />
</svg>
</body>
</html>
```

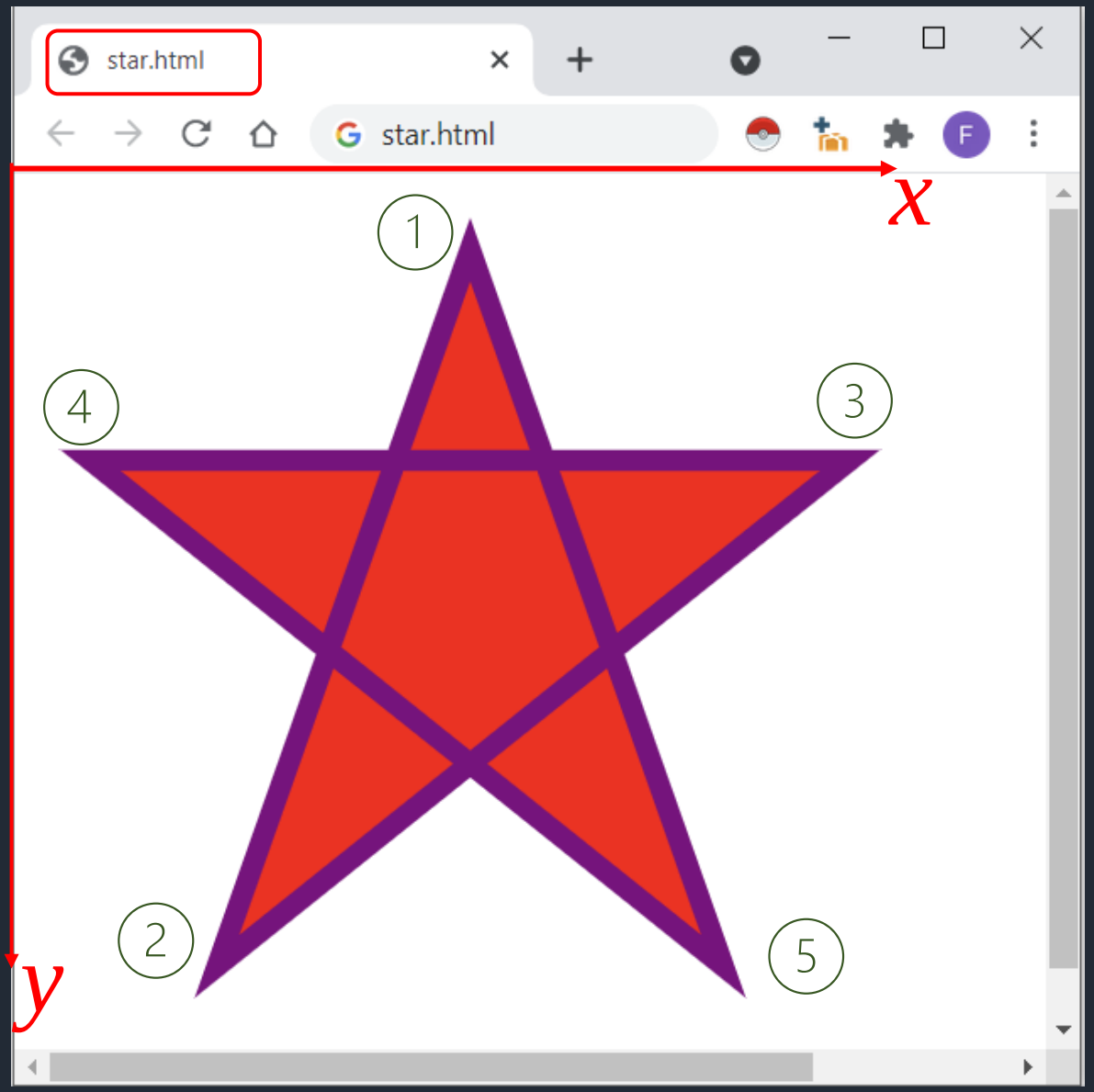
star.html - Notepad

File Edit Format View Help

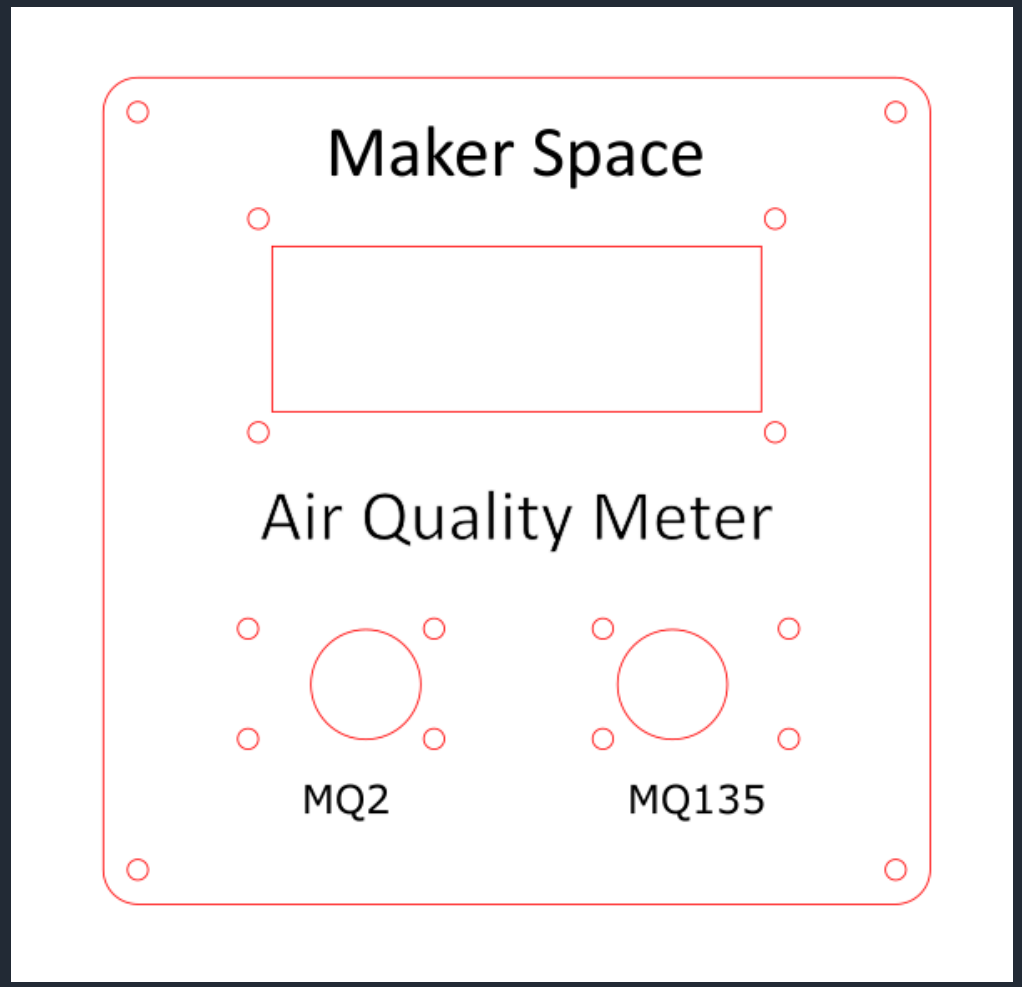
```
<!DOCTYPE html>
<html>
<body>

<svg width="300" height="200">
        <polygon points="100,10 40,180 190,60 10,60 160,180"
        style="fill:red; stroke:purple; stroke-width:5; " />
</svg>

</body>
</html>
```

Ln 1, Col 1 | 100% | Windows (CRLF) | UTF-8

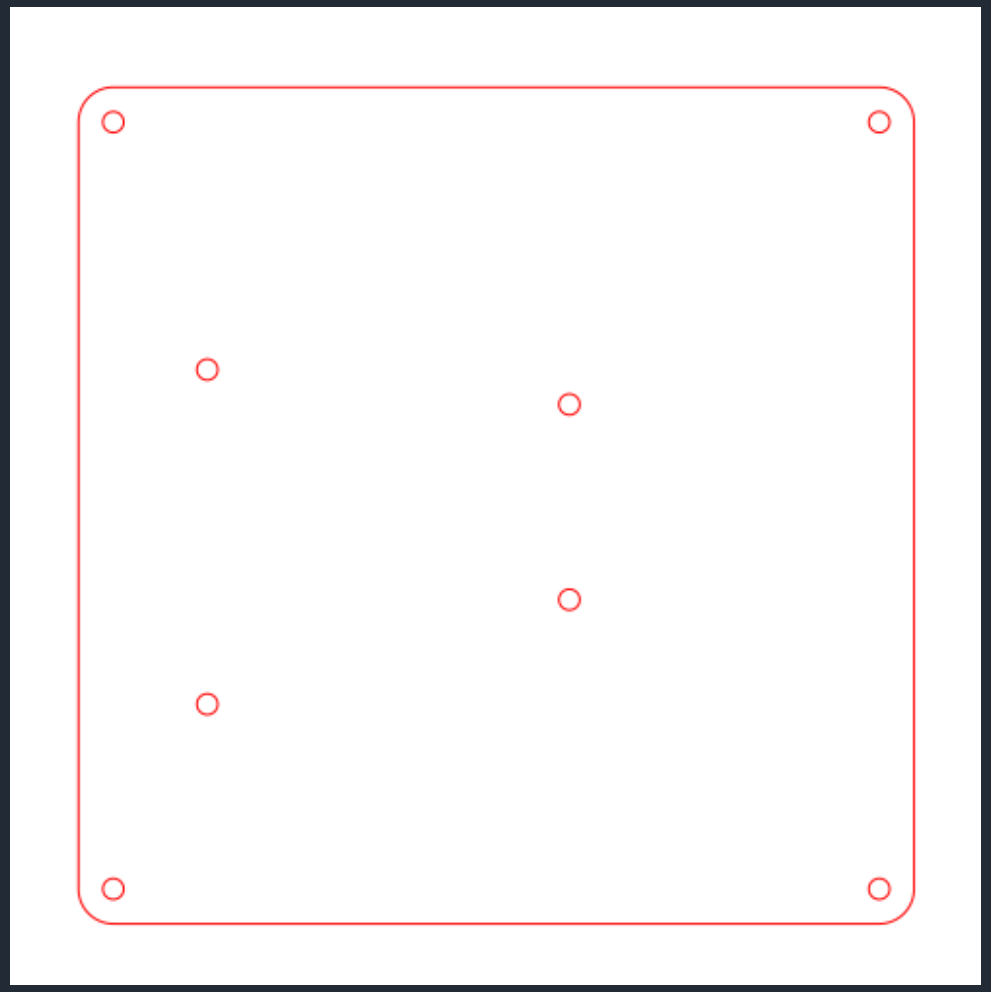
尝試改變以上資料，看browser內的圖像有何反應。



利用CorelDraw向量設計軟件繪畫面板和底板

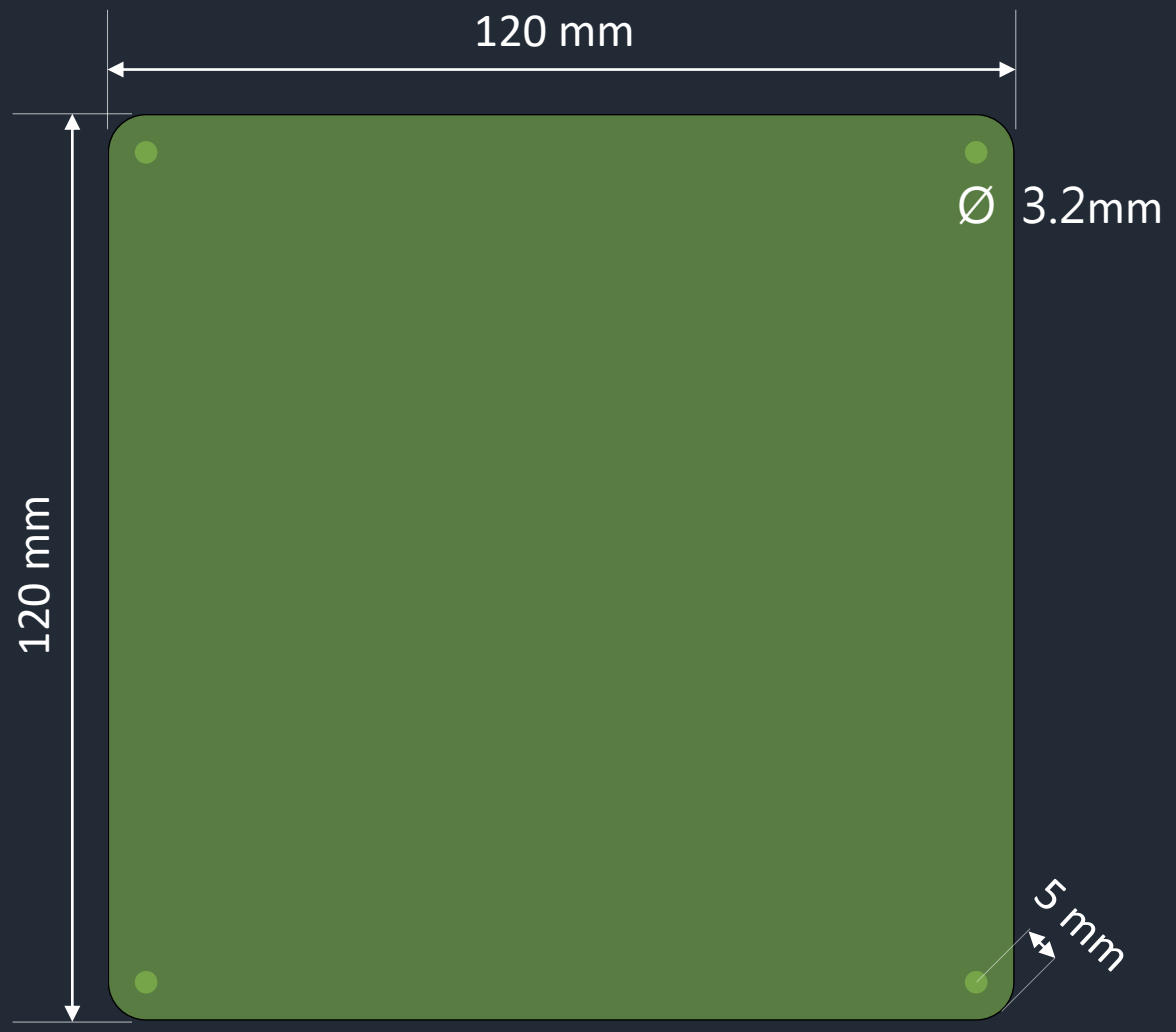


面板



底板

利用CorelDraw向量設計軟件繪畫面板和底板



面板與底板的螺絲尺寸圖

CorelDRAW X5 (不可用於商業用途)

檔案(F) 編輯(E) 檢視(V) 版面(L) 排列(A) 效果(C) 點陣圖(B) 文字(X) 表格(T) 工具(O) 視窗(W) 說明(H)

100% 貼齊

A4 297.0 mm 210.0 mm 單位: 公釐 0.1 mm 5.0 mm 5.0 mm

建立新文件

名稱(N): AYF

預設項目目的地(D): 自訂

大小(S): A4

寬度(W): 297.0 mm 公釐

高度(H): 210.0 mm

主要色彩模式(C): RGB

建構解析度(R): 300 dpi

預覽模式(P): 增強

RGB

色彩設定

描述

從文件的預設項目目的地清單中選取，例如：Web、RGB 或 CMYK。

不再顯示本對話方塊(A)

確定 取消 說明

(-21.100, 211.3...

文件色彩描述檔: 無

CorelDRAW X5 (不可用於商業用途) - [無標題-1]

檔案(F) 編輯(E) 檢視(V) 版面(L) 排列(A) 效果(C) 點陣圖(B) 文字(X) 表格(T) 工具(O) 視窗(W) 說明(H)

62% 貼齊

x: 148.5 mm y: 105.0 mm 0.0 mm 0.0 mm 100.0 100.0 0.0 0.0 mm 0.0 mm 0.0 mm 0.0 mm 0.2 mm

矩形工具 (F6)
在繪製視窗中拖曳以繪製方形和矩形。

CorelDRAW X5 (不可用於商業用途) - [無標題-1]

檔案(F) 編輯(E) 檢視(V) 版面(L) 排列(A) 效果(C) 點陣圖(B) 文字(X) 表格(T) 工具(O) 視窗(W) 說明(H)

75% 貼齊

x: 107.096 mm
y: 123.79 mm
120.0 mm
120.0 mm
104.3 %
139.6 %
0.0 °
0.0 mm
0.0 mm
0.0 mm
0.0 mm
0.2 mm

Width: 120mm

Height: 120mm

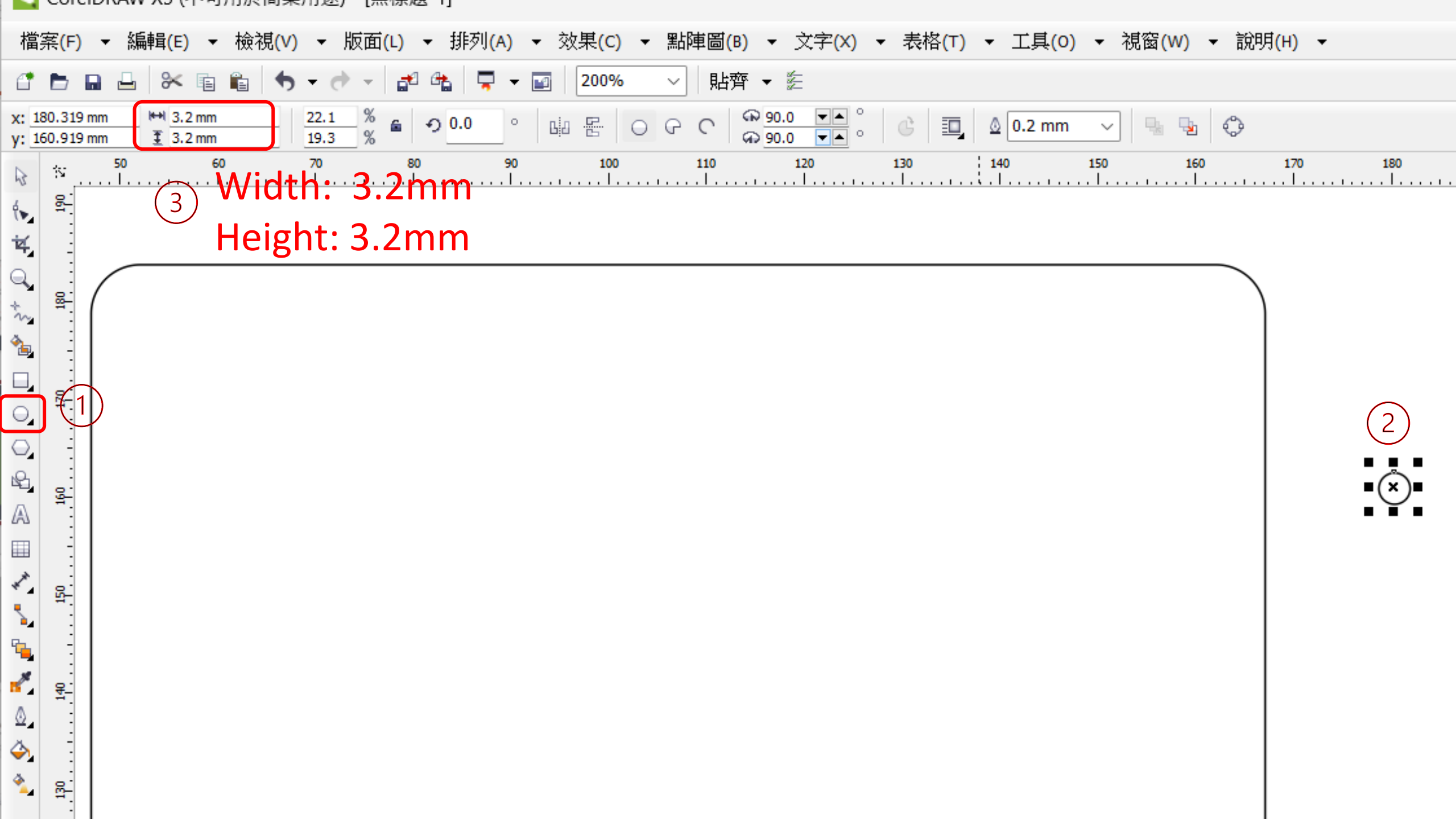
CorelDRAW X5 (不可用於商業用途) - [無標題-1]

檔案(F) 編輯(E) 檢視(V) 版面(L) 排列(A) 效果(C) 點陣圖(B) 文字(X) 表格(T) 工具(O) 視窗(W) 說明(H)

75% 貼齊

x: 107.096 mm y: 123.79 mm 120.0 mm 120.0 mm 104.3 % 139.6 % 0.0 ° 5.0 mm 5.0 mm 5.0 mm 5.0 mm 0.2 mm

Rounded corners
radius: 5mm


檔案(F) 編輯(E) 檢視(V) 版面(L) 排列(A) 效果(C) 點陣圖(B) 文字(X) 表格(T) 工具(O) 視窗(W) 說明(H)
200%
貼齊
x: 180.319 mm
y: 160.919 mm
3.2 mm
3.2 mm
22.1
19.3
0.0
90.0
90.0
0.2 mm
3
Width: 3.2mm
Height: 3.2mm
1
2

CorelDRAW X5 (不可用於商業用途) - [無標題-1]

檔案(F) 編輯(E) 檢視(V) 版面(L) 排列(A) 效果(C) 點陣圖(B) 文字(X) 表格(T) 工具(O) 視窗(W) 說明(H)

100% 貼齊

x: 107.427 mm
y: 121.673 mm
110.0 mm
110.0 mm
104.5 %
109.1 %
0.0 °
0.0 mm
0.0 mm
0.0 mm
0.0 mm
0.2 mm

Width: 110mm

Height: 110mm

CorelDRAW X5 (不可用於商業用途) - [無標題-1]

檔案(F) 編輯(E) 檢視(V) 版面(L) 排列(A) 效果(C) 點陣圖(B) 文字(X) 表格(T) 工具(O) 視窗(W) 說明(H)

100% 貼齊

A4 297.0 mm 210.0 mm 單位: 公釐 0.1 mm 5.0 mm 5.0 mm

1

2

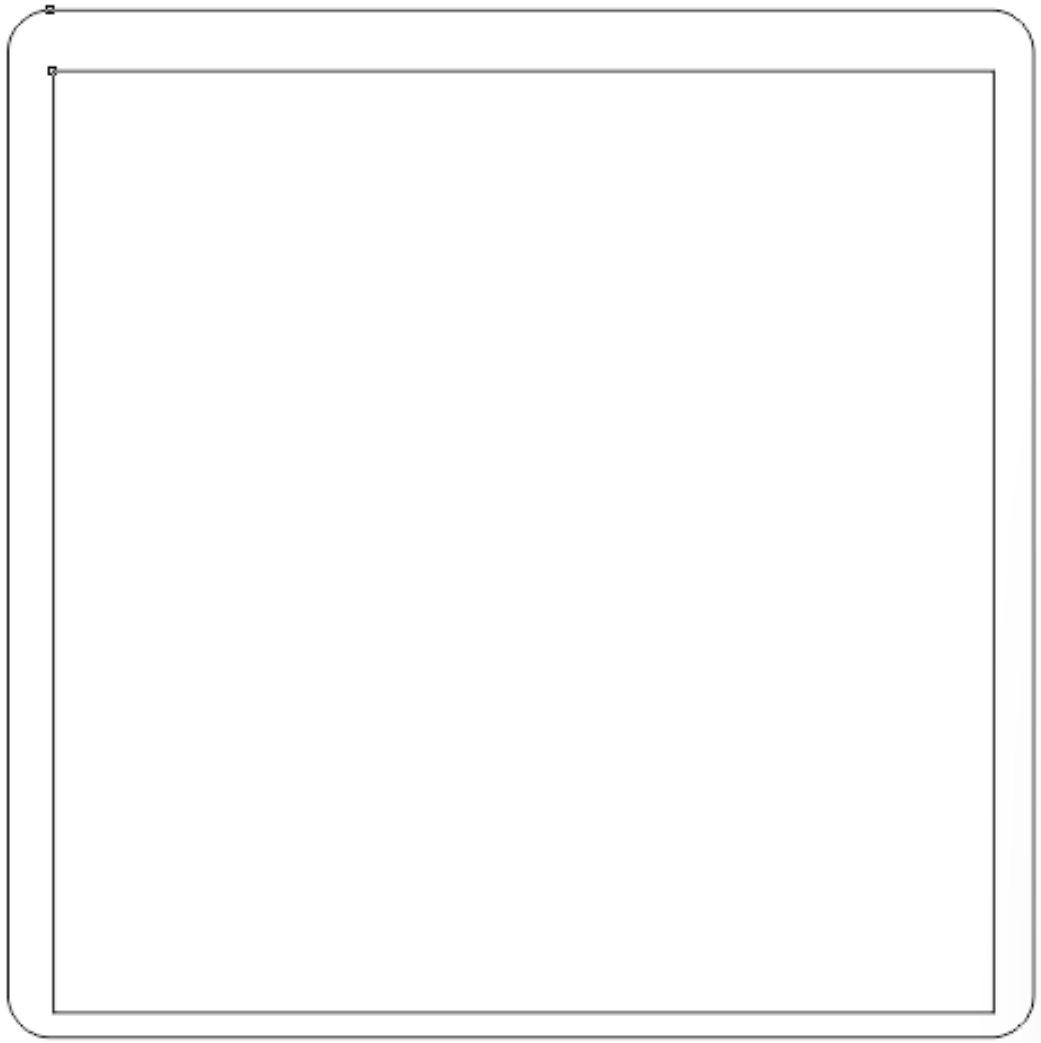
CorelDRAW X5 (不可用於商業用途) - [無標題-1]

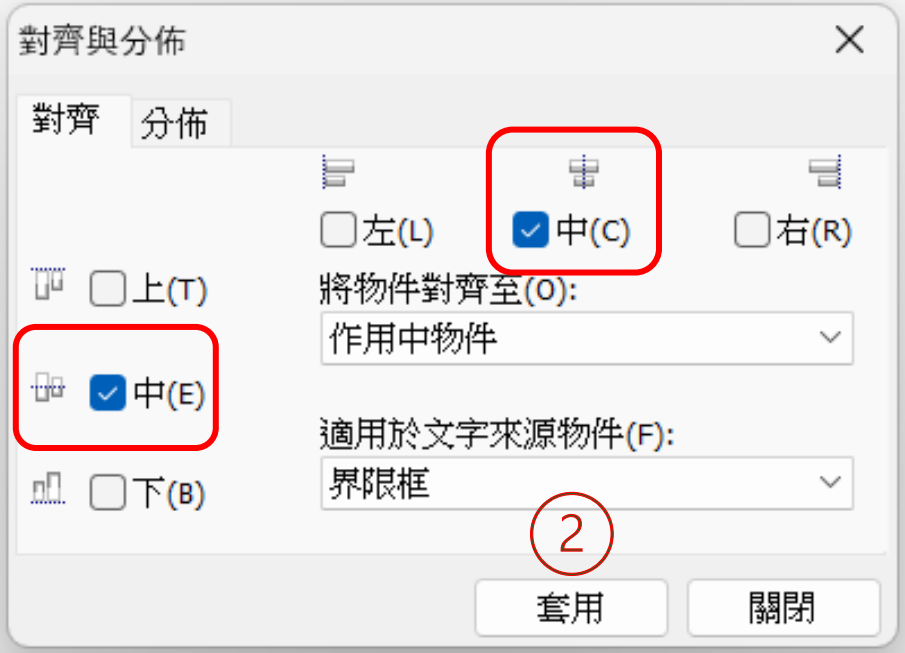
檔案(F) 編輯(E) 檢視(V) 版面(L) 排列(A) 效果(C) 點陣圖(B) 文字(X) 表格(T) 工具(O) 視窗(W) 說明(H)

100% 貼齊

x: 107.096 mm y: 123.79 mm 120.0 mm 120.0 mm 100.0 % 100.0 % 0.0 °

1





CorelDRAW X5 (不可用於商業用途) - [無標題-1]

檔案(F) 編輯(E) 檢視(V) 版面(L) 排列(A) 效果(C) 點陣圖(B) 文字(X) 表格(T) 工具(O) 視窗(W) 說明(H)

100% 貼齊

x: 107.096 mm
y: 123.79 mm
120.0 mm
120.0 mm
100.0 %
100.0 %
0.0 °

CorelDRAW X5 (不可用於商業用途) - [無標題-1]

檔案(F) 編輯(E) 檢視(V) 版面(L) 排列(A) 效果(C) 點陣圖(B) 文字(X) 表格(T) 工具(O) 視窗(W) 說明(H)

400% 貼齊

x: 180.319 mm y: 160.919 mm 3.2 mm 3.2 mm 22.1 % 18.1 % 0.0 ° 90.0 90.0 0.2 mm

1

中心

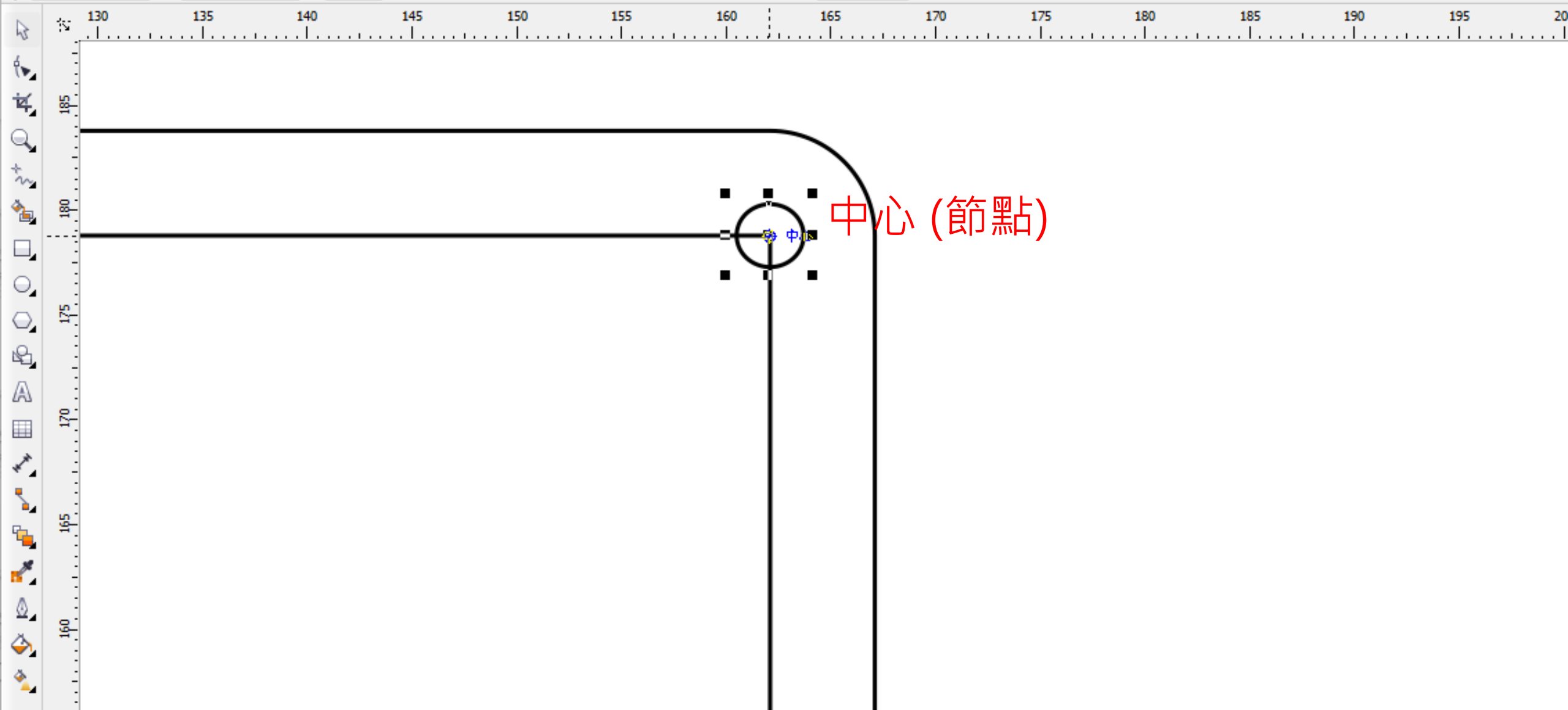
2

CorelDRAW X5 (不可用於商業用途) - [無標題-1]

檔案(F) 編輯(E) 檢視(V) 版面(L) 排列(A) 效果(C) 點陣圖(B) 文字(X) 表格(T) 工具(O) 視窗(W) 說明(H)

400% 貼齊

x: 162.096 mm y: 178.79 mm 3.2 mm 3.2 mm 22.1 % 18.1 % 0.0 ° 90.0 90.0 0.2 mm



CorelDRAW X5 (不可用於商業用途) - [C:\Ayf\ATEC\2022-23\PDP\AirQuality2022-23\Design\temp.cdr]

檔案(F) 編輯(E) 檢視(V) 版面(L) 排列(A) 效果(C) 點陣圖(B) 文字(X) 表格(T) 工具(O) 視窗(W) 說明(H)

250% 貼齊

x: 52.096 mm y: 178.79 mm 3.2 mm 3.2 mm 22.1 % 18.1 % 0.0 ° 90.0 90.0 0.2 mm

複製圓形及重複以上步驟

1 的 1 頁面 1

(183.038, 145.3...) 橢圓形 於 圖層 1 無

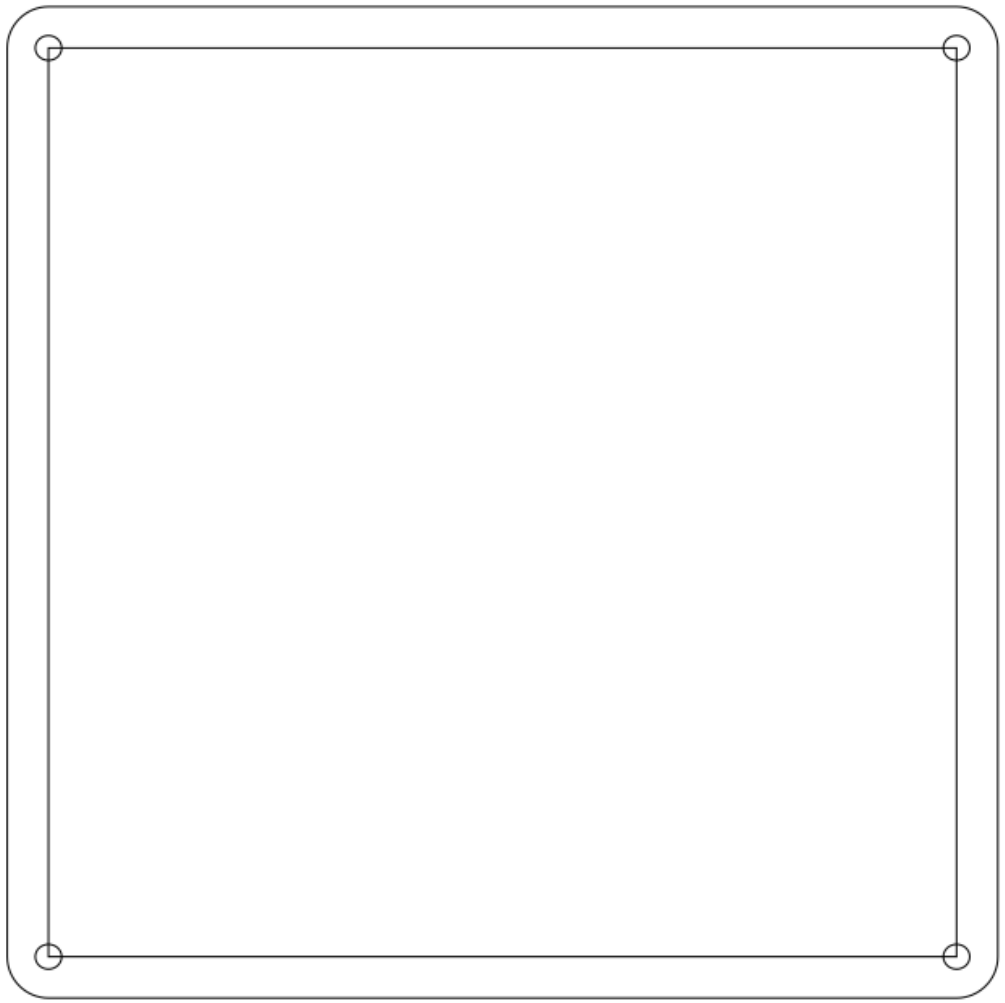
文件色彩描述檔: RGB: sRGB IEC61966-2.1; CMYK: Japan Color 2001 Coated; 灰階: Dot Gain 15% R:0 G:0 B:0 (#000000)

CorelDRAW X5 (不可用於商業用途) - [C:\Ayf\ATEC\2022-23\PDP\AirQuality2022-23\Design\temp.cdr]

檔案(F) 編輯(E) 檢視(V) 版面(L) 排列(A) 效果(C) 點陣圖(B) 文字(X) 表格(T) 工具(O) 視窗(W) 說明(H)

135% 貼齊

A4 297.0 mm 210.0 mm 單位: 公釐 0.1 mm 5.0 mm 5.0 mm



刪除中間的正方形

1 的 1 頁面 1

(175.262, 188.7...

文件色彩描述檔: RGB: sRGB IEC61966-2.1; CMYK: Japan Color 2001 Coated; 灰階: Dot Gain 15%

CorelDRAW X5 (不可用於商業用途) - [C:\Ayf\ATEC\2022-23\PDP\AirQuality2022-23\Design\temp.cdr]

檔案(F) 編輯(E) 檢視(V) 版面(L) 排列(A) 效果(C) 點陣圖(B) 文字(X) 表格(T) 工具(O) 視窗(W) 說明(H)

135% 貼齊

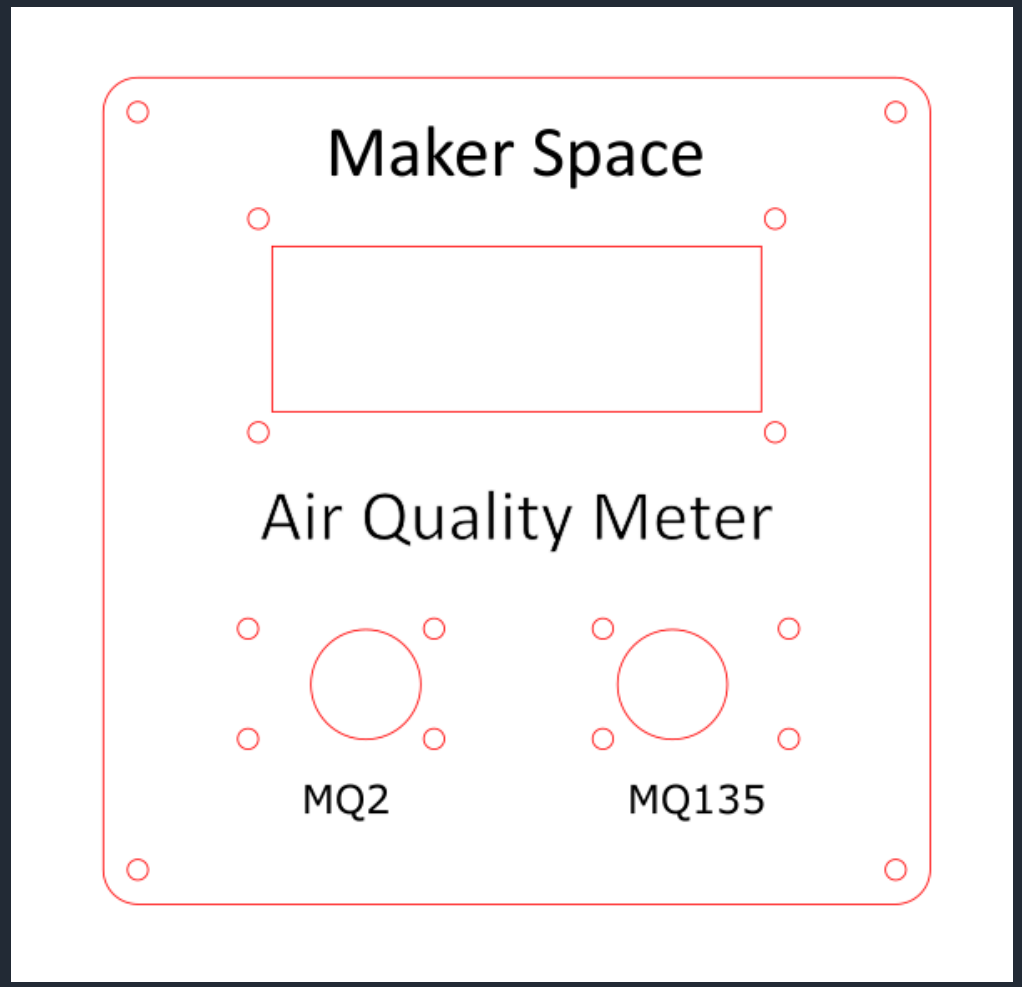
A4 297.0 mm 210.0 mm 單位: 公釐 0.1 mm 5.0 mm 5.0 mm

1 的 1 頁面 1

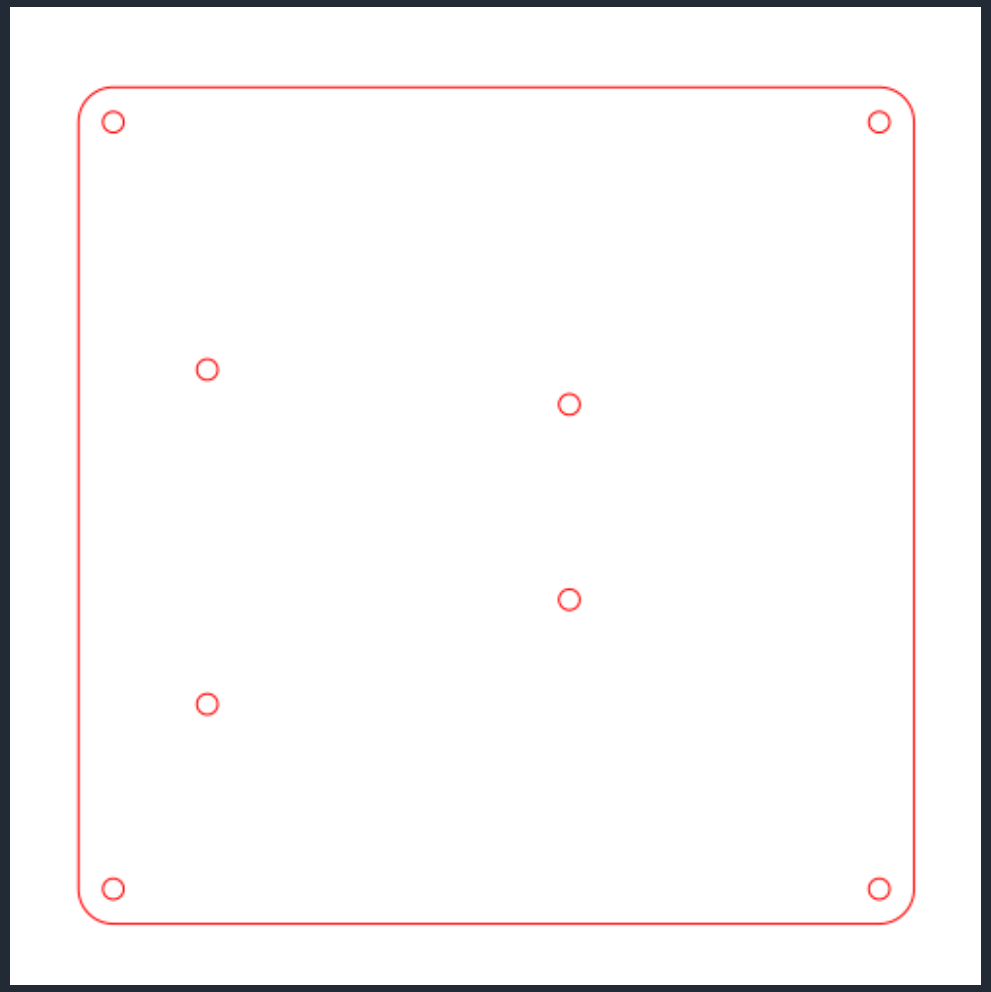
(230.335, 67.84...

文件色彩描述檔: RGB: sRGB IEC61966-2.1; CMYK: Japan Color 2001 Coated; 灰階: Dot Gain 15%

利用CorelDraw向量設計軟件繪畫面板和底板



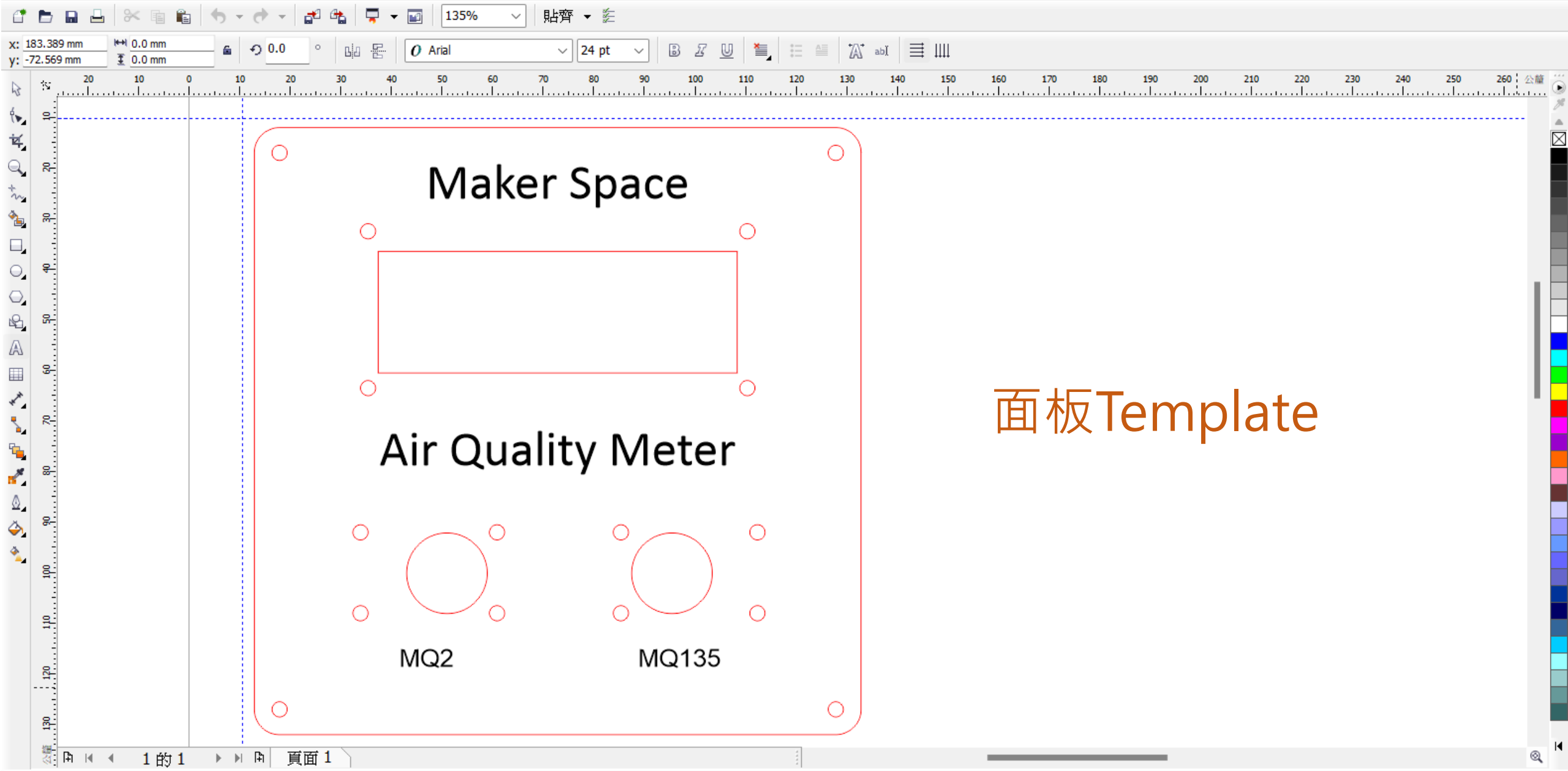
面板



底板

CorelDRAW X5 (不可用於商業用途) - [C:\Ayf\ATEC\2022-23\PDP\AirQuality2022-23\Design\Templates\TopCover_corelDraw_2021Nov30.cdr]

檔案(F) 編輯(E) 檢視(V) 版面(L) 排列(A) 效果(C) 點陣圖(B) 文字(X) 表格(T) 工具(O) 視窗(W) 說明(H)



面板Template

1 的 1 頁面 1

(183.389, -72.5...) 文字 於 圖層 1 R:0 G:0 B:0 (#000000)

文件色彩描述檔: RGB: sRGB IEC61966-2.1; CMYK: Japan Color 2001 Coated; 灰階: Dot Gain 15%

CorelDRAW X5 (不可用於商業用途) - [C:\Ayf\ATEC\2022-23\PDP\AirQuality2022-23\Design\Templates\TopCover_corelDraw_2021Nov30.cdr]

檔案(F) 編輯(E) 檢視(V) 版面(L) 排列(A) 效果(C) 點陣圖(B) 文字(X) 表格(T) 工具(O) 視窗(W) 說明(H)

135% 貼齊

x: 72.861 mm y: -72.032 mm 120.0 mm 120.0 mm 100.0 % 100.0 % 0.0 °

Maker Space

Air Quality Meter

MQ2

MQ135

極細線

外框筆

色彩(C):

寬度(W): 極細線 公釐

樣式(S):

編輯樣式...

斜接限制: 5.0 °

邊角

線條帽緣

箭頭

選項(O) 選項(N)

共用屬性(T)

書寫式

延展(T): 100 %

筆尖形狀:

角度(A): 0.0 °

預設值(D)

在填色之後(B)

隨影像縮放(M)

確定 取消 說明(H)

1 的 1 頁面 1

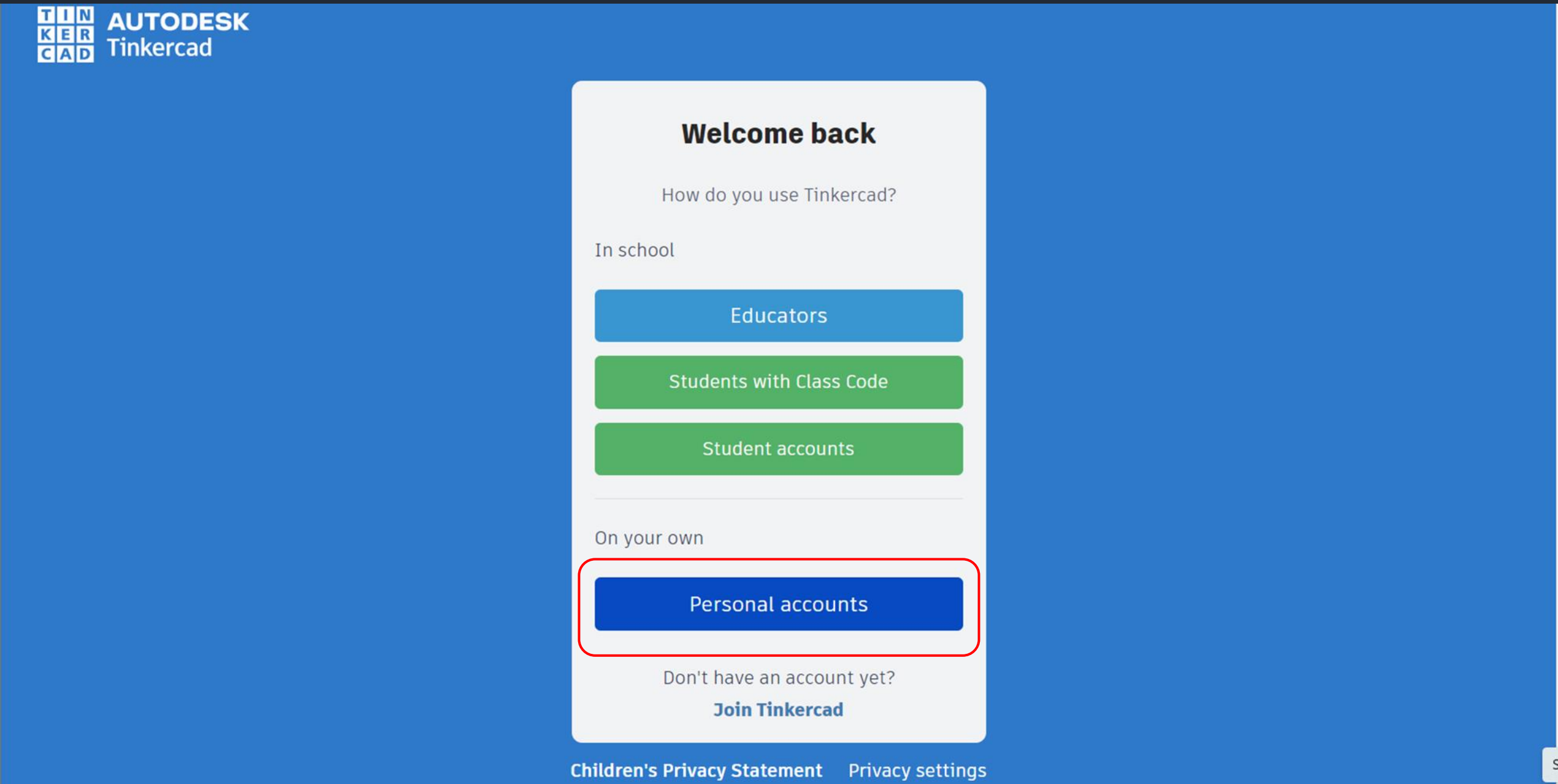
(256.493, -91.3...) 14 物件的群組 於 圖層 1

文件色彩描述檔: RGB: sRGB IEC61966-2.1; CMYK: Japan Color 2001 Coated; 灰階: Dot Gain 15%

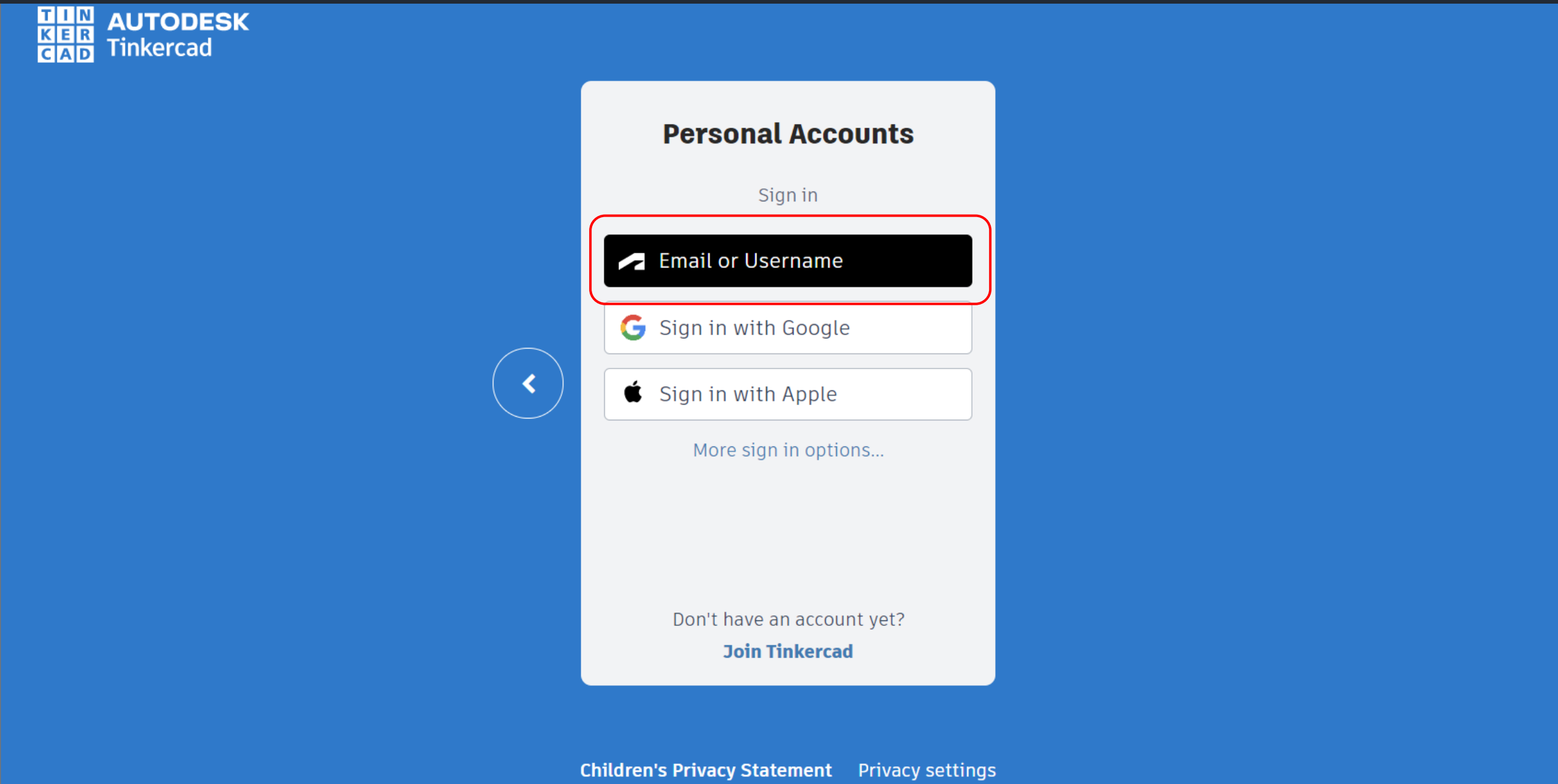
填色色彩

外框色彩

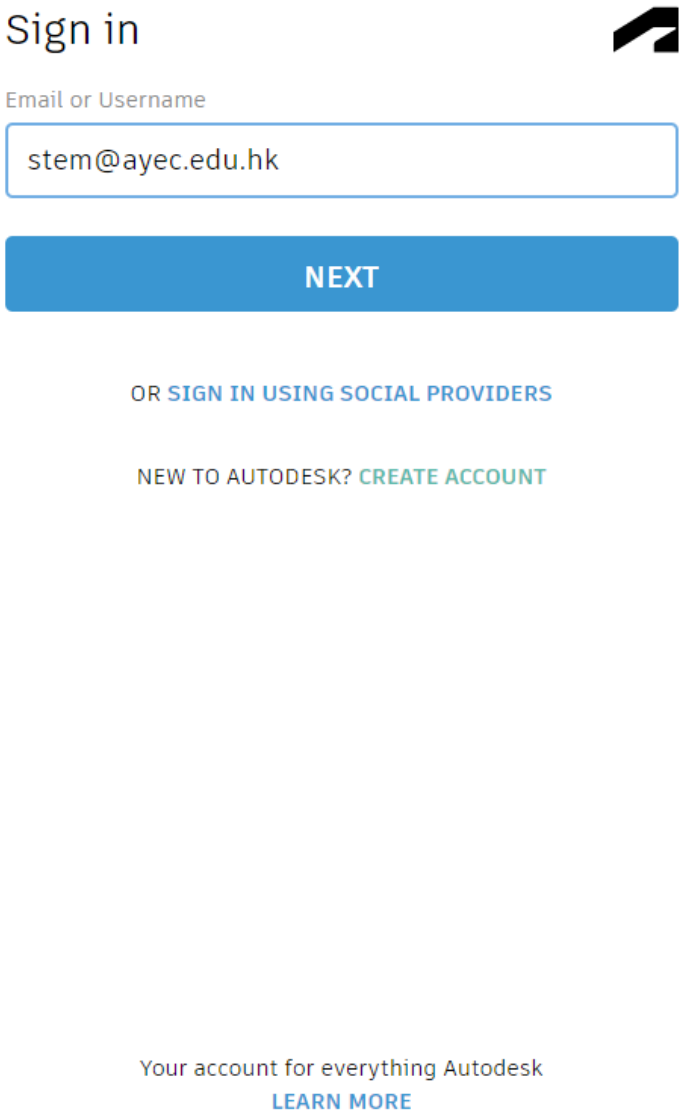
利用 Tinkercad 網上軟件繪畫殼身



利用 Tinkercad 網上軟件繪畫殼身

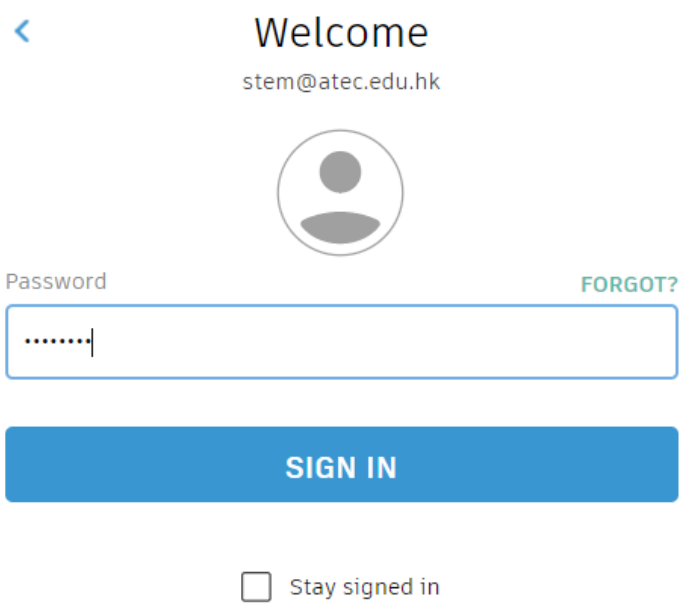


利用 Tinkercad 網上軟件繪畫殼身



stem@atec.edu.hk

利用 Tinkercad 網上軟件繪畫殼身



Password: stem2017

Your account for everything Autodesk
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利用 Tinkercad 網上軟件繪畫殼身

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NM 1JT32WE 2021/2022

SL 2JT44VE 2021/2022

2022May11

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Your Classes

Teaching Enrolled

Create new class

Help center

Email support

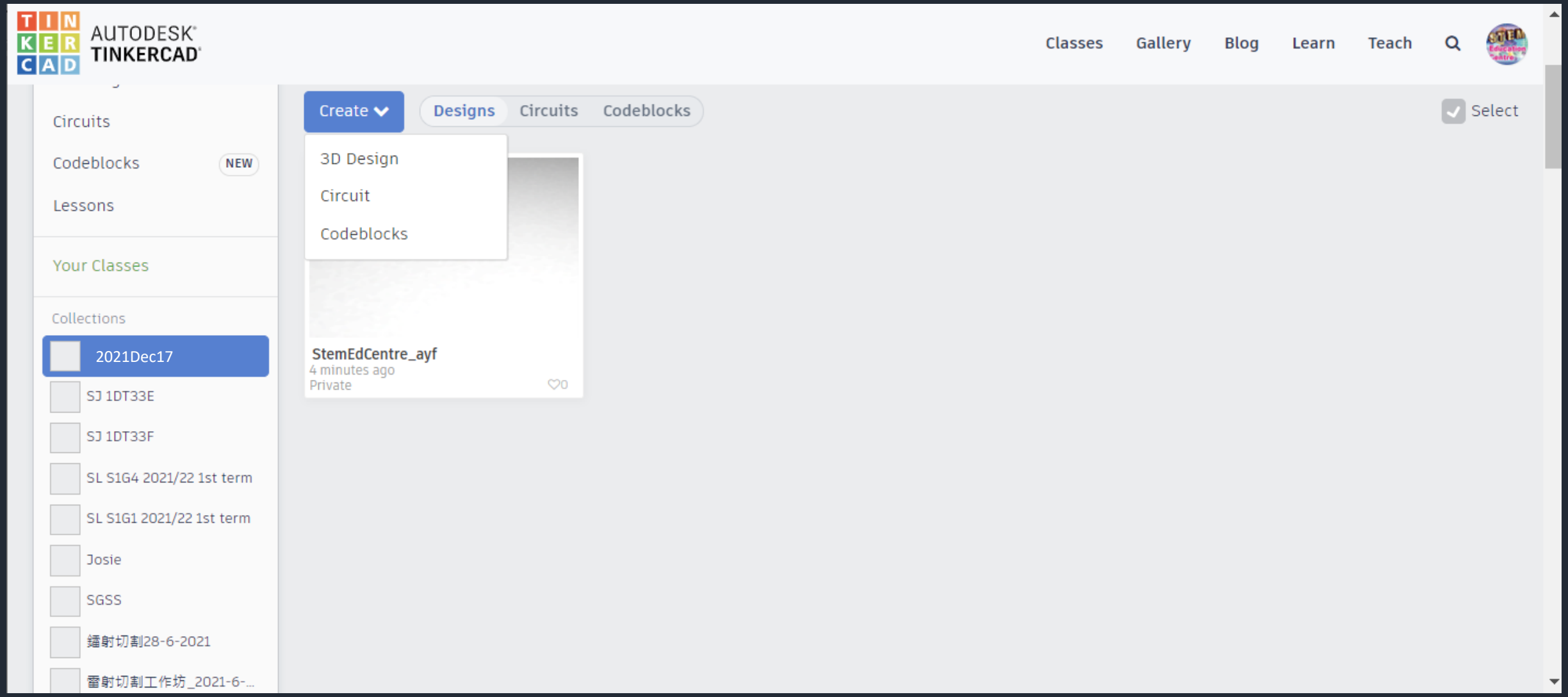
1JT22VE	2 students	Created 05/03/2022
Ch1	2 students	Created 01/05/2022
SJ_1JT33E	13 students	Created 01/05/2022

Unassigned Students

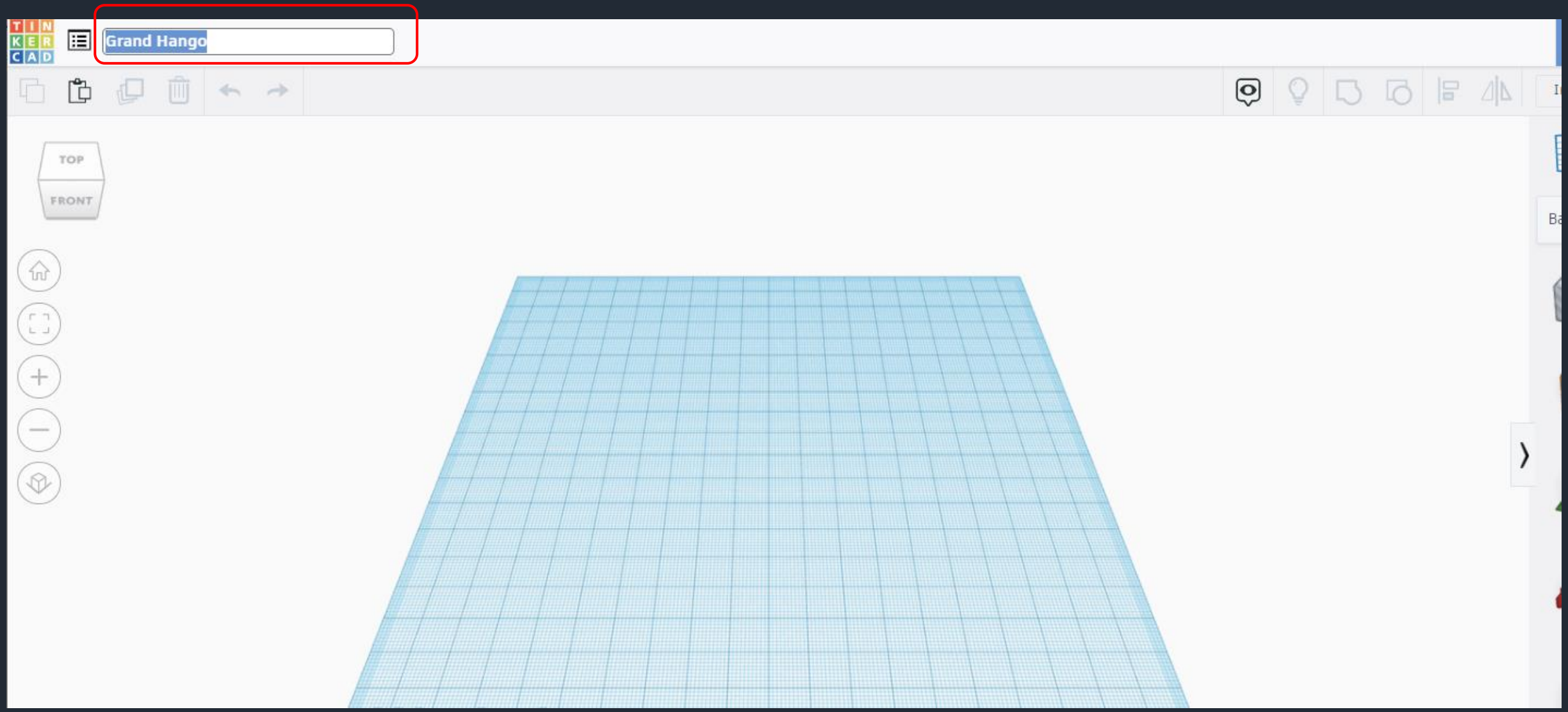
Students who have not been assigned to a Class

0 students

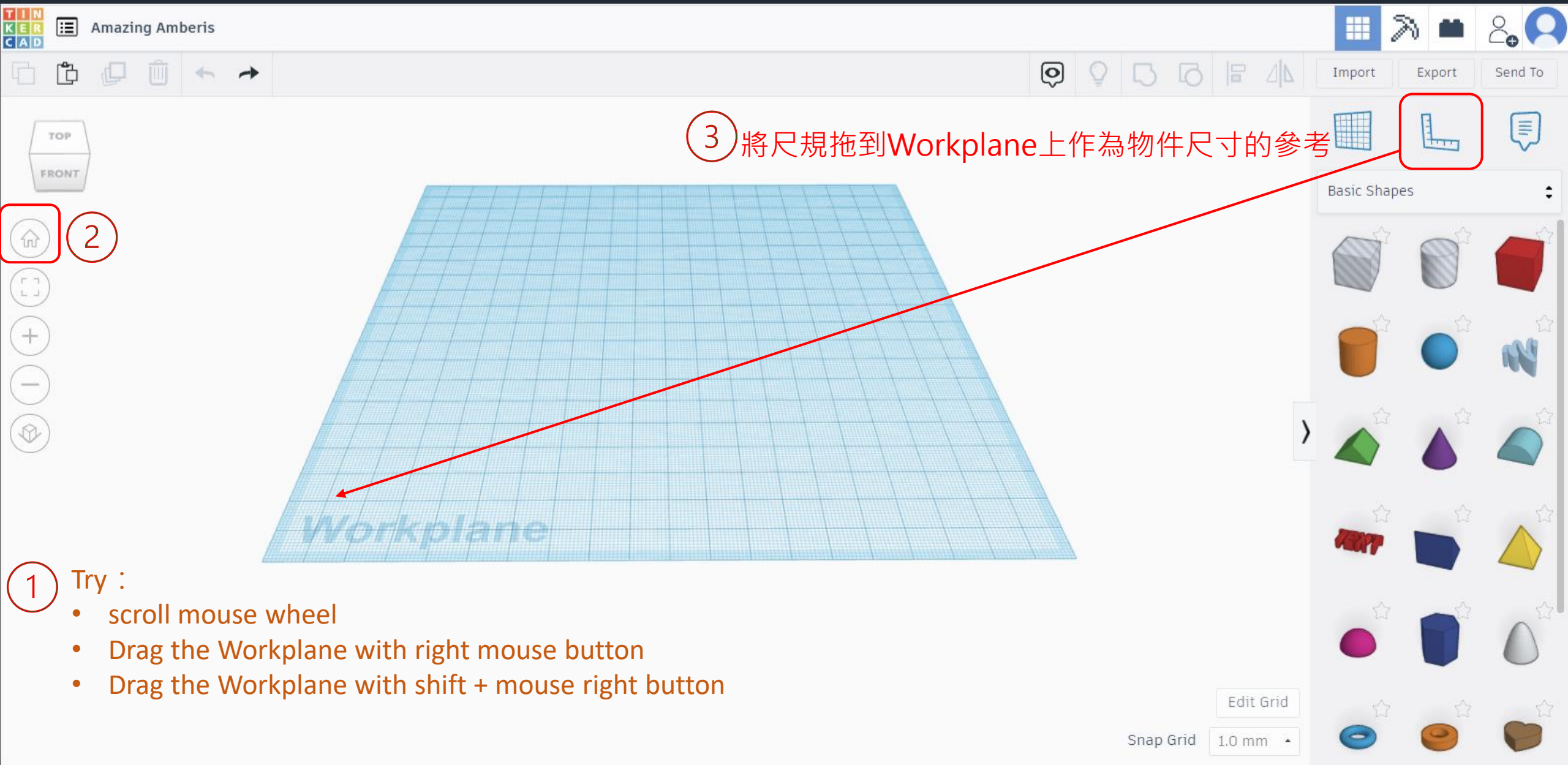
利用 Tinkercad 網上軟件繪畫殼身



利用 Tinkercad 網上軟件繪畫殼身



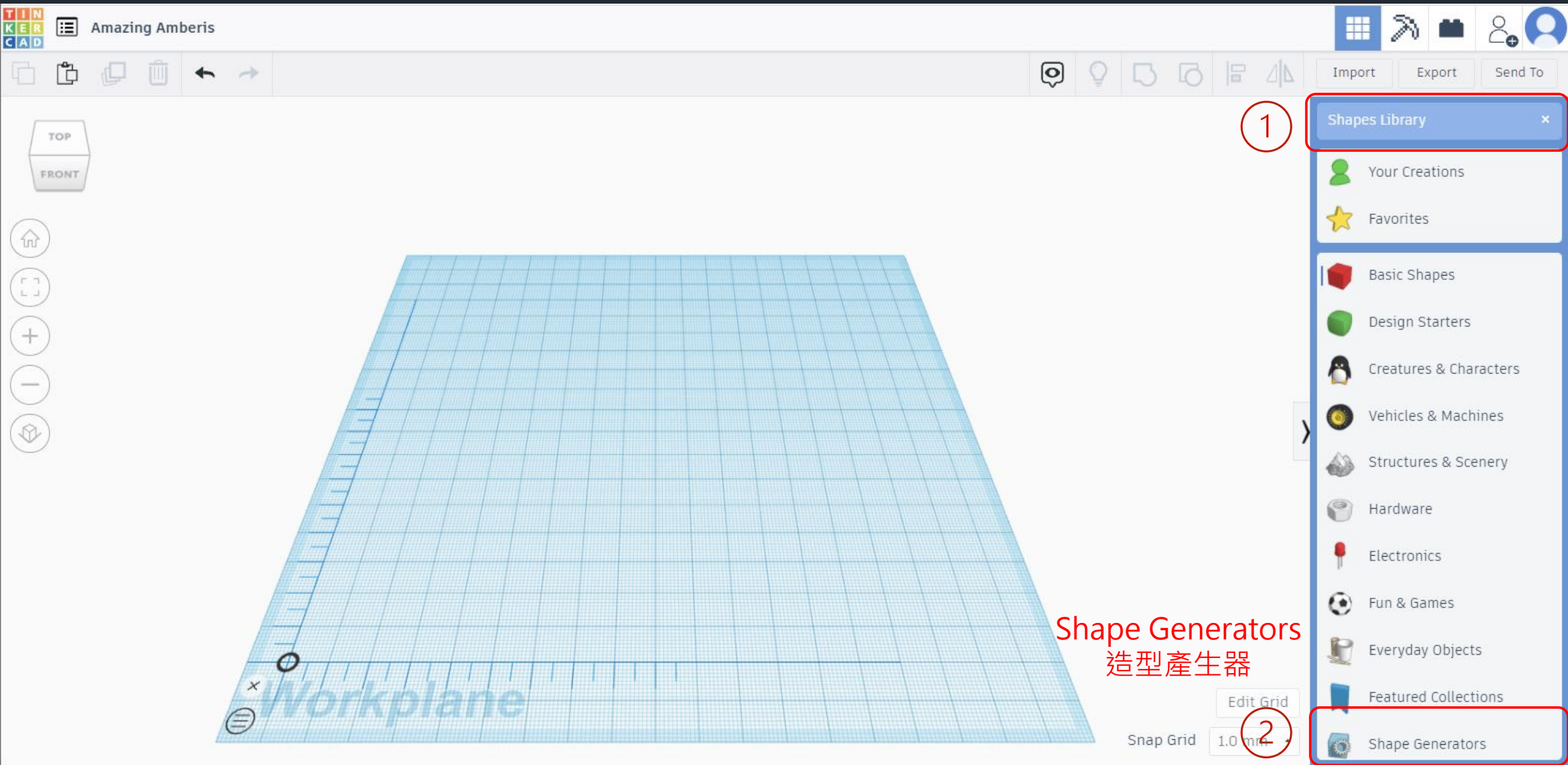
利用 Tinkercad 網上軟件繪畫殼身



1 Try：

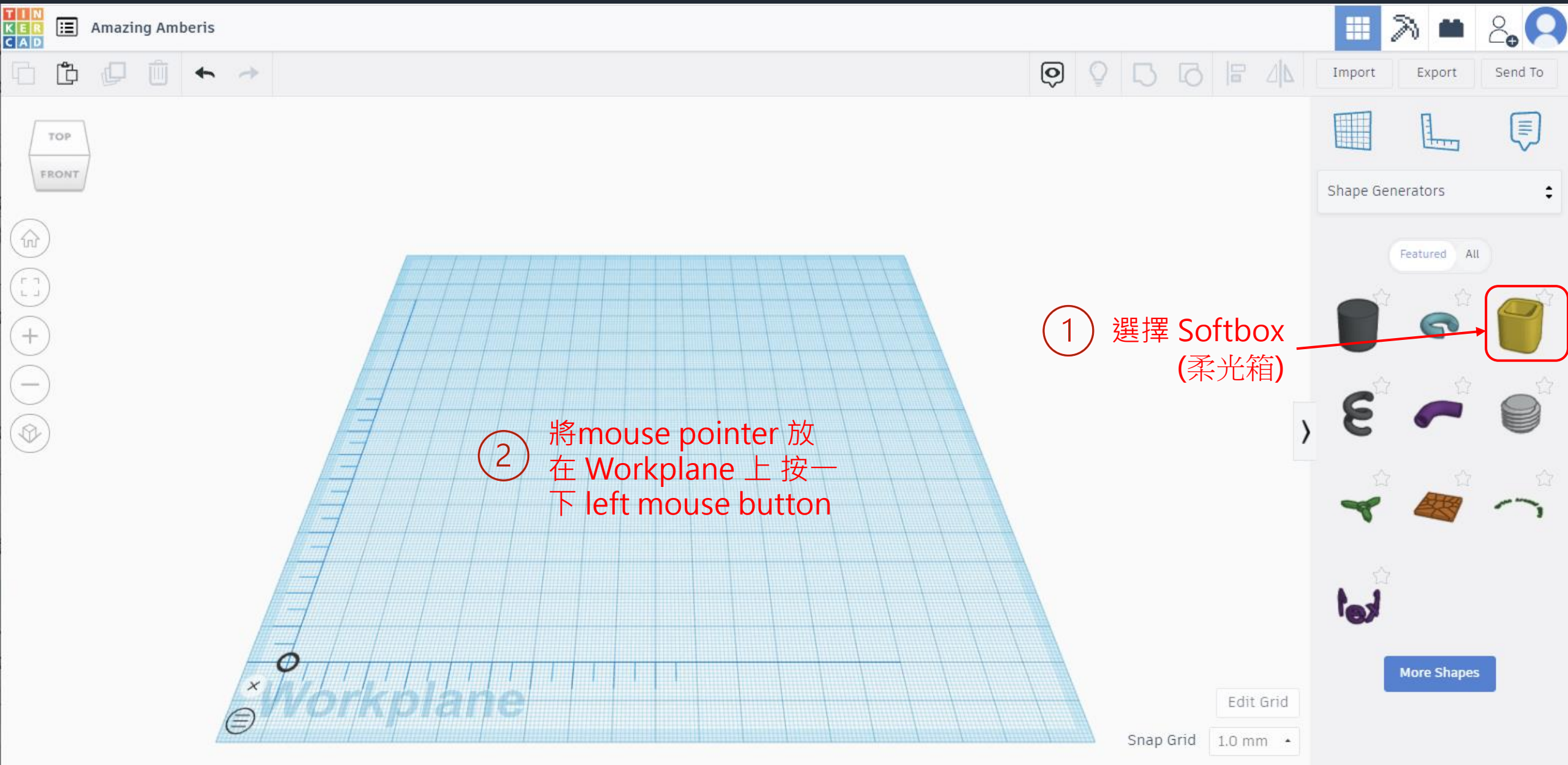
- scroll mouse wheel
- Drag the Workplane with right mouse button
- Drag the Workplane with shift + mouse right button

利用 Tinkercad 網上軟件繪畫殼身



Shape Generators
造型產生器

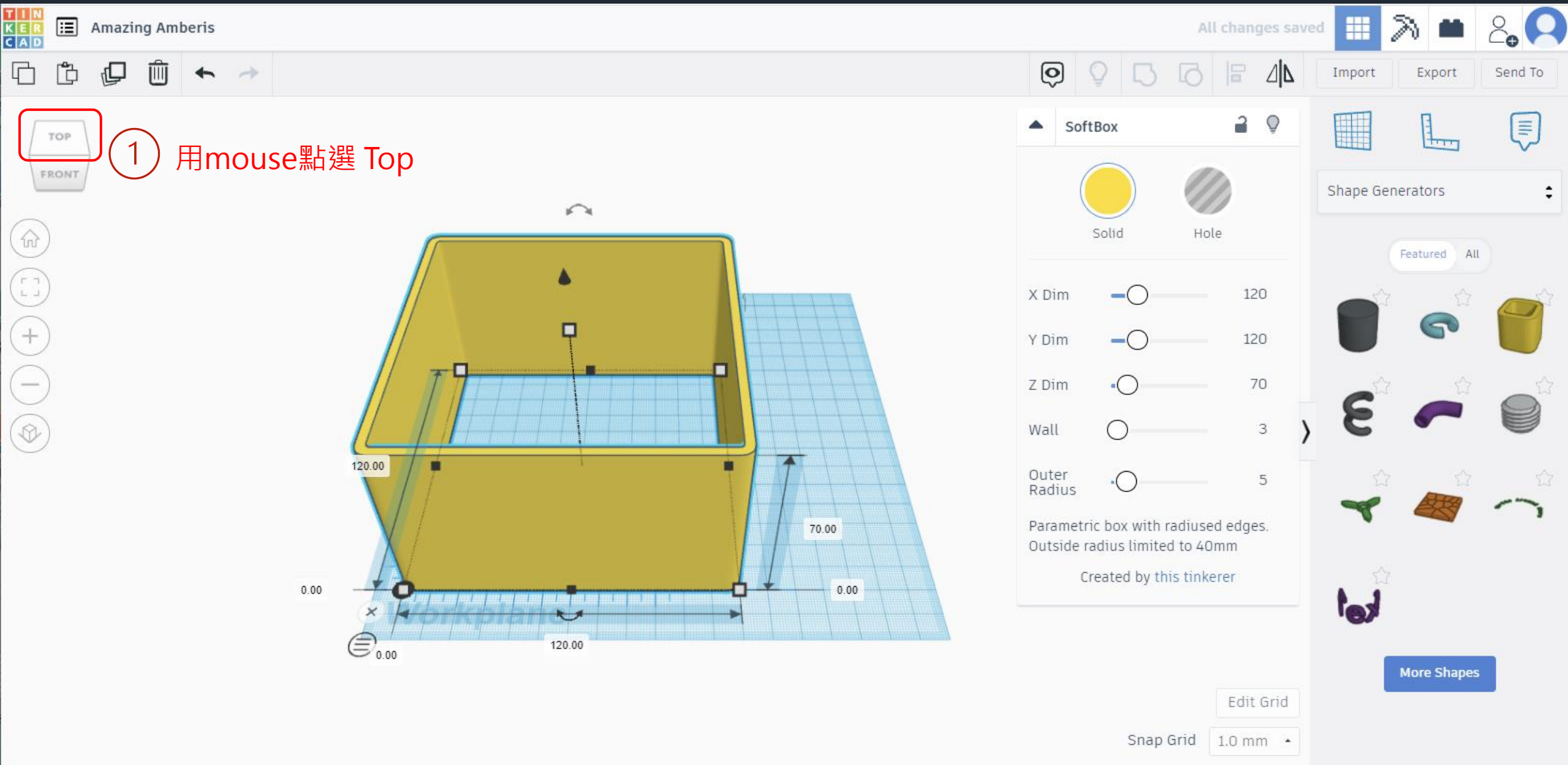
利用 Tinkercad 網上軟件繪畫殼身



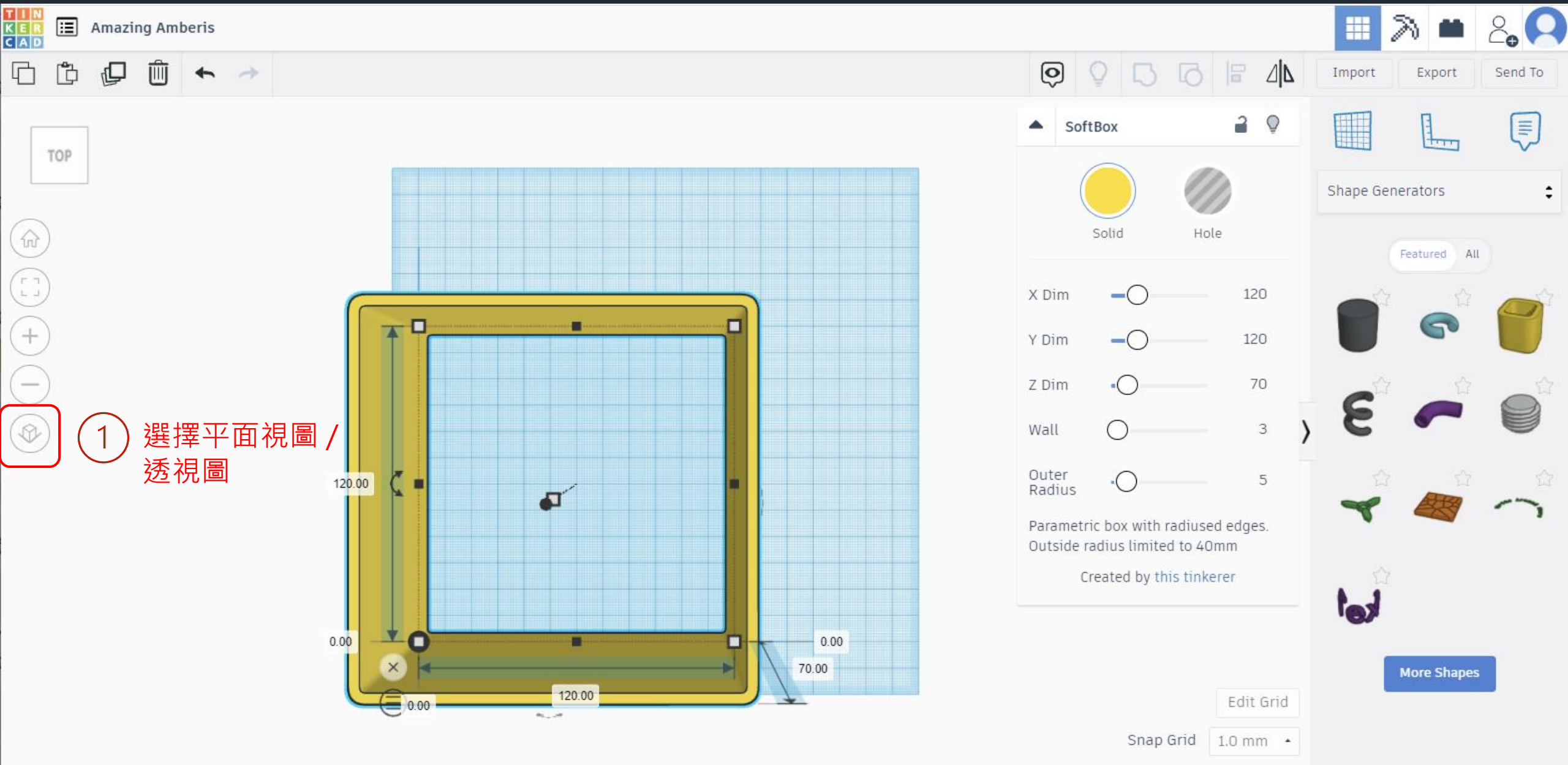
利用 Tinkercad 網上軟件繪畫殼身

2 分別鍵入 0 將 softbox 搬到 (0 , 0) 位置

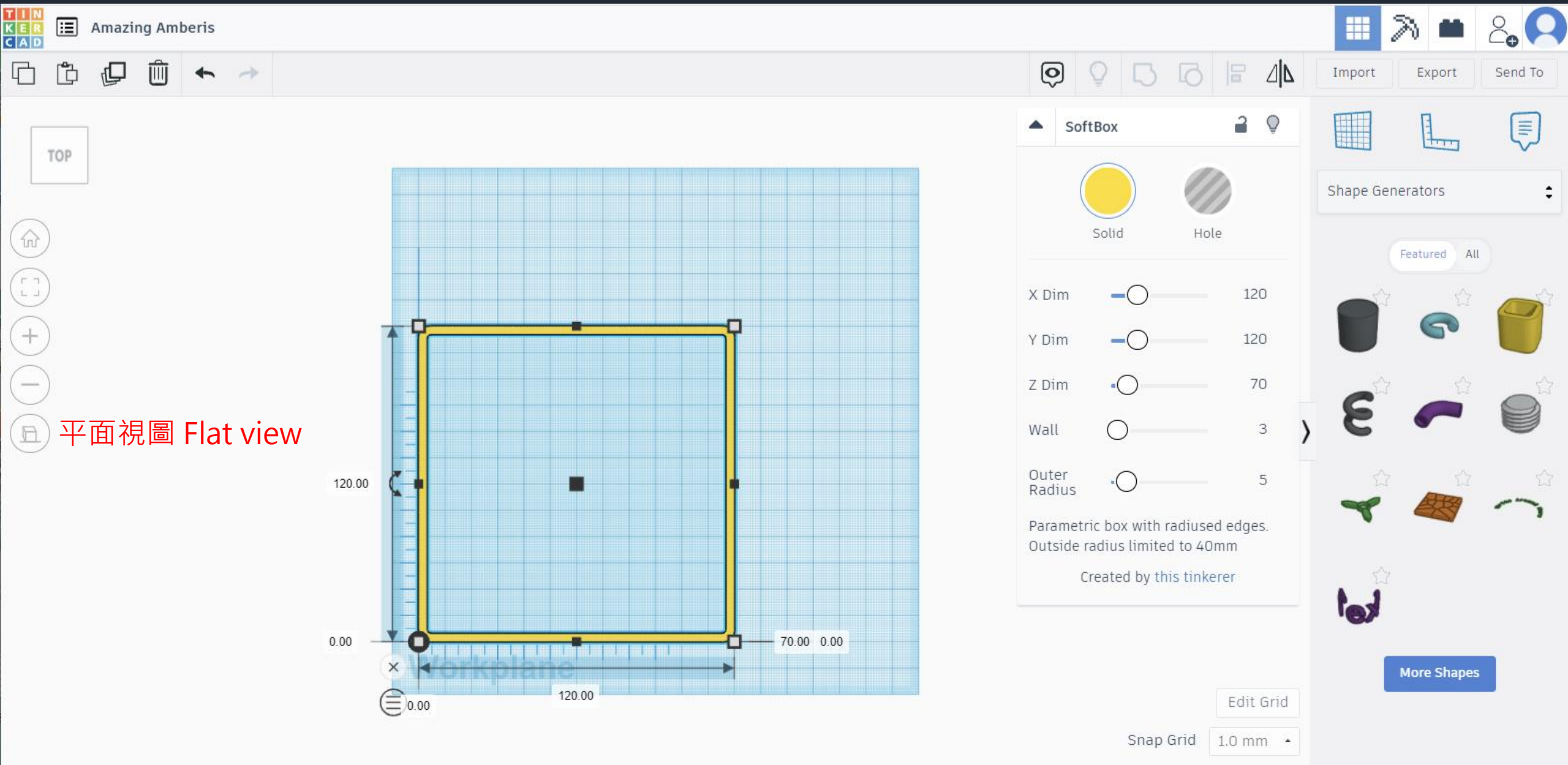
利用 Tinkercad 網上軟件繪畫殼身



利用 Tinkercad 網上軟件繪畫殼身



利用 Tinkercad 網上軟件繪畫殼身



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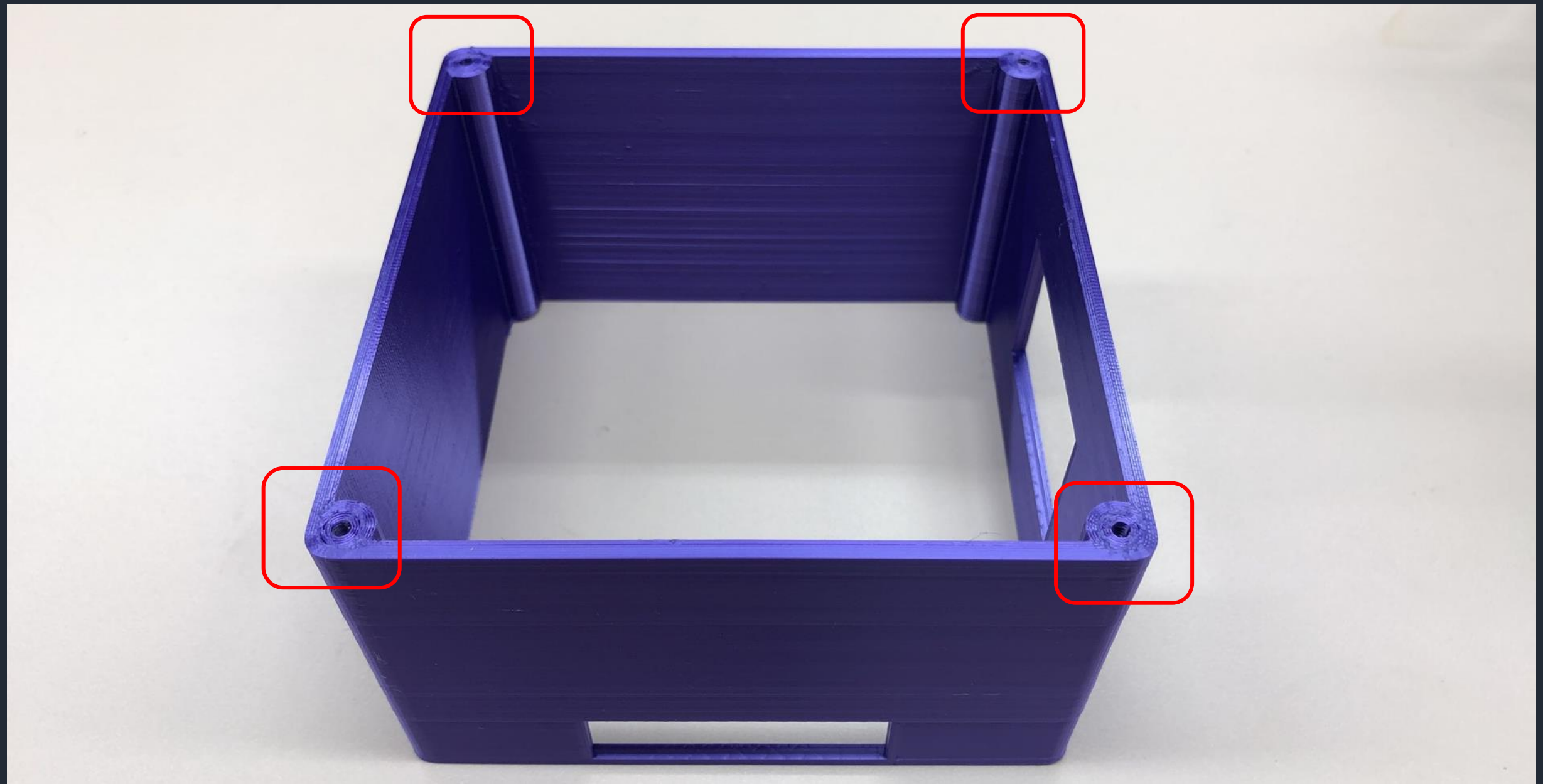
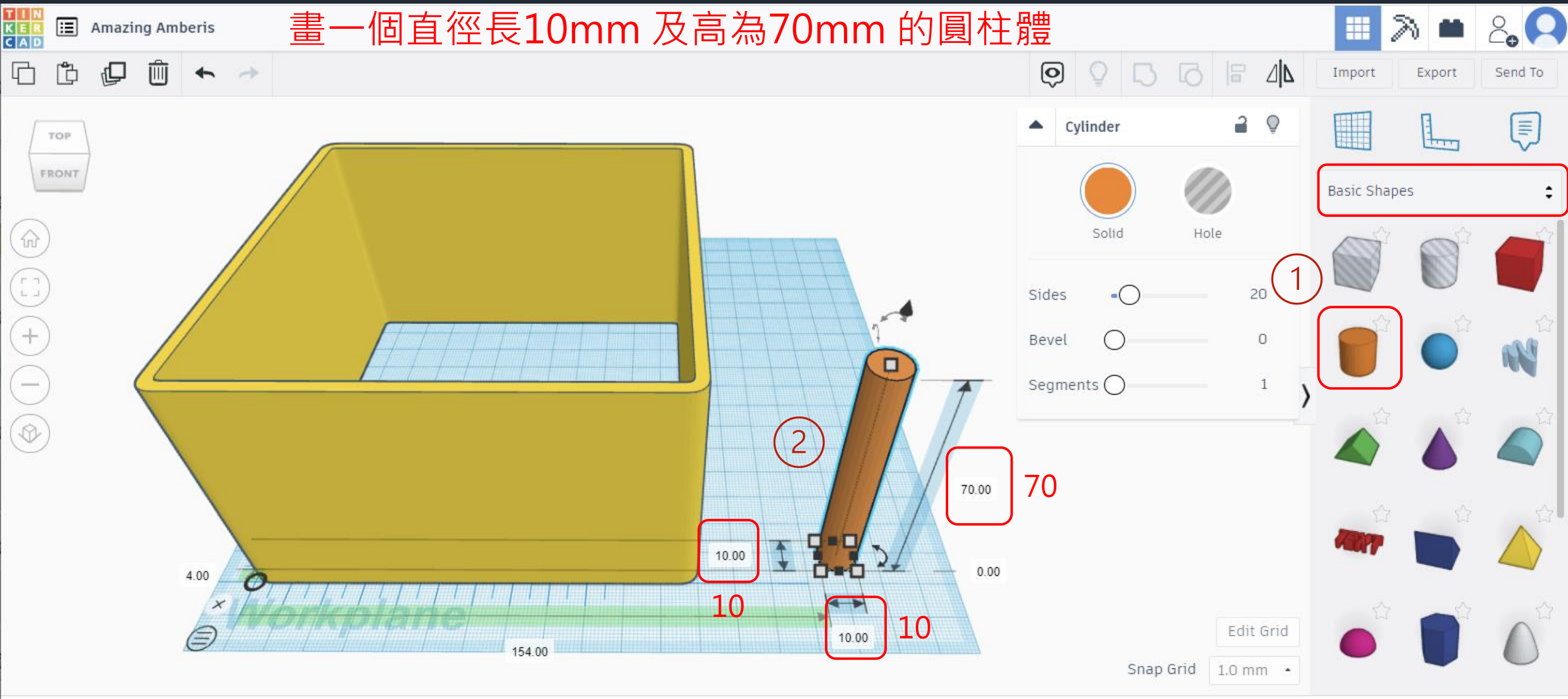
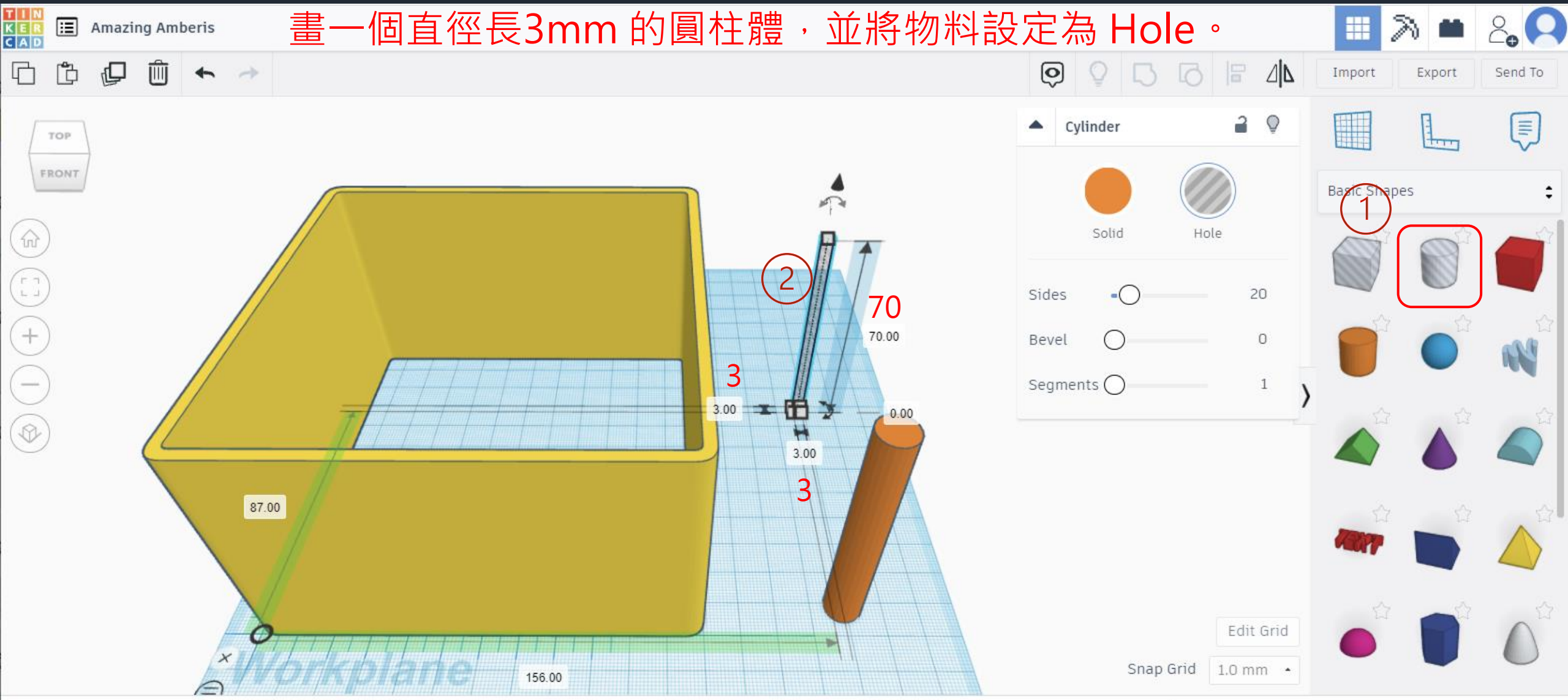


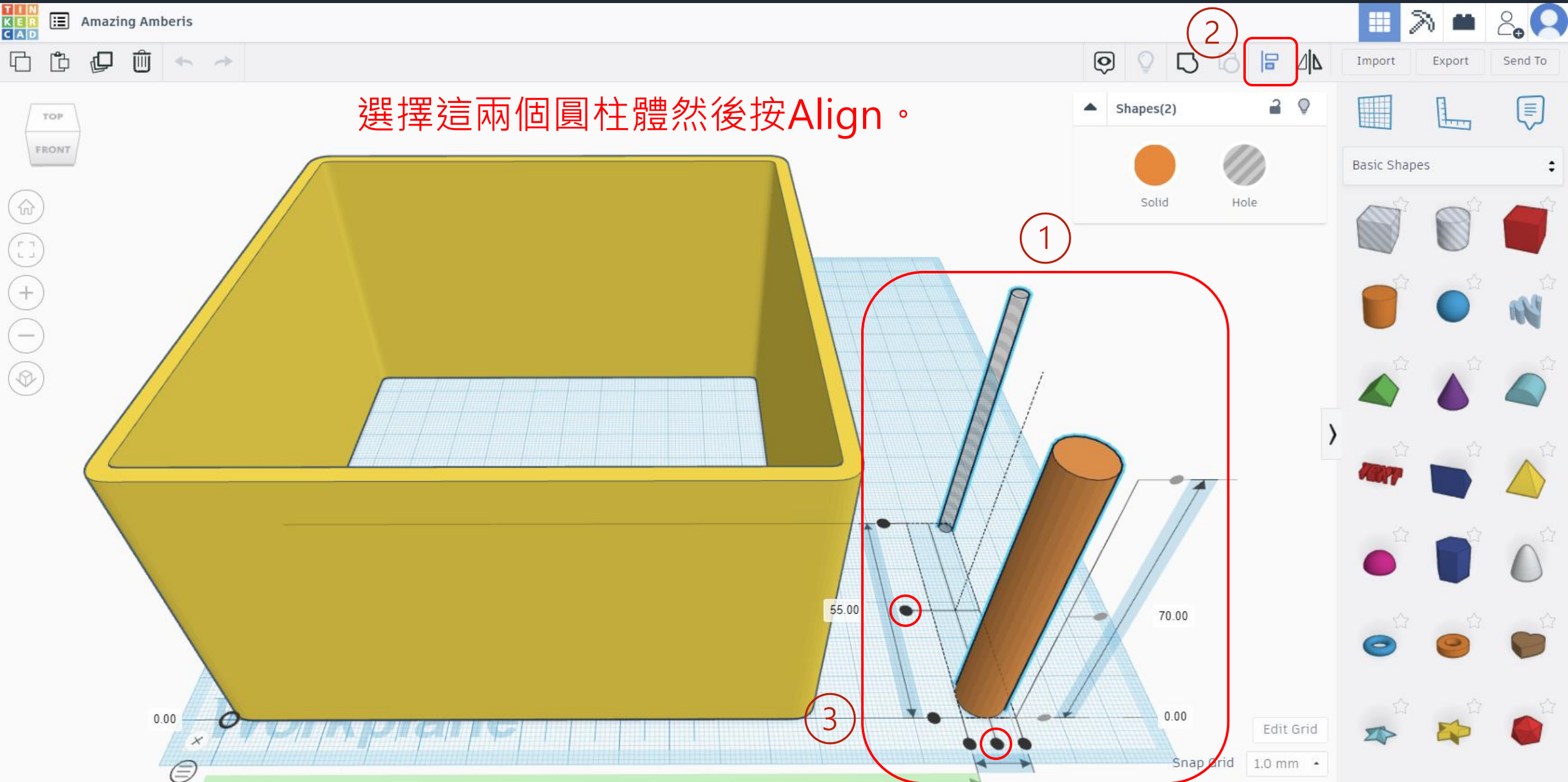
利用 Tinkercad 網上軟件繪畫殼身



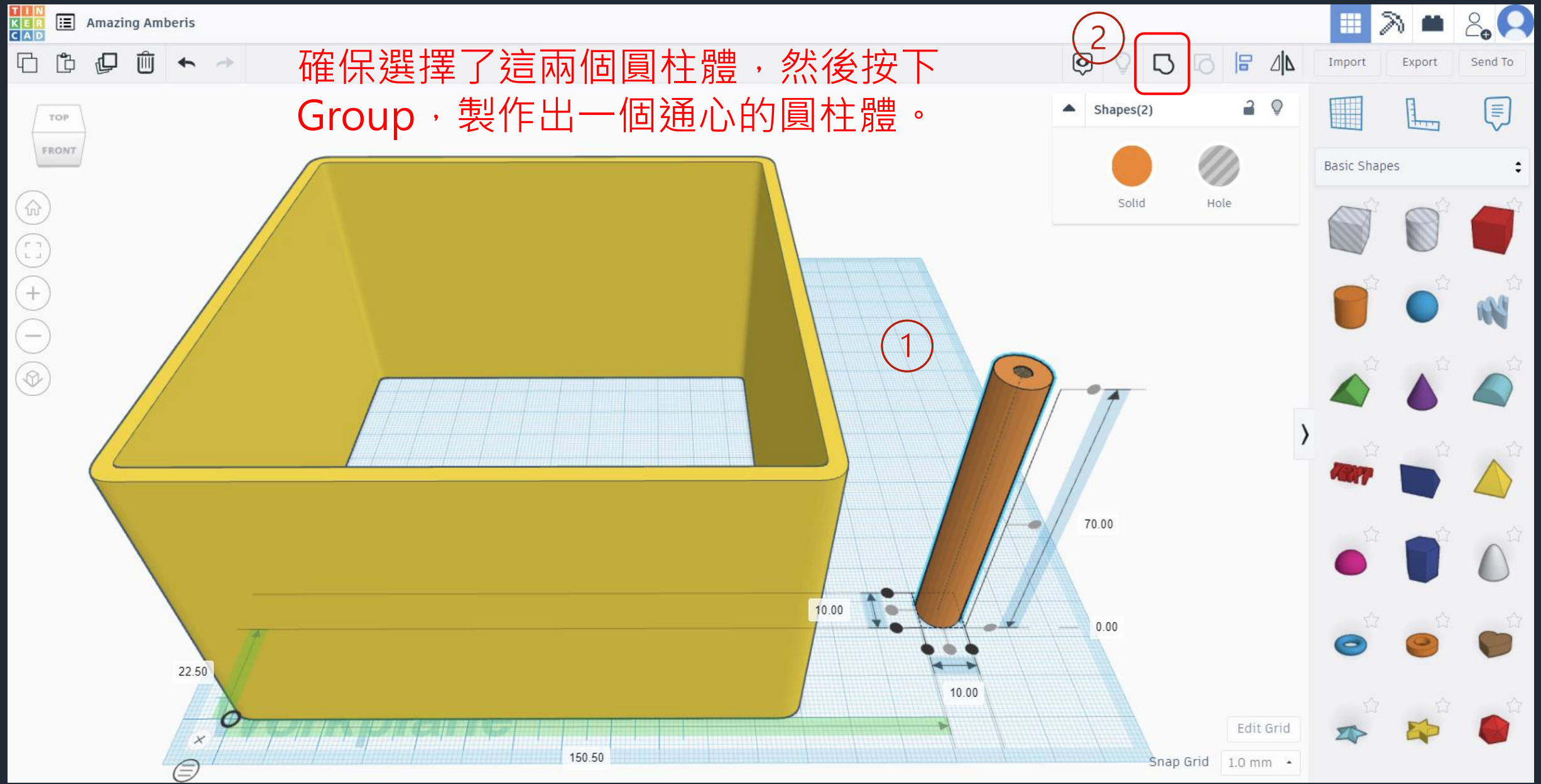
利用 Tinkercad 網上軟件繪畫殼身



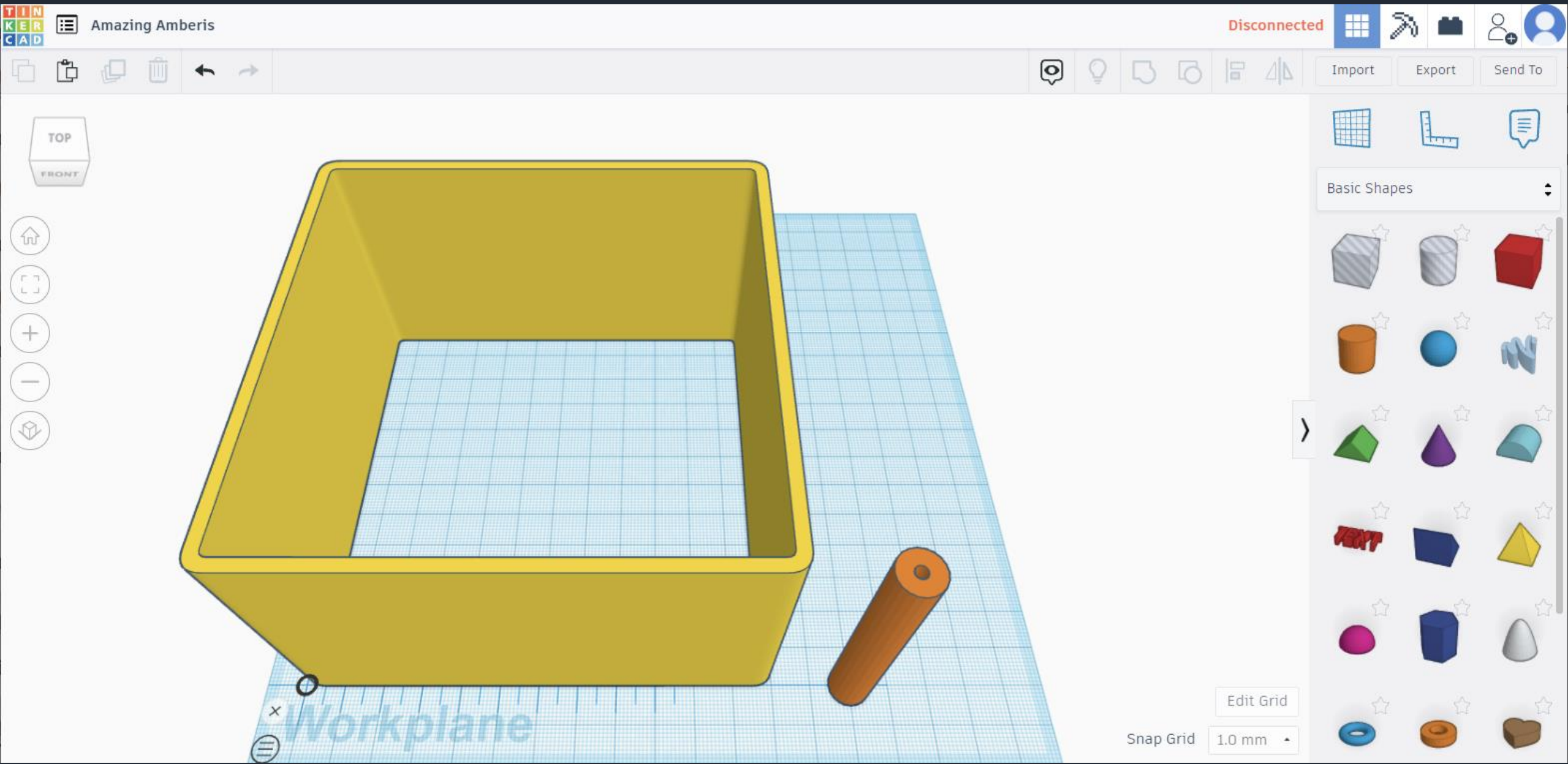
利用 Tinkercad 網上軟件繪畫殼身



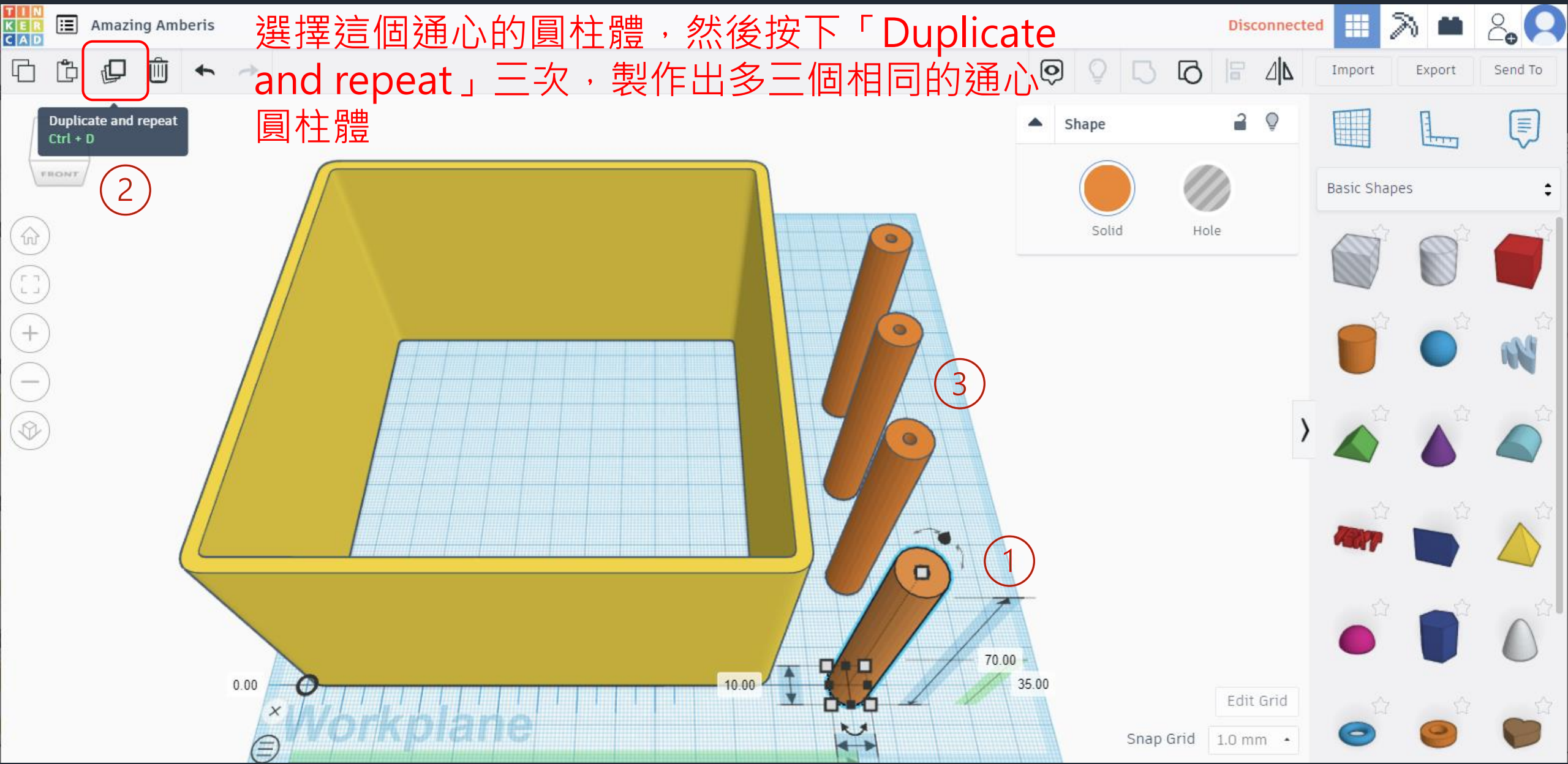
利用 Tinkercad 網上軟件繪畫殼身



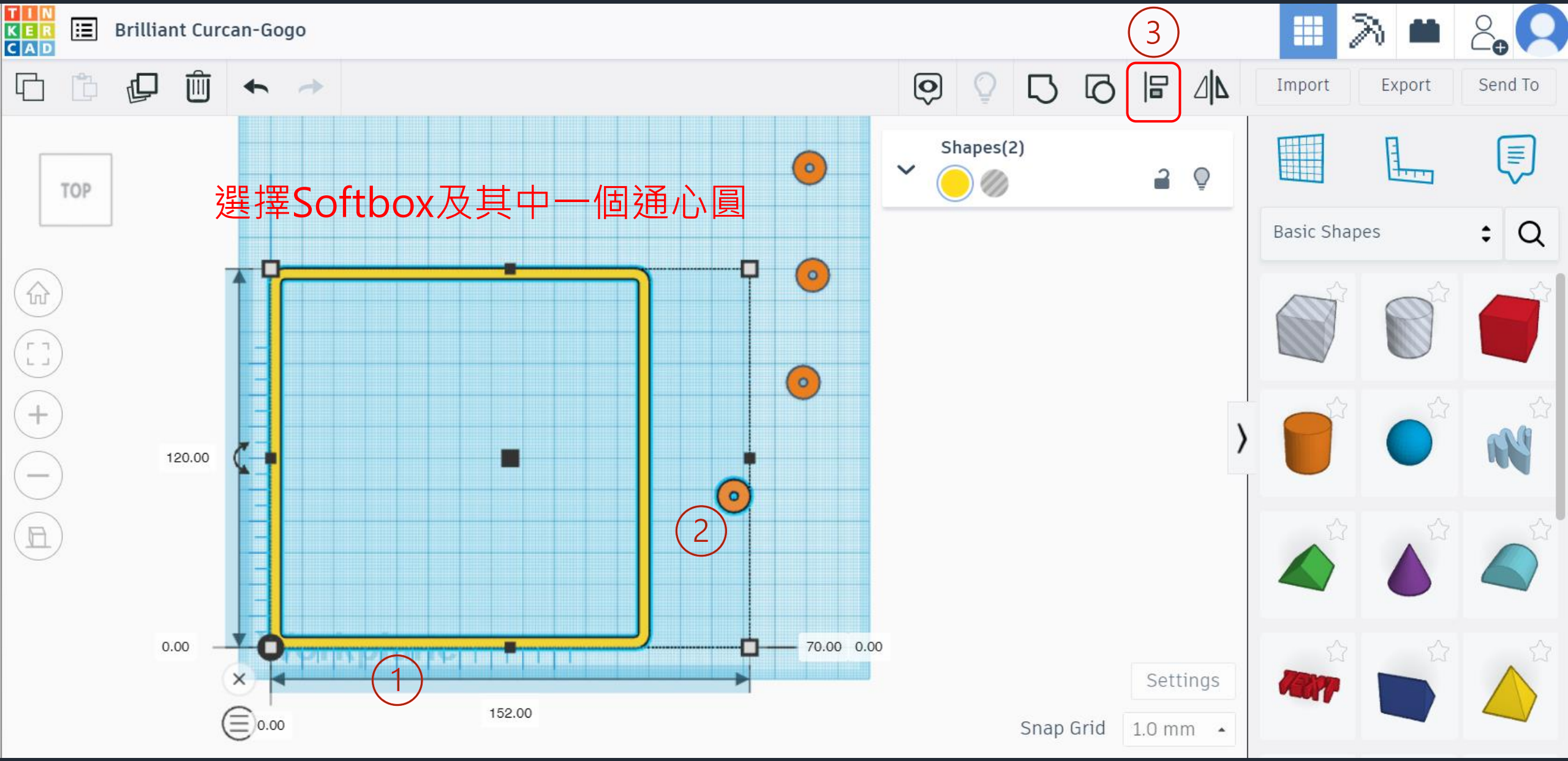
利用 Tinkercad 網上軟件繪畫殼身



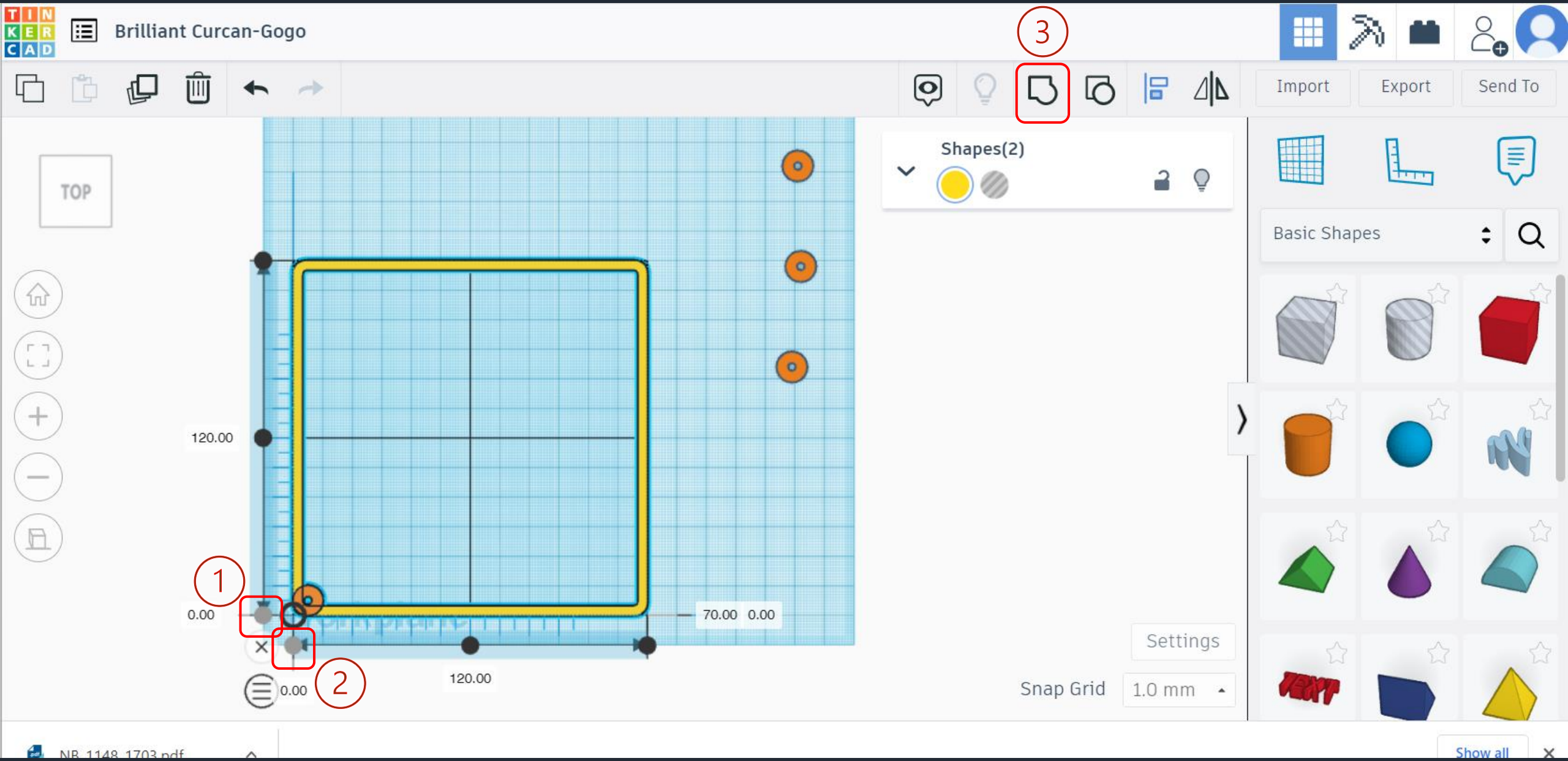
利用 Tinkercad 網上軟件繪畫殼身



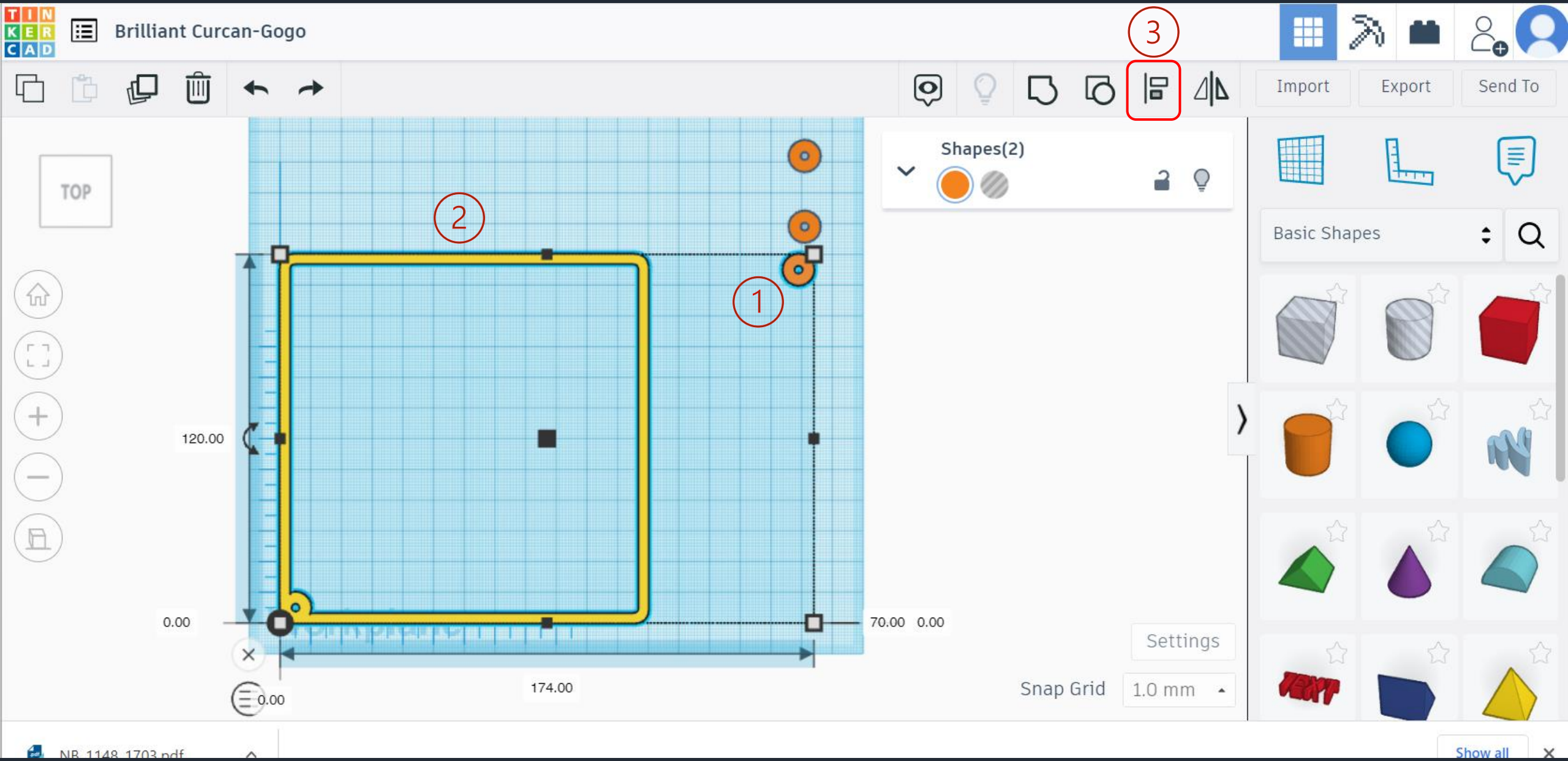
利用 Tinkercad 網上軟件繪畫殼身



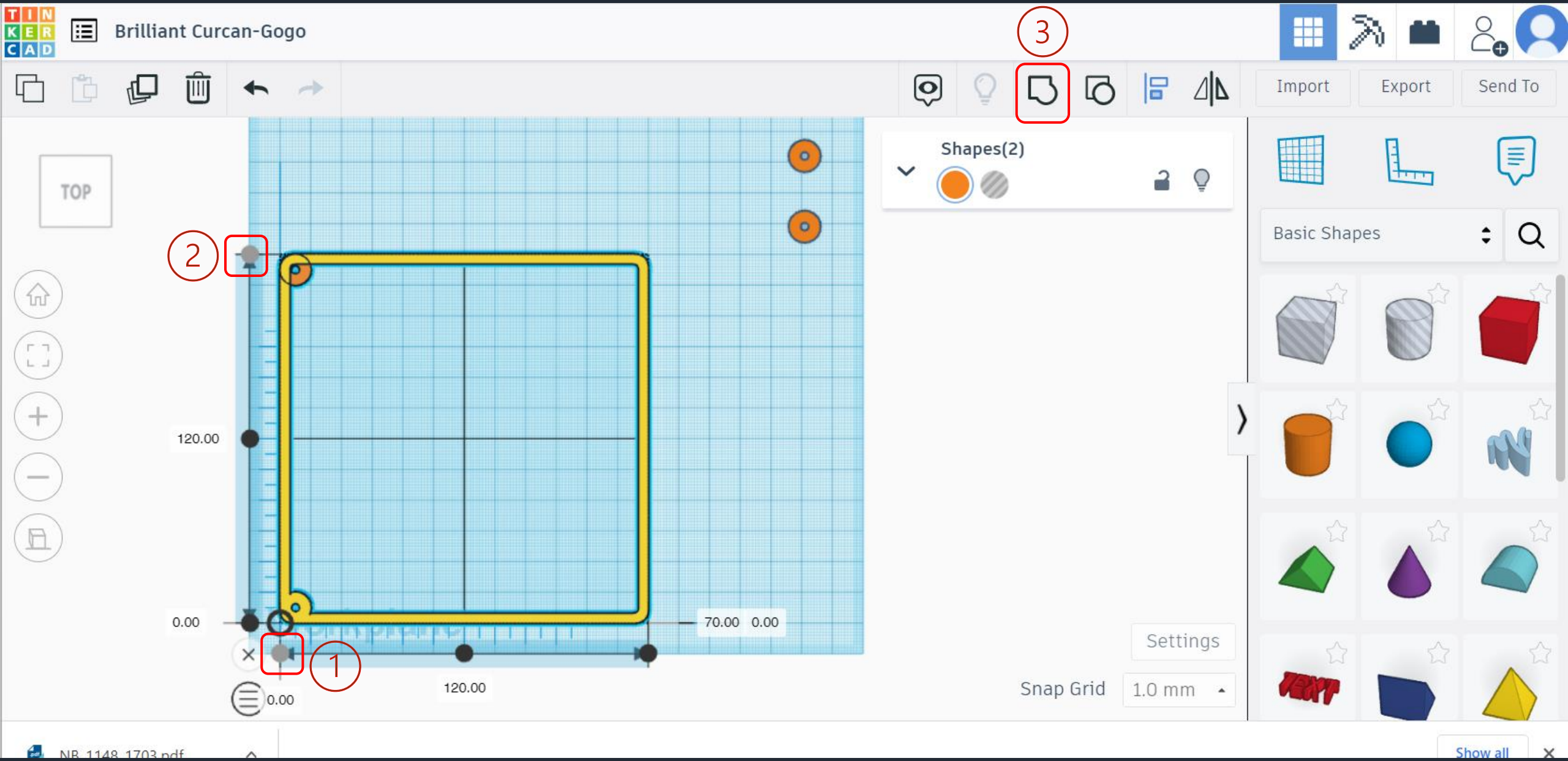
利用 Tinkercad 網上軟件繪畫殼身



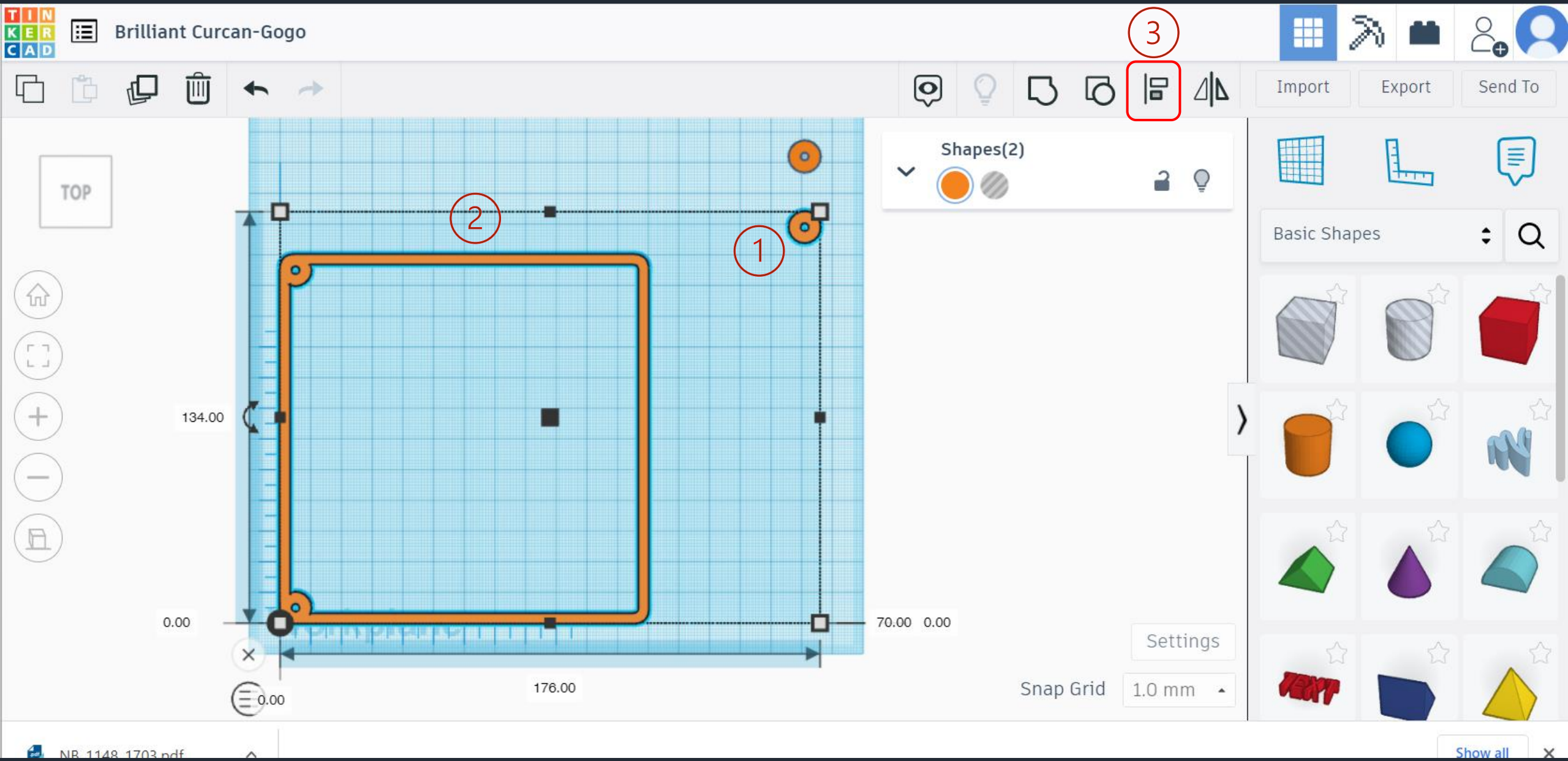
利用 Tinkercad 網上軟件繪畫殼身



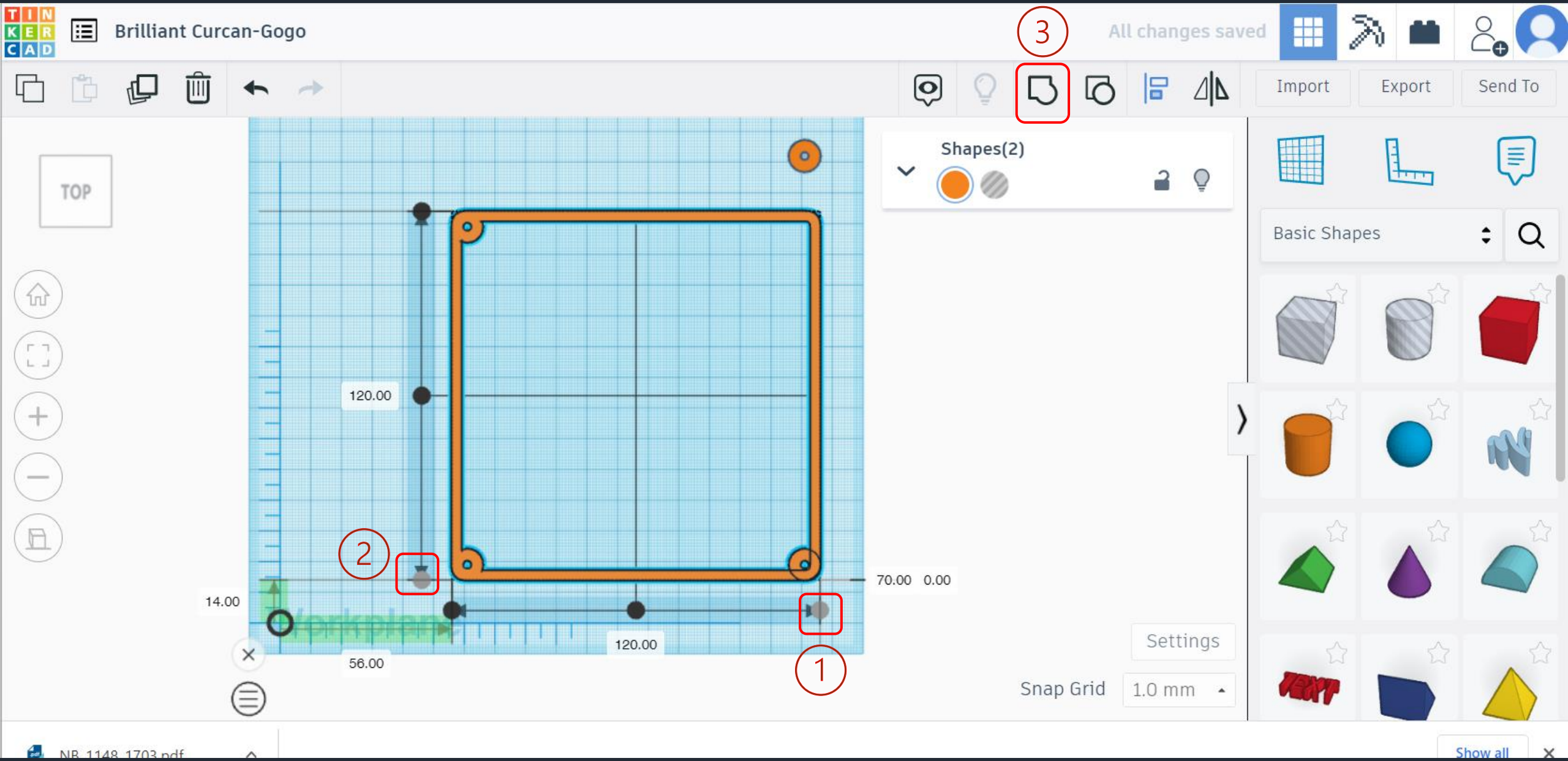
利用 Tinkercad 網上軟件繪畫殼身



利用 Tinkercad 網上軟件繪畫殼身



利用 Tinkercad 網上軟件繪畫殼身



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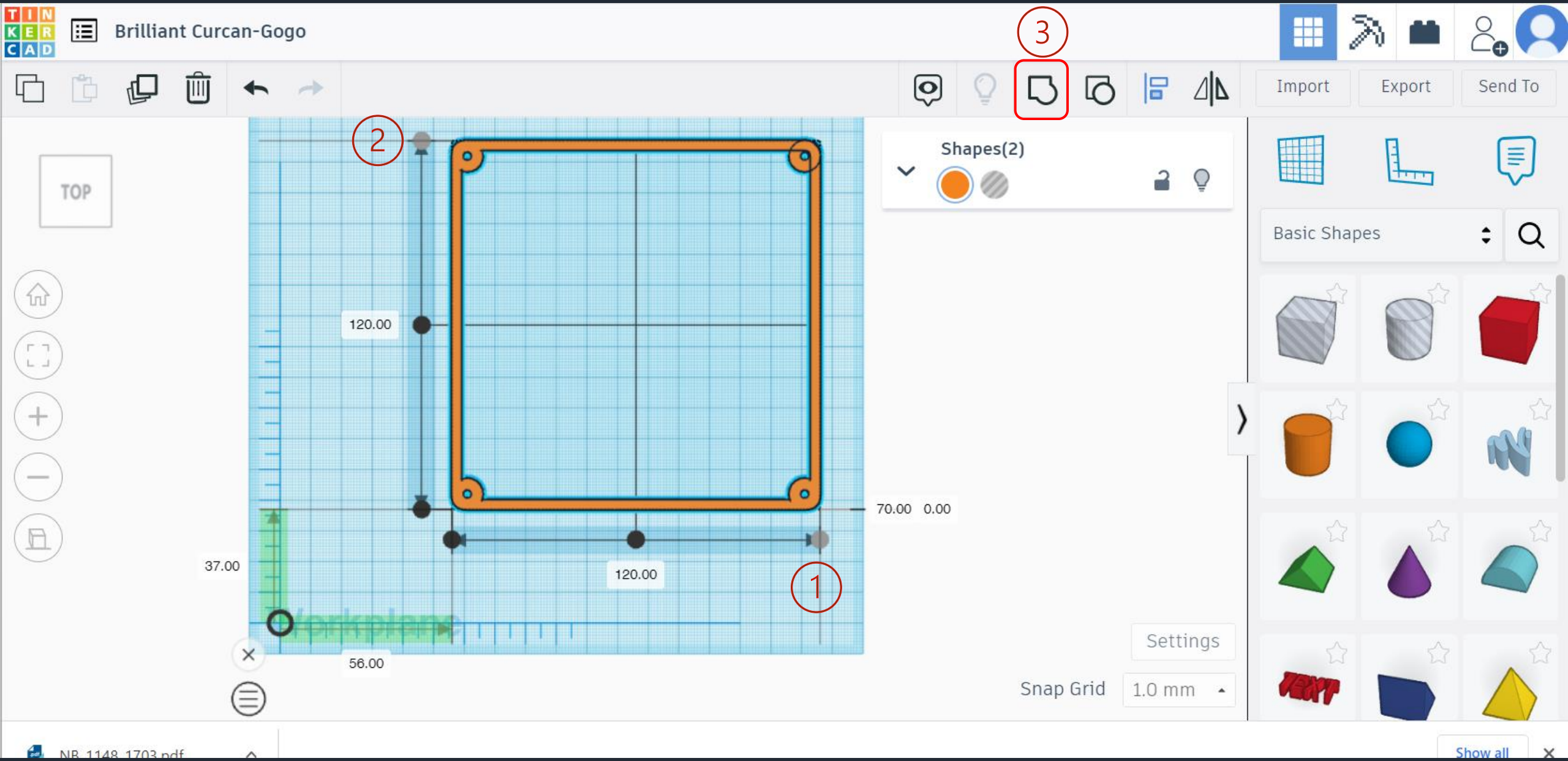
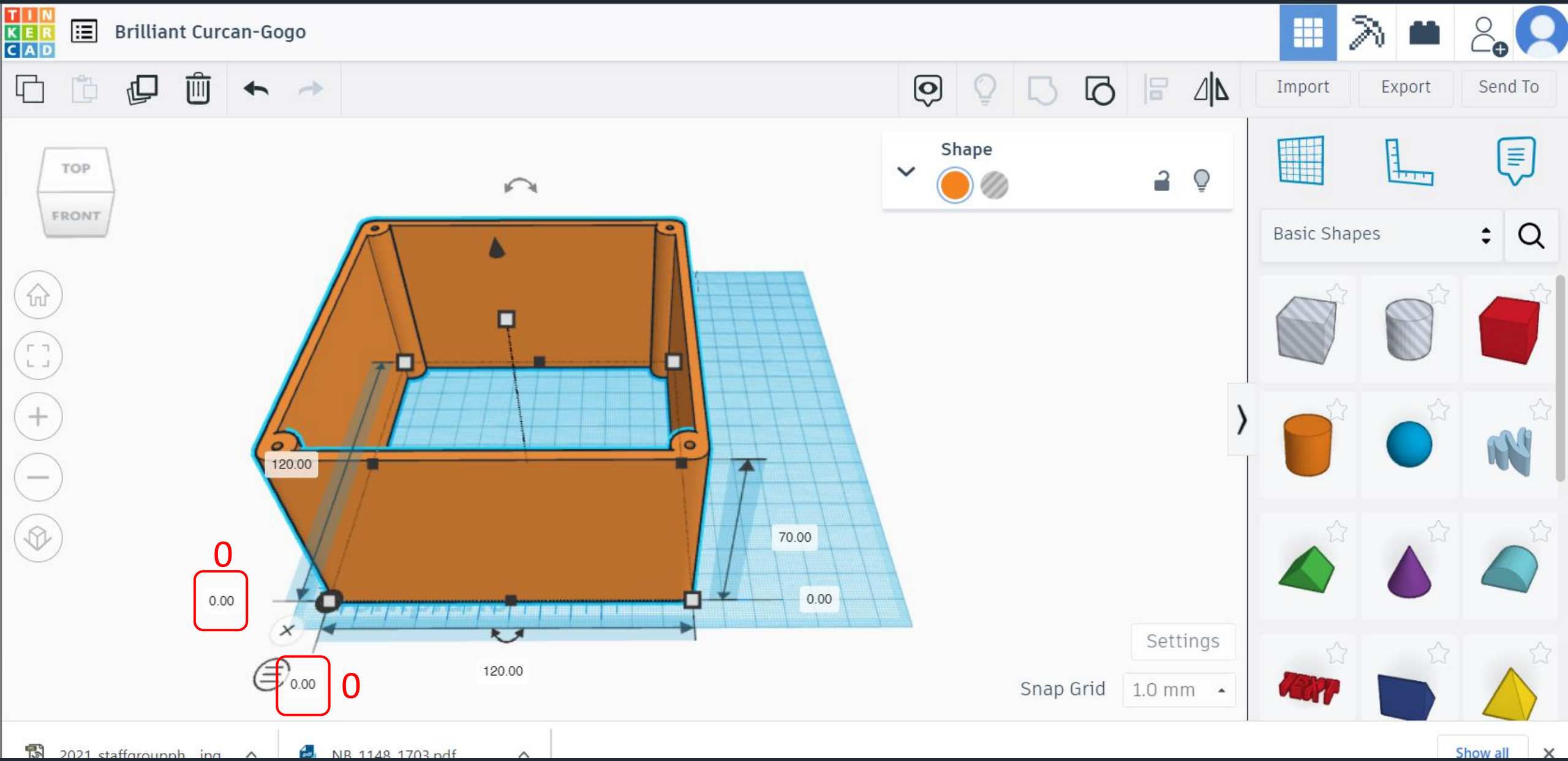
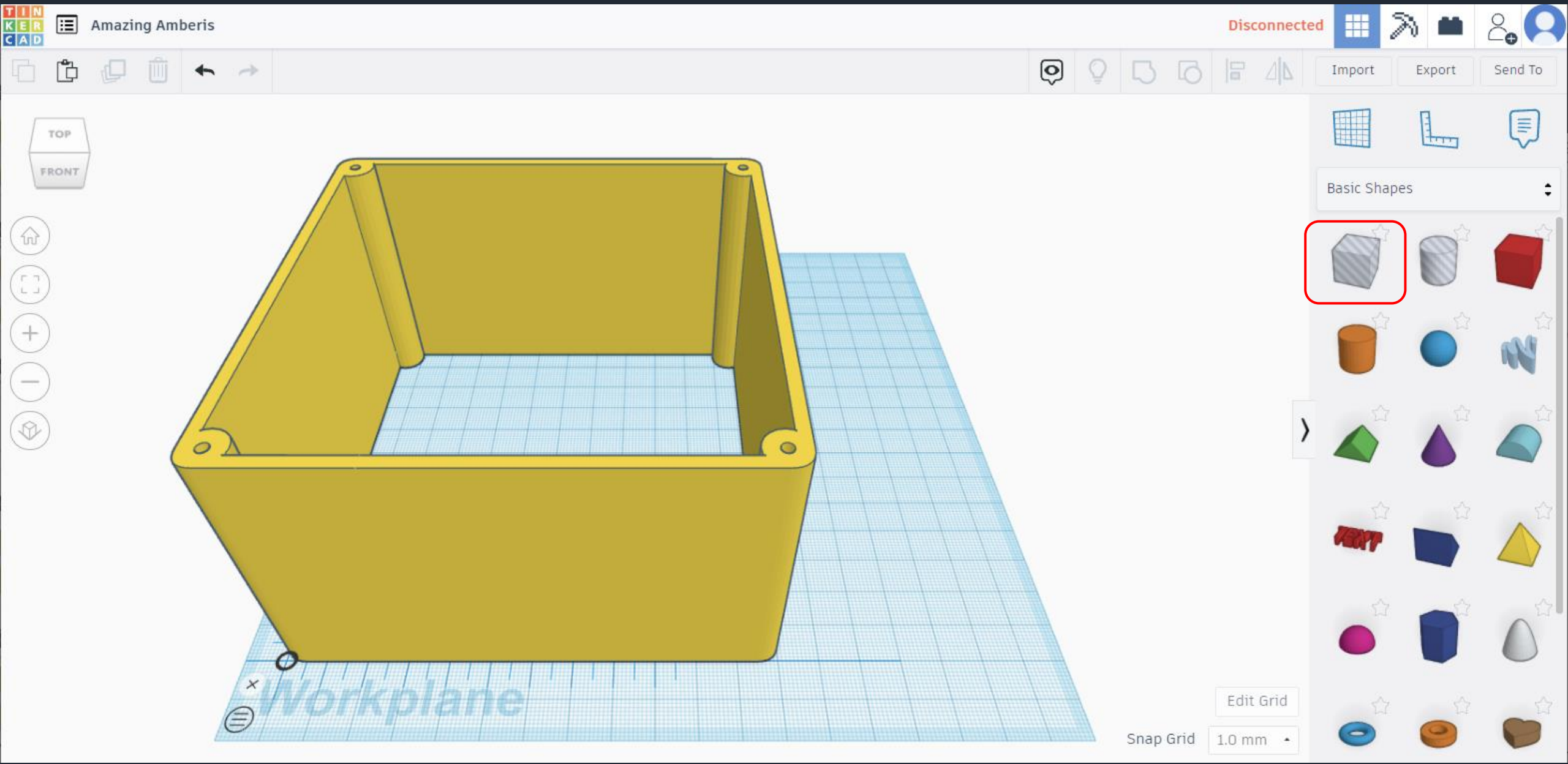


利用 Tinkercad 網上軟件繪畫殼身

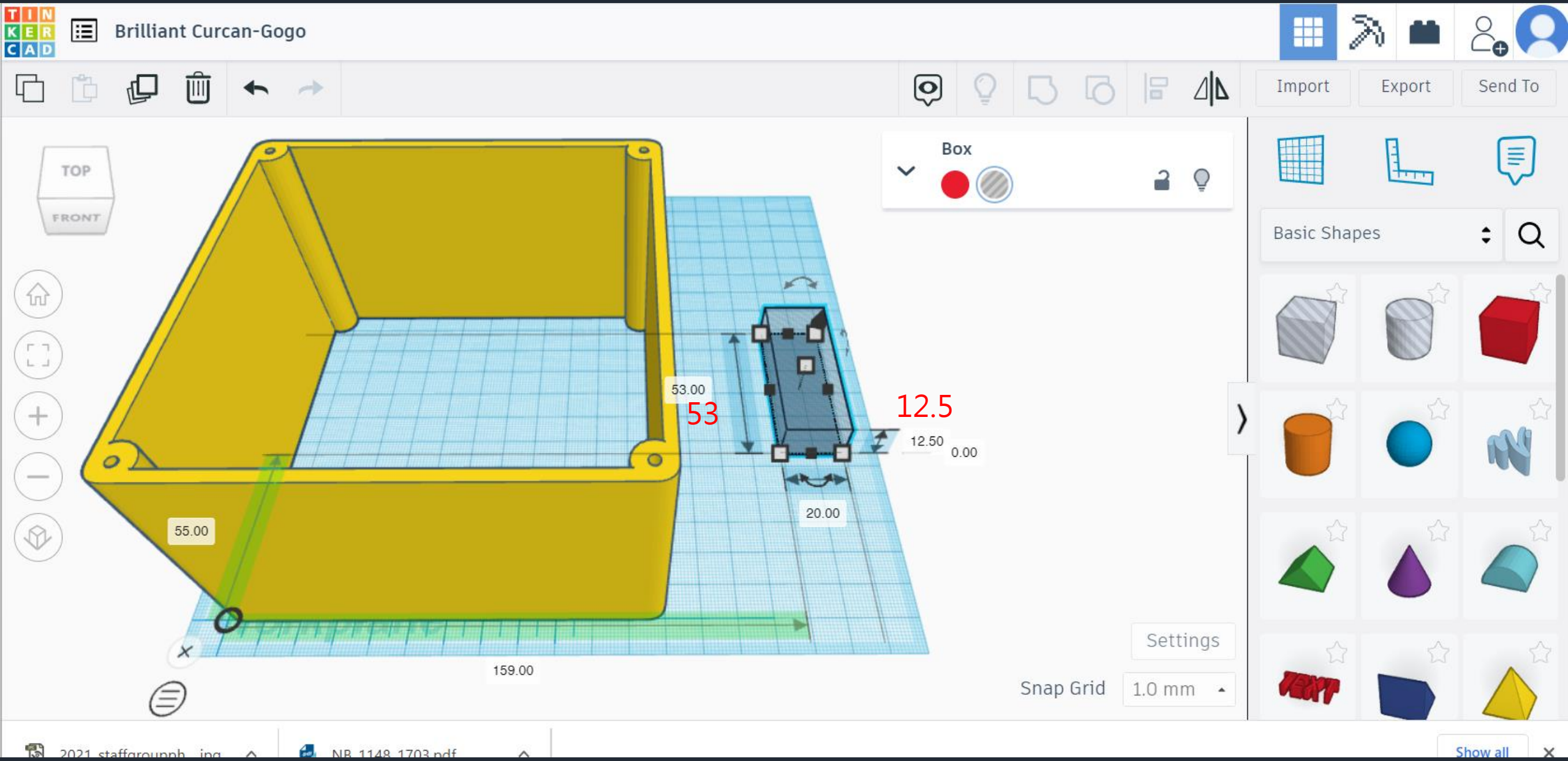


預留空間放置灰塵傳感器及 Arduino 供電位

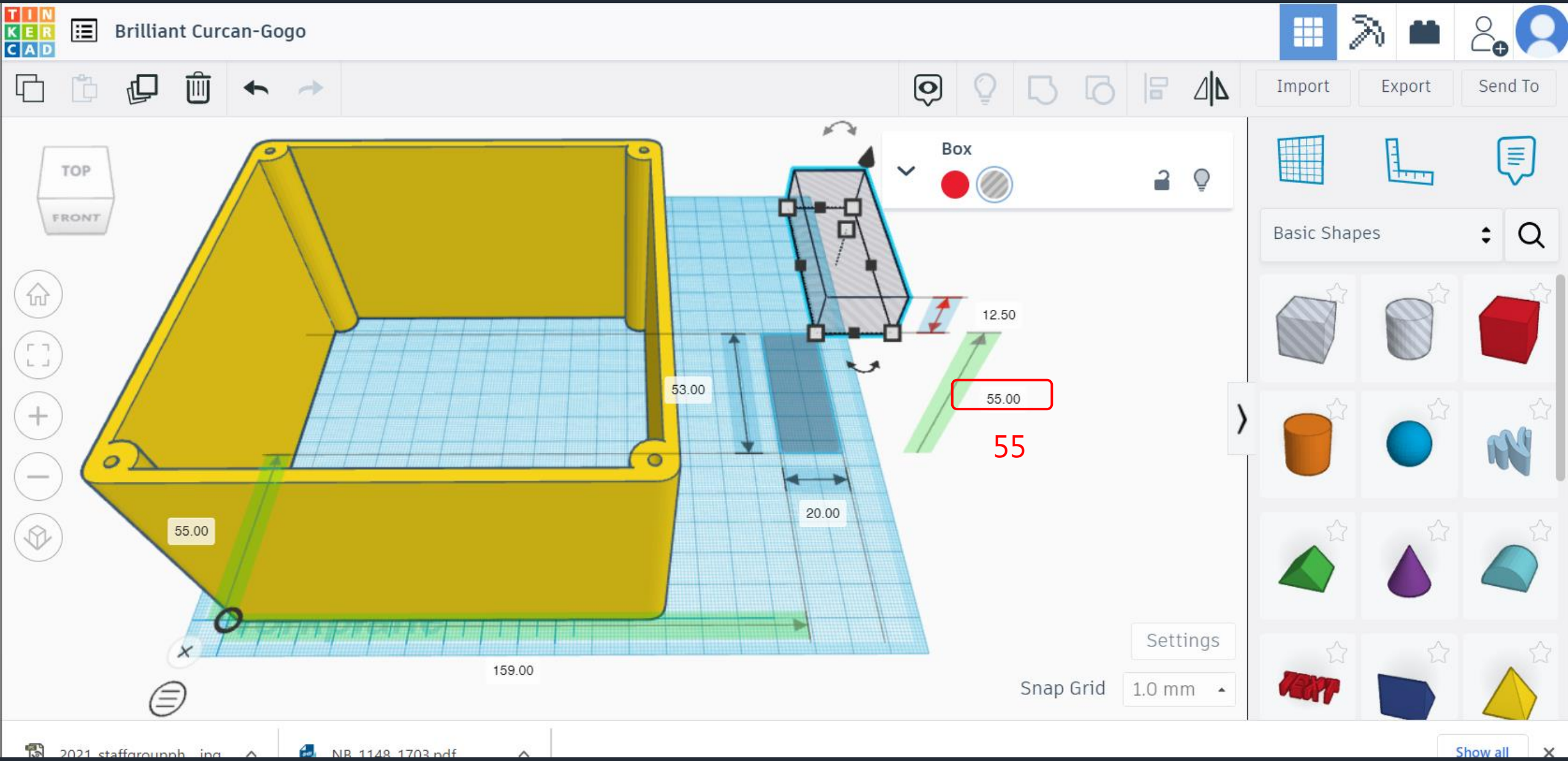
預留空間放置灰塵傳感器及Arduino 開發板



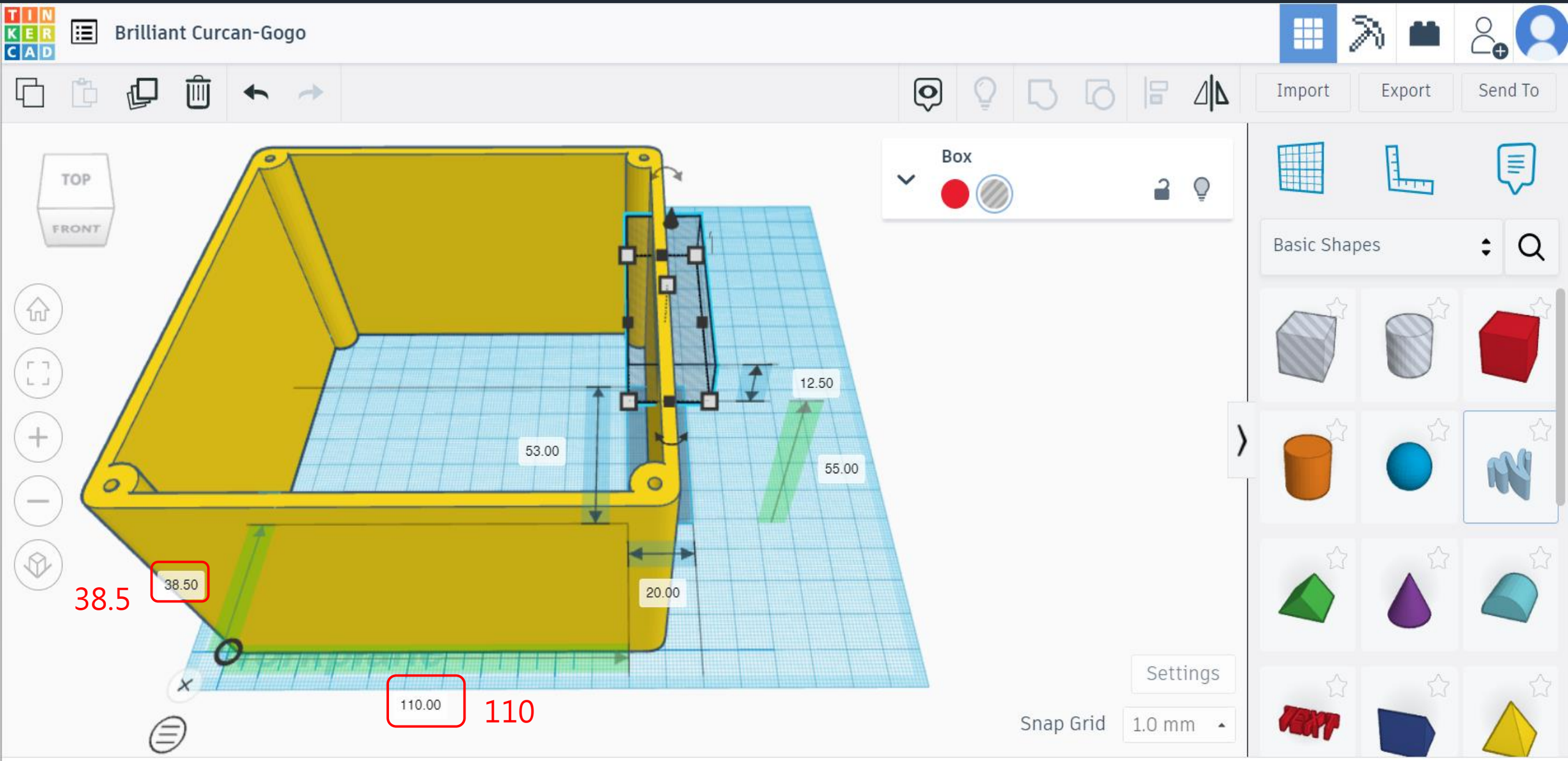
預留空間放置灰塵傳感器及Arduino 開發板



預留空間放置灰塵傳感器及Arduino 開發板



預留空間放置灰塵傳感器及Arduino 開發板



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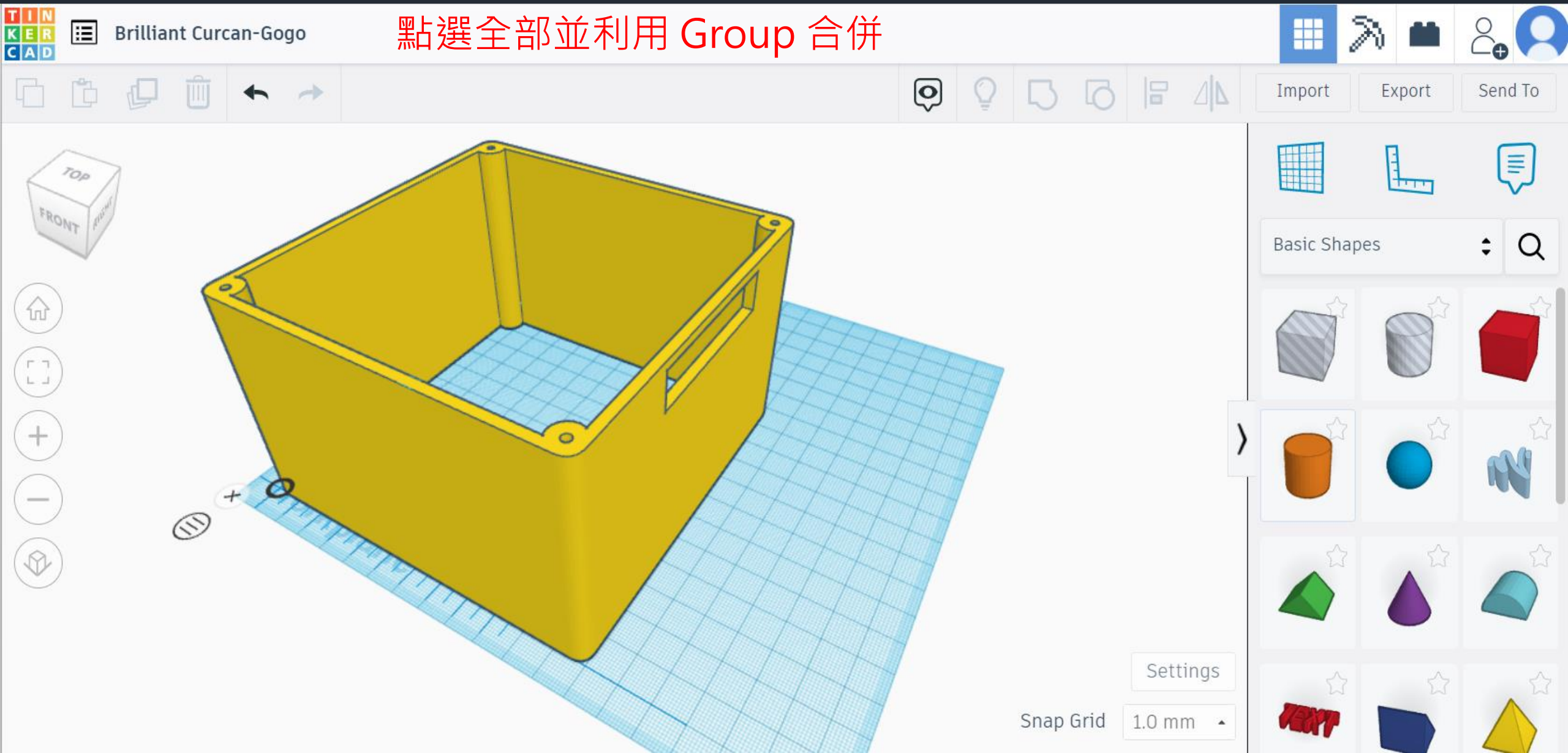
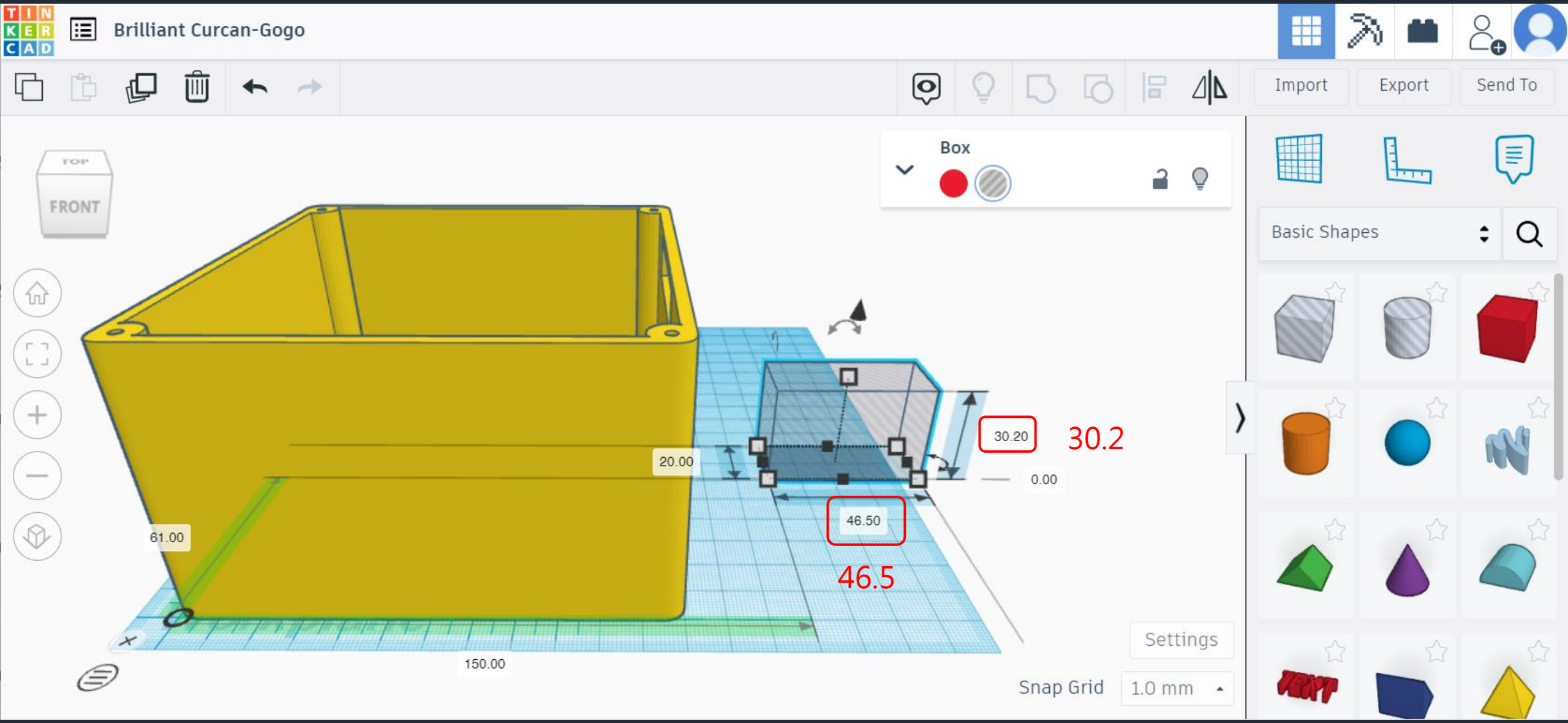


預留空間放置灰塵傳感器及Arduino 開發板



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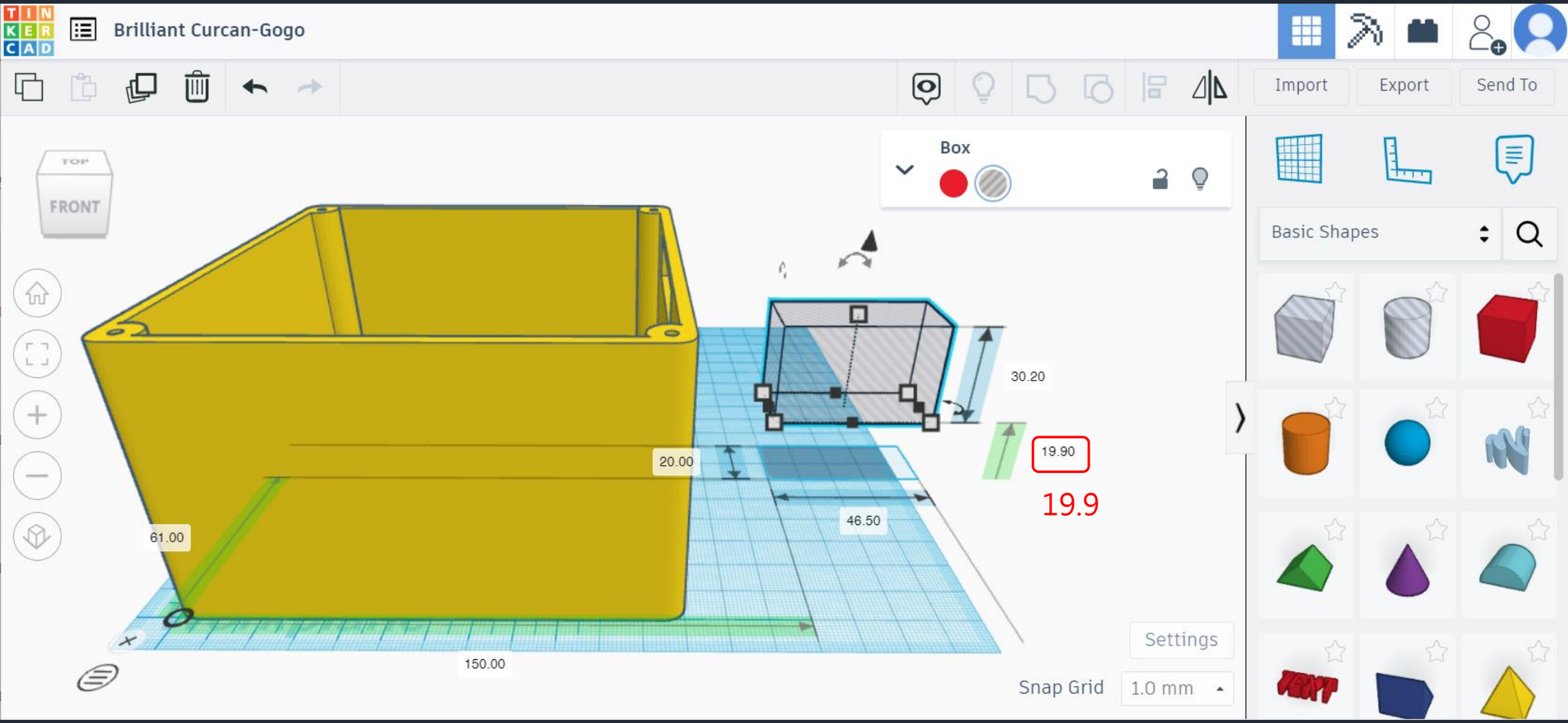
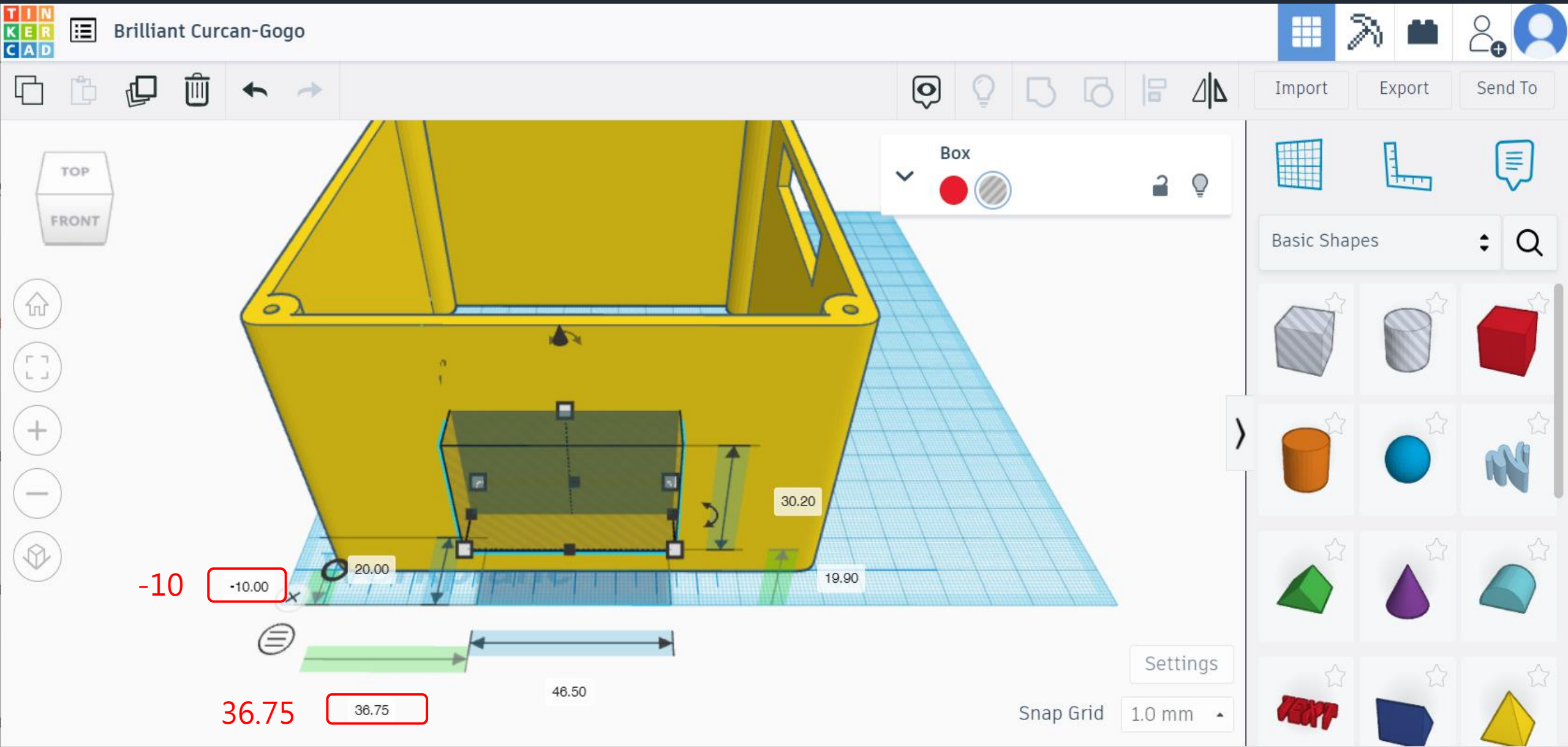
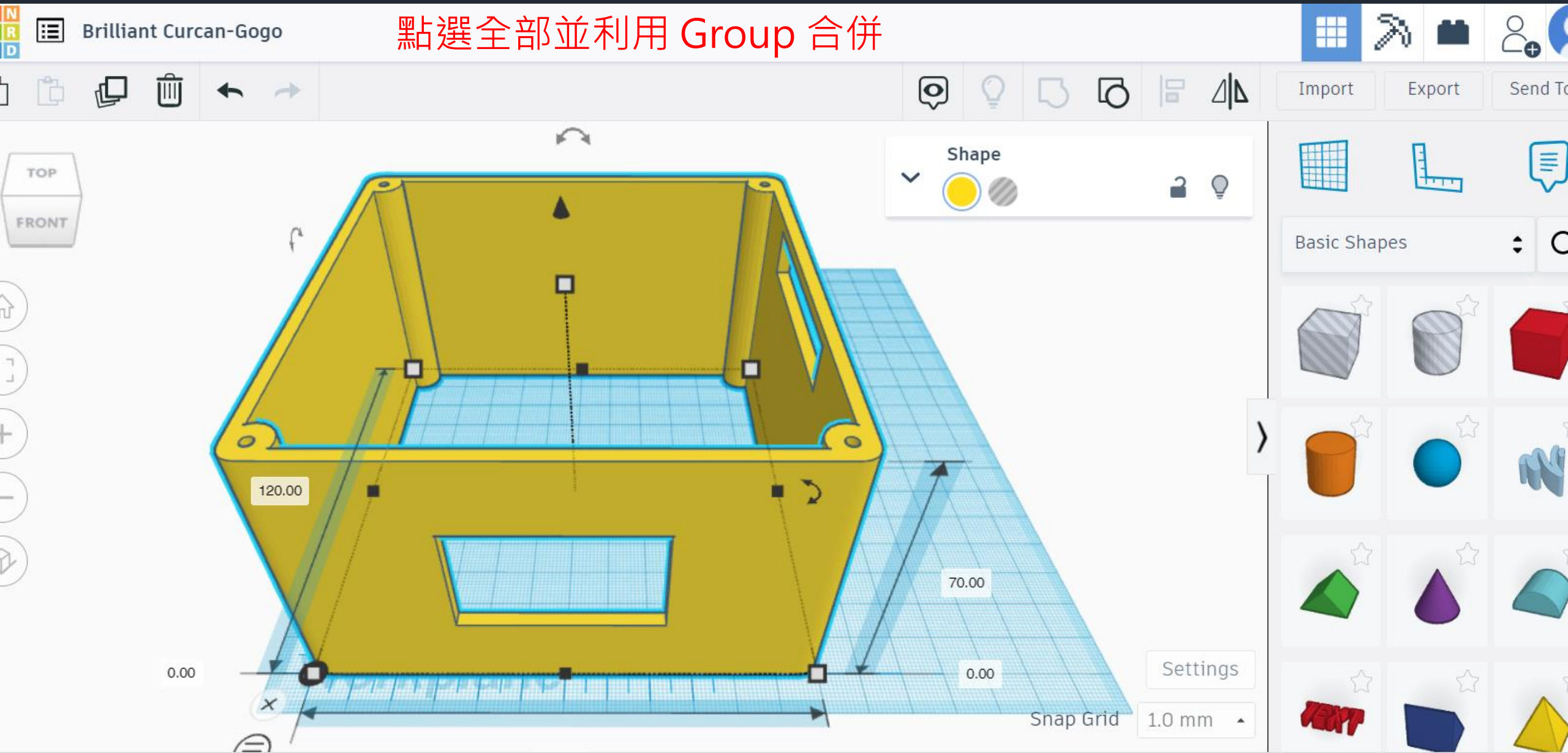


預留空間放置灰塵傳感器及Arduino 開發板



預留空間放置灰塵傳感器及Arduino 開發板



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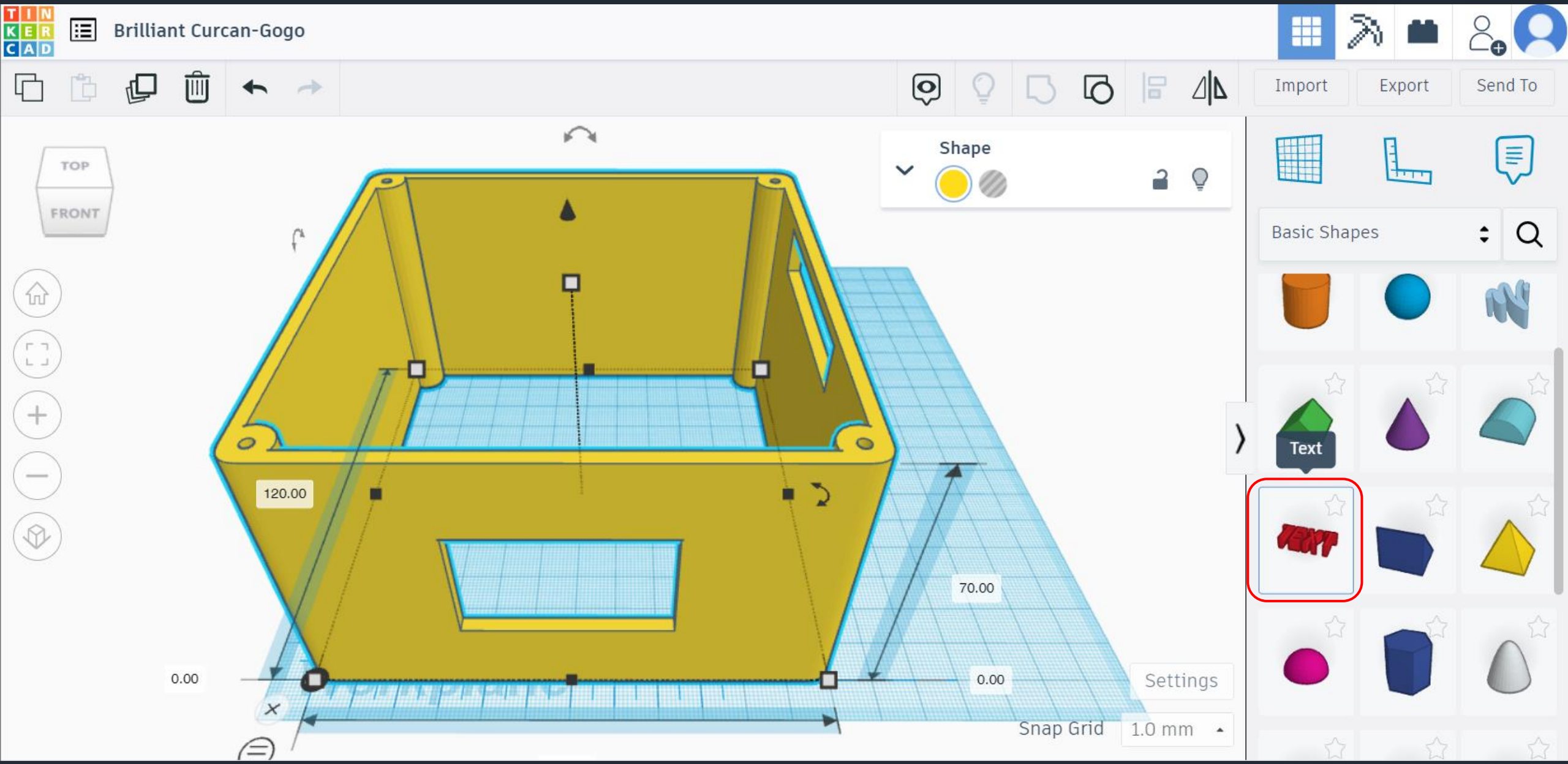
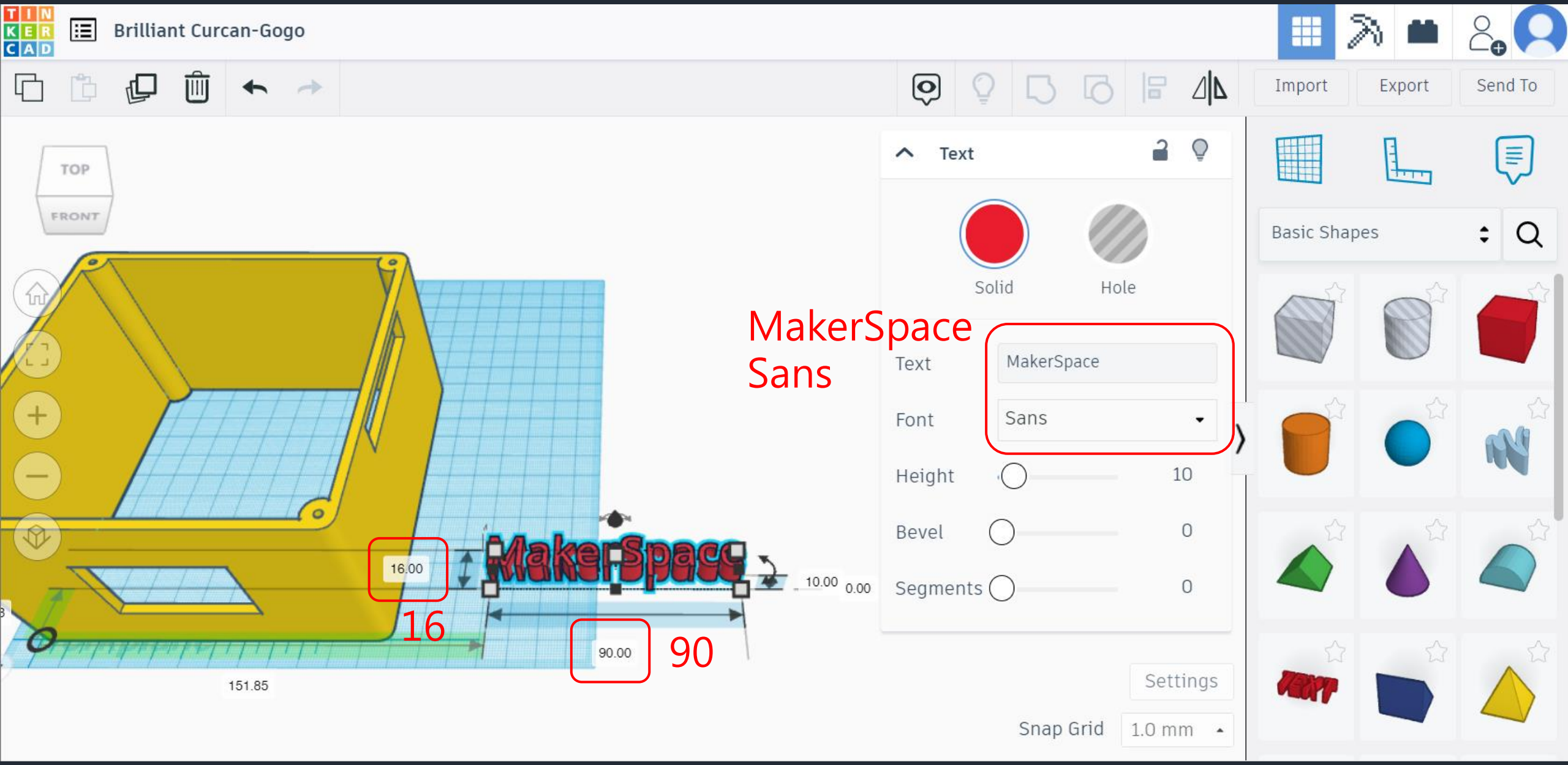

Brilliant Curcan-Gogo
Import
Export
Send To
TOP
FRONT
Shape
Basic Shapes
Text
120.00
70.00
0.00
0.00
Settings
Snap Grid
1.0 mm

在適當位置刻上文字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Segments
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Settings
Snap Grid
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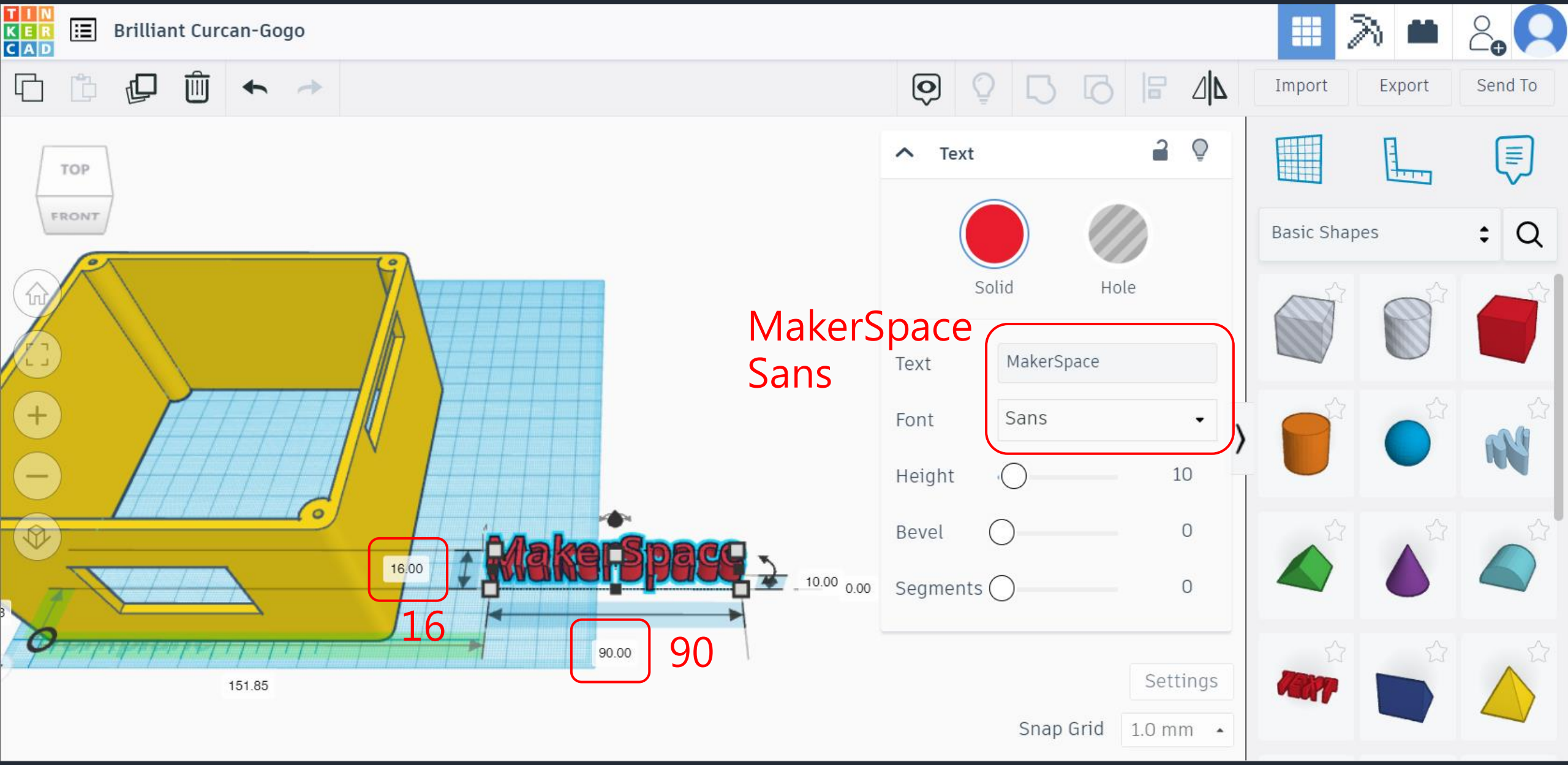
在適當位置刻上文字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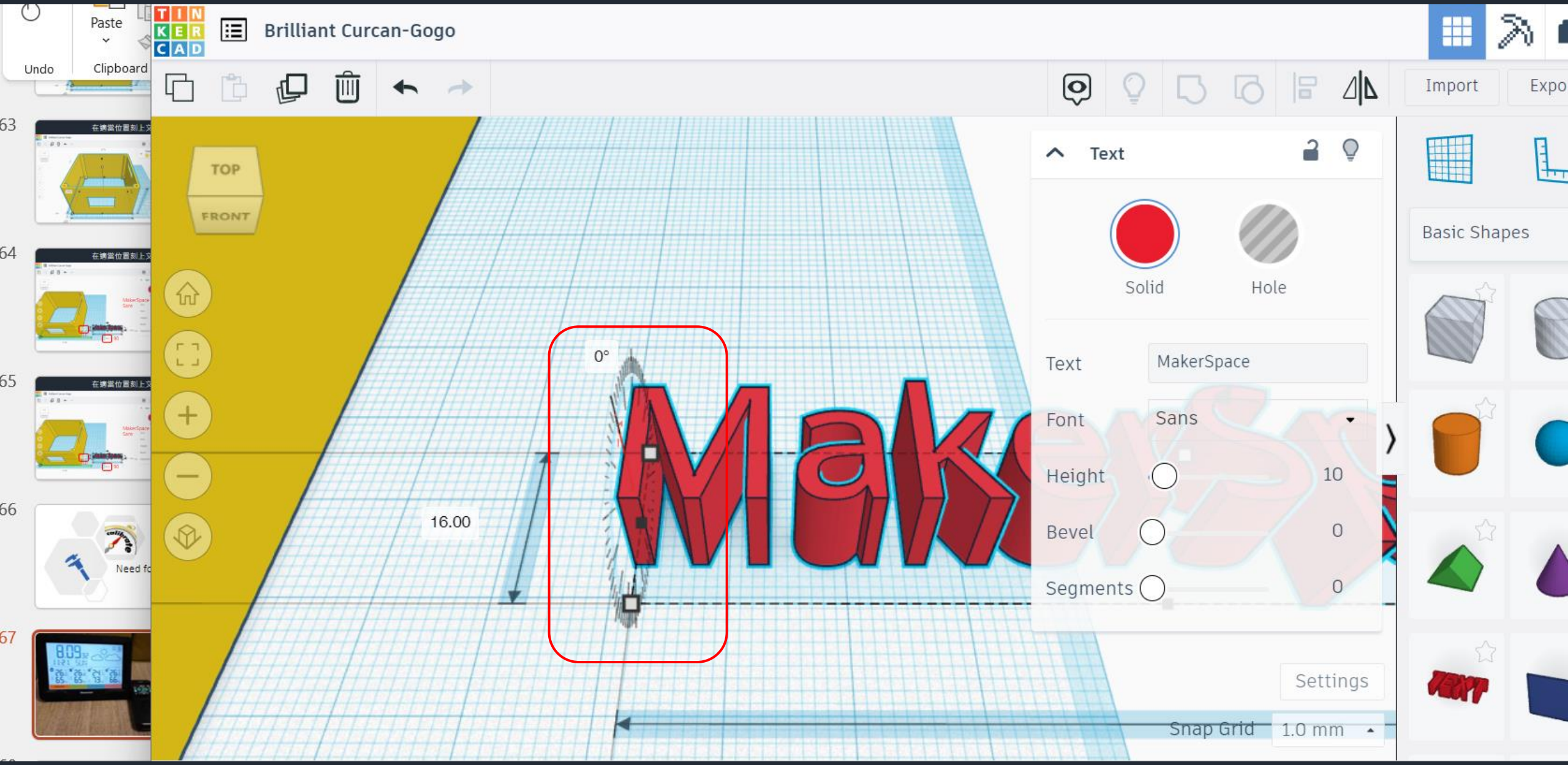
在適當位置刻上文字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Segments
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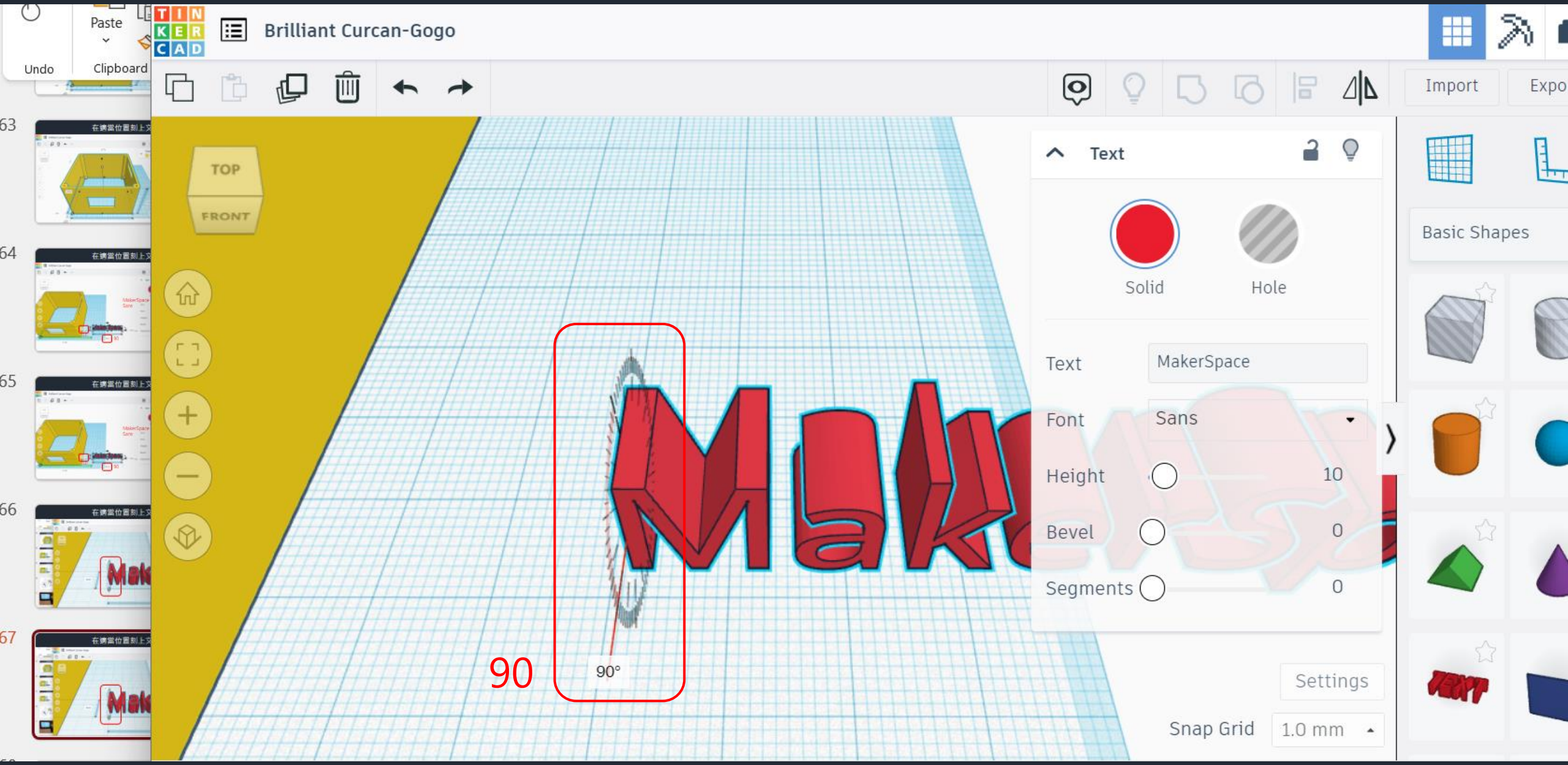
Settings
Snap Grid
1.0 mm
Basic Shapes

在適當位置刻上文字


Undo
Paste
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Brilliant Curcan-Gogo
Import
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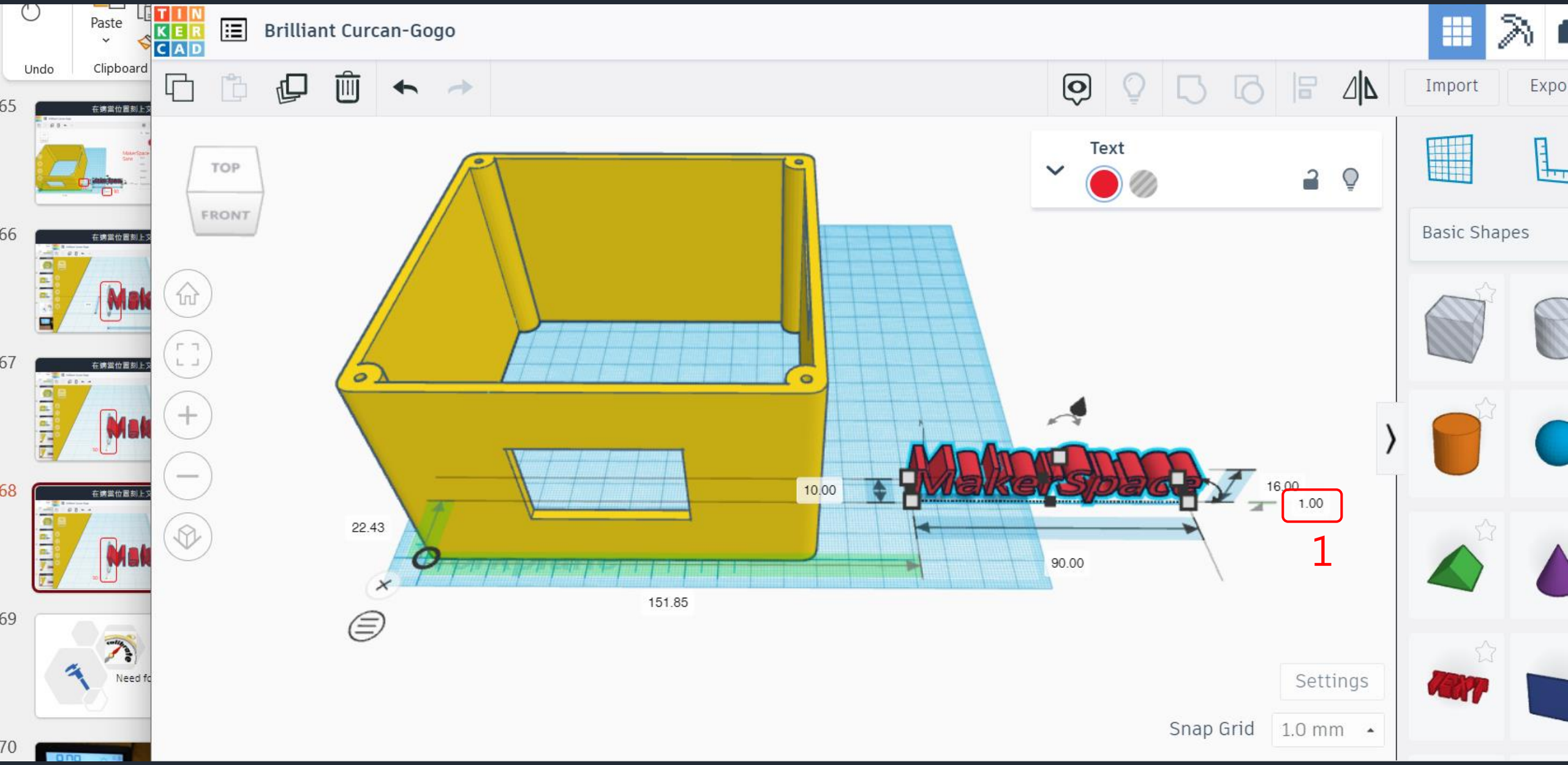
Text
Solid
Hole
Text
MakerSpace
Font
Sans
Height
10
Bevel
0
Segments
0
90
90°
Settings
Snap Grid
1.0 mm
Basic Shapes
63
64
65
66
67

在適當位置刻上文字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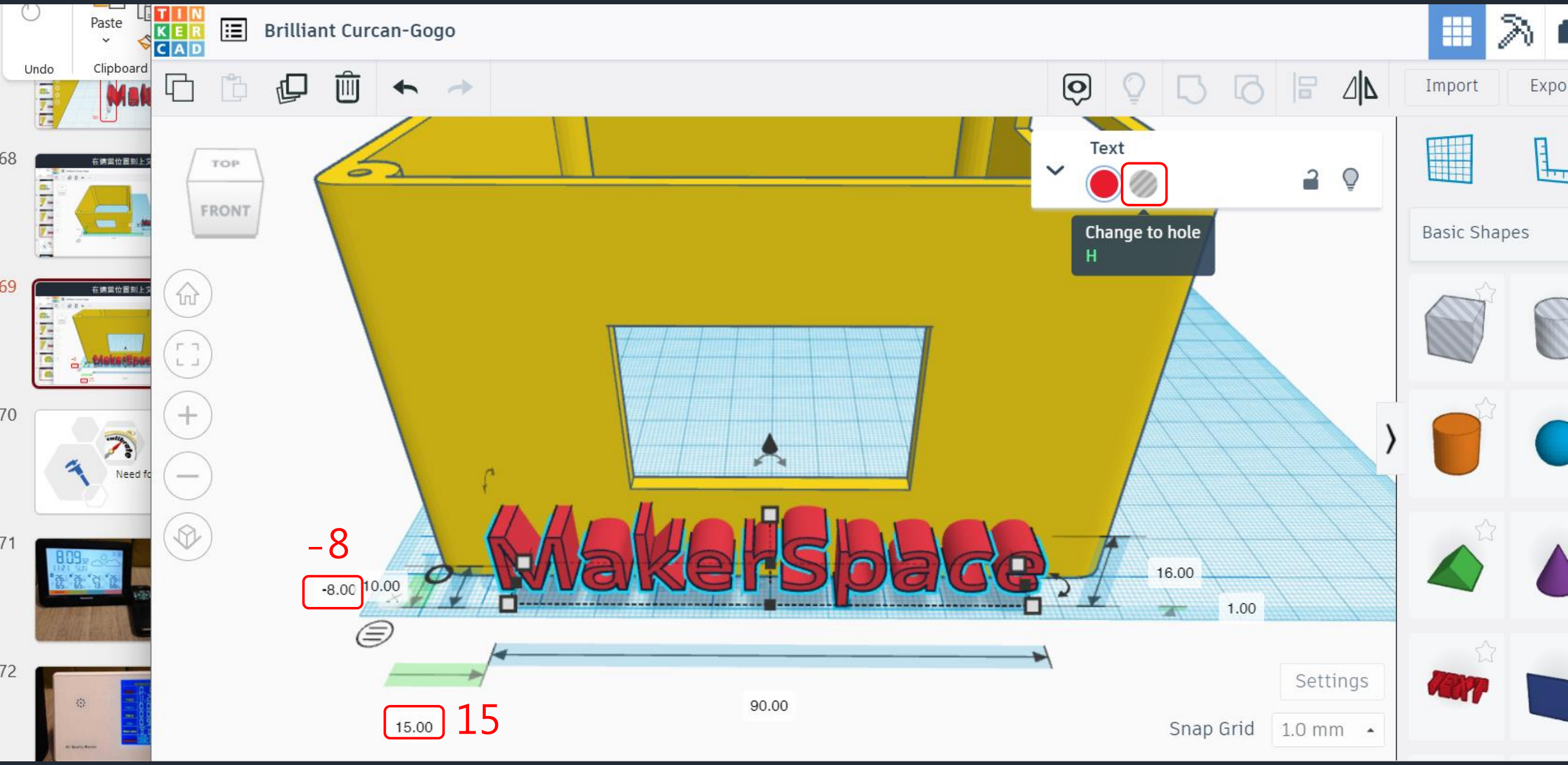
Snap Grid
1.0 mm

在適當位置刻上文字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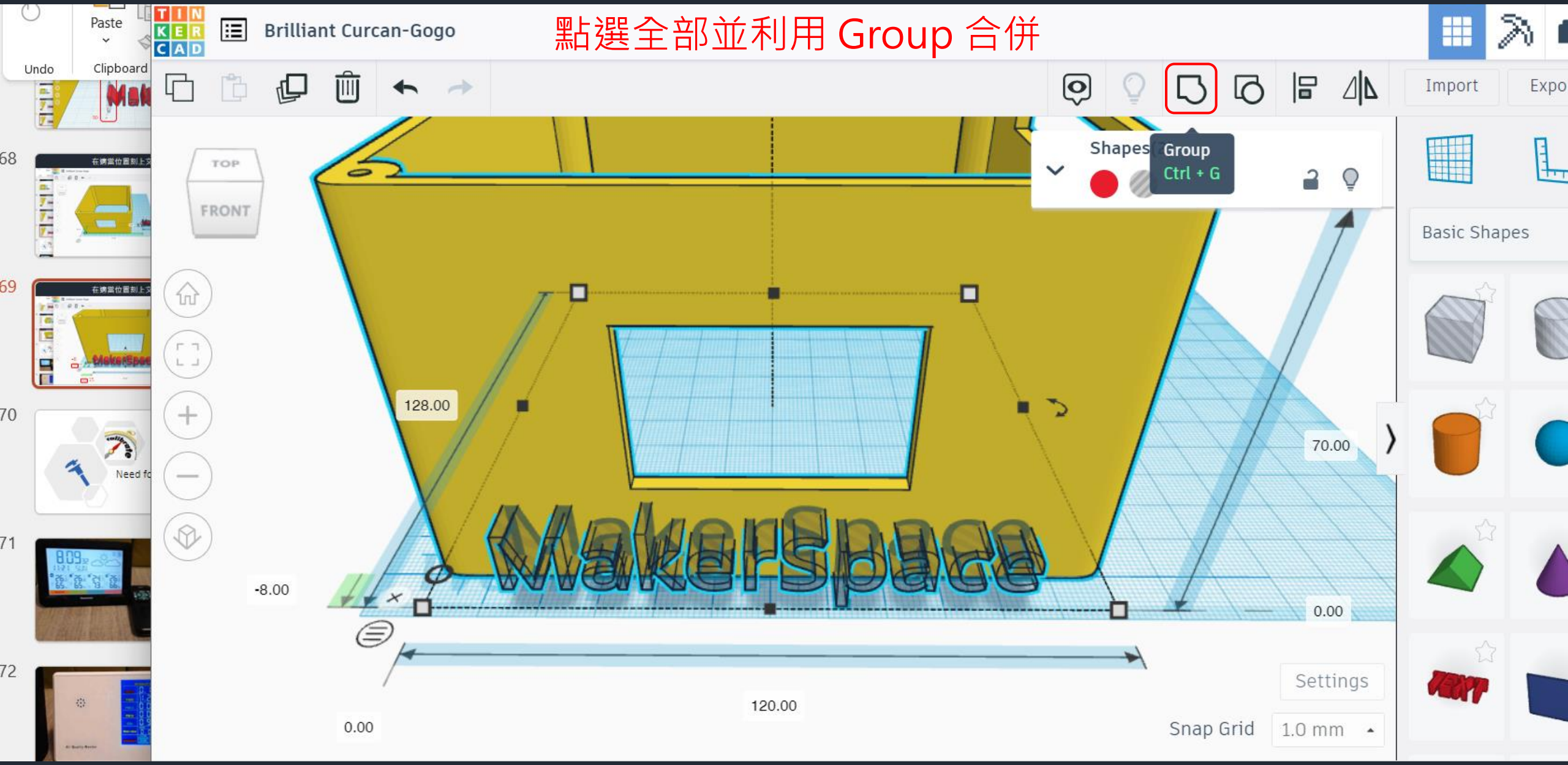
90.00
15.00
15
Settings
Snap Grid
1.0 mm

在適當位置刻上文字


點選全部並利用 Group 合併
Brilliant Curcan-Gogo
Undo
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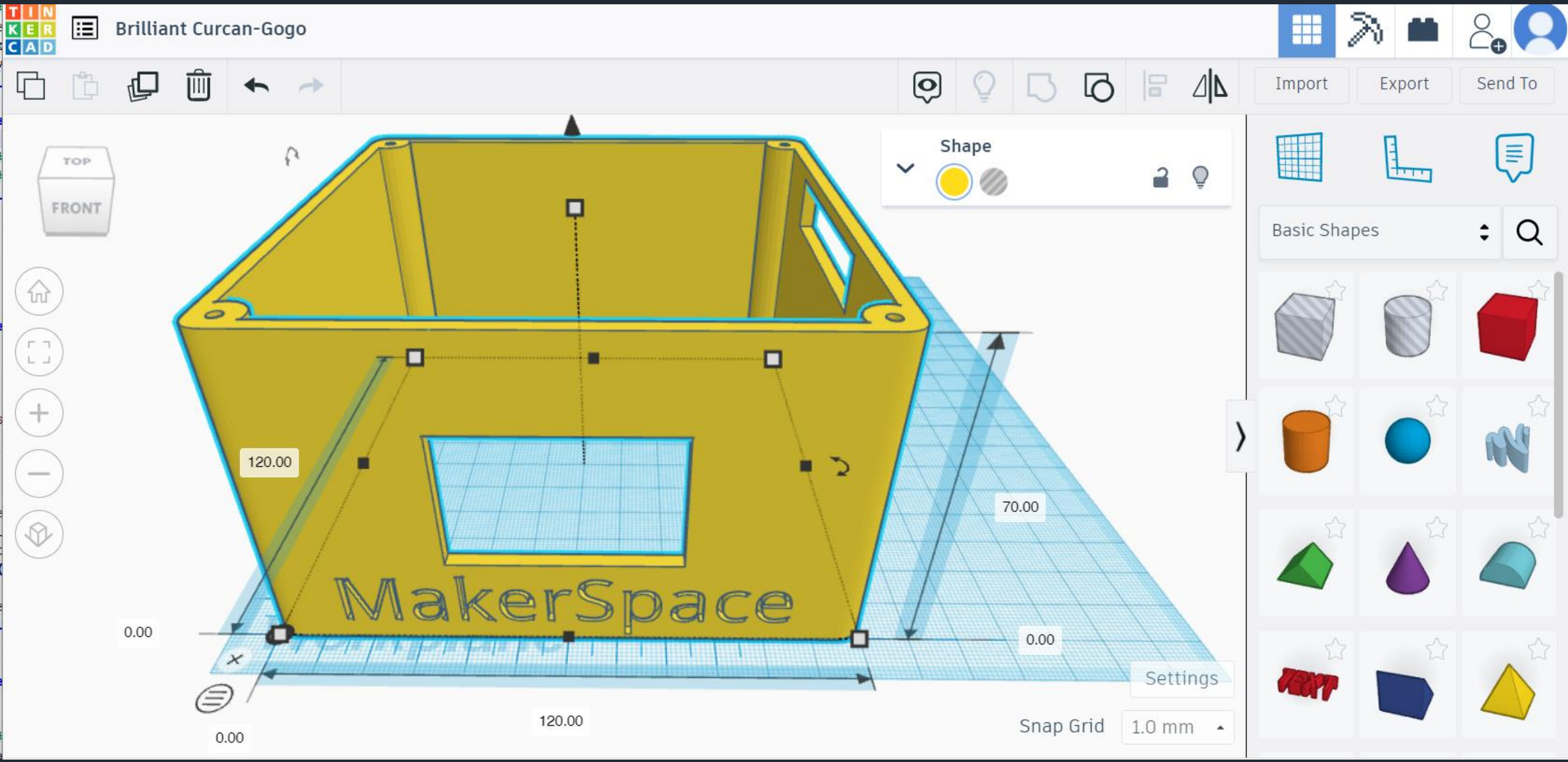
Settings
Snap Grid
1.0 mm

在適當位置刻上文字


Brilliant Curcan-Gogo
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Shape
Basic Shapes
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MakerSpace
0.00
0.00
0.00
120.00
Settings
Snap Grid
1.0 mm

Need for Calibration

AIR QUALITY DETECTOR
HCHO
0.174 mg/m³
TVOC
1.270 mg/m³
PM2.5
0003 ug/m³
PM10
0007 ug/m³
CO2
0948 ppm
HCHO
Mean value
0.054
environment
Air Quality Monitor

AIR QUALITY DETECTOR
HCHO
0.042 mg/m³
TVOC
0.329 mg/m³
PM2.5
0006 ug/m³
PM10
0015 ug/m³
CO2
0851 ppm
PM2.5
Mean value
0006 ug/m³
(1) GOOD
(3)POI IUTE
(5)POI IUTE
enviroment
(4)POI IUTE
(6)POI IUTE
Air Quality Monitor

指數	臭氧，運行8小時平均值 (微克/米^3)	二氧化氮，每小時平均 (微克/米^3)	二氧化硫15分鐘平均值 (微克/米^3)	PM10顆粒，24小時平均值 (微克/米^3)	PM2.5顆粒，24小時平均值 (微克/米^3)
1	0-33	0-67	0-88	0-16	0-11
2	34-66	68-134	89-177	17-33	12-23
3	67-100	135-200	178-266	34-50	24-35
4	101-120	201-267	267-354	51-58	36-41
5	121-140	268-334	355-443	59-66	42-47
6	141-160	335-400	444-532	67-75	48-53
7	161-187	401-467	533-710	76-83	54-58
8	188-213	468-534	711-887	84-91	59-64
9	214-240	535-600	888-1064	92-100	65-70
10	≥ 241	≥ 601	≥ 1065	≥ 101	≥ 71

空氣污染	值	對有危險個人的健康信息	對於一般人群的健康信息
高	7–9	成人和兒童肺部有問題，和成人心臟有問題，應減少劇烈的體力勞動尤其是在戶外，特別是如果他們有症狀。有哮喘的人可能會發現他們需要更頻繁地需要藥物吸入。年紀大的人也應減少體力消耗。	任何人感到不適，如眼痛，咳嗽或喉嚨痛應該考慮減少活動，尤其是在戶外。
非常高	10	成人和兒童肺的問題，有心臟問題的成人，老年人，應避免劇烈的體力活動。有哮喘的人可能會發現他們需要更頻繁地需要藥物吸入。	減少體力消耗，特別是在戶外，尤其是如果你遇到的症狀，如咳嗽或喉嚨

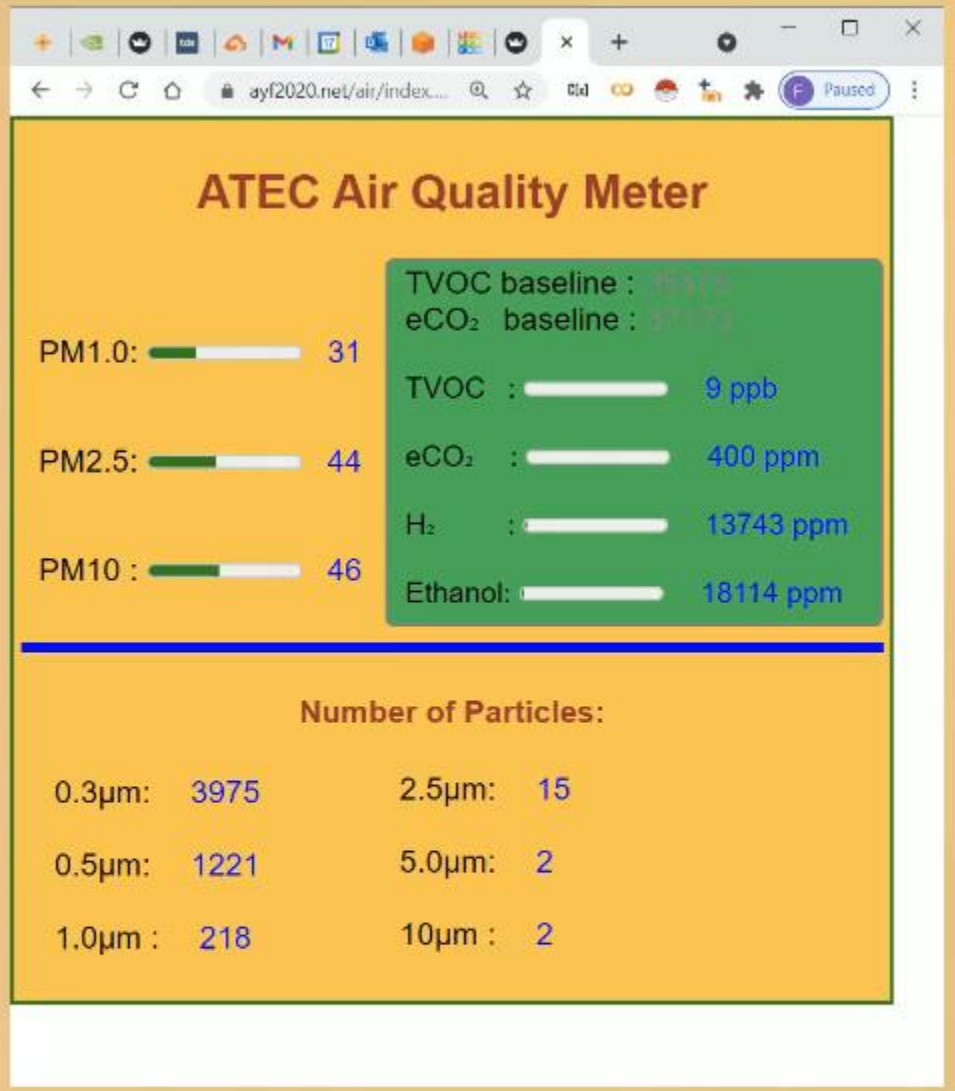
Past 24 Hours Pollutant Concentration Summary

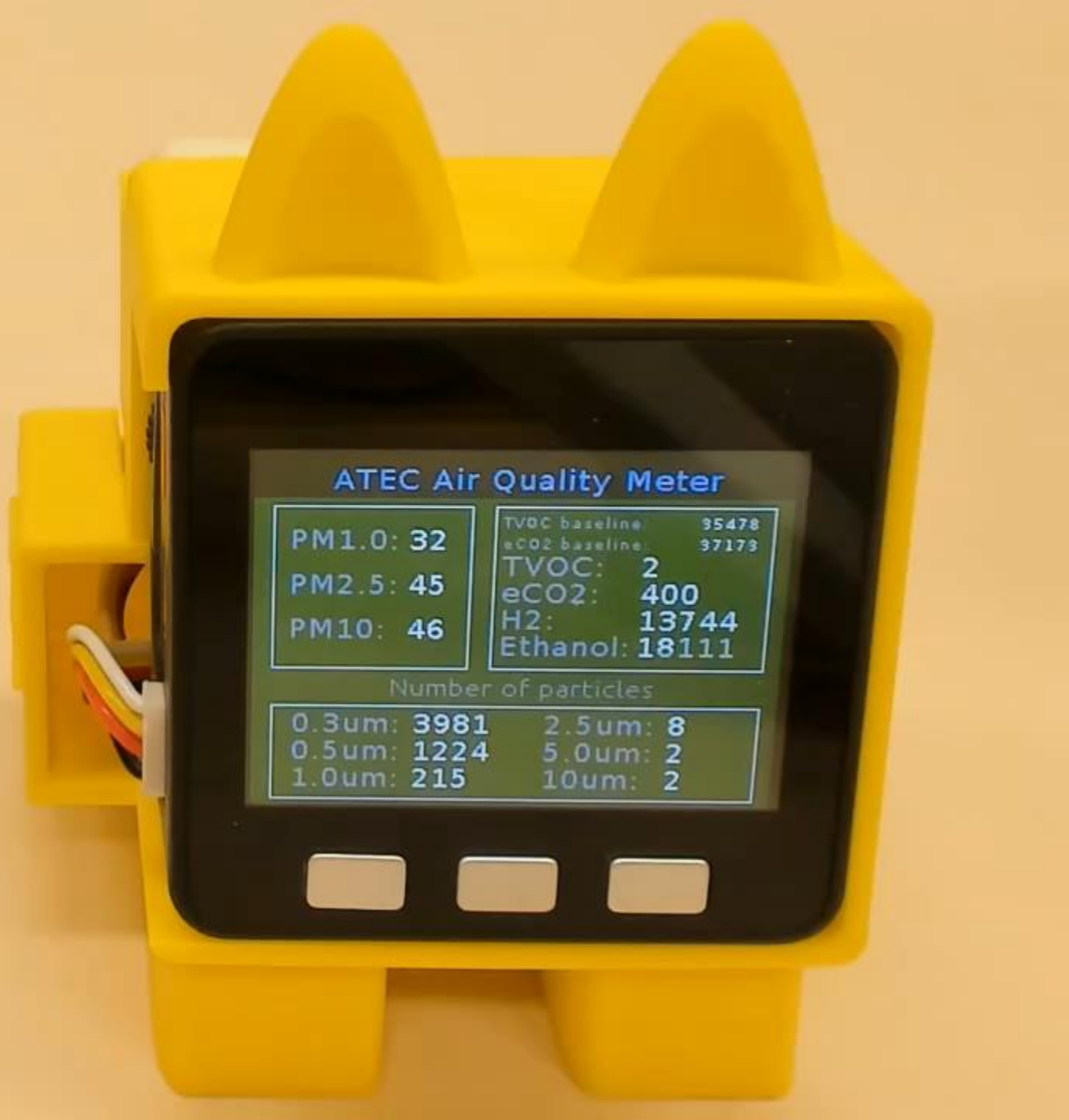
General Stations

- Central/Western
- Southern
- Eastern
- Kwun Tong
- **Sham Shui Po**
- Kwai Chung
- Tsuen Wan
- Tseung Kwan O
- Yuen Long
- Tuen Mun
- Tung Chung
- Tai Po
- Sha Tin
- North
- Tap Mun

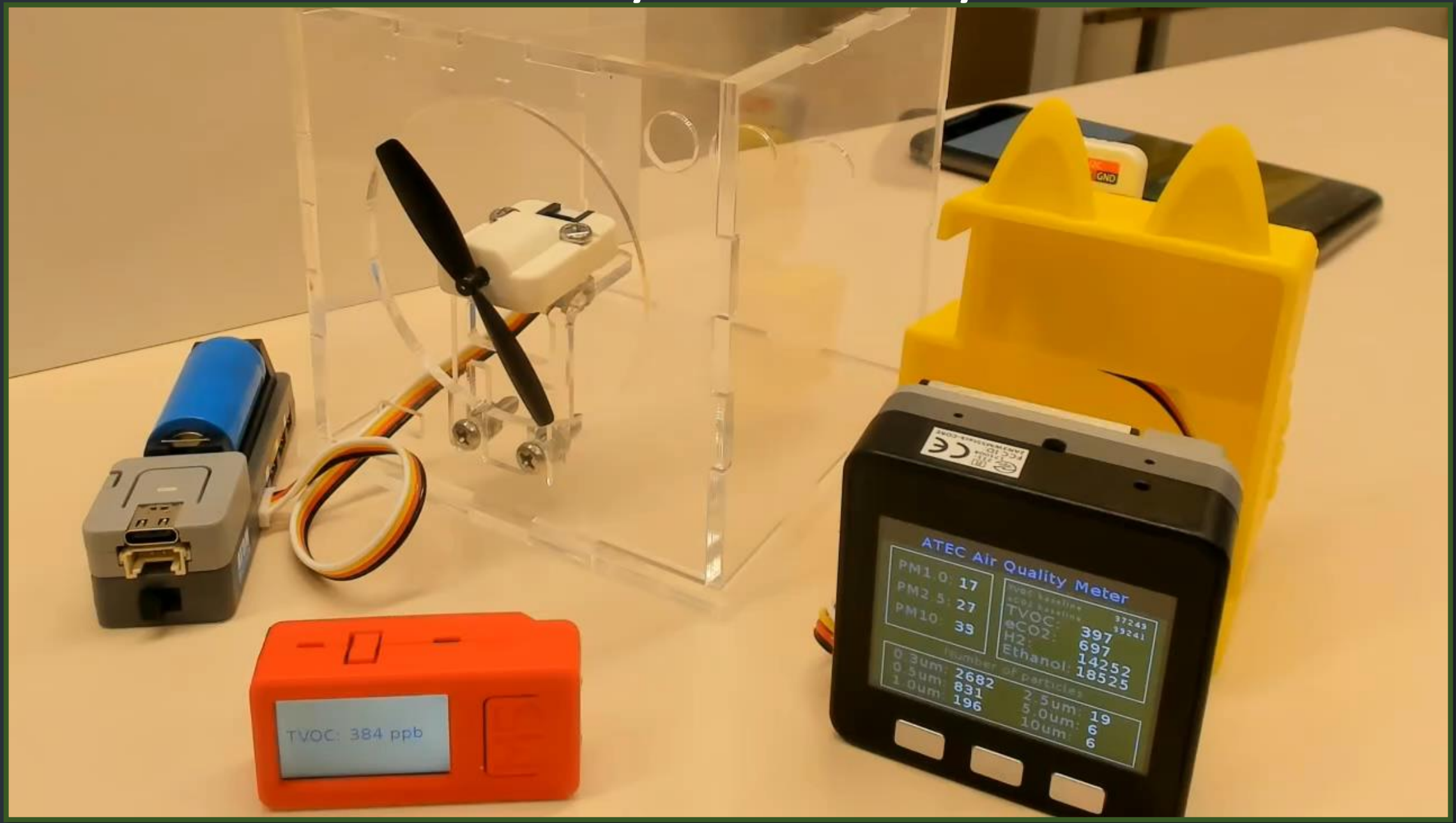
Sham Shui Po

Date Time	NO_2	O_3	SO_2	CO	PM_{10}	$PM_{2.5}$
2021-11-20 21:00	43.1	73.3	2.9	-	28.5	19.4
2021-11-20 20:00	49.9	69.7	3.0	-	31.0	17.9
2021-11-20 19:00	72.5	52.4	3.3	-	36.5	13.4
2021-11-20 18:00	65.1	64.7	3.3	-	35.9	14.9
2021-11-20 17:00	67.2	67.7	3.6	-	33.6	12.7
2021-11-20 16:00	59.8	73.8	3.9	-	40.6	17.3
2021-11-20 15:00	57.5	73.1	3.9	-	40.9	22.0
2021-11-20 14:00	62.8	65.8	3.9	-	32.9	14.2
2021-11-20 13:00	54.9	69.8	4.1	-	28.3	5.1
2021-11-20 12:00	54.7	63.4	4.2	-	26.6	4.6
2021-11-20 11:00	44.0	67.3	4.2	-	22.0	2.2
2021-11-20 10:00	40.5	64.2	3.9	-	19.7	6.0
2021-11-20 09:00	47.2	52.7	3.4	-	16.6	11.9
2021-11-20 08:00	41.2	52.7	2.9	-	17.4	7.0
2021-11-20 07:00	39.8	51.5	2.9	-	16.3	3.5
2021-11-20 06:00	19.7	72.3	2.8	-	16.1	8.1


ayf2020.net/air/index...
Paused
ATEC Air Quality Meter
TVOC baseline :
eCO₂ baseline :
PM1.0: 31
PM2.5: 44
PM10 : 46
TVOC : 9 ppb
eCO₂ : 400 ppm
H₂ : 13743 ppm
Ethanol: 18114 ppm
Number of Particles:
0.3µm: 3975
0.5µm: 1221
1.0µm : 218
2.5µm: 15
5.0µm: 2
10µm : 2

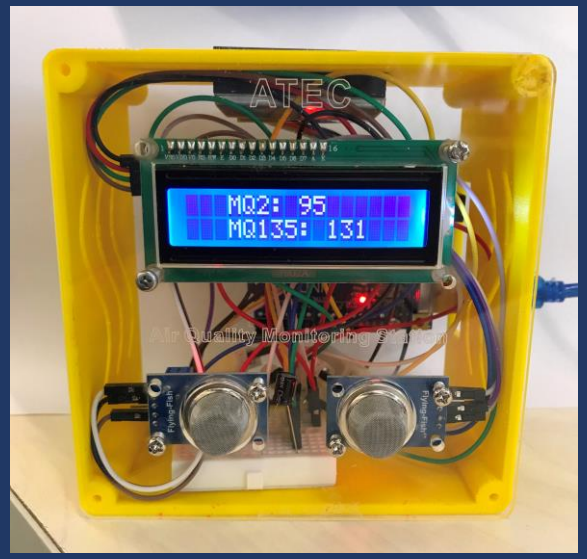

ATEC Air Quality Meter
PM1.0: 32
PM2.5: 45
PM10: 46
TVOC baseline 35478
eCO2 baseline 37173
TVOC: 2
eCO2: 400
H2: 13744
Ethanol: 18111
Number of particles
0.3um: 3981
0.5um: 1224
1.0um: 215
2.5um: 8
5.0um: 2
10um: 2

Air Quality Control System

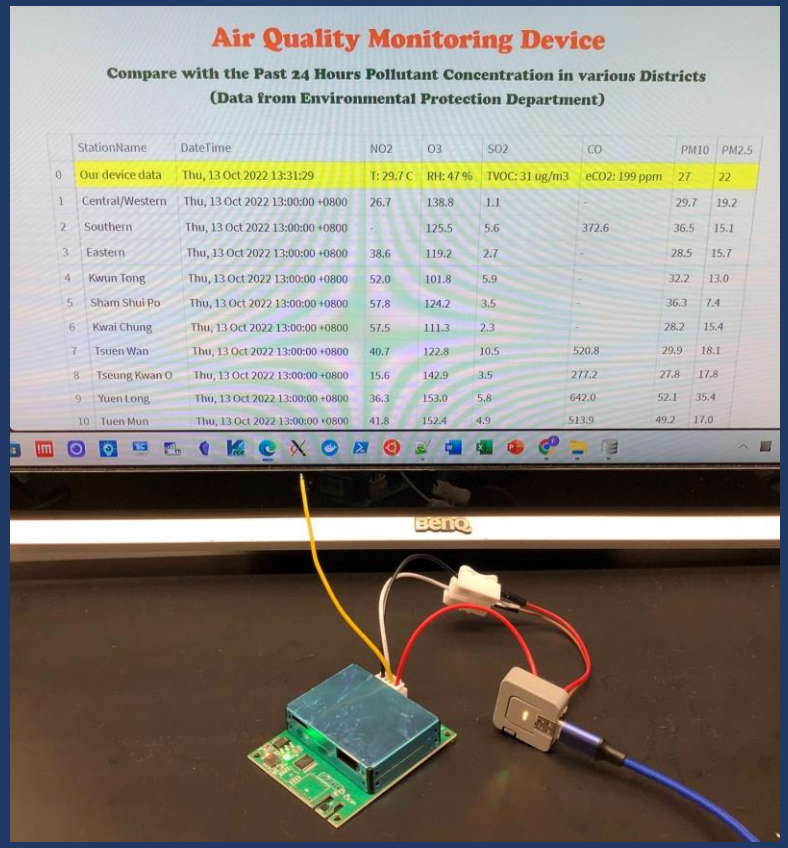


製作空氣質素監察裝置工作坊

參加者可於兩節工作坊中完成裝嵌以下監察裝置，當中包括電子元件與控制板的接線及裝置箱的繪製，並即場利用鐳射切割機製作自行設計的裝置箱面板。
(兩節均有出席的參加者可於第二節完結時取走此裝置)



參加者亦可同時淺嘗另一功能設計較全面裝置的接駁及測試



	StationName	DateTime	NO2	O3	SO2	CO	PM10	PM2.5
0	Our device data	Thu, 13 Oct 2022 13:31:29	T: 29.7 C	RH: 47 %	TVOC: 31 ug/m3	eCO2: 199 ppm	27	22
1	Central/Western	Thu, 13 Oct 2022 13:00:00 +0800	26.7	138.8	1.1	-	29.7	19.2
2	Southern	Thu, 13 Oct 2022 13:00:00 +0800	-	125.5	5.6	372.6	36.5	15.1
3	Eastern	Thu, 13 Oct 2022 13:00:00 +0800	38.6	119.2	2.7	-	28.5	15.7
4	Kwun Tong	Thu, 13 Oct 2022 13:00:00 +0800	52.0	101.8	5.9	-	32.2	13.0
5	Sham Shui Po	Thu, 13 Oct 2022 13:00:00 +0800	57.8	124.2	3.5	-	36.3	7.4
6	Kwai Chung	Thu, 13 Oct 2022 13:00:00 +0800	57.5	111.3	2.3	-	28.2	15.4
7	Tsuen Wan	Thu, 13 Oct 2022 13:00:00 +0800	40.7	122.8	10.5	520.8	29.9	18.1
8	Tseung Kwan O	Thu, 13 Oct 2022 13:00:00 +0800	15.6	142.9	3.5	277.2	27.8	17.8
9	Yuen Long	Thu, 13 Oct 2022 13:00:00 +0800	36.3	153.0	5.8	642.0	52.1	35.4
10	Tuen Mun	Thu, 13 Oct 2022 13:00:00 +0800	41.8	152.4	4.9	513.9	49.2	17.0

Air Quality Monitoring Device

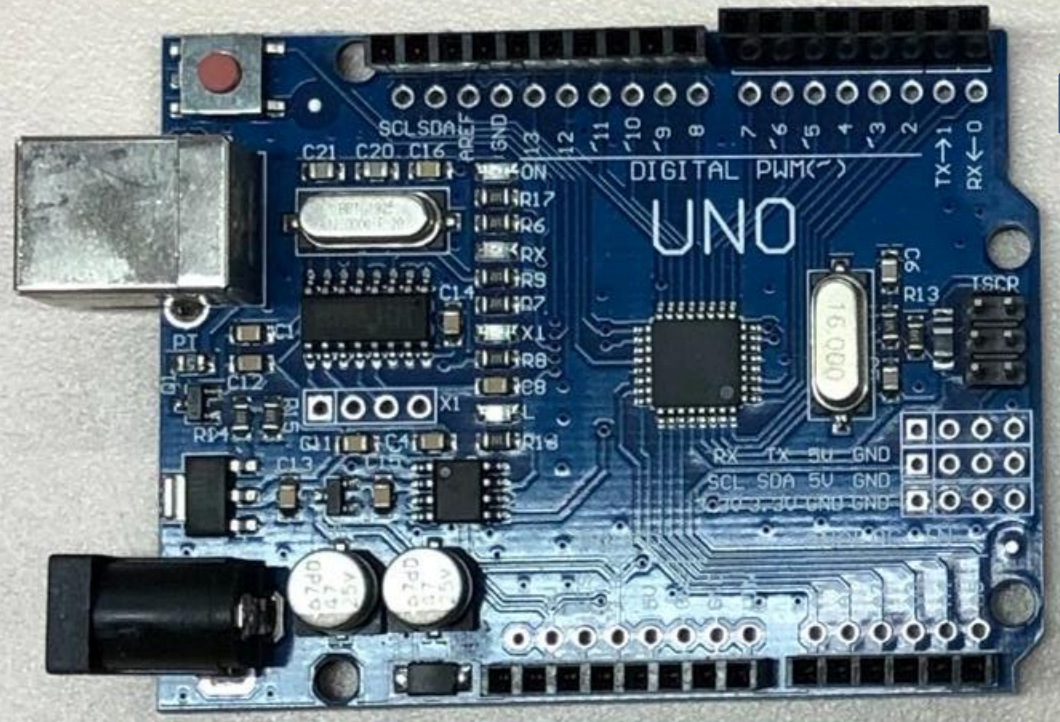
Science	✓	Technology	✓	Engineering	✓	Art	✓	Mathematics	✓

Air Quality Monitoring Device

Compare with the Past 24 Hours Pollutant Concentration in various Districts
(Data from Environmental Protection Department)

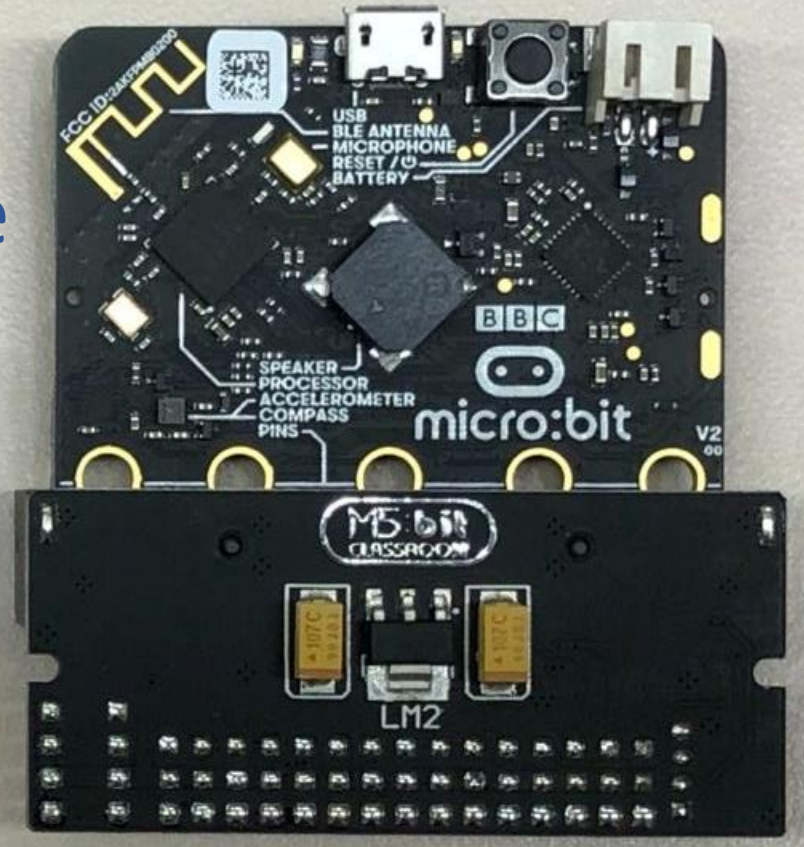
	StationName	DateTime	NO2	O3	SO2	CO	PM10	PM2.5
0	Our device data	Sun, 18 Sep 2022 16:22:48	T: 28.2 C	RH: 56 %	TVOC: 15 ug/m3	eCO2: 171 ppm	43	35
1	Central/Western	Sun, 18 Sep 2022 15:00:00 +0800	14.3	191.4	5.8	-	45.7	37.1
2	Southern	Sun, 18 Sep 2022 15:00:00 +0800	32.2	134.6	6.7	437.5	40.8	34.0
3	Eastern	Sun, 18 Sep 2022 15:00:00 +0800	25.3	172.9	6.9	-	41.3	31.8
4	Kwun Tong	Sun, 18 Sep 2022 15:00:00 +0800	61.2	142.4	8.0	-	46.8	31.1
5	Sham Shui Po	Sun, 18 Sep 2022 15:00:00 +0800	24.7	178.0	5.2	-	46.6	27.8
6	Kwai Chung	Sun, 18 Sep 2022 15:00:00 +0800	62.9	116.4	8.5	-	50.3	40.1
7	Tsuen Wan	Sun, 18 Sep 2022 15:00:00 +0800	48.0	152.5	11.0	985.5	50.6	41.8
8	Tseung Kwan O	Sun, 18 Sep 2022 15:00:00 +0800	27.3	178.0	6.4	635.9	53.5	42.2
9	Yuen Long	Sun, 18 Sep 2022 15:00:00 +0800	17.2	220.8	4.1	829.5	57.6	37.8
10	Tuen Mun	Sun, 18 Sep 2022 15:00:00 +0800	29.0	183.1	9.0	711.0	59.3	42.1
11	Tung Chung	Sun, 18 Sep 2022 15:00:00 +0800	25.3	164.7	6.3	693.6	42.2	32.1
12	Tai Po	Sun, 18 Sep 2022 15:00:00 +0800	16.3	172.3	2.5	-	42.9	32.5

Development of new hardware ➔ Opportunities for innovation



Arduino (Uno)

M5 Atom Lite



Micro:bit

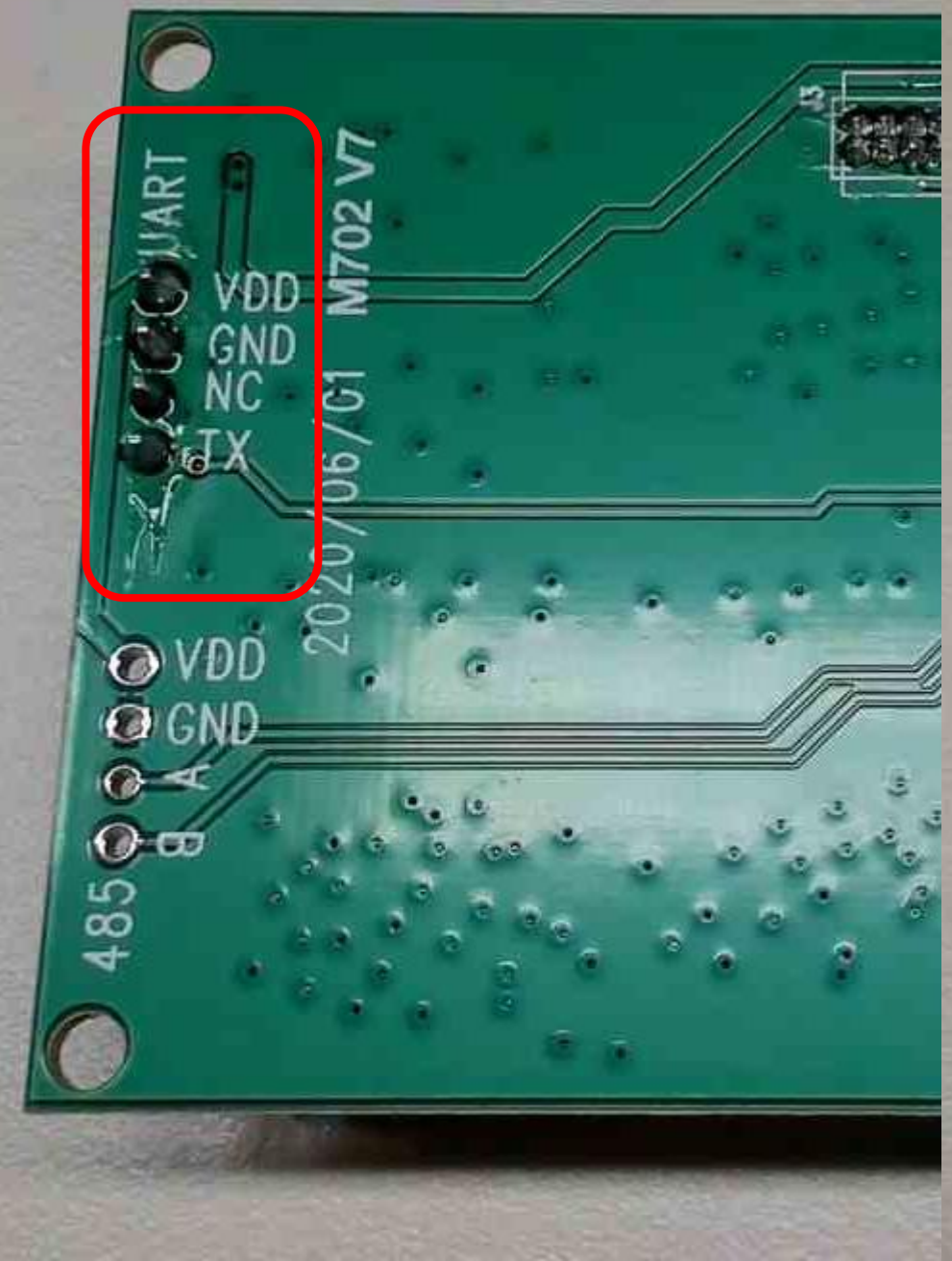
ATOM
LITE

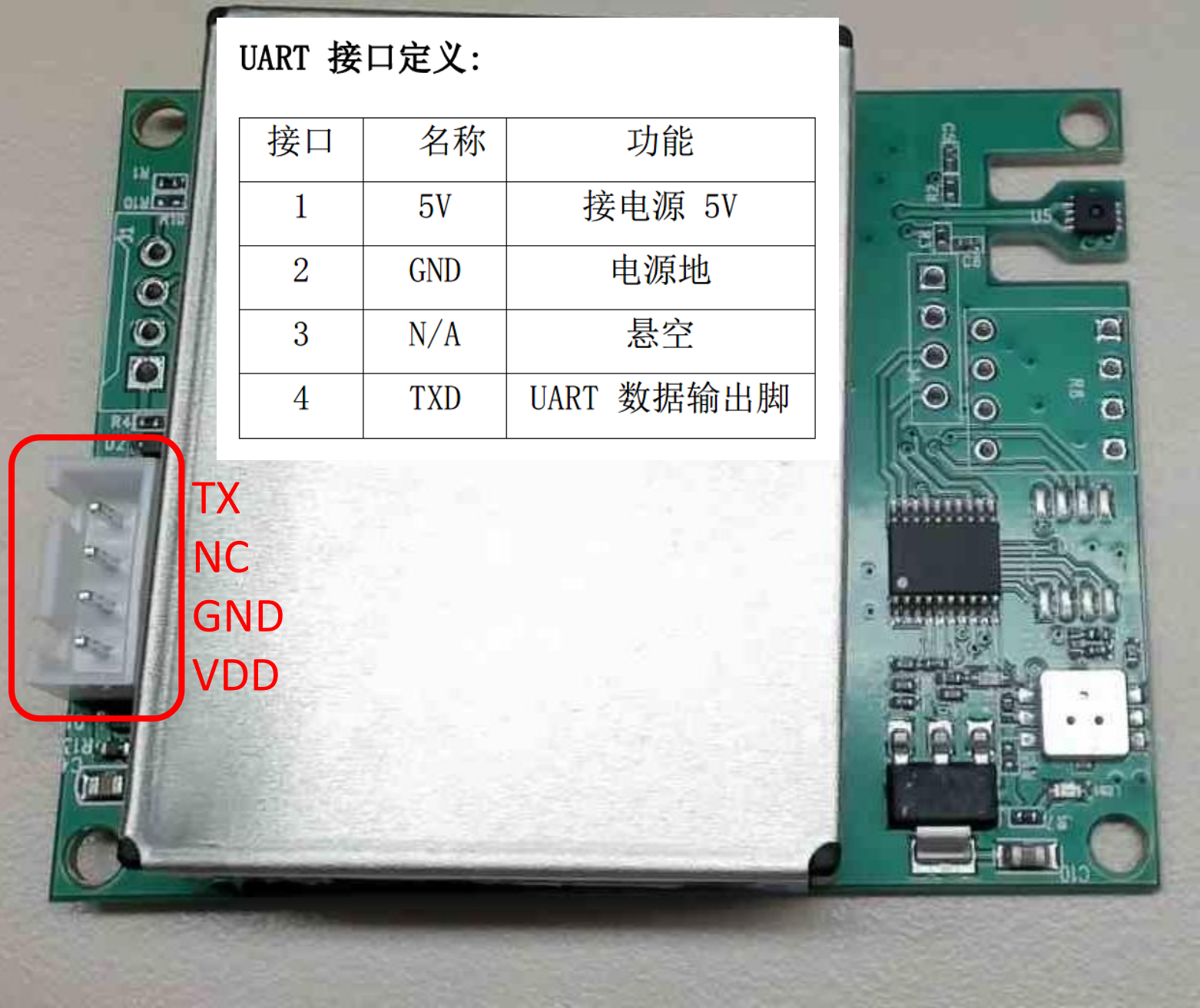
7合1空氣質量傳感器

M702B

M702

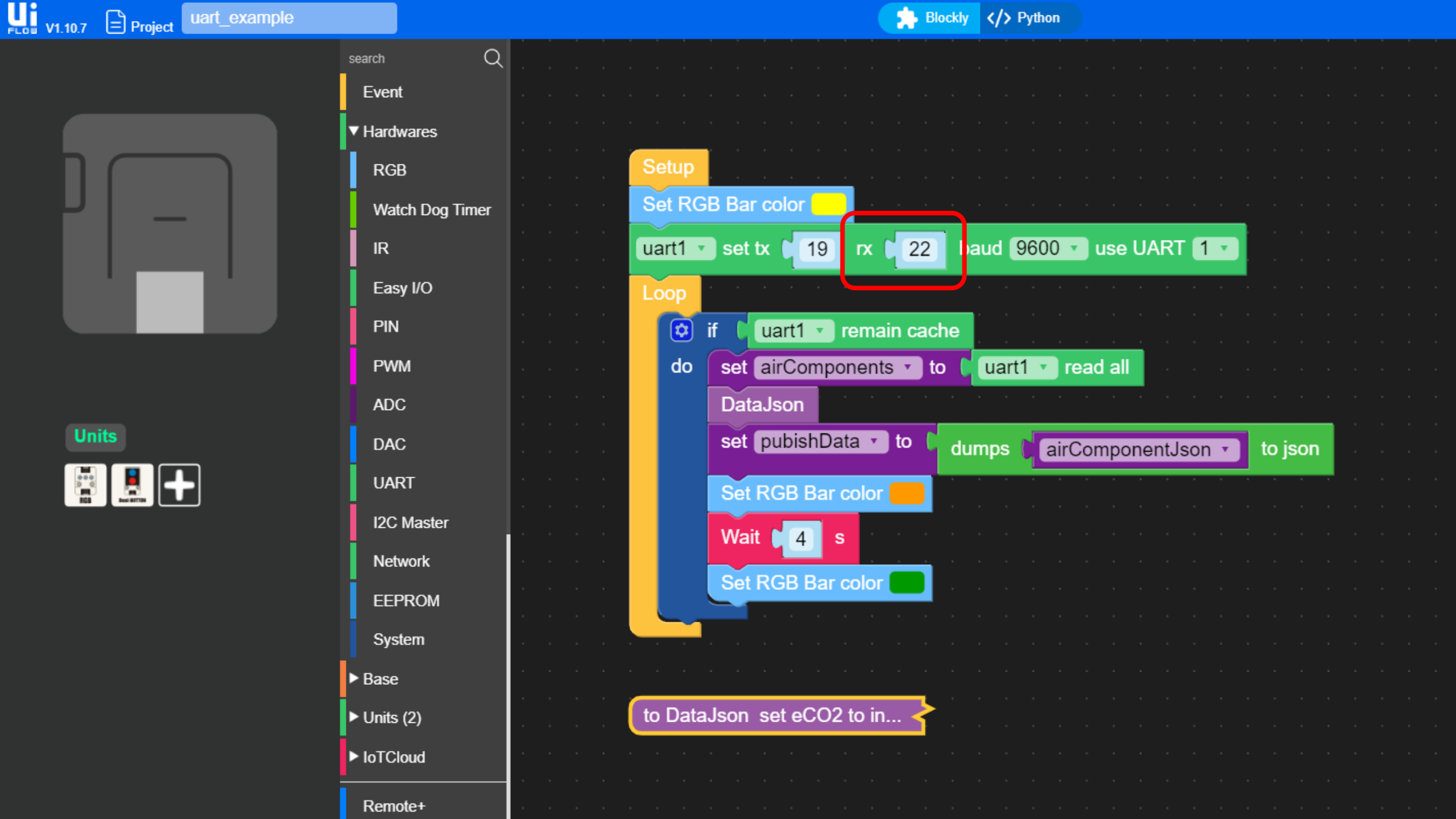
Universal Asynchronous Receiver Transmitter (UART) 通用非同步收發傳輸器



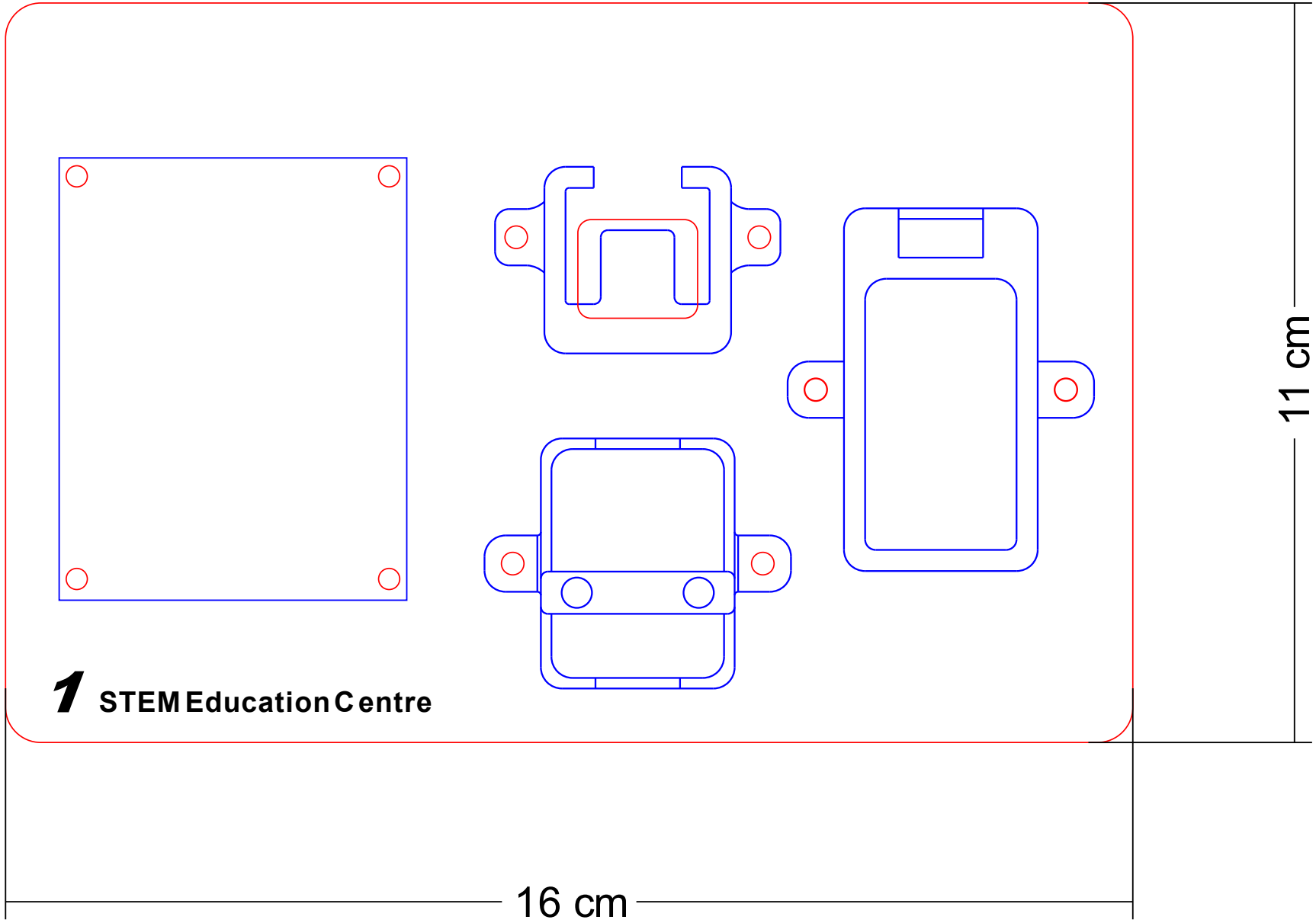


UART 接口定义:

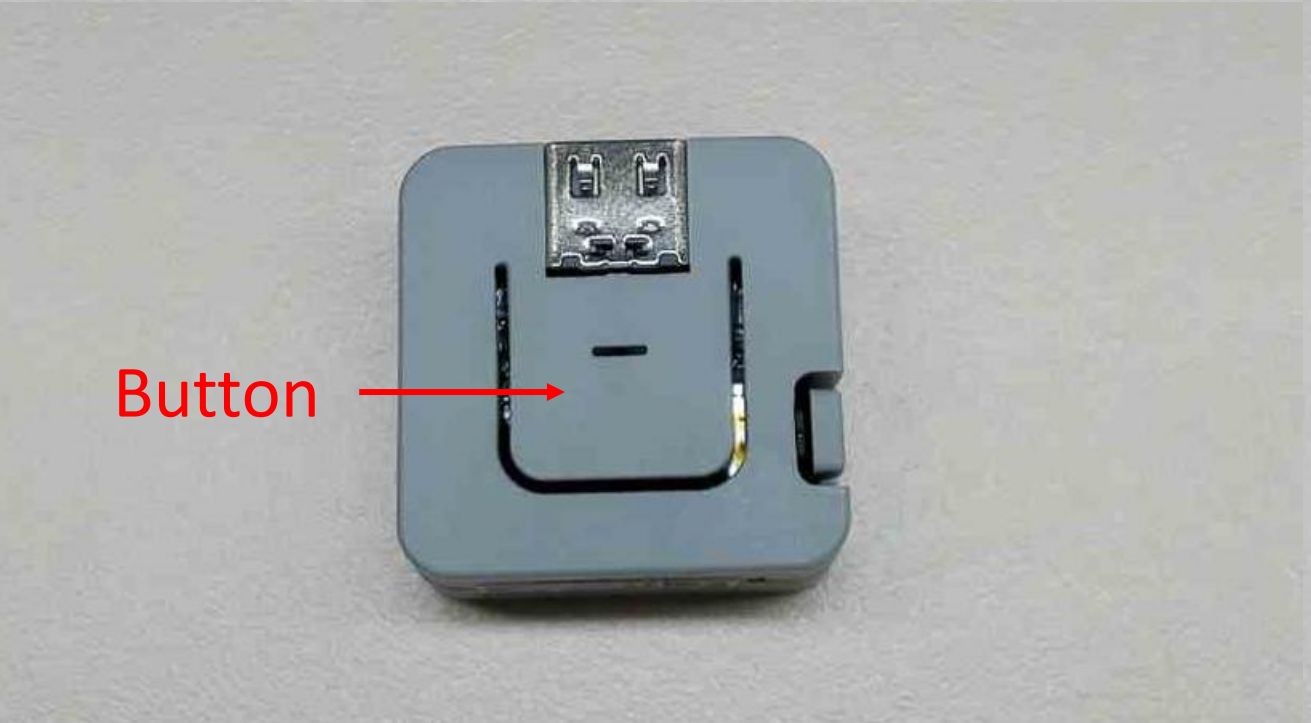
接口	名称	功能
1	5V	接电源 5V
2	GND	电源地
3	N/A	悬空
4	TXD	UART 数据输出脚


V1.10.7
Project
uart_example
Blockly
Python
search
Event
Hardwares
RGB
Watch Dog Timer
IR
Easy I/O
PIN
PWM
ADC
DAC
UART
I2C Master
Network
EEPROM
System
Base
Units (2)
IoTCloud
Remote+
Units
Setup
Set RGB Bar color
uart1 set tx 19 rx 22 baud 9600 use UART 1
Loop
if uart1 remain cache
do
set airComponents to uart1 read all
DataJson
set pubishData to dumps airComponentJson to json
Set RGB Bar color
Wait 4 s
Set RGB Bar color
to DataJson set eCO2 to in...

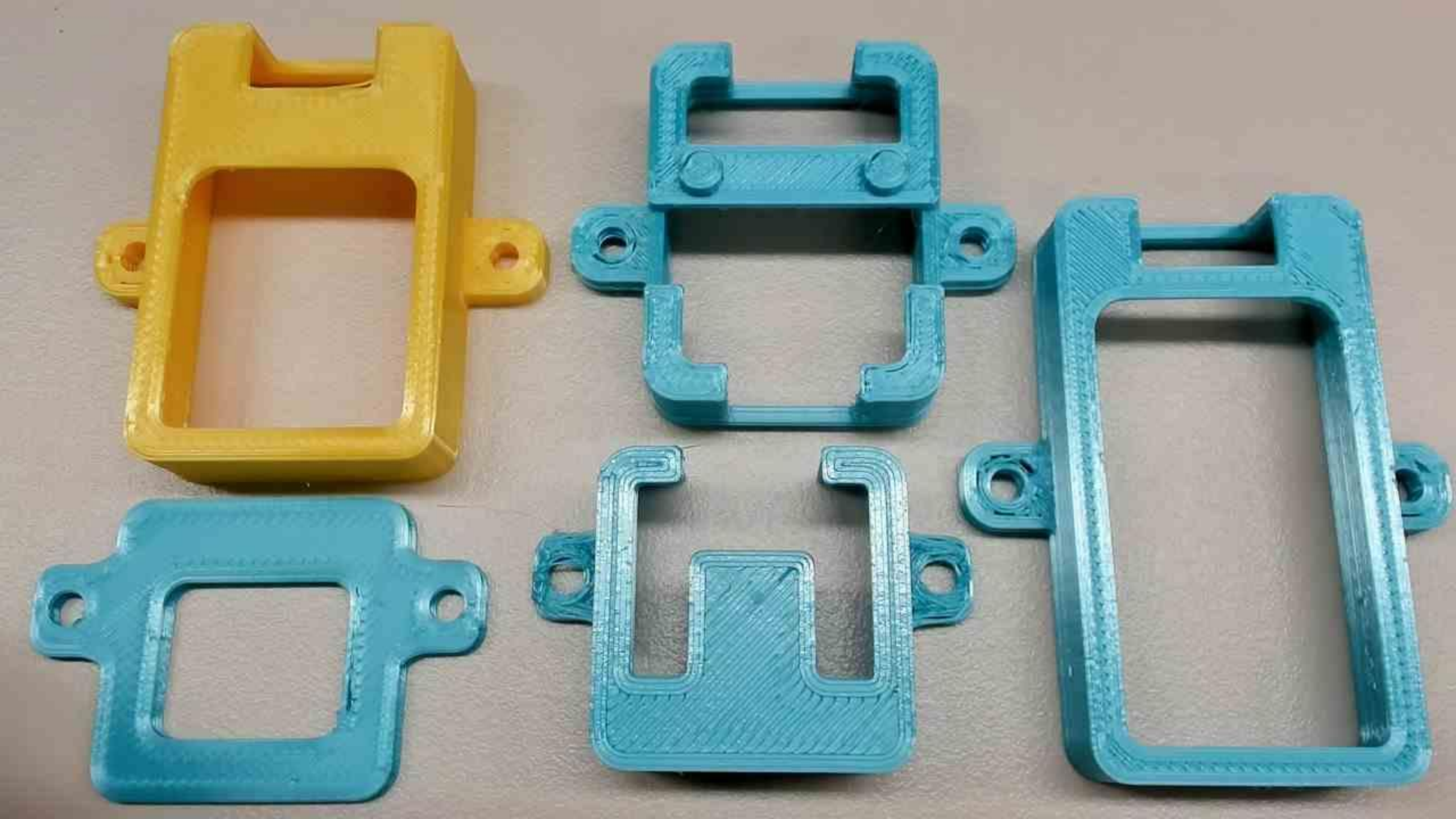
ATOM
LITE
IR
G12
3V3
ESP32
PICO
BPS:
1200-
RST
G22
Neo=G27
Btn=G39
G21
G19
M2
HOLE
G25
G23
5V
G33
G
5V
G26
G32
G


1 STEM Education Centre
11 cm
16 cm

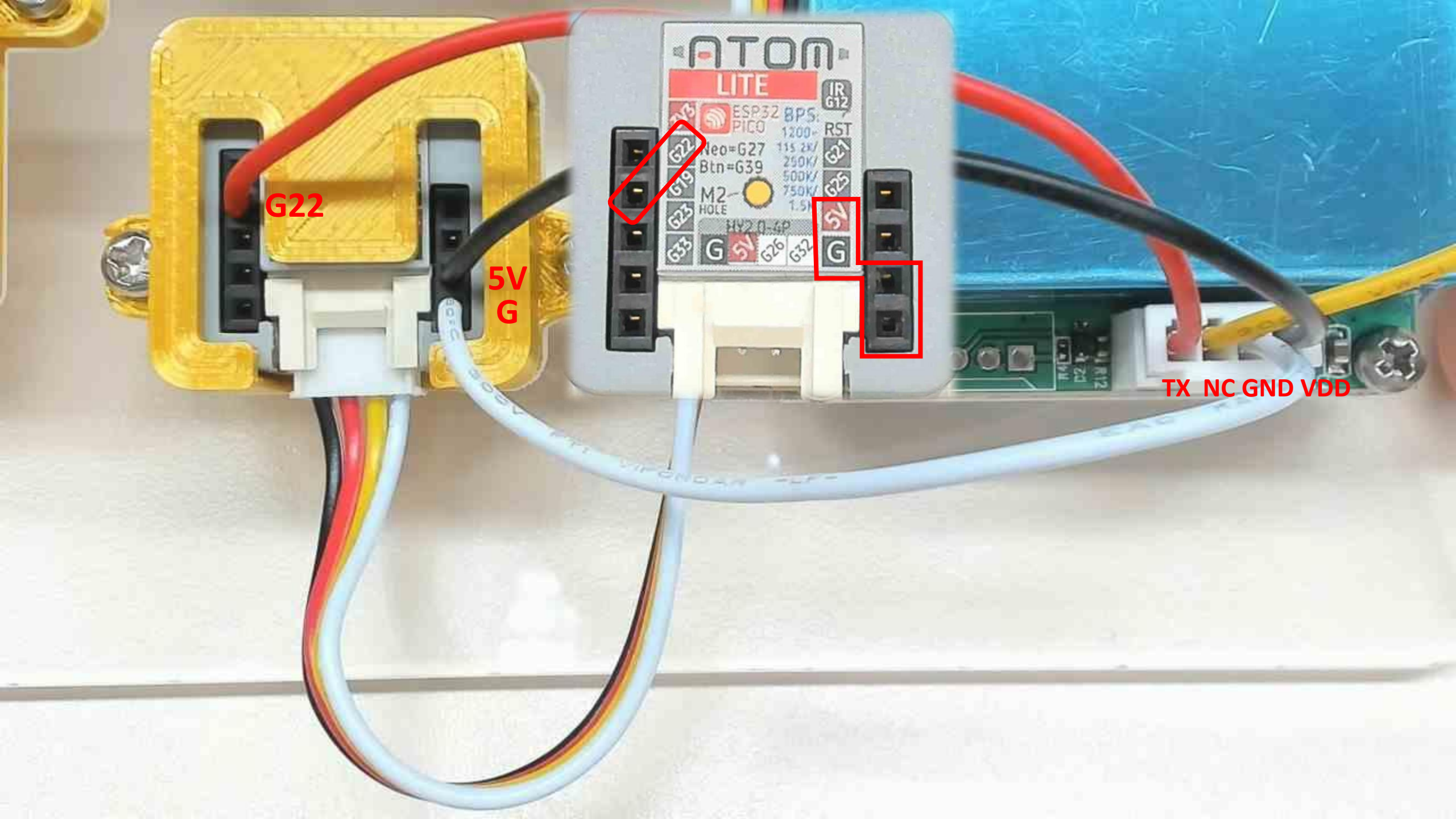
ATOM
LITE
Neo=G27
Btn=G39
M2
G
5V
G


Button

GND 5V G26 G32
Connector
Grove
USB-C



Air Quality Monitoring System


G22
5V
G
ATOM
LITE
ESP32
PICO
Neo=G27
Btn=G39
M2
HOLE
HY2.0-4P
TX NC GND VDD

STEM Education Centre

Select Device:

Data from:

- Device0
- Device1
- Device2
- Device3
- Device4
- Device5
- Device6
- Device7
- Device8
- Device9
- Device10
- Device11
- Device12
- Device13
- Device14
- Device15
- Device16
- Device17
- Device18
- Device19
- Device20
- Device21
- Device22
- Device23
- Device24
- Device25

Receiving data from Device0 !

Air Quality Monitoring Device

Compare with the Past 24 Hours Pollutant Concentration in various Districts

(Data from Environmental Protection Department)

	StationName	DateTime	NO2	O3	SO2	CO	PM10	PM2.5
0	Data from Device0	Fri, 11 Nov 2022 10:11:35	T: 23.3 C	RH: 66 %	TVOC: 15 ug/m3	eCO2: 171 ppm	12	10
1	Central/Western	Fri, 11 Nov 2022 09:00:00 +0800	29.1	40.3	3.3	-	9.1	6.1
2	Southern	Fri, 11 Nov 2022 09:00:00 +0800	16.8	50.4	3.2	288.4	12.3	10.5
3	Eastern	Fri, 11 Nov 2022 09:00:00 +0800	42.2	40.5	0.7	-	9.9	6.3
4	Kwun Tong	Fri, 11 Nov 2022 09:00:00 +0800	26.3	34.3	4.5	-	10.7	8.6
5	Sham Shui Po	Fri, 11 Nov 2022 09:00:00 +0800	42.8	31.1	2.8	-	23.6	10.7
6	Kwai Chung	Fri, 11 Nov 2022 09:00:00 +0800	28.4	29.5	1.2	-	12.2	8.8
7	Tsuen Wan	Fri, 11 Nov 2022 09:00:00 +0800	41.6	25.7	9.0	523.6	16.2	13.8
8	Tseung Kwan O	Fri, 11 Nov 2022 09:00:00 +0800	13.4	47.8	0.2	194.0	13.8	7.0
9	Yuen Long	Fri, 11 Nov 2022 09:00:00 +0800	39.2	37.2	3.1	607.3	19.9	11.1
10	Tuen Mun	Fri, 11 Nov 2022 09:00:00 +0800	42.6	32.1	4.6	635.7	26.9	14.0
11	Tung Chung	Fri, 11 Nov 2022 09:00:00 +0800	14.4	44.6	5.6	114.1	10.0	5.7
12	Tai Po	Fri, 11 Nov 2022 09:00:00 +0800	29.9	40.7	1.6	-	13.7	9.4
13	Sha Tin	Fri, 11 Nov 2022 09:00:00 +0800	14.8	50.5	5.8	-	8.3	4.8
14	North	Fri, 11 Nov 2022 09:00:00 +0800	35.1	34.1	2.1	95.6	11.8	7.3
15	Tap Mun	Fri, 11 Nov 2022 09:00:00 +0800	4.5	55.9	10.1	181.5	13.2	4.5
16	Causeway Bay	Fri, 11 Nov 2022 09:00:00 +0800	68.5	9.8	4.9	478.5	25.9	17.0
17	Central	Fri, 11 Nov 2022 09:00:00 +0800	46.5	24.6	2.8	800.2	11.8	7.2
18	Mong Kok	Fri, 11 Nov 2022 09:00:00 +0800	57.8	24.7	0.6	326.4	13.9	9.4