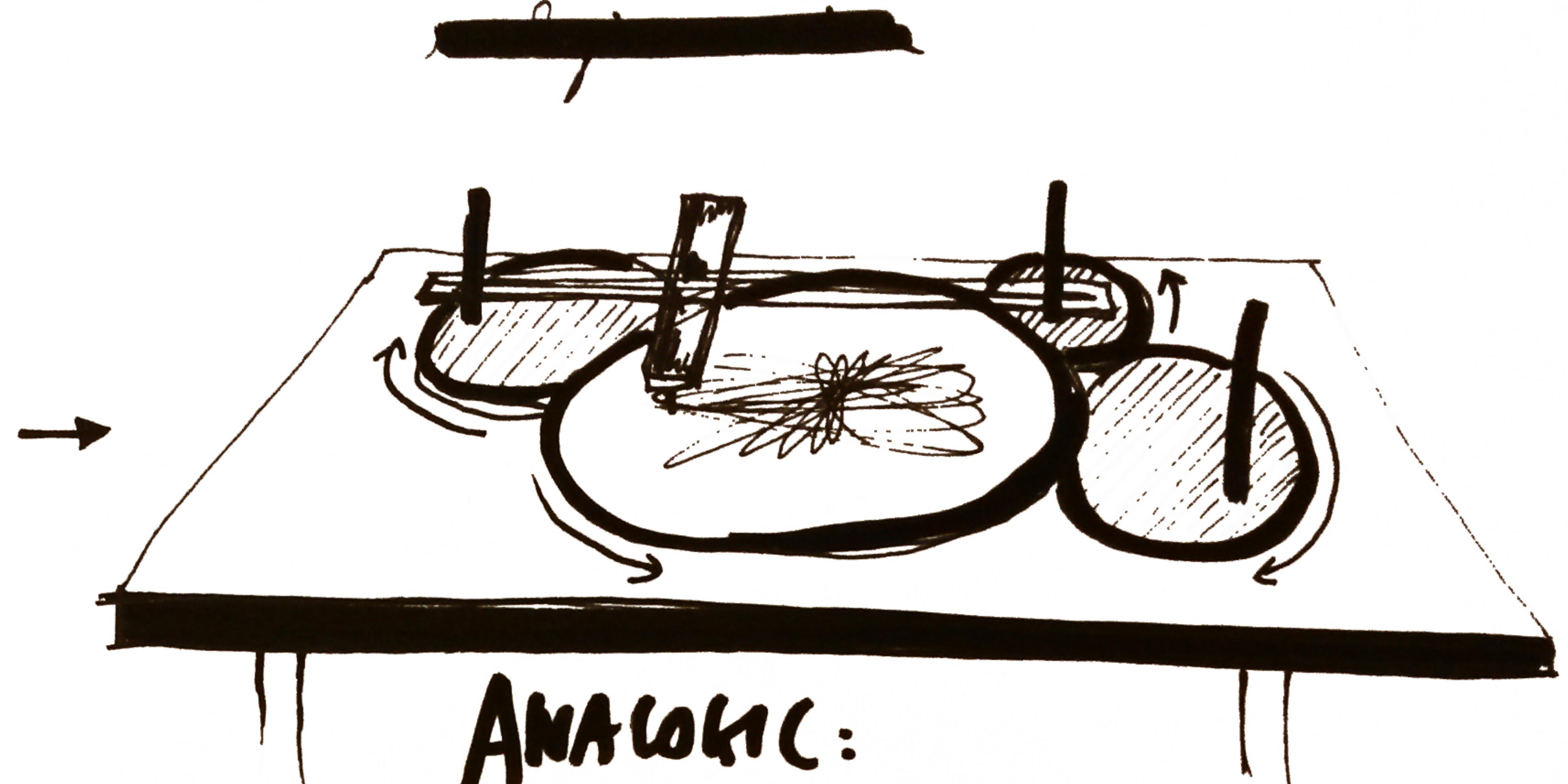


## AN HARMONOGRAPH

IS A MACHINE MADE OF  
2 OR MORE PENDULUMS,  
GEARS AND A DRAWING  
ARM.

IT PRODUCES NICE  
CYCLOID-LIKE DRAWINGS.



ANALOGIC:  
3-PENDULUM MECHANISM

## EDUCATIONAL APP/GAME

2-mode application:

I. set the mechanism  
and draw

II. look at the drawing  
& retweak the mechanism

But can we design a Python version?  
Let's do it!

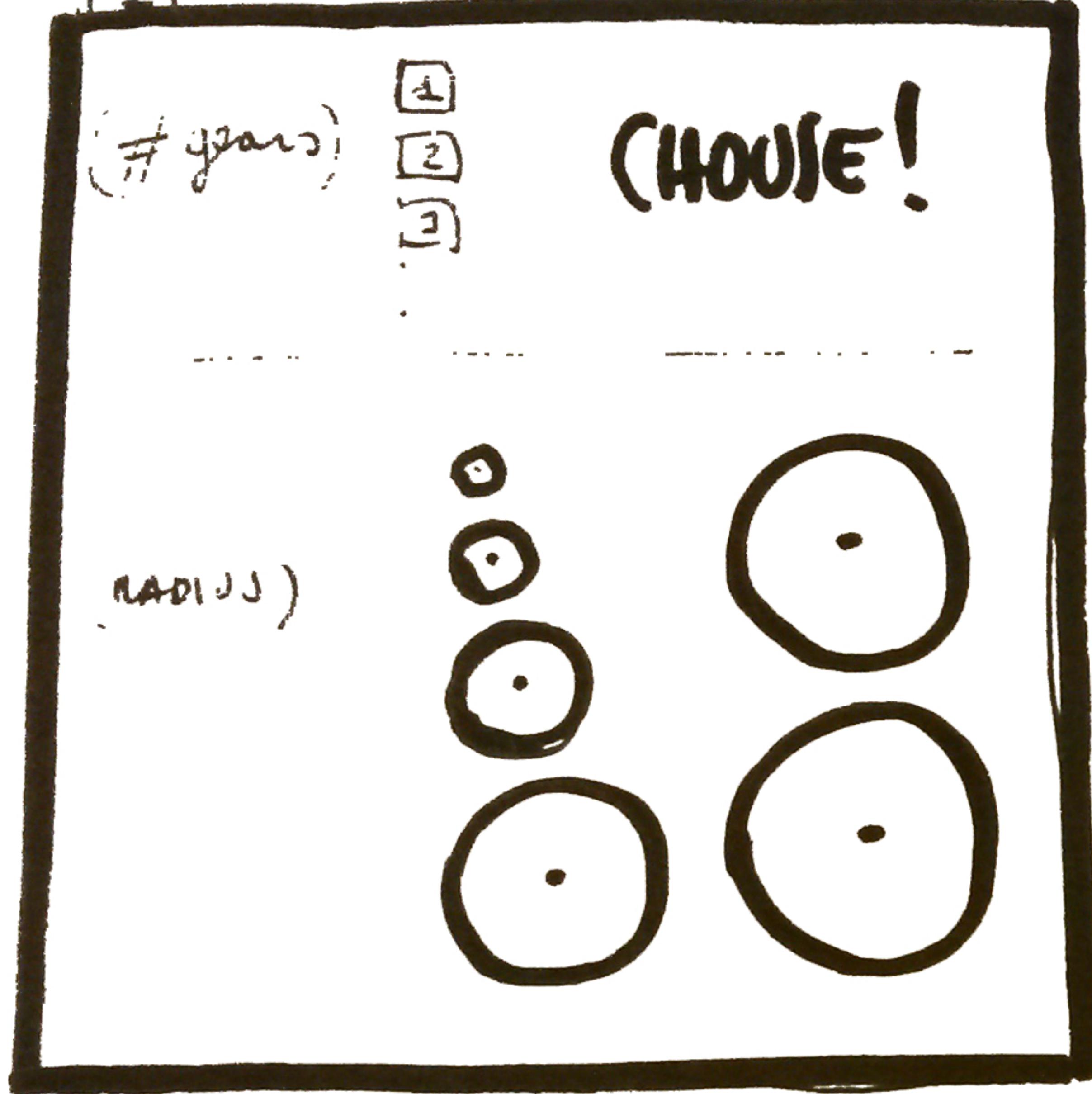
GOAL: design a TKinter Harmonograph on Python  
to teach kids the beauty of pendulums,  
cycloids and trigonometry

DIGITAL:  
PYTHON TKINTER

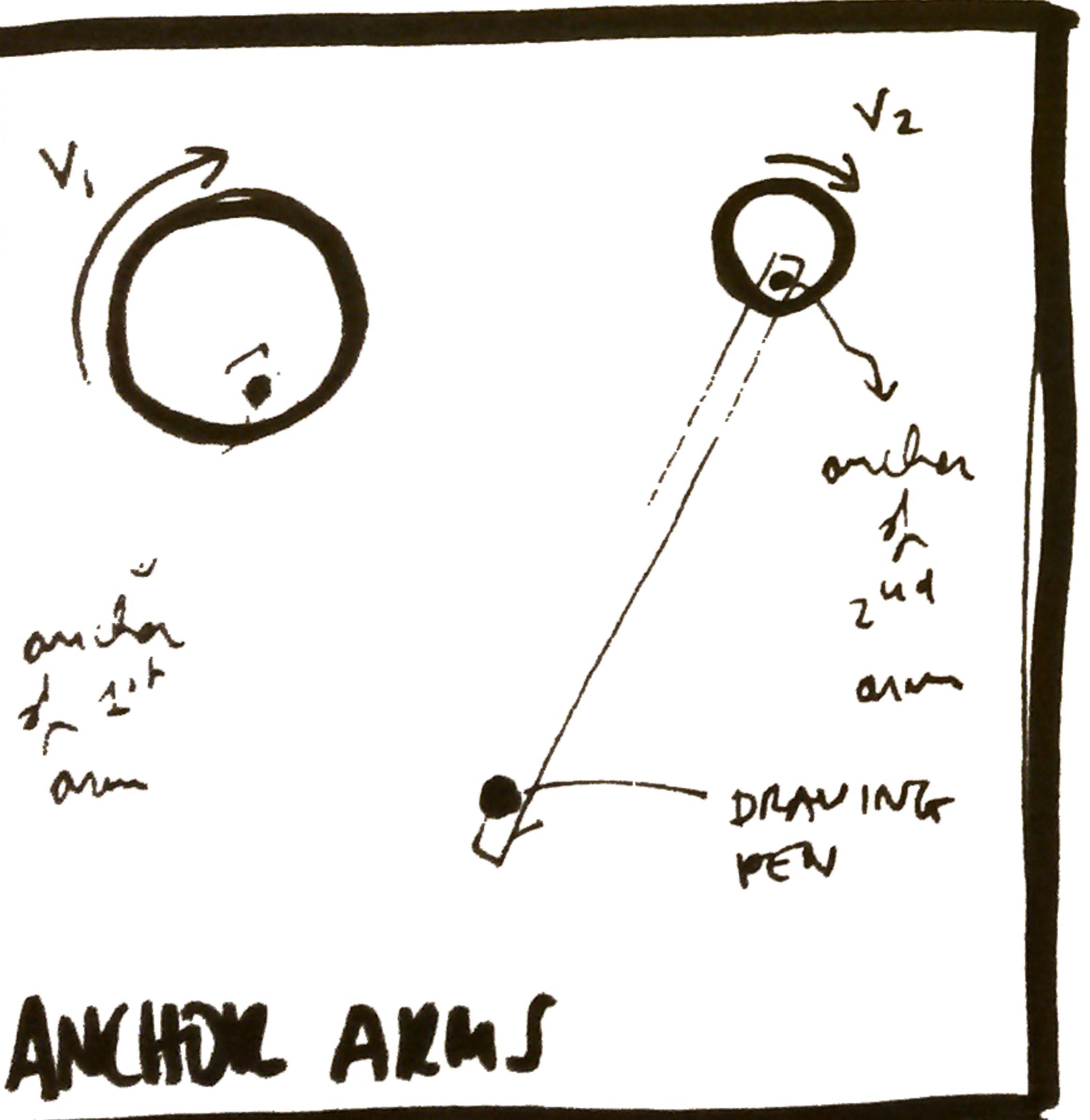
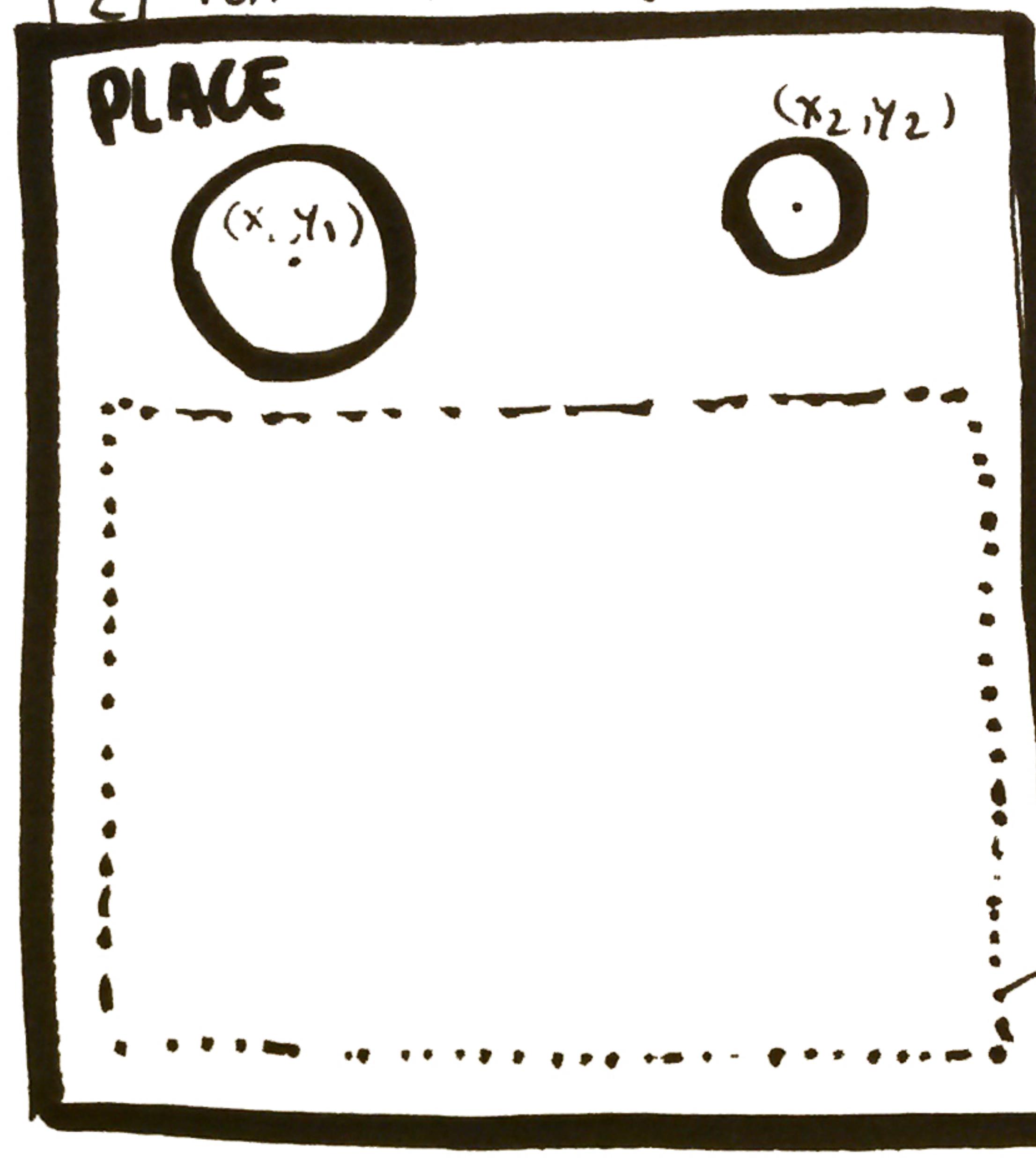
MODE (I)

JET THE MECHANISM, SEE THE RESULT

[1] SELECT THE GEARS

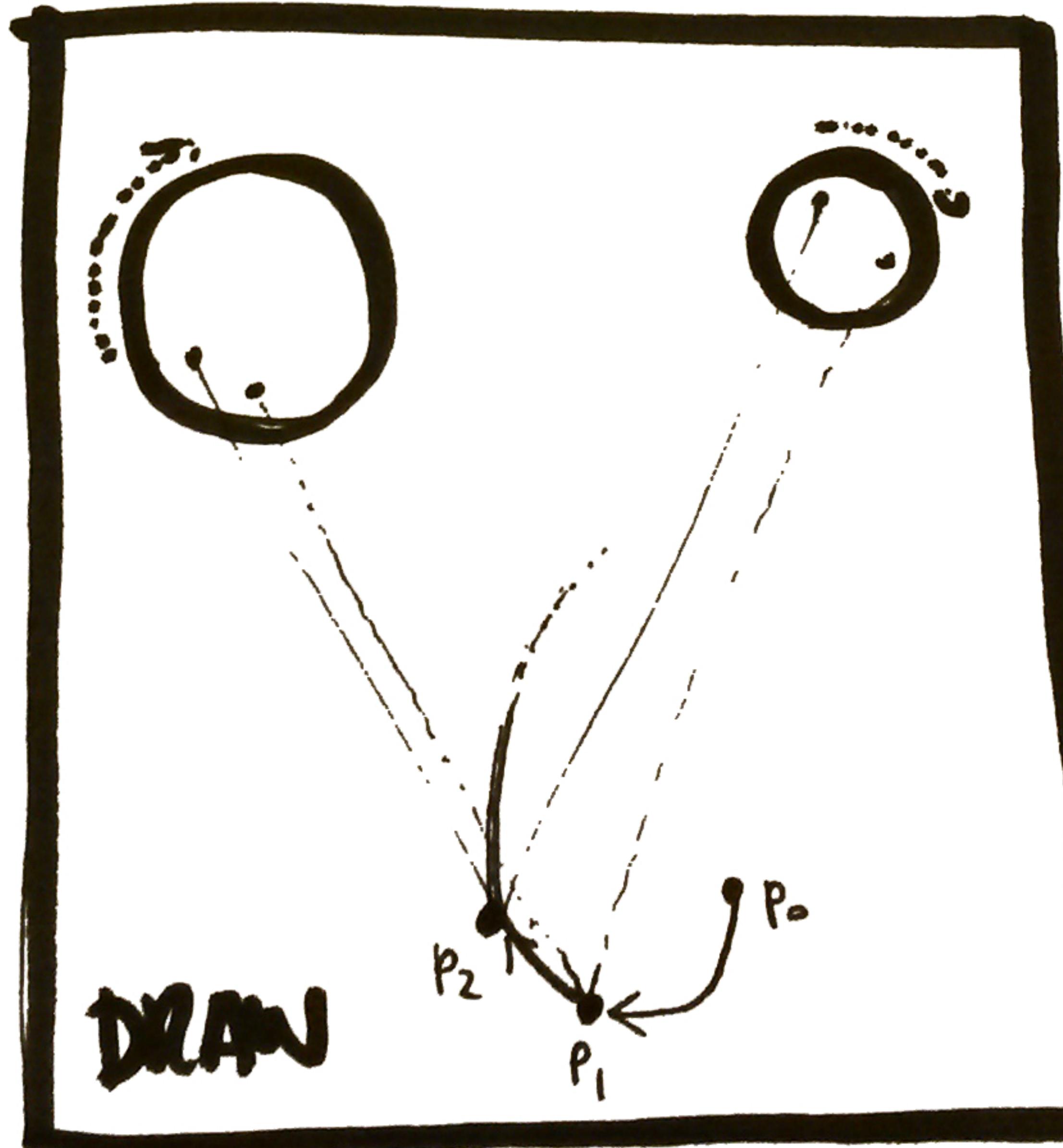


[2] PLACE THE GEARS ON THE CANVAS



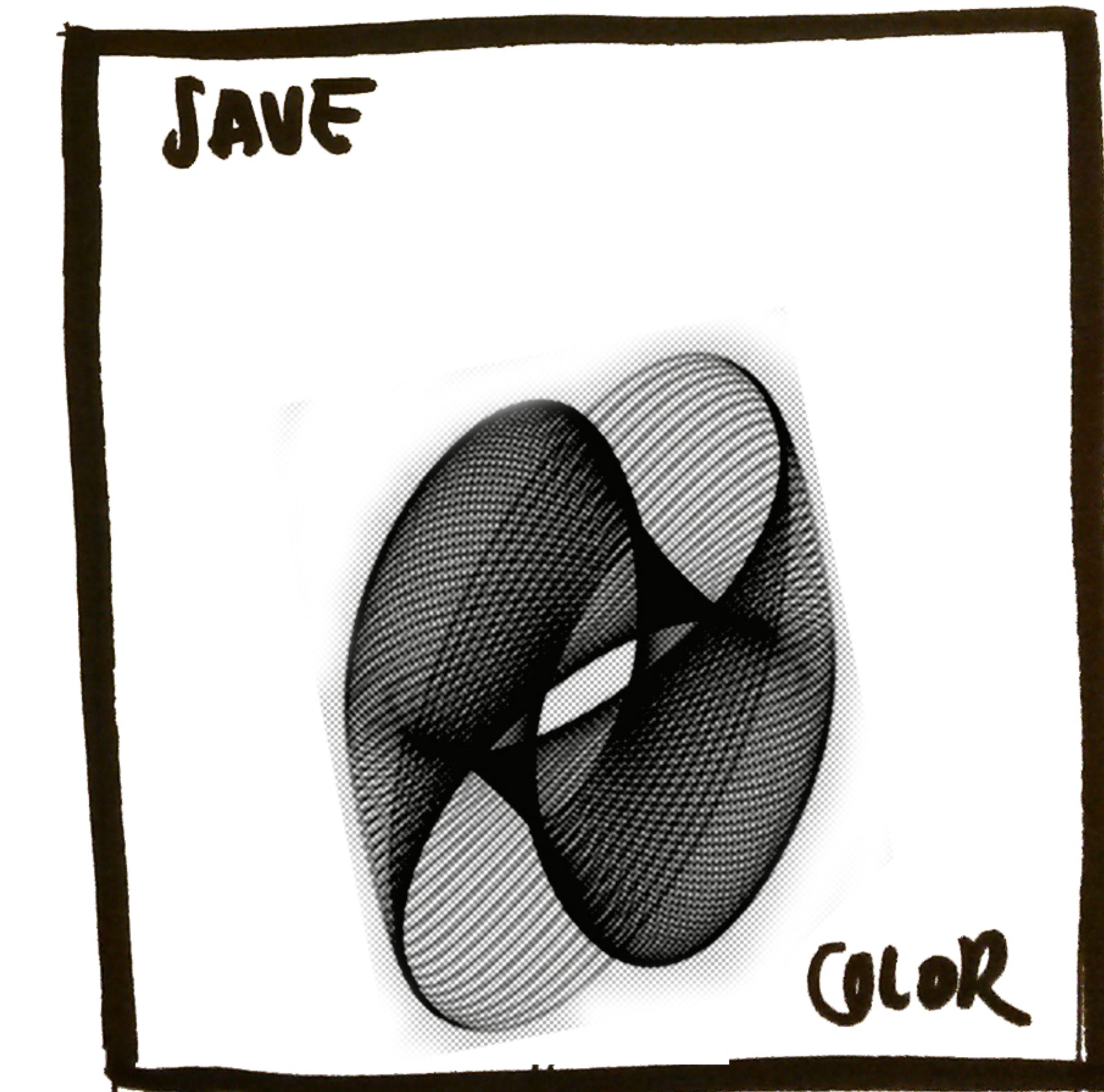
ANCHOR ARMS

[3] choose rotation speed,  
choose the drawing arms



DRAW

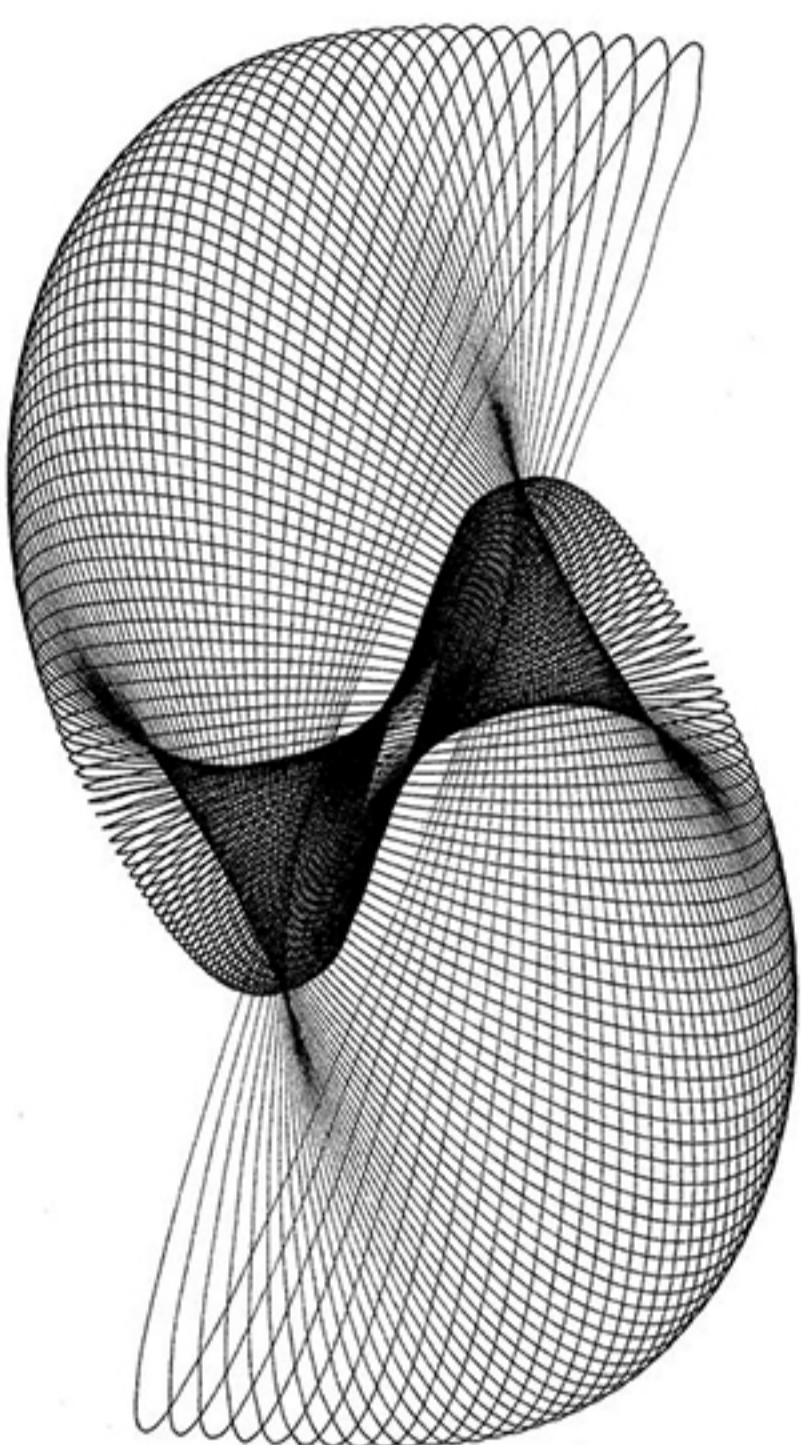
[4] start draw of



[5] Speed up and  
SEE THE RESULT

1 look at this cycloid

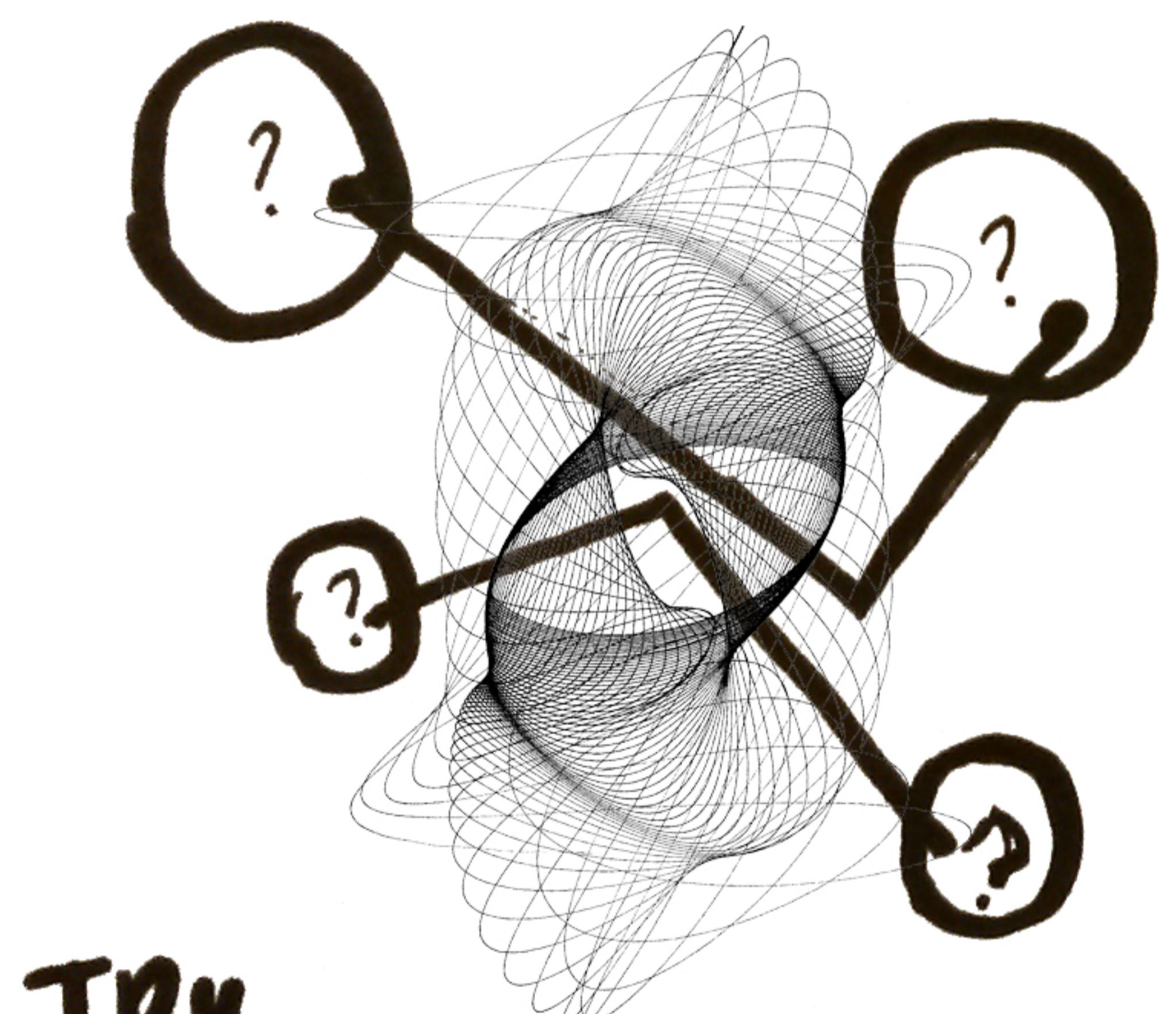
LOOK!



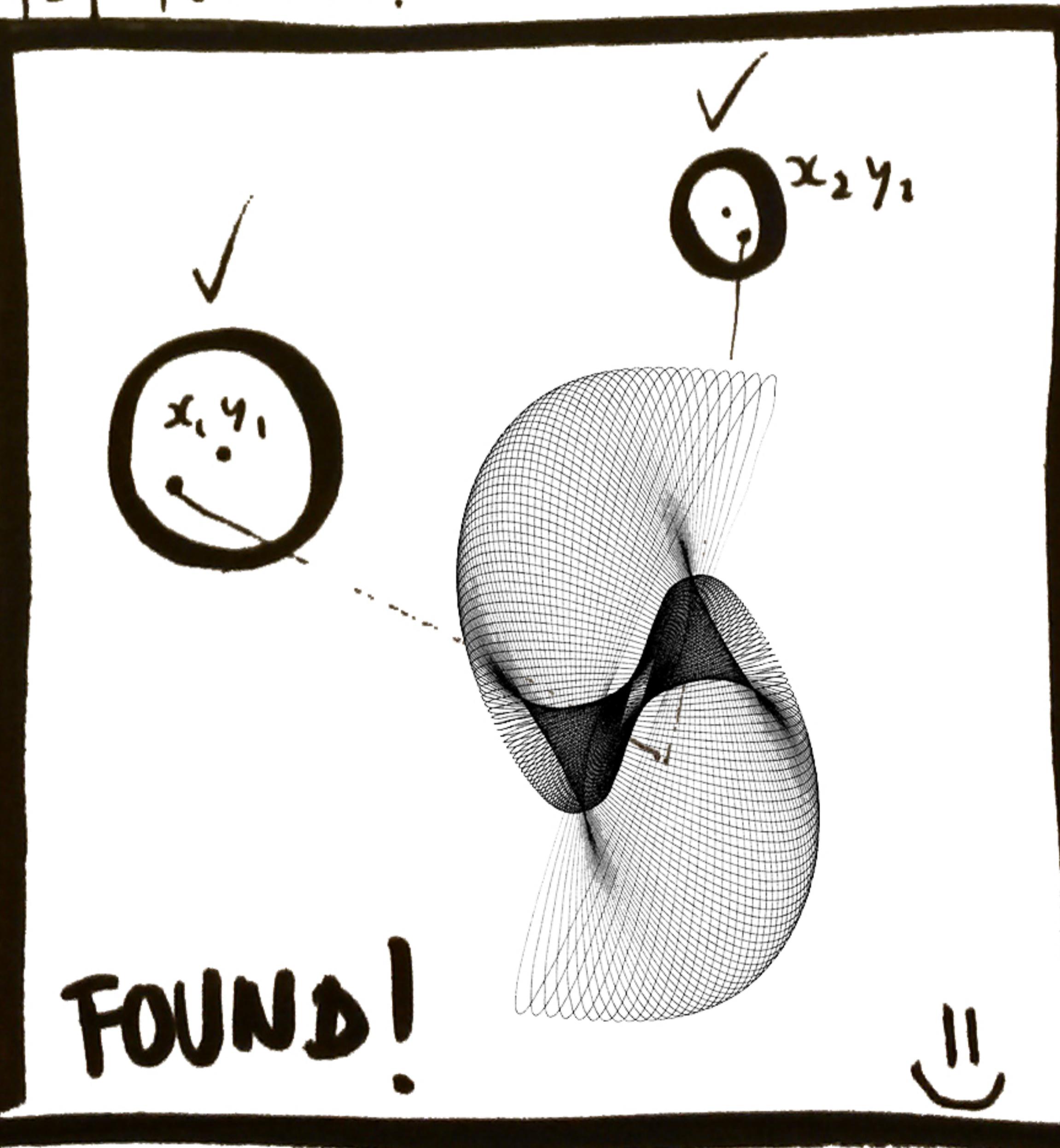
2 retrieve the gears position & dimensions

HOW WAS IT  
MADE?

2 how was it made?  
which gears? which radii?



3 You Win!



FEATURES  
and display

- speed up the drawing process (or slow down)  
→ use threshold properly
- gears visualization  $\langle^{\text{on}}_{\text{off}}$
- visualize with brushes
- color the cycloid by clicking inside the white spaces
- let Python color the drawing randomly

MODE II

LOOK AT THE DRAWING, RETRIEVE THE ORIGINAL MECHANISM

## CHALLENGES :

- TRIGONOMETRY ( HARD MATH TO RECREATE THE MECHANISM )
- GRAPHIC USER INTERFACE ( simple but precise! )
- EDUCATIONAL GOAL

## EXTRA POSSIBLE FEATURES :

- COLOR THE CYCLOID ON TKINTER
- EXPORT TO DXF / DWG ...
- HISTORIC / MATH EXPLANATIONS