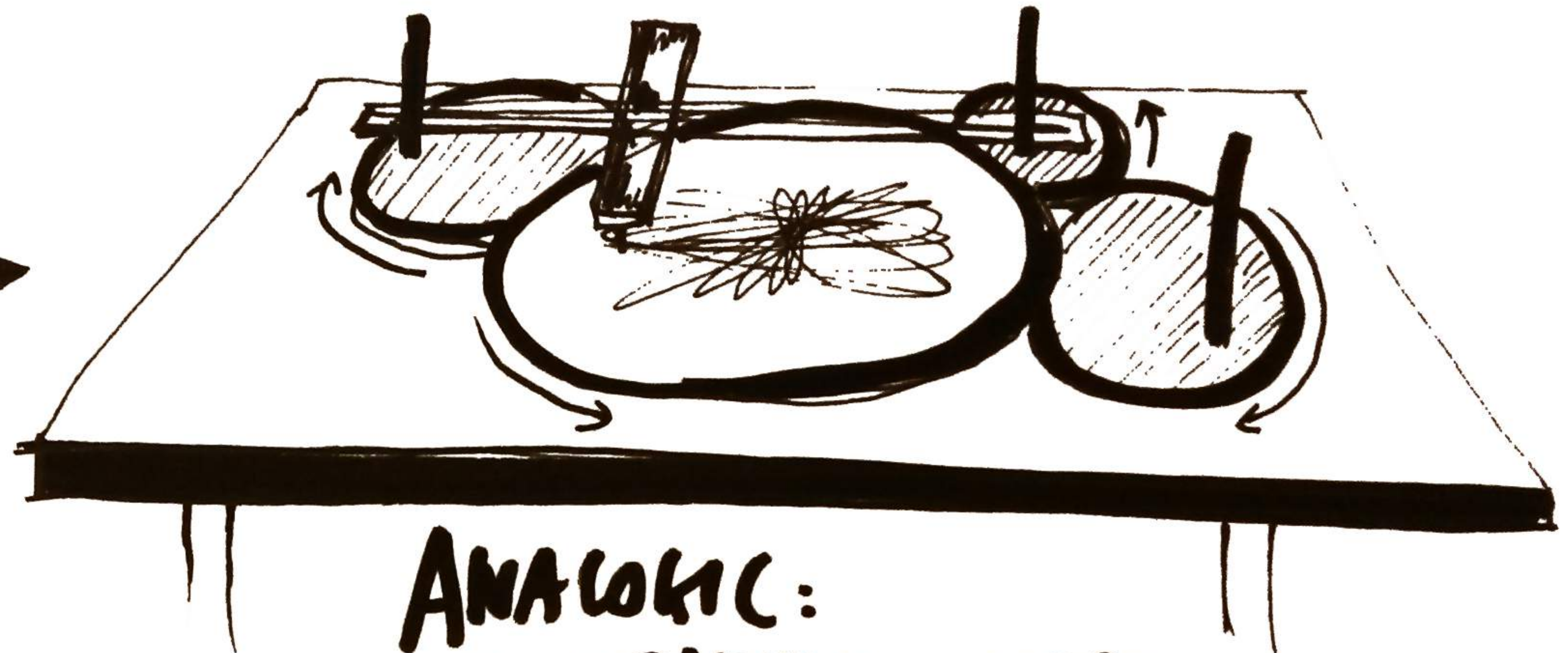AN HARMONOGRAPH
IS A MACHINE MADE OF
2 OR MORE PENDULUMS,
GEARS AND A DRAWING
ARM.

IT PRODUCES NICE
CYCLOID-LIKE DRAWINGS.
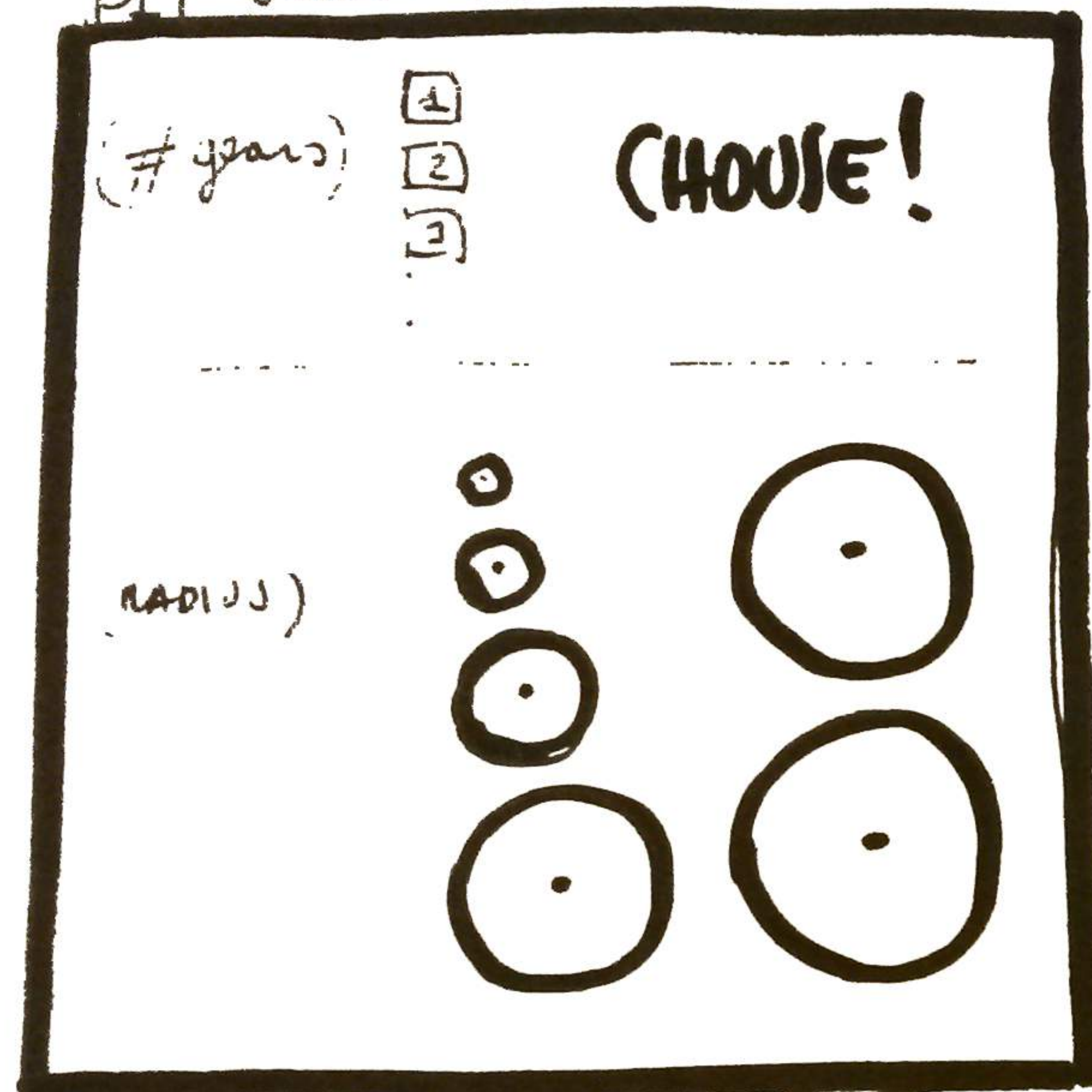
ANALOGIC:
3-PENDULUM MECHANISM

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,
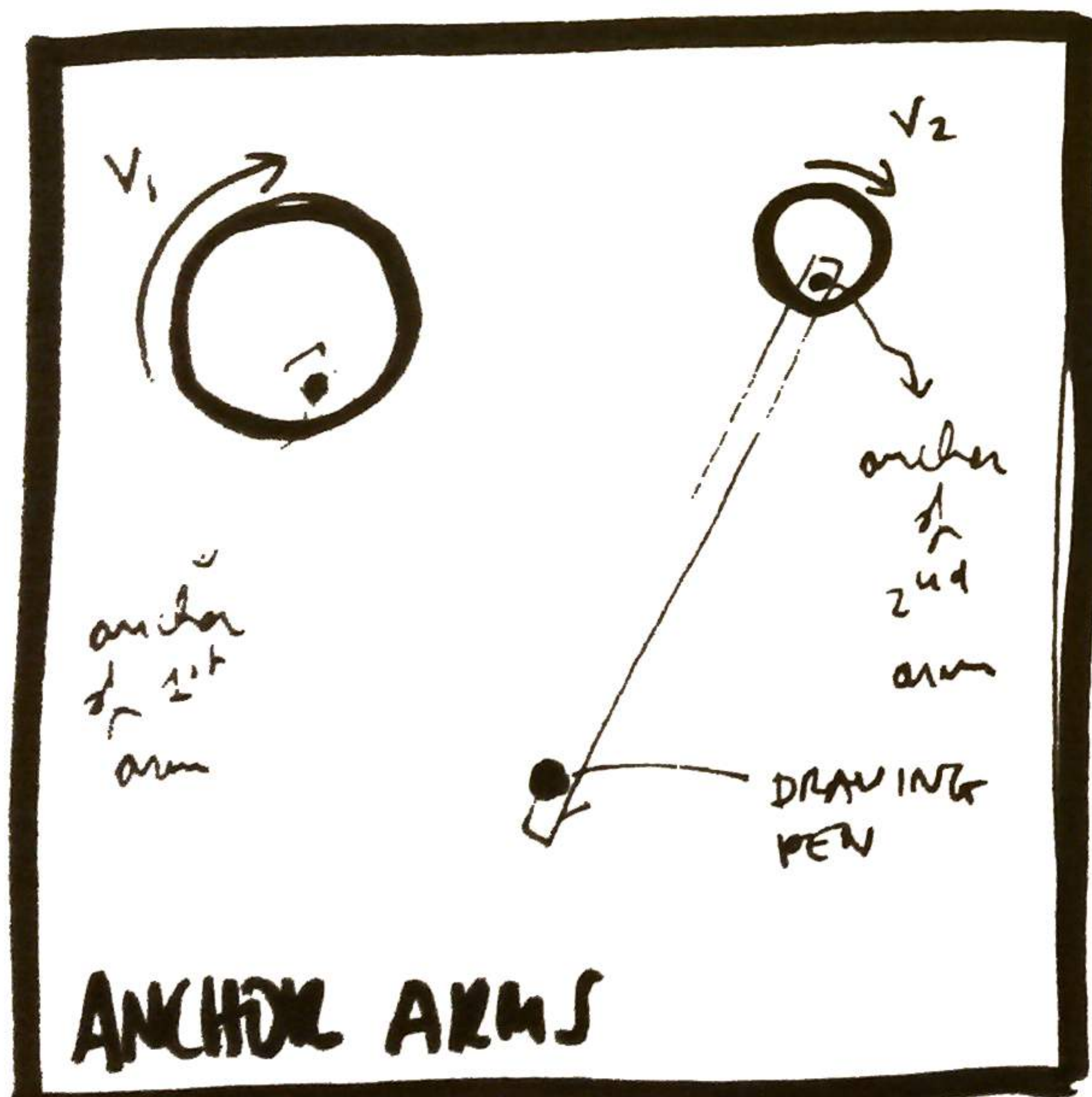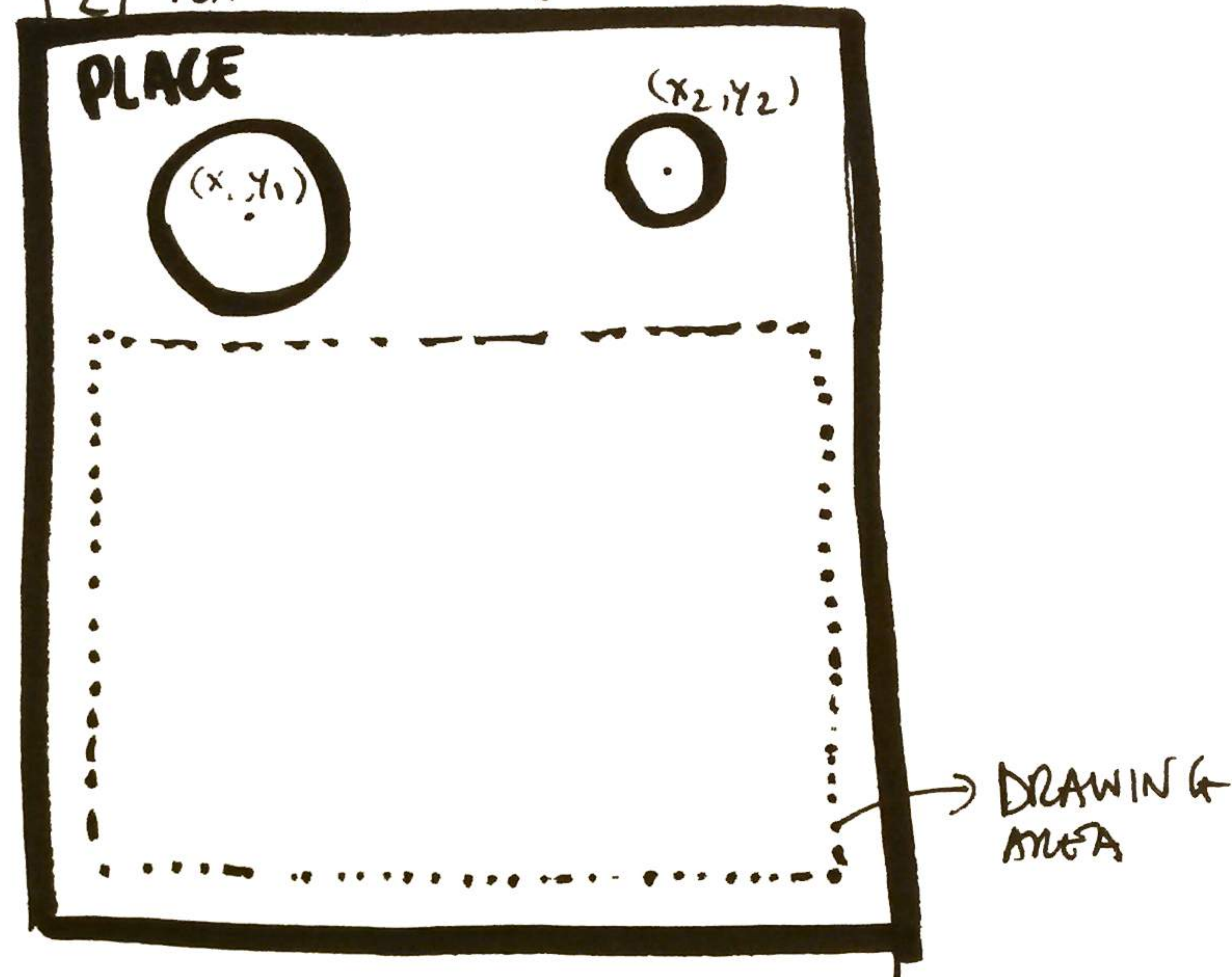   cycloids and trigonometry

DIGITAL:
PYTHON TKINTER

EDUCATIONAL APP/GAME

2-mode application:

I.   set the mechanism
     and draw

II. look at the drawing
     & retrieve the mechanism

MODE ①   SET THE MECHANISM, SEE THE RESULT

1   SELECT THE GEARS

(# gears)
- ☐ 1
- ☐ 2
- ☐ 3

CHOOSE!

(RADIUS)

2   PLACE THE GEARS ON THE CANVAS

PLACE

(x_1, y_1) (x_2, y_2)

→ DRAWING AREA

3   choose rotation speed, visualize the drawing arms

V_1 V_2

anchor of 2nd arm

anchor of 2nd arm

DRAWING PEN

ANCHOR ARMS

4   start drawing

P_0

P_2 P_1
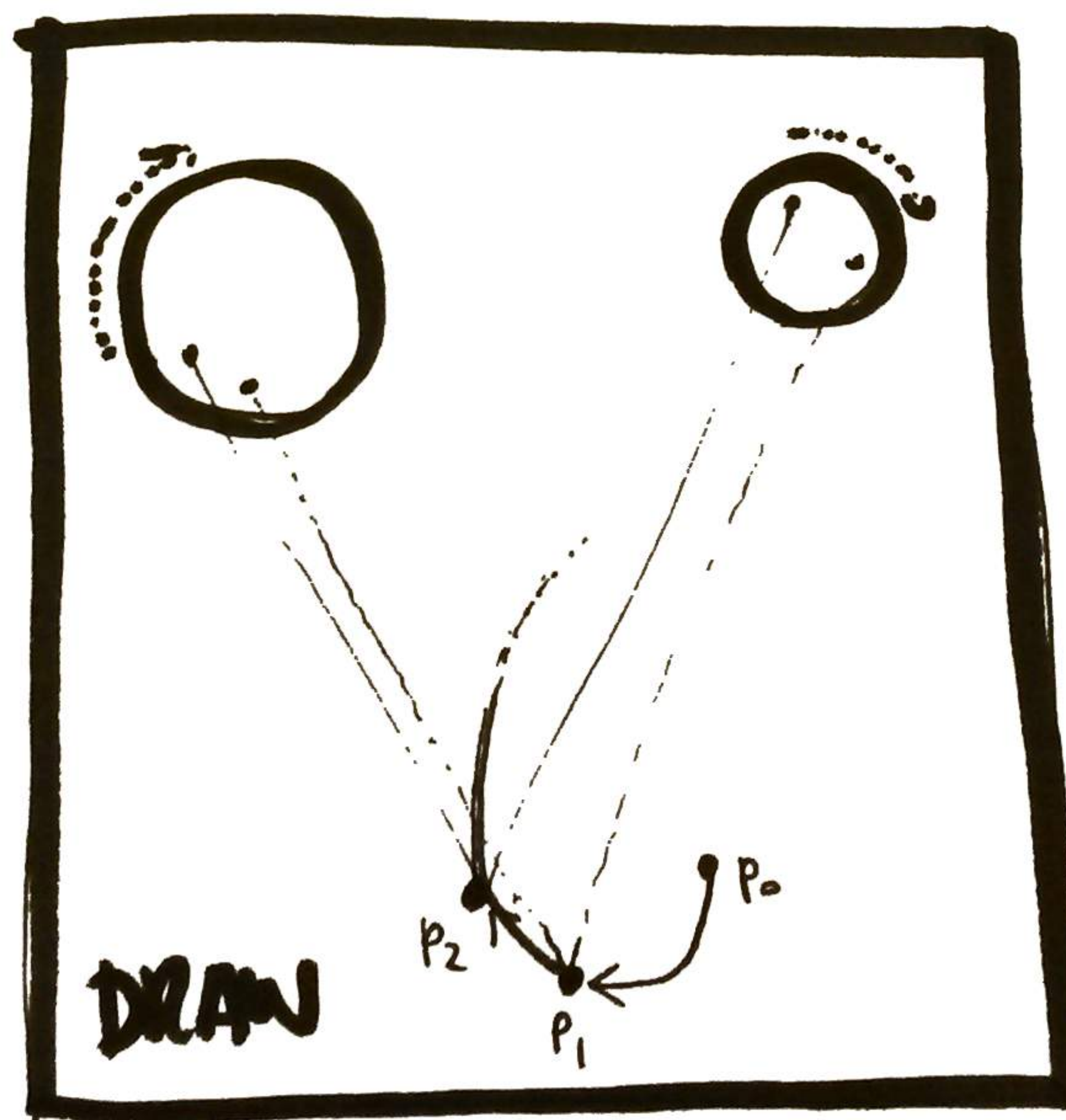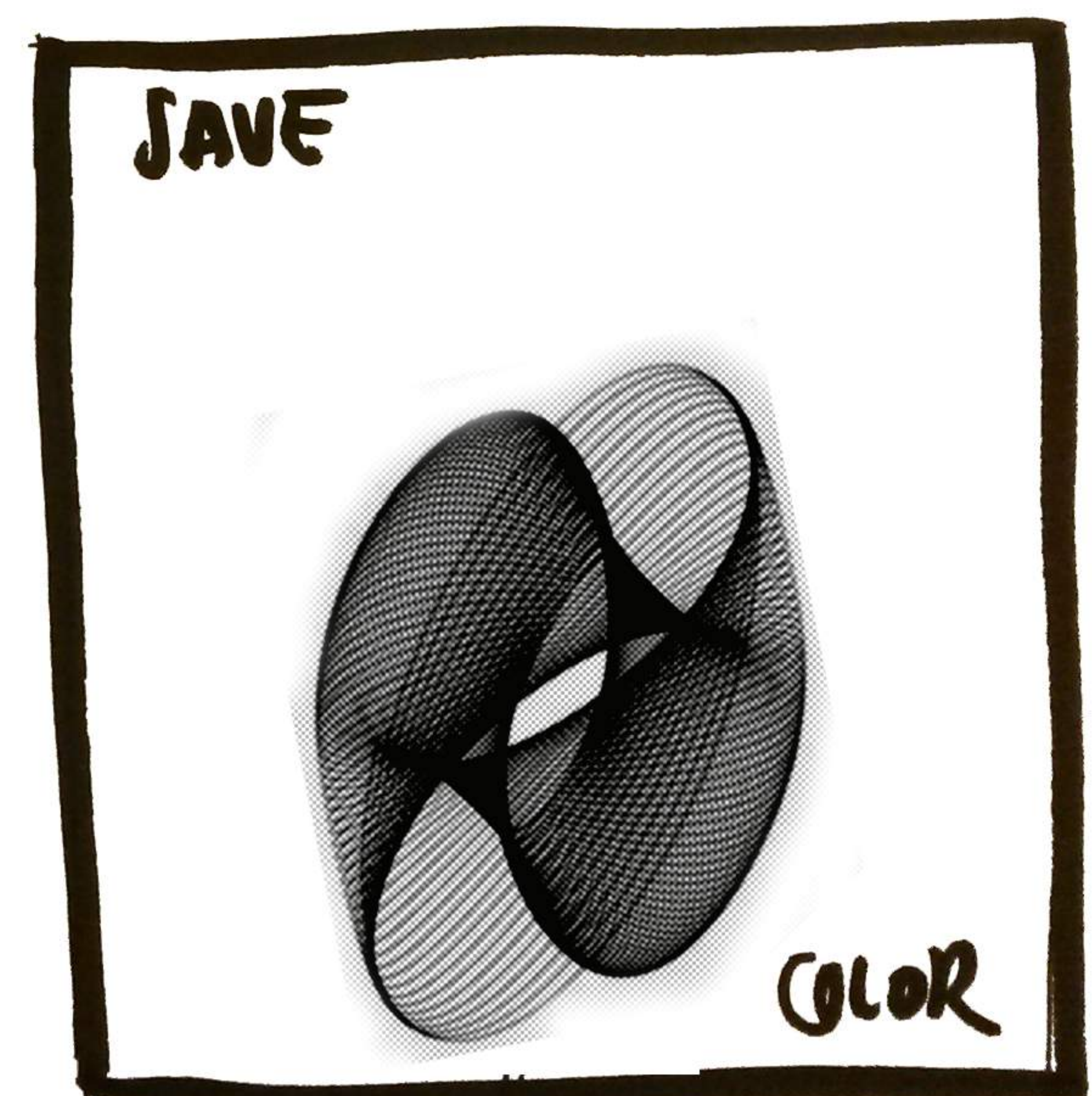
DRAW

S   Speed up and SEE THE RESULT

SAVE

COLOR

1 look at this cycloid

LOOK!
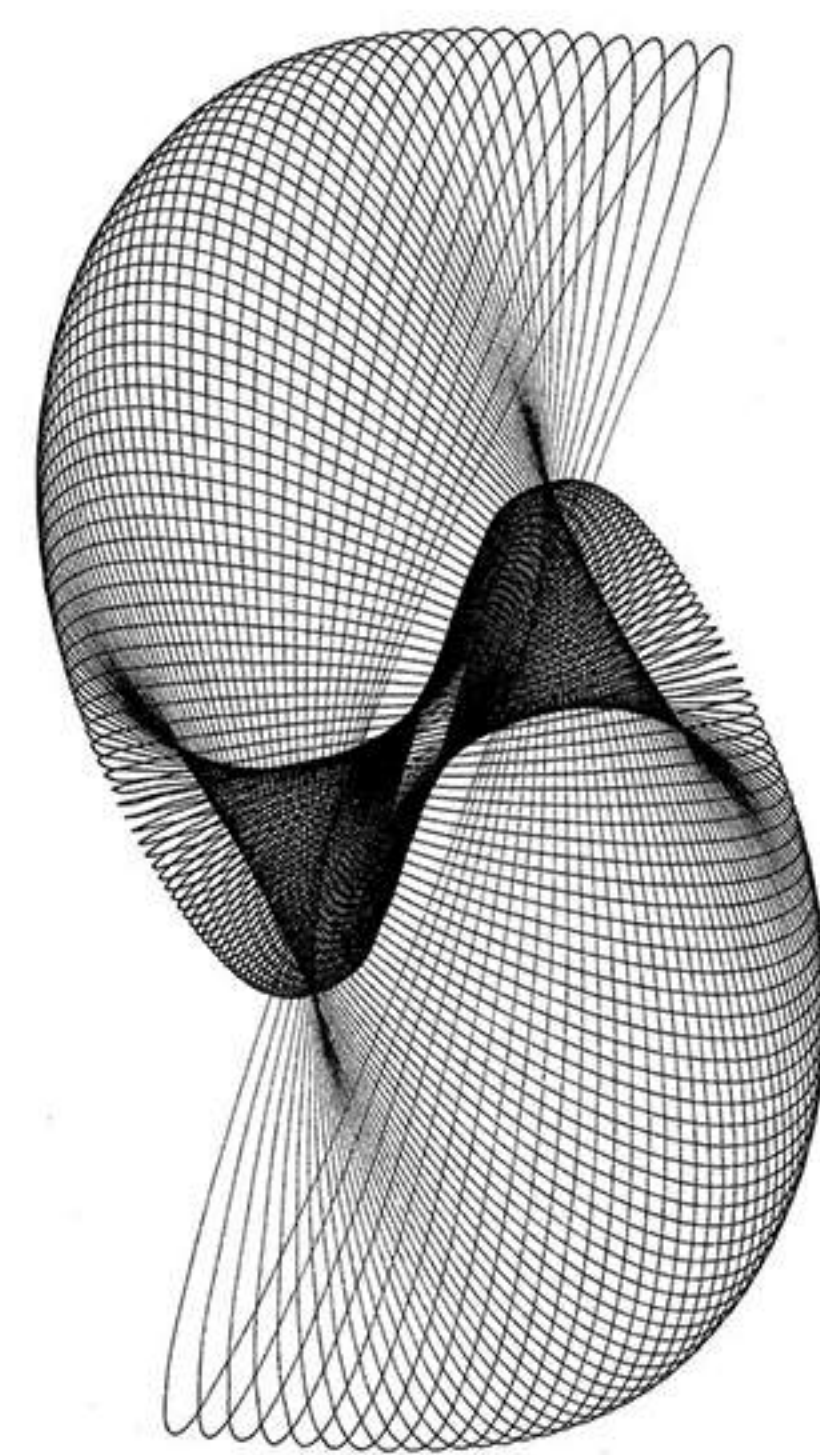
2 retrieve the gears position & dimensions

HOW WAS IT MADE?

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

TRY...

3 You Win!

$x_2 y_1$

$x_1 y_1$

FOUND!

FEATURES

~~on display~~

- Speed up the drawing process (or slow down)
  → use threejs properly

- gears visualisation — ON / OFF

- visualise math formulas

- color the cycloid by clicking inside the white spaces

- let Python color the drawing randomly
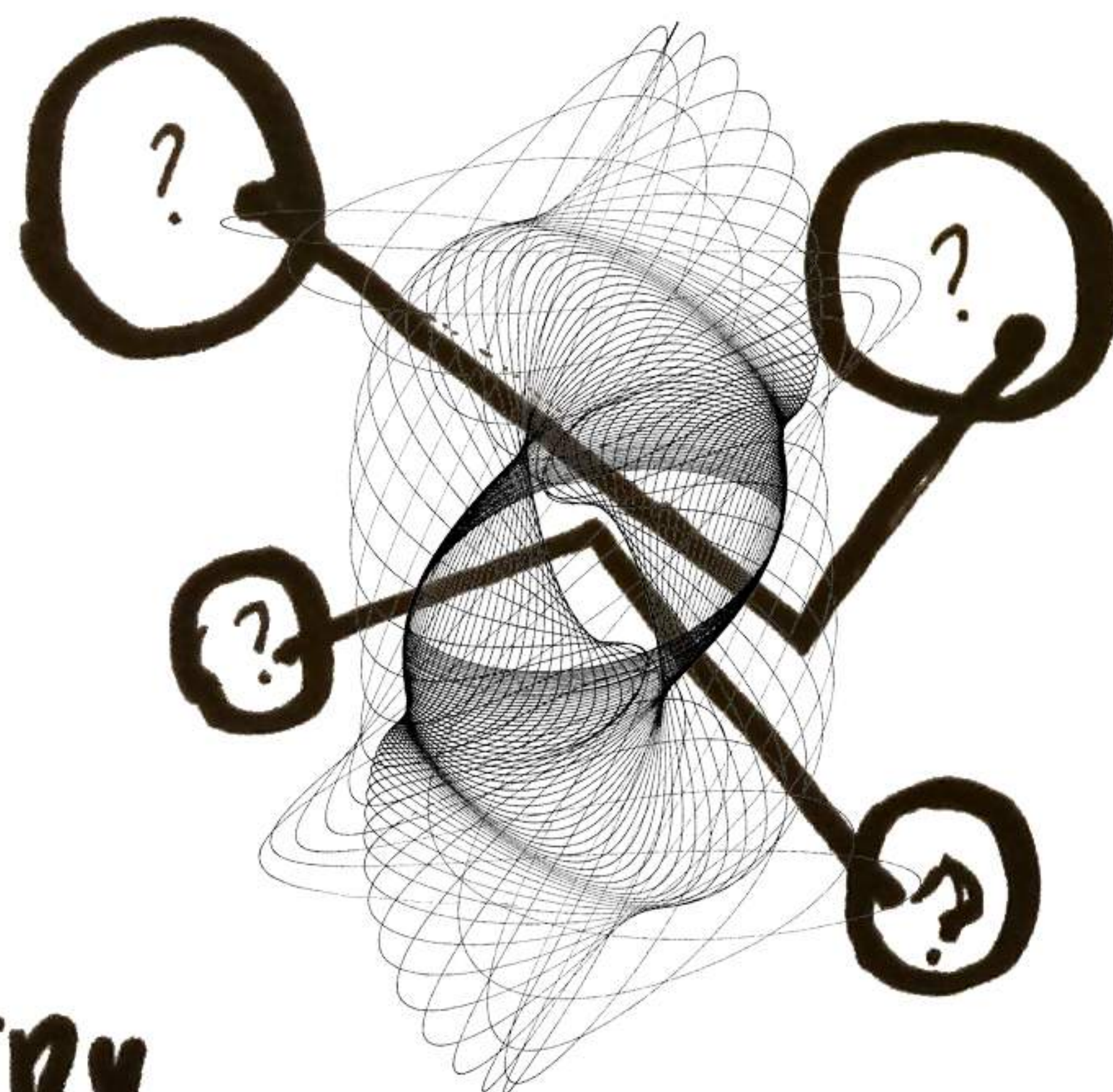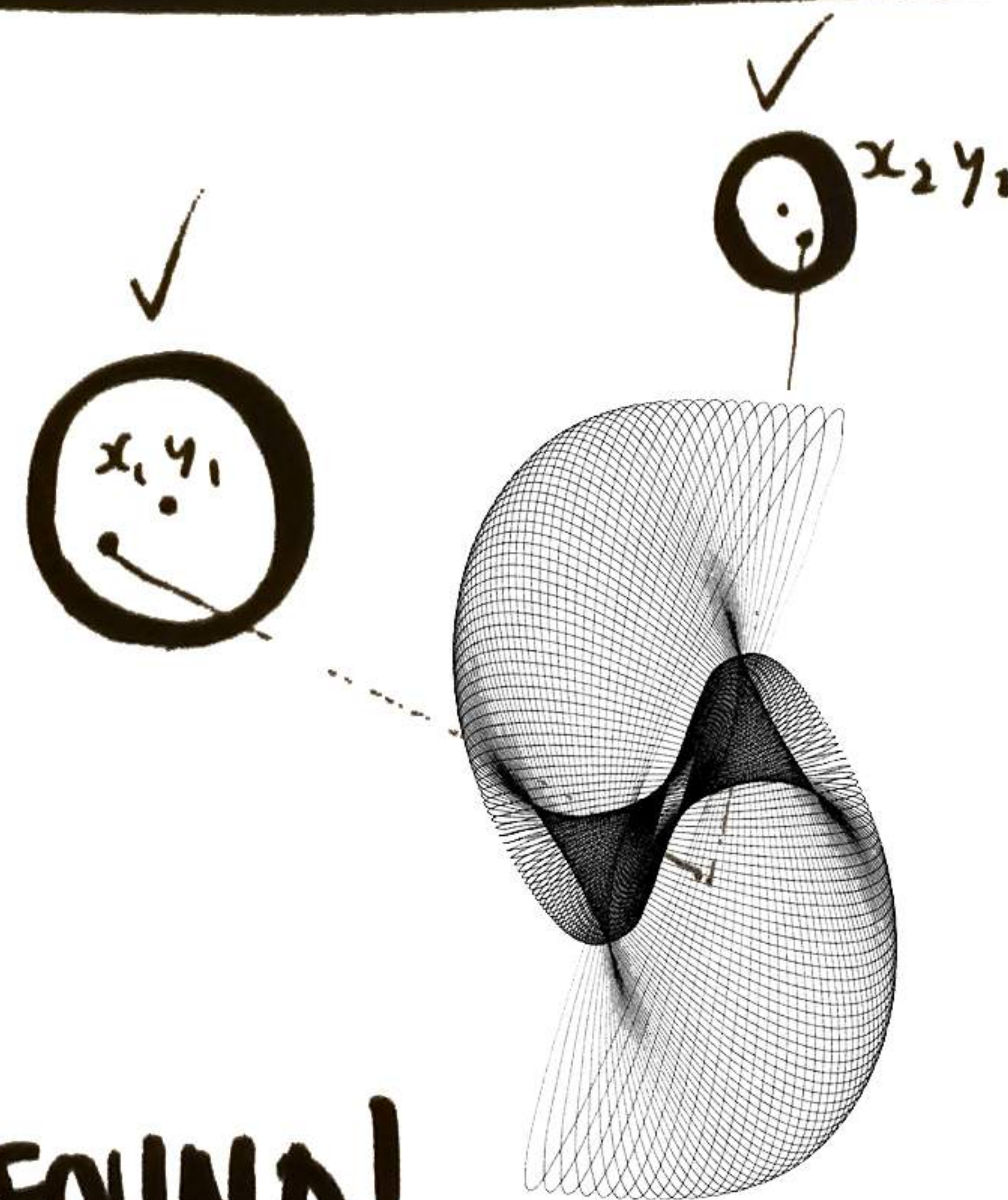
MODE **II**   LOOK AT THE DRAWING, RETRIEVE THE ORIGINAL MECHANISM

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