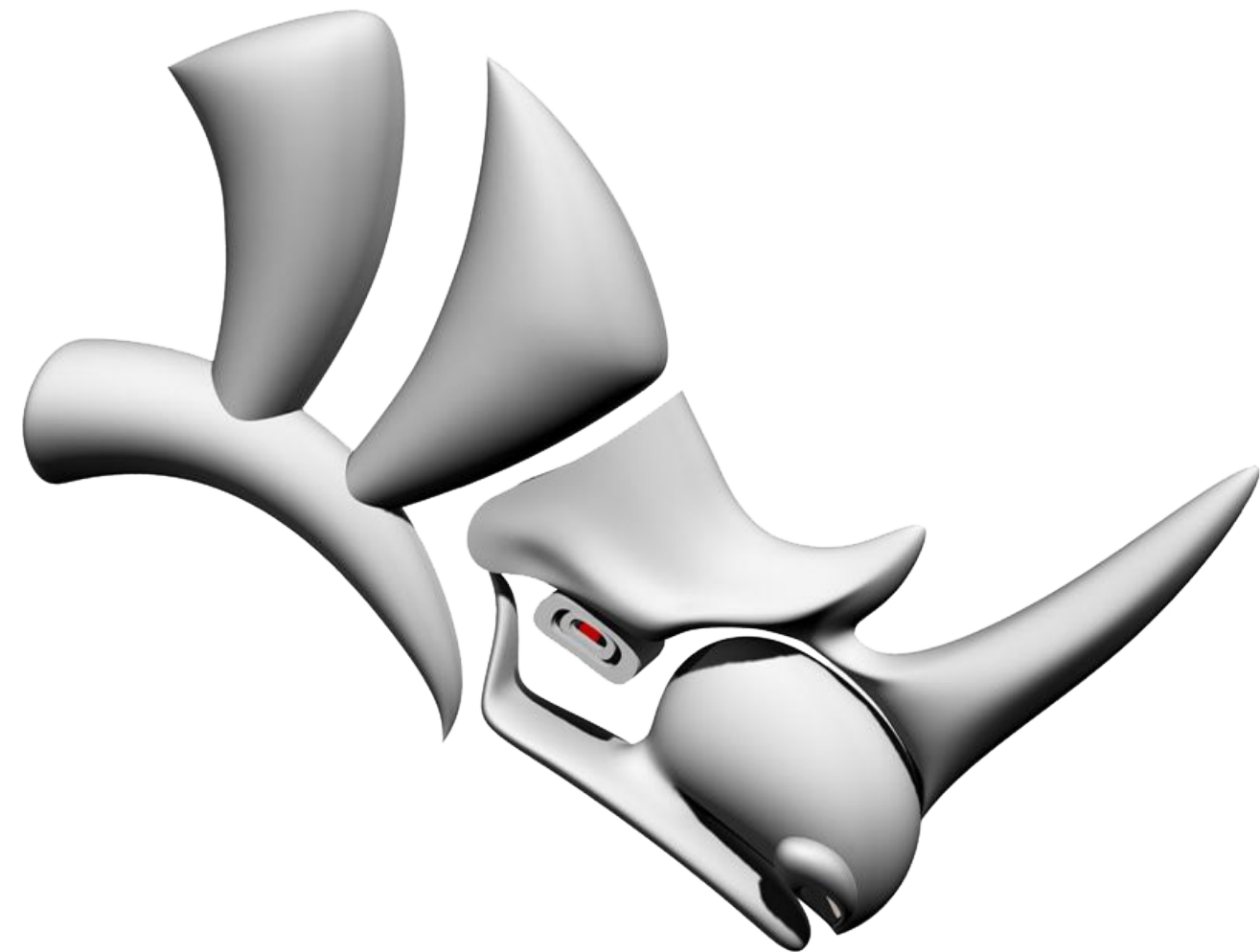


2D IN RHINO

NuNu

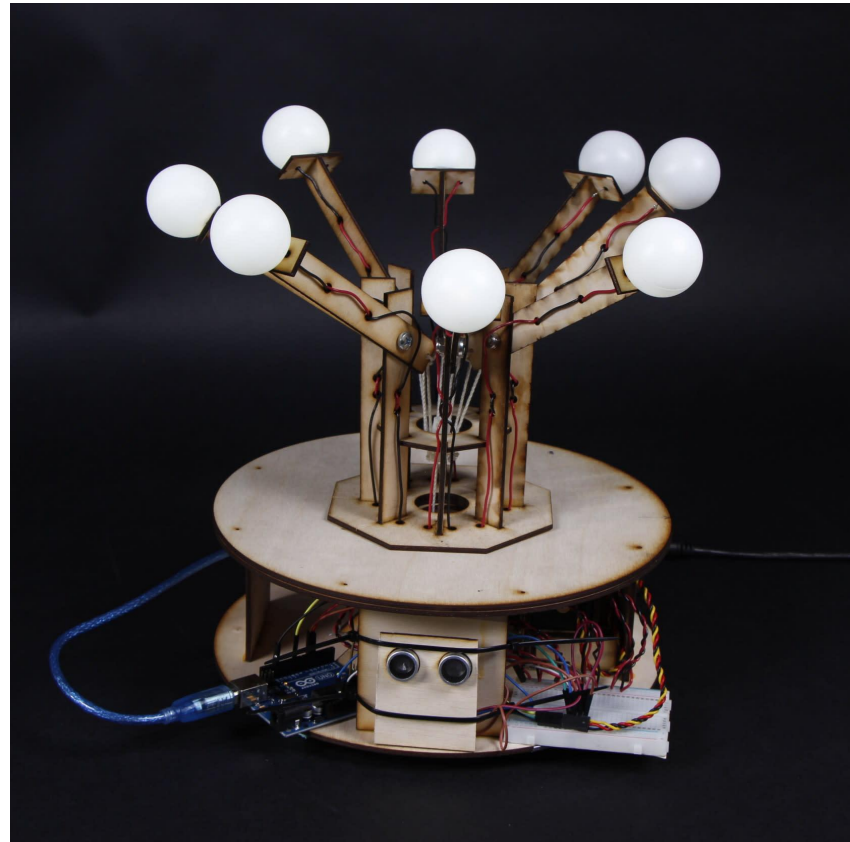
WHAT IS RHINO?

- Surface-Based Modeling Software
- Uses NURBS curves
- Used to Design, Edit, Transform, Represent & Manufacture 2D and 3D objects
- Used in a variety of design and engineering industries - Architecture, Industrial Design, Aerospace, Jewelry
- Fast - Great for quick prototypes

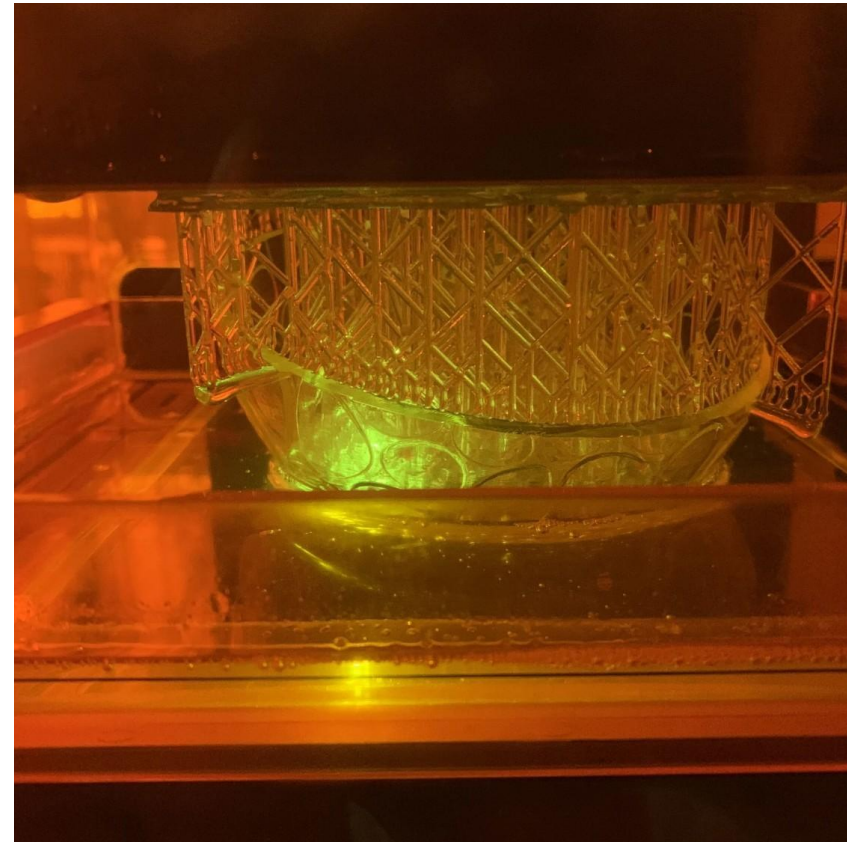


Rhinoceros

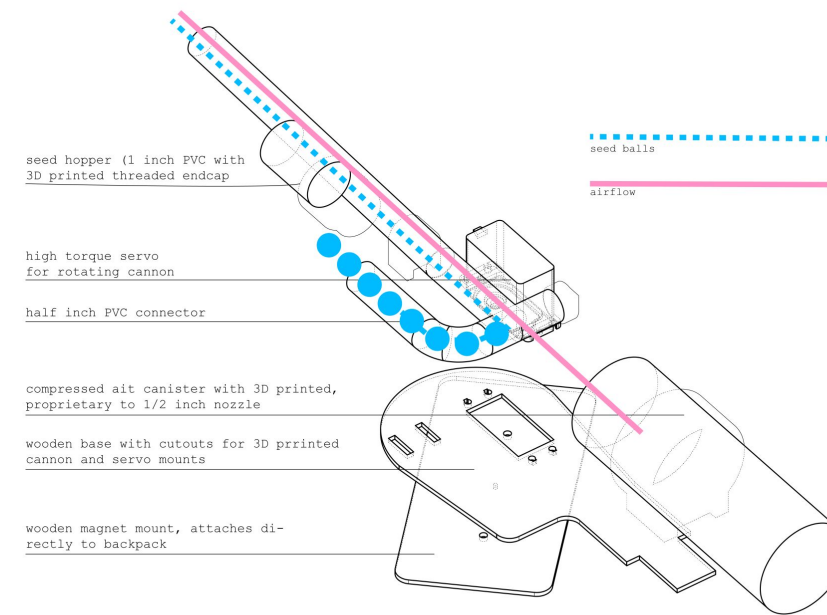
HOW DOES NUVU USE RHINO?



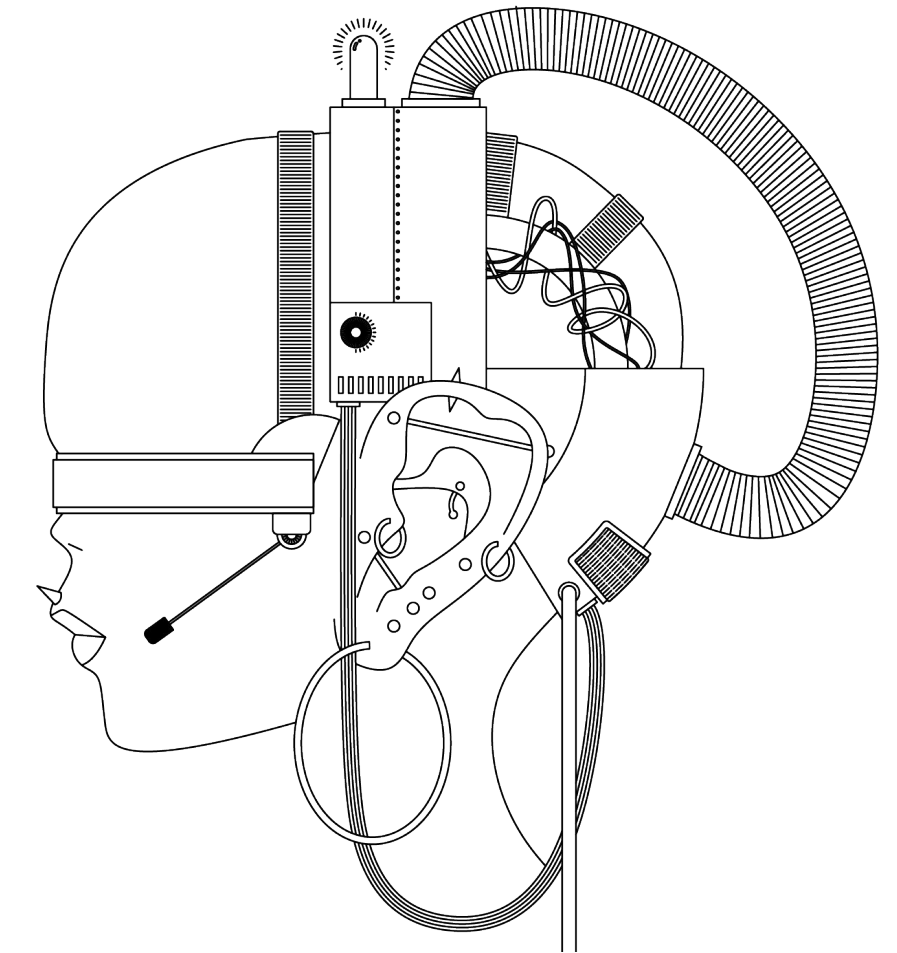
2D Fabrication



3D Fabrication



Documentation



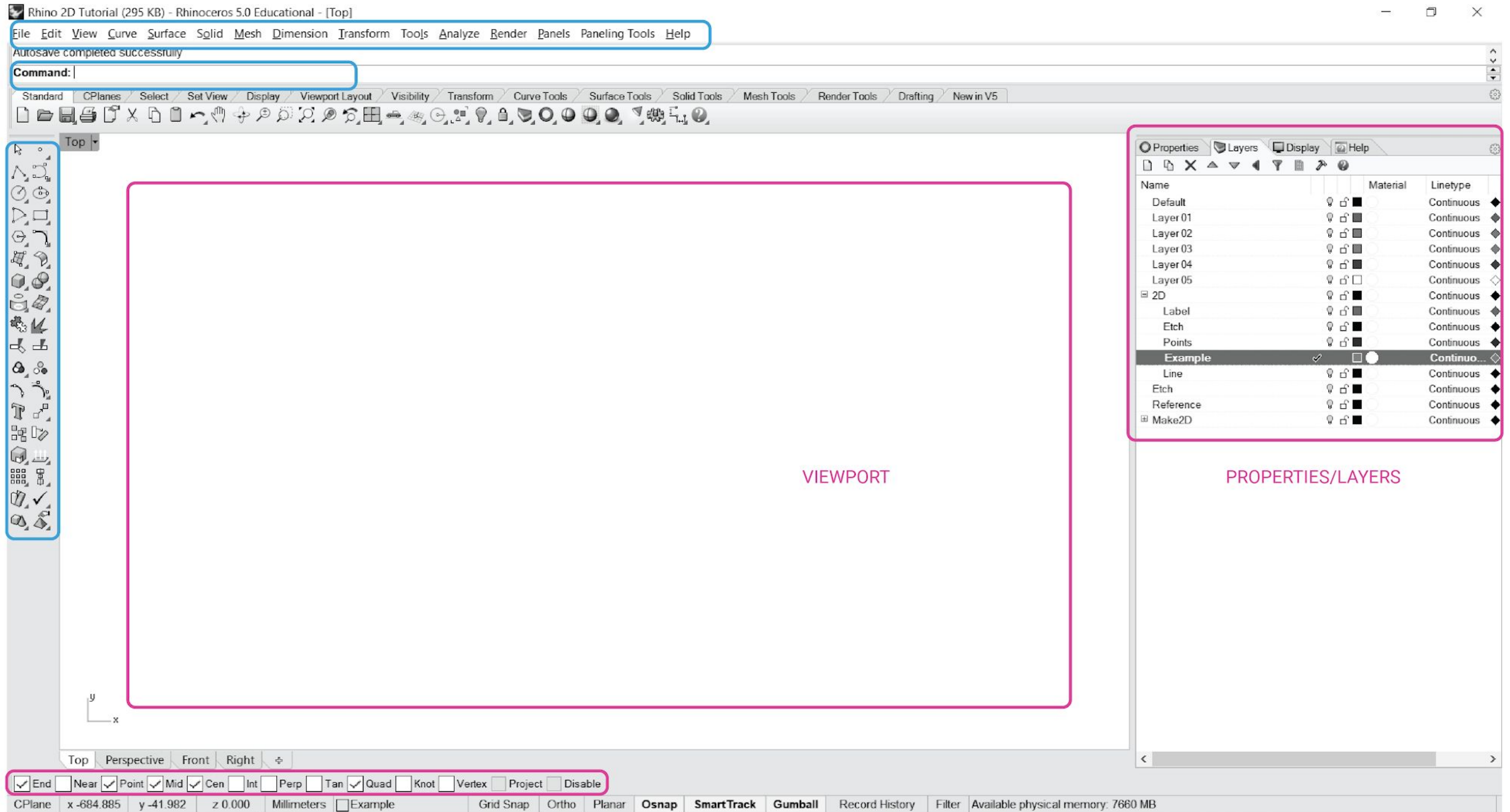
Illustration

INTERFACE OVERVIEW

FILE MENU
COMMAND LINE

TOOLBARS

OBJECT SNAPS

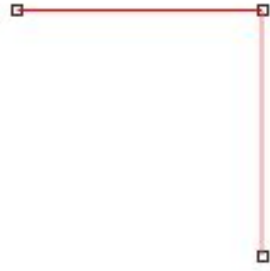


DRAWING TOOLS

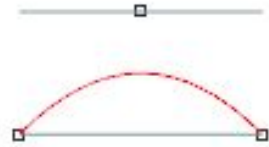
Line



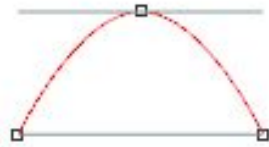
Polyline



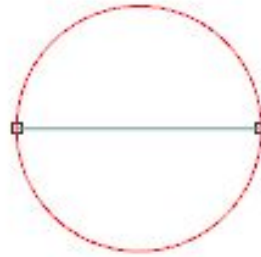
Curve



InterpCrv



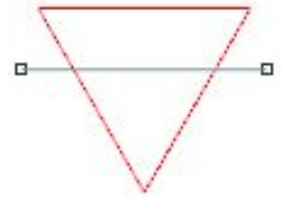
Circle



Rectangle > Center



Polygon > 3 Sides



Line



Polyline



Curve



InterpCrv



Circle



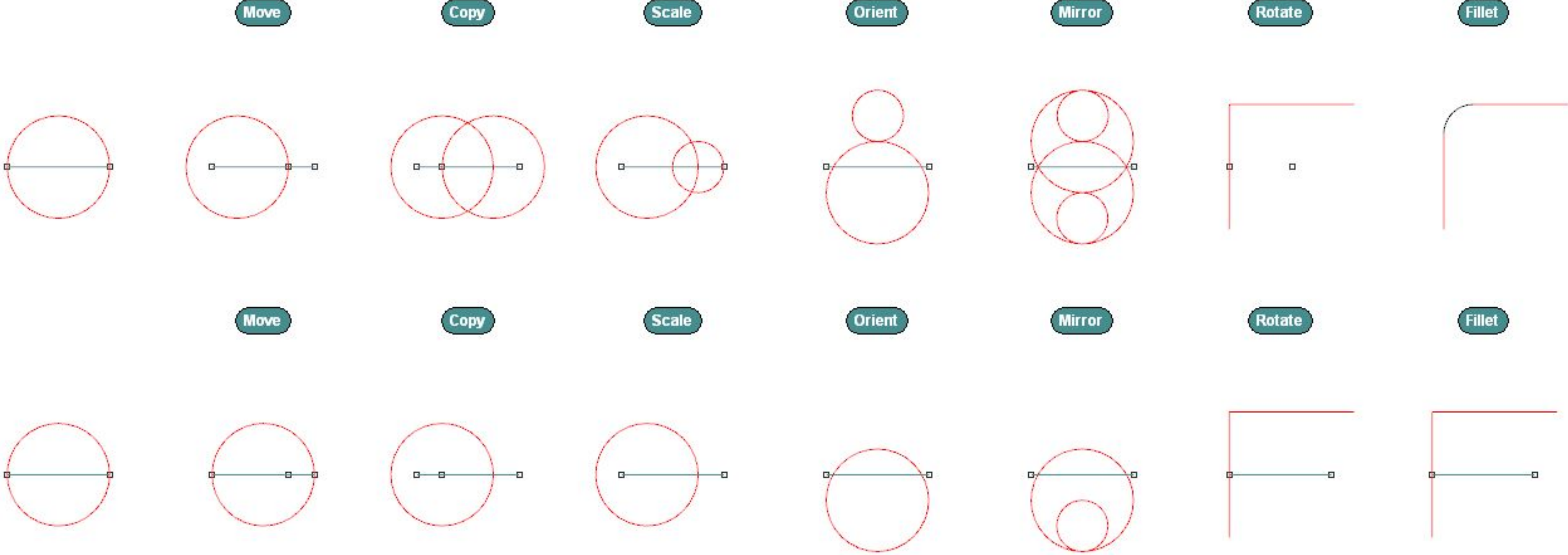
Rectangle > Center



Polygon > 3 Sides



TRANSFORMATION TOOLS



EDITING TOOLS

Trim



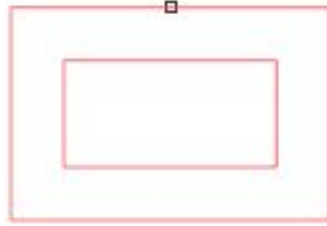
Offset



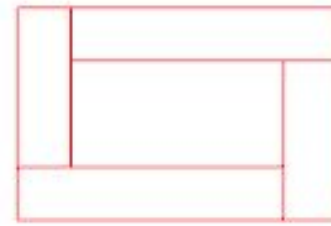
Join



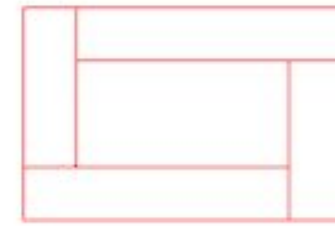
Offset Then Explode



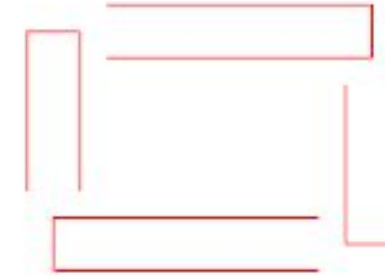
Extend



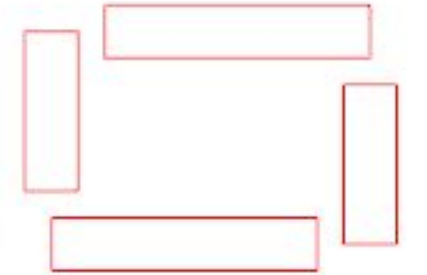
Split



Join



CloseCrv



Trim



Offset



Join



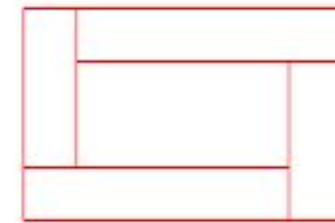
Offset Then Explode



Extend



Split



Join



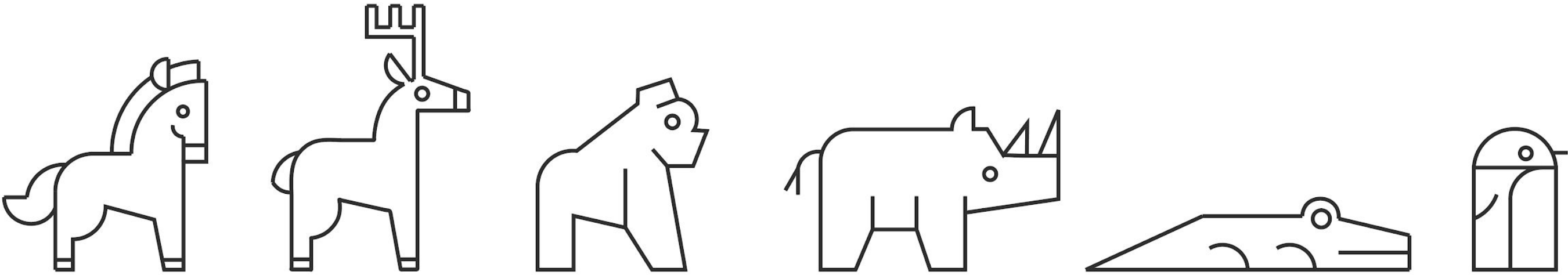
CloseCrv



DISCOVER YOUR SPIRIT ANIMAL!

Now it's your turn!

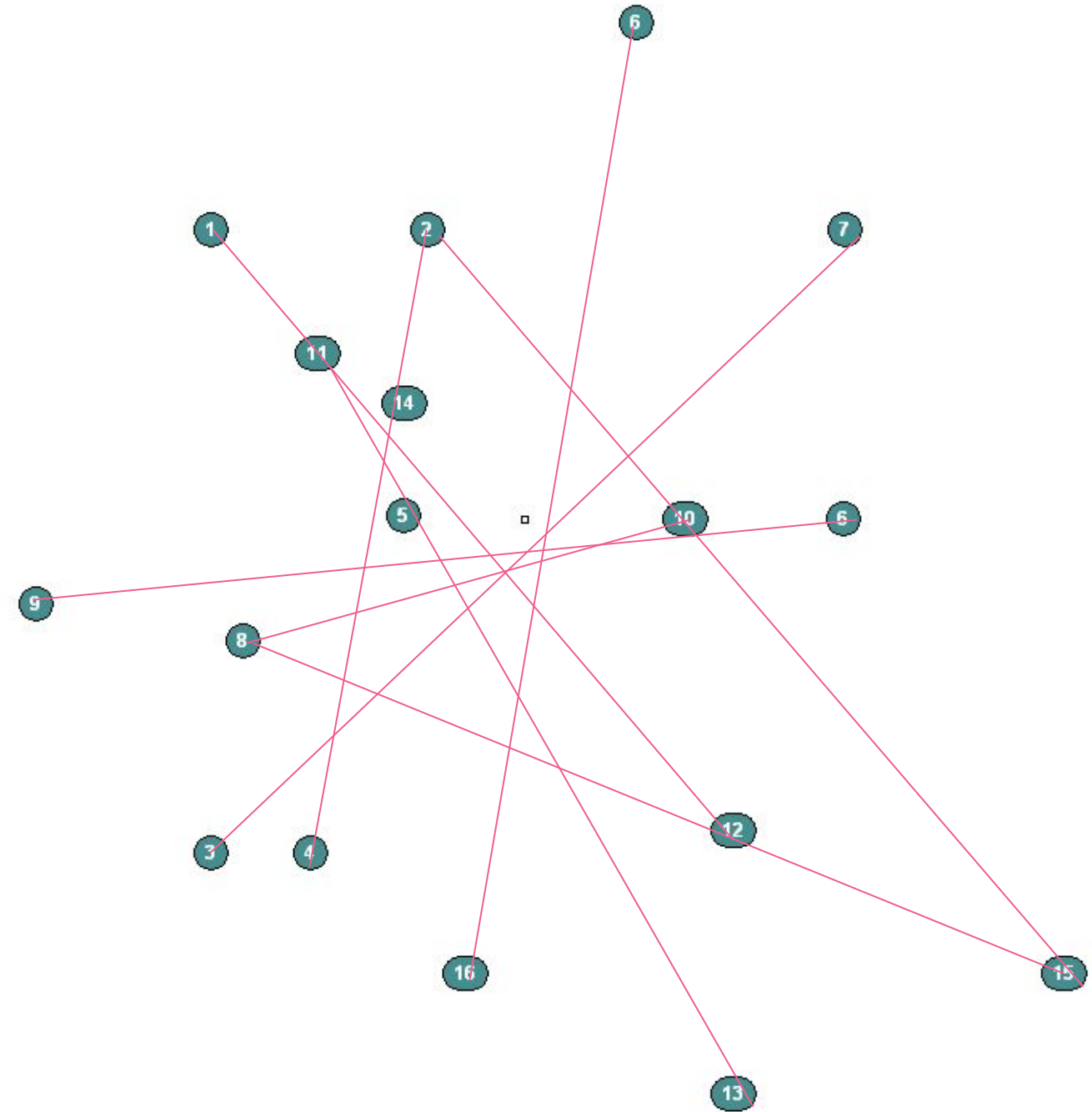
Next, we will take these commands and apply them to a drawing. Follow the instructions carefully and you will reveal a new friend!.



CONNECT THE DOTS!

This tutorial will use a “connect the dots” logic to construct a drawing.

For this exercise, be sure to have:
POINT snaps enabled

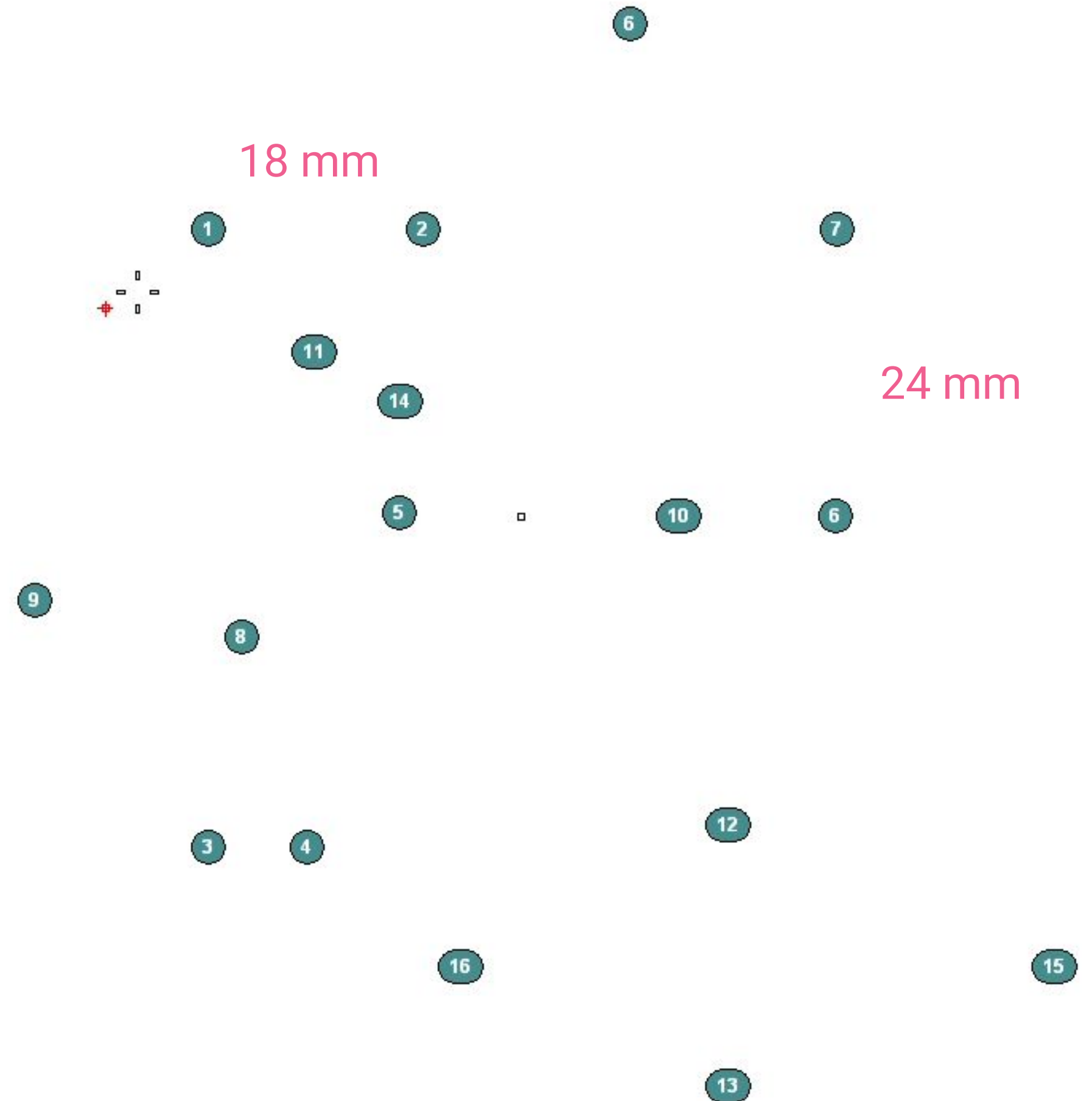


STEP 1: Use Line Command 3 Ways

Draw a **LINE** between dots 1 & 3

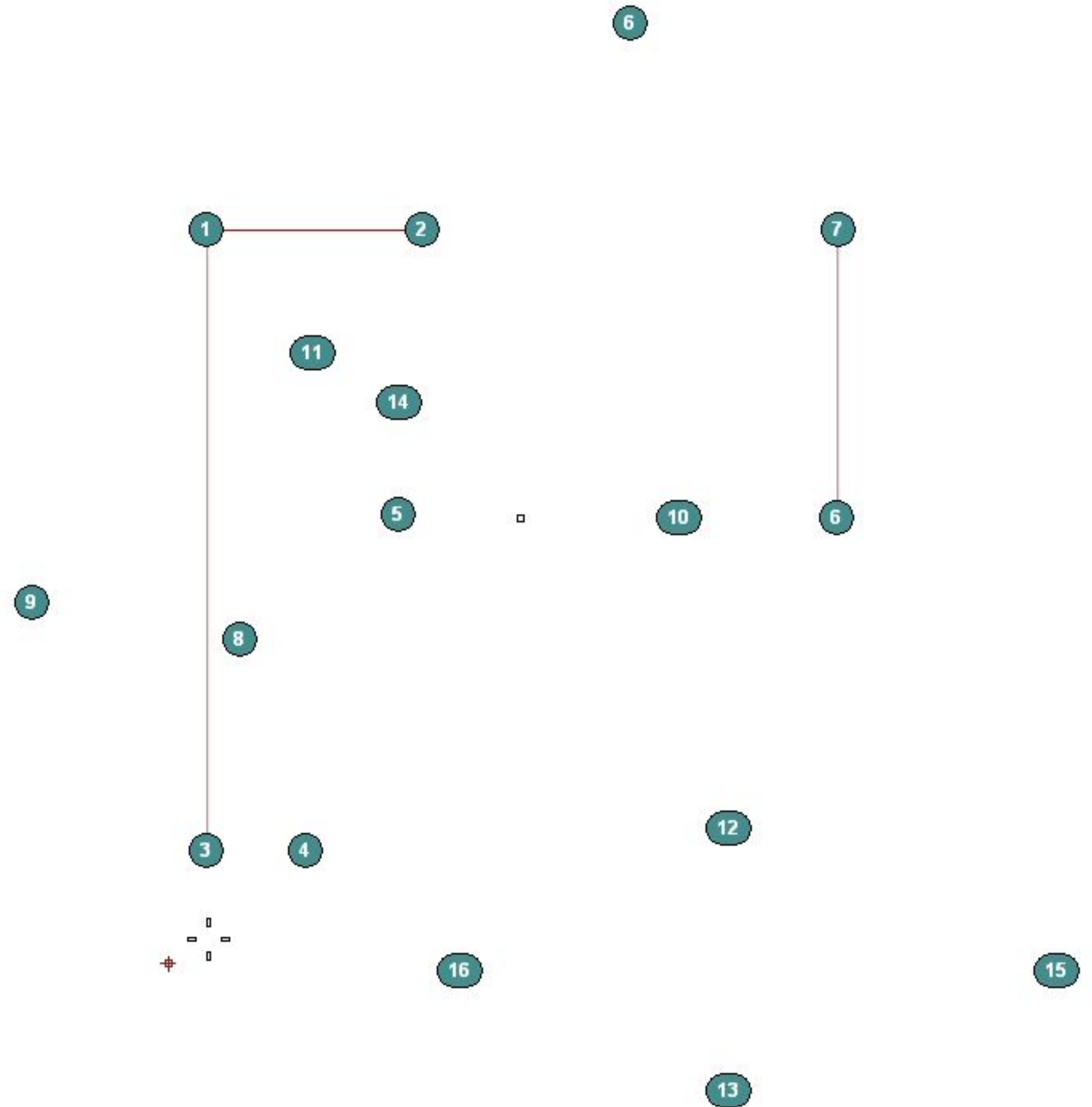
Making sure **ORTHO** is turned on, draw an 18 mm horizontal line between 1 & 2

Making sure **ORTHO** is turned on, draw a 24mm vertical line between points 6 & 7



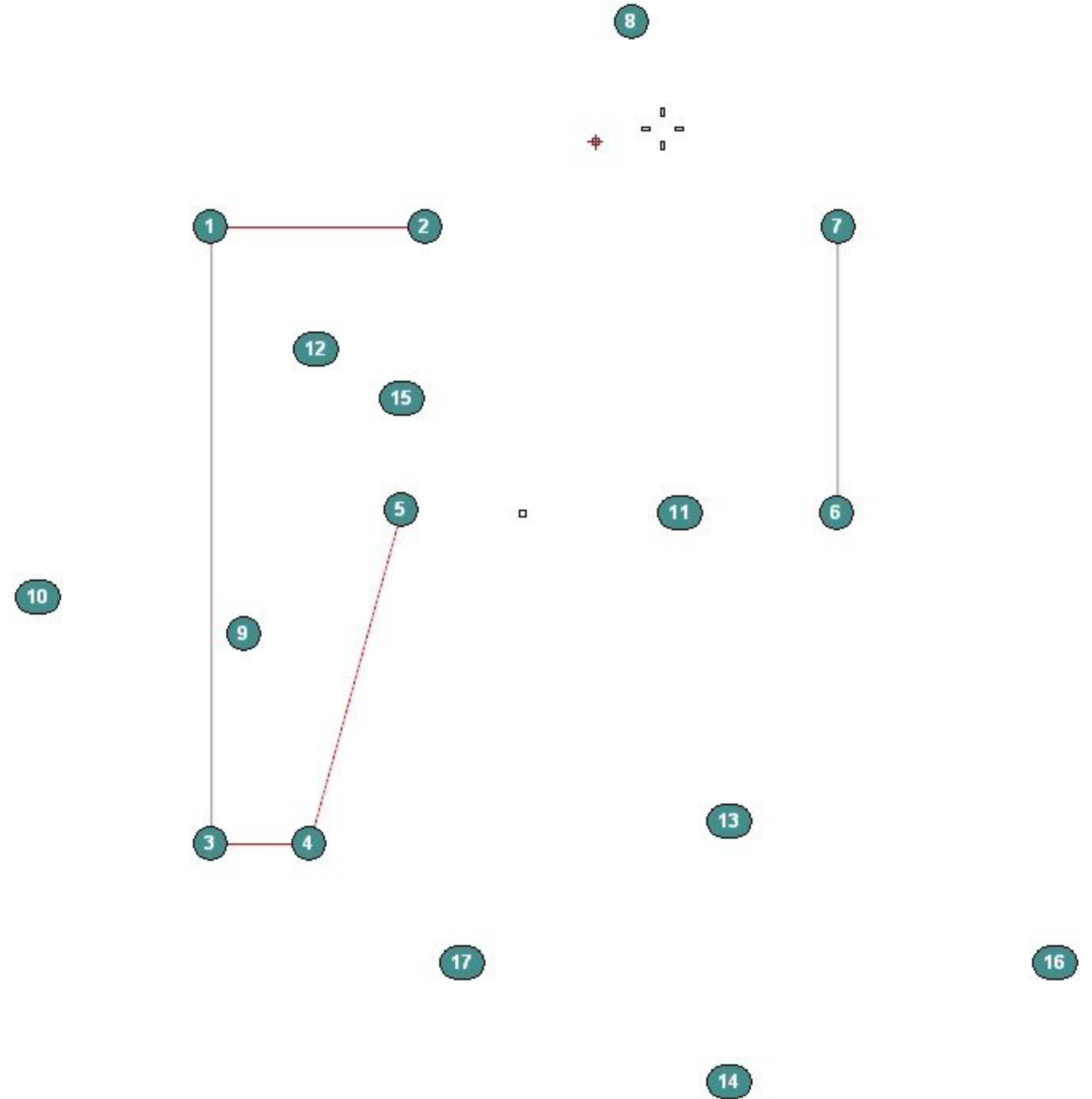
STEP 2

Draw a **POLYLINE** between points 3,4,5



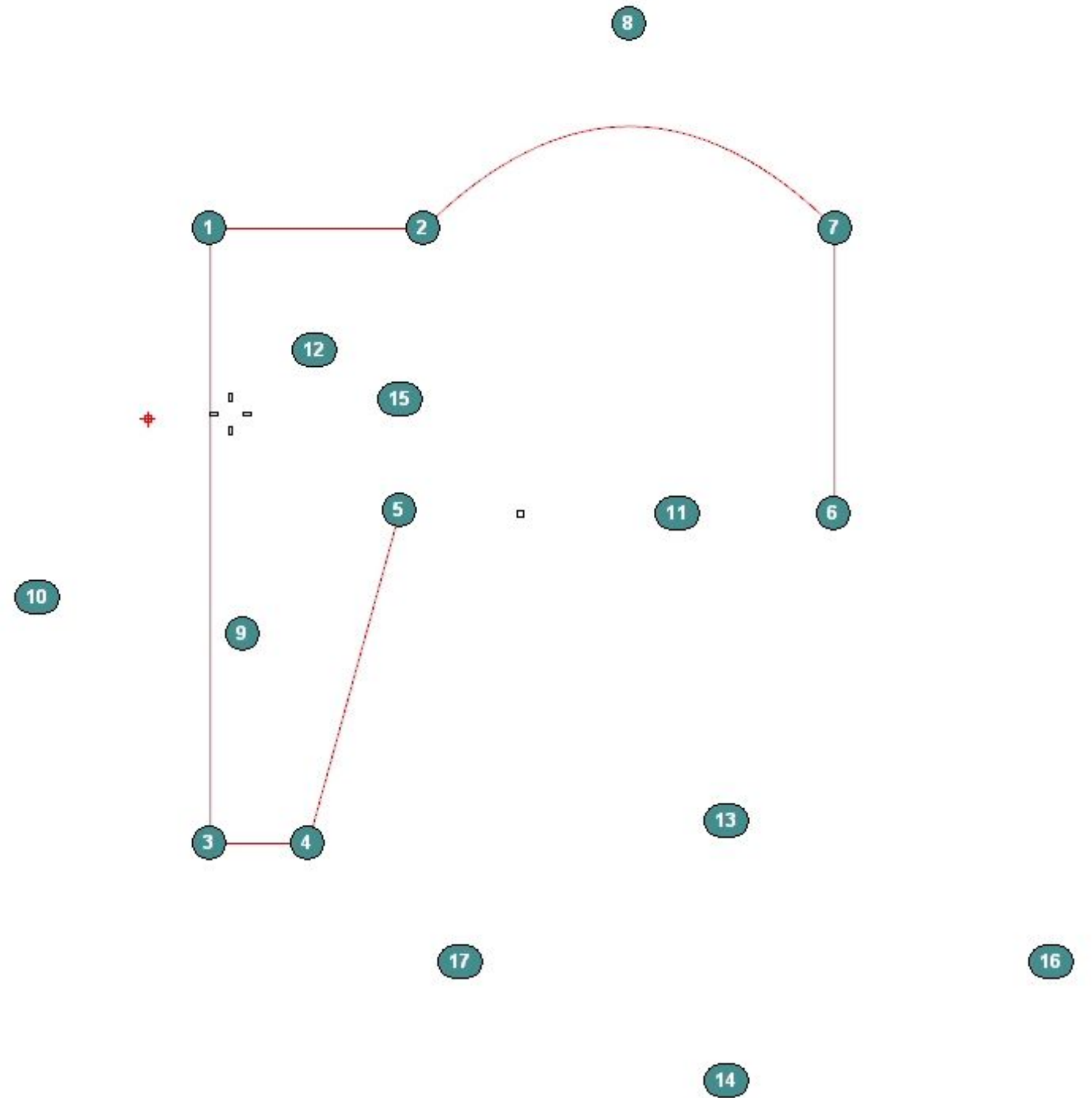
STEP 3

Draw a **CURVE** by clicking on dots 7,8,2



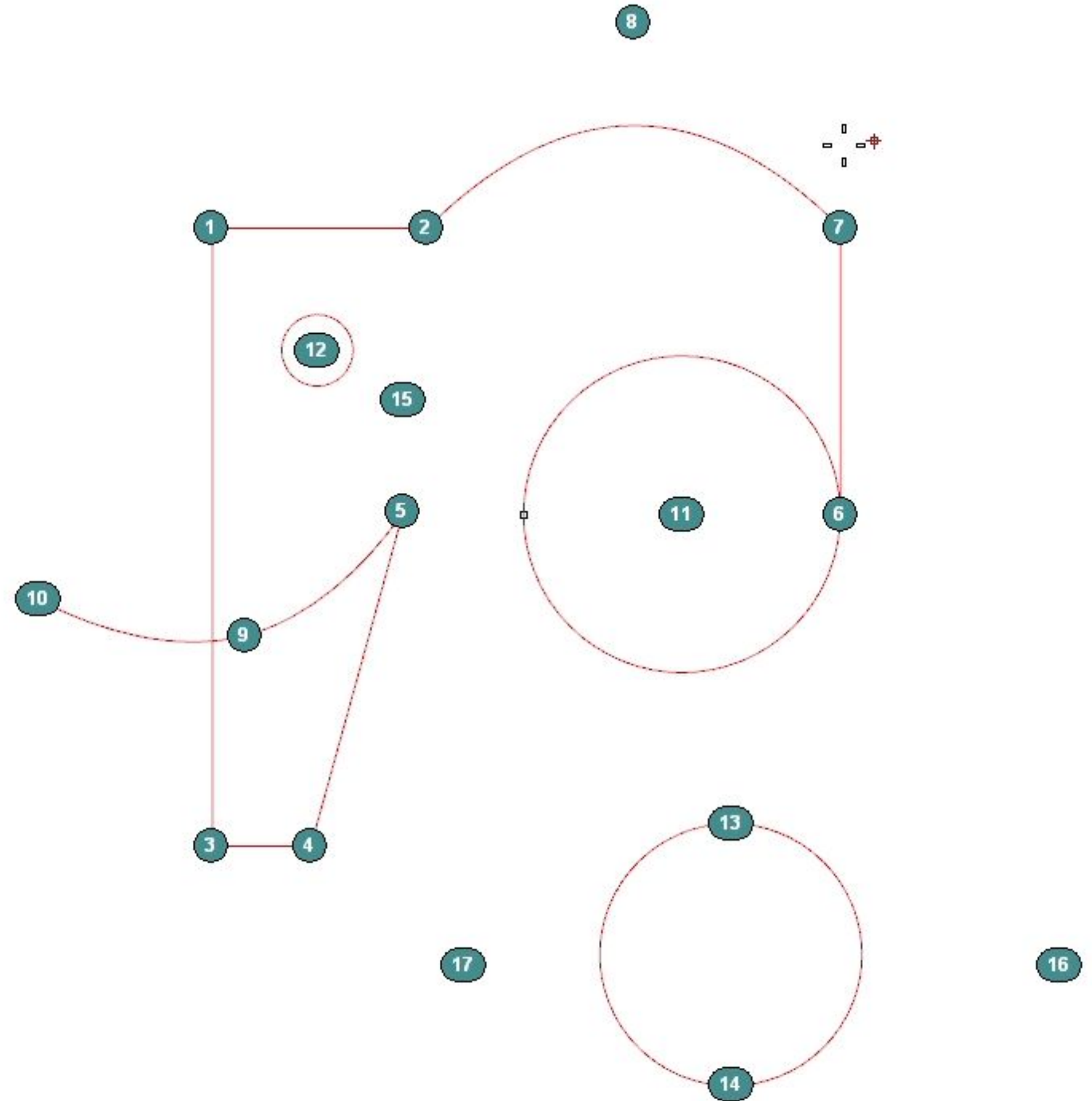
STEP 4

Draw a **INTERP CURVE** by clicking on dots 5,9,10



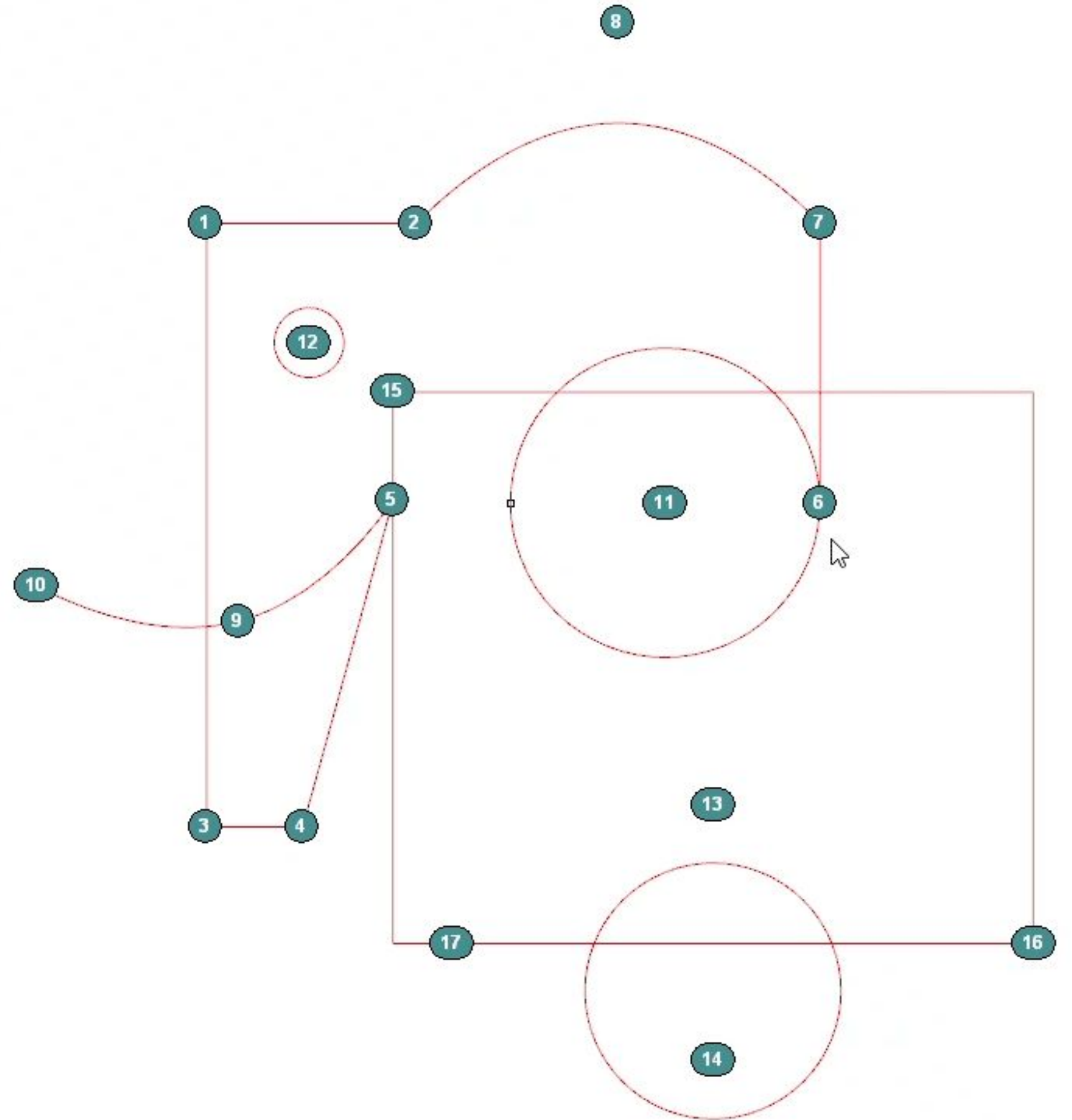
STEP 6

Draw a RECTANGLE between points 15 & 16



STEP 8

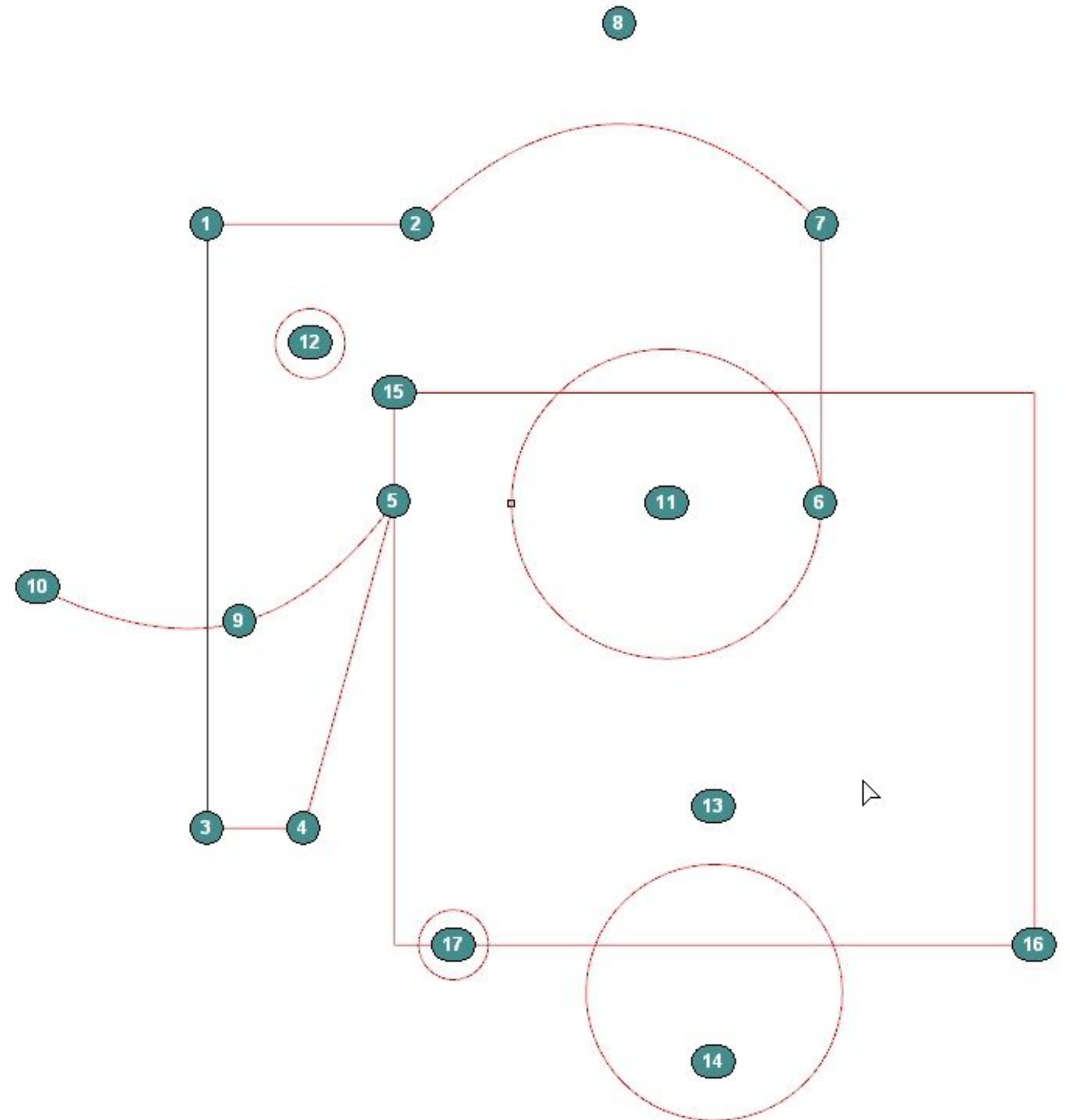
COPY the small circle from point 12 to point 17. Make sure to select the circle from the center point. You will need to have **CENTER** snaps enabled.



STEP 9

SCALE the bottom circle at point 14 using the center of the circle as the scaling point. Use a scale factor of 1.6

SCALE the small circle at point 17 in a similar manner using the center as a scaling point. Use a scale factor of 0.5

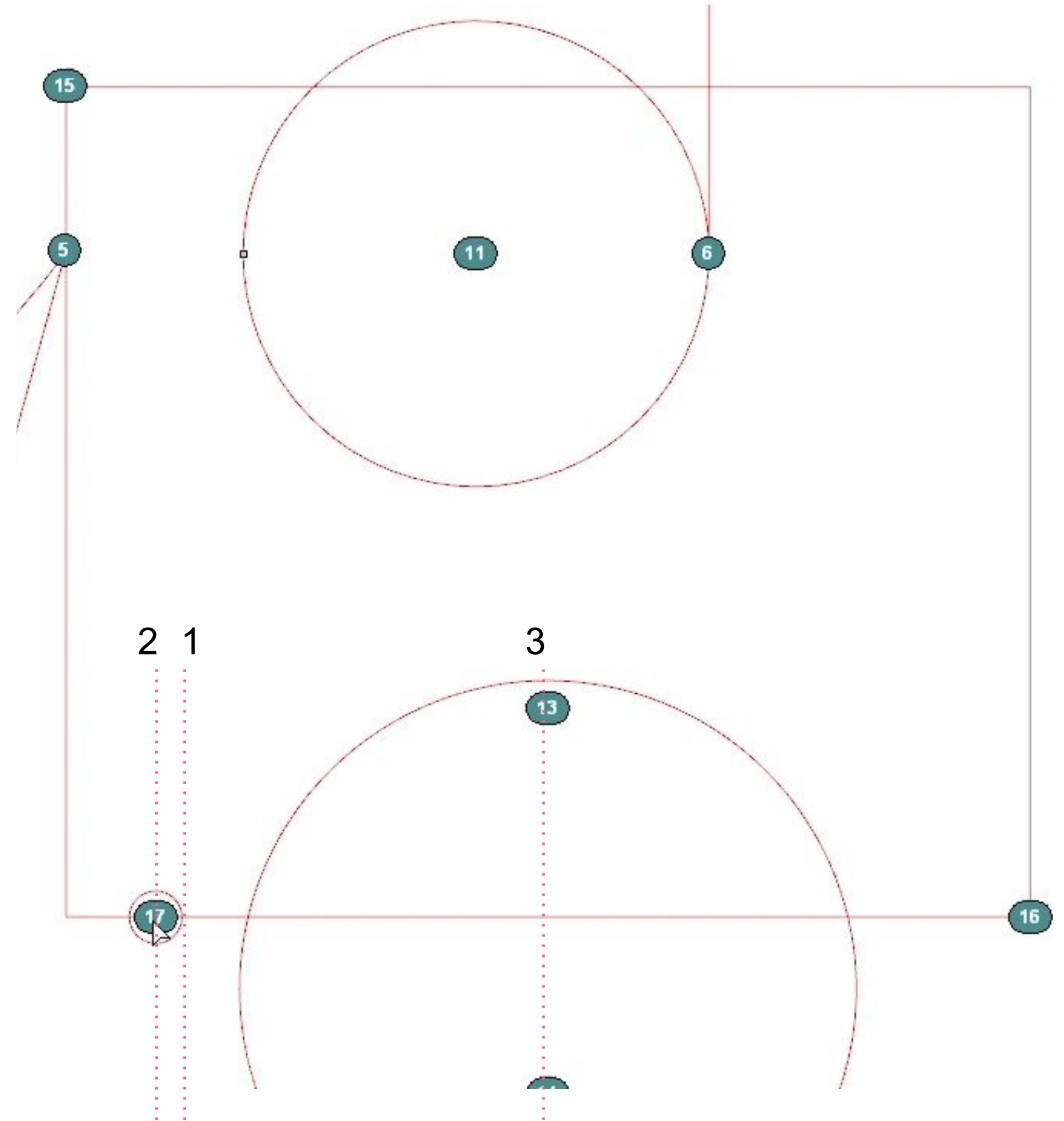


STEP 10

MIRROR the small circle at point 17 across its right **QUAD** point. You will need **QUAD** snaps enabled.

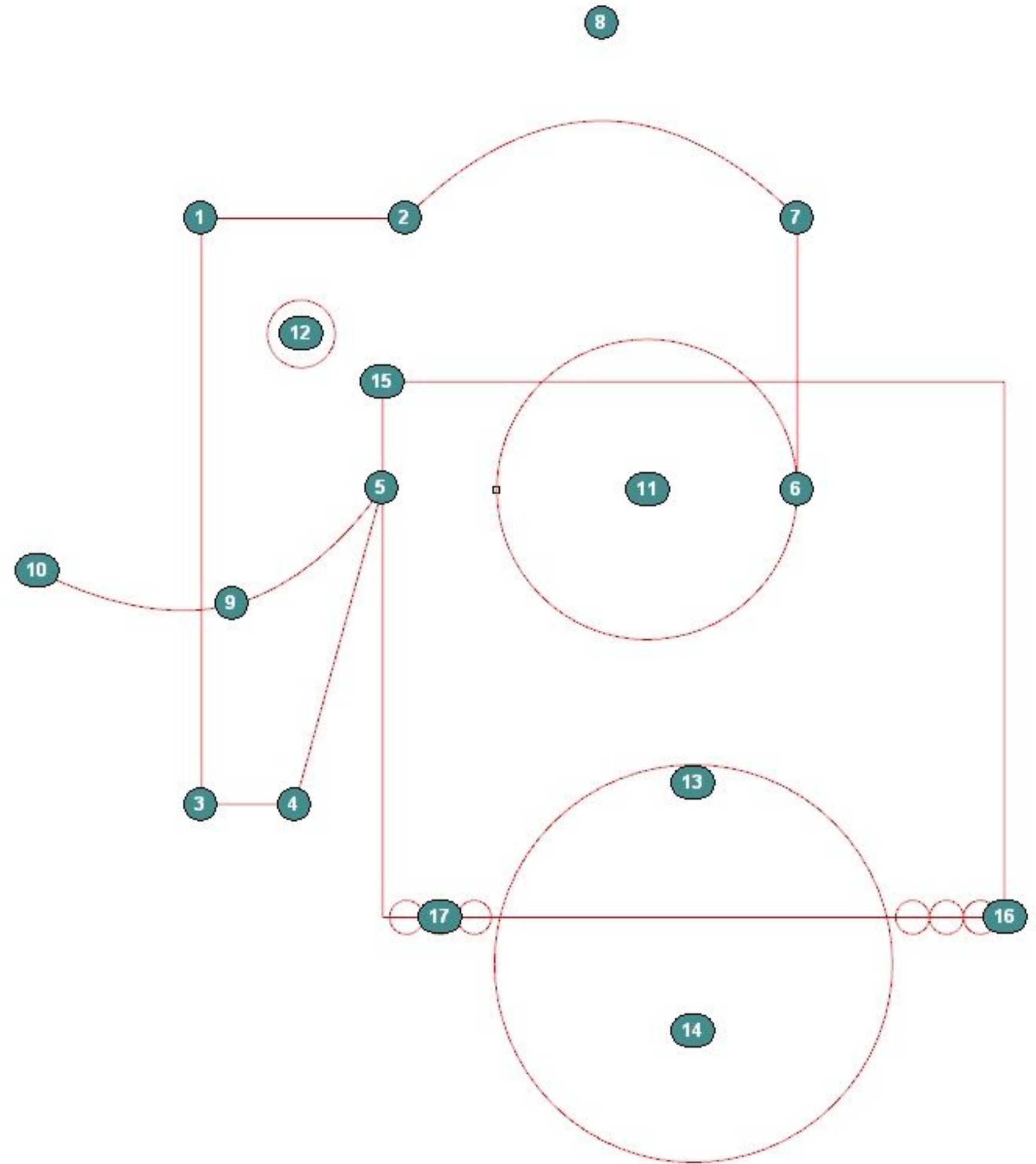
MIRROR this new circle across the **CENTER** point of the original circle.

MIRROR all three of these small circles across the **MIDPOINT** of the bottom edge of the rectangle. You will need **MIDPOINT** snaps enabled.



STEP 11

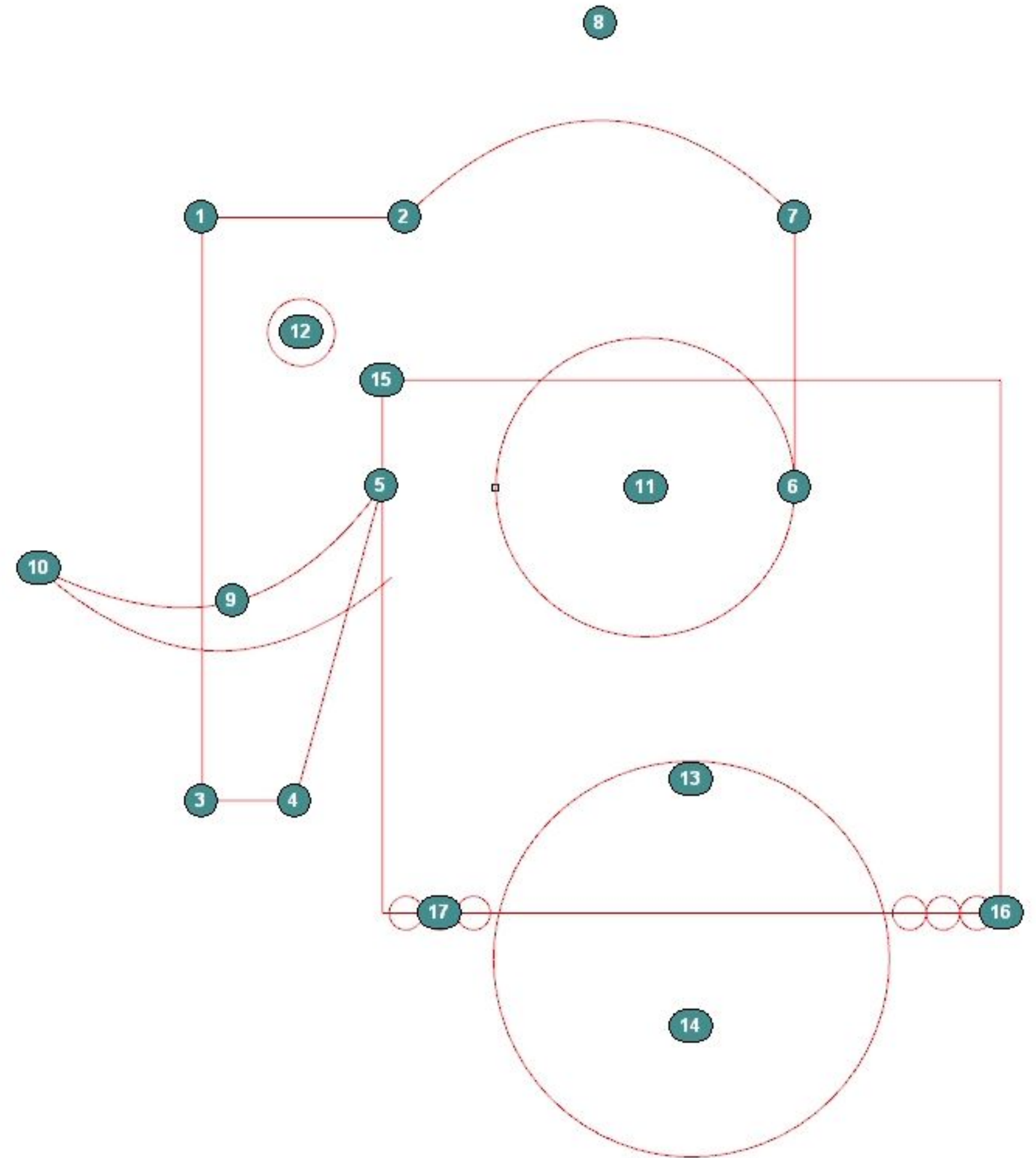
ROTATE the interp curve using point 10 as the rotation center. Rotate -15° . **Be sure to have the COPY option changed to YES before rotating.** This will allow you to create a duplicate of the original curve. Hit ENTER to end the command.



STEP 12

FILLET the lines at the top left using a radius of 8mm.

FILLET the line at the top right using a radius of 12 mm.

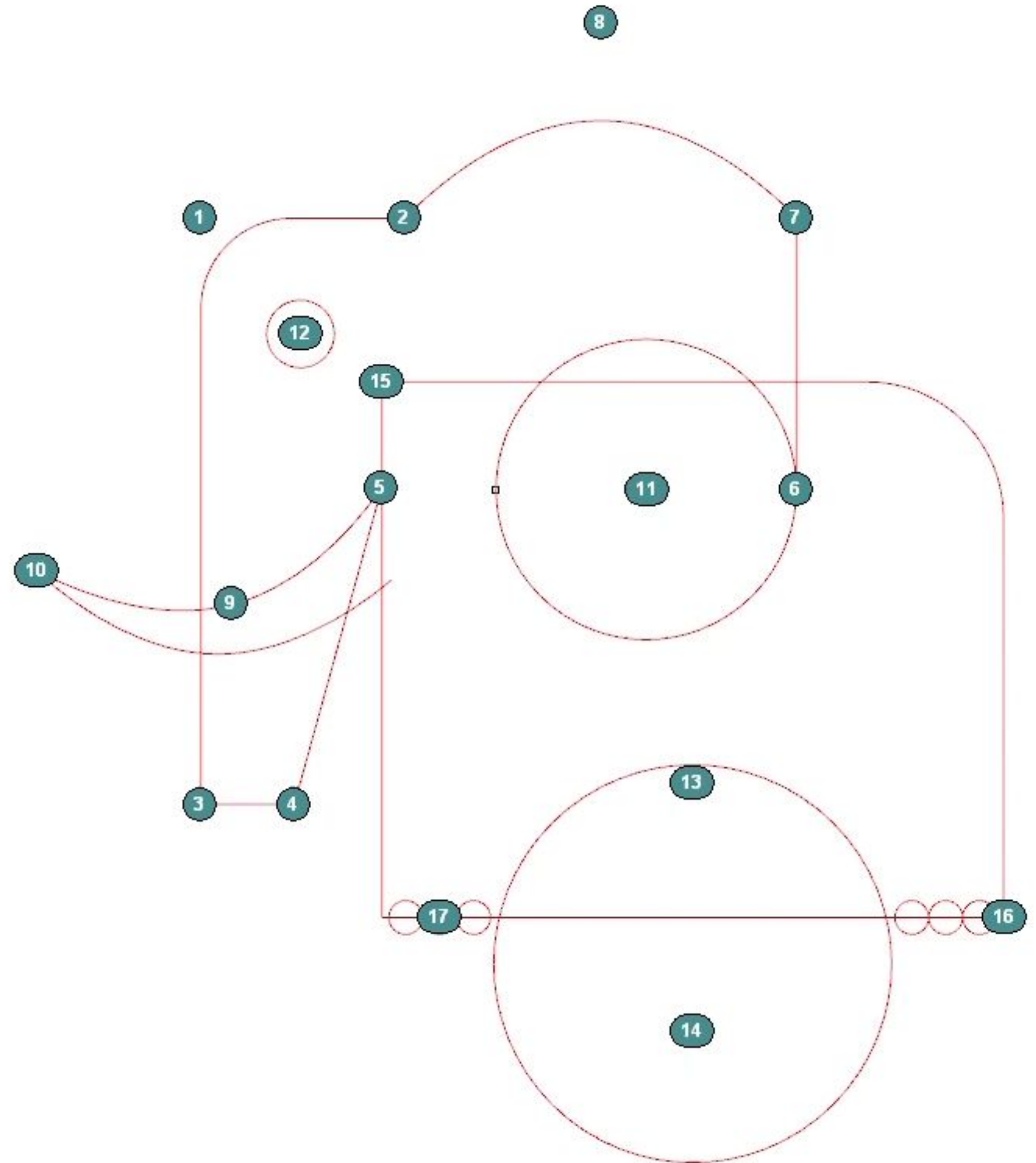




STEP 13

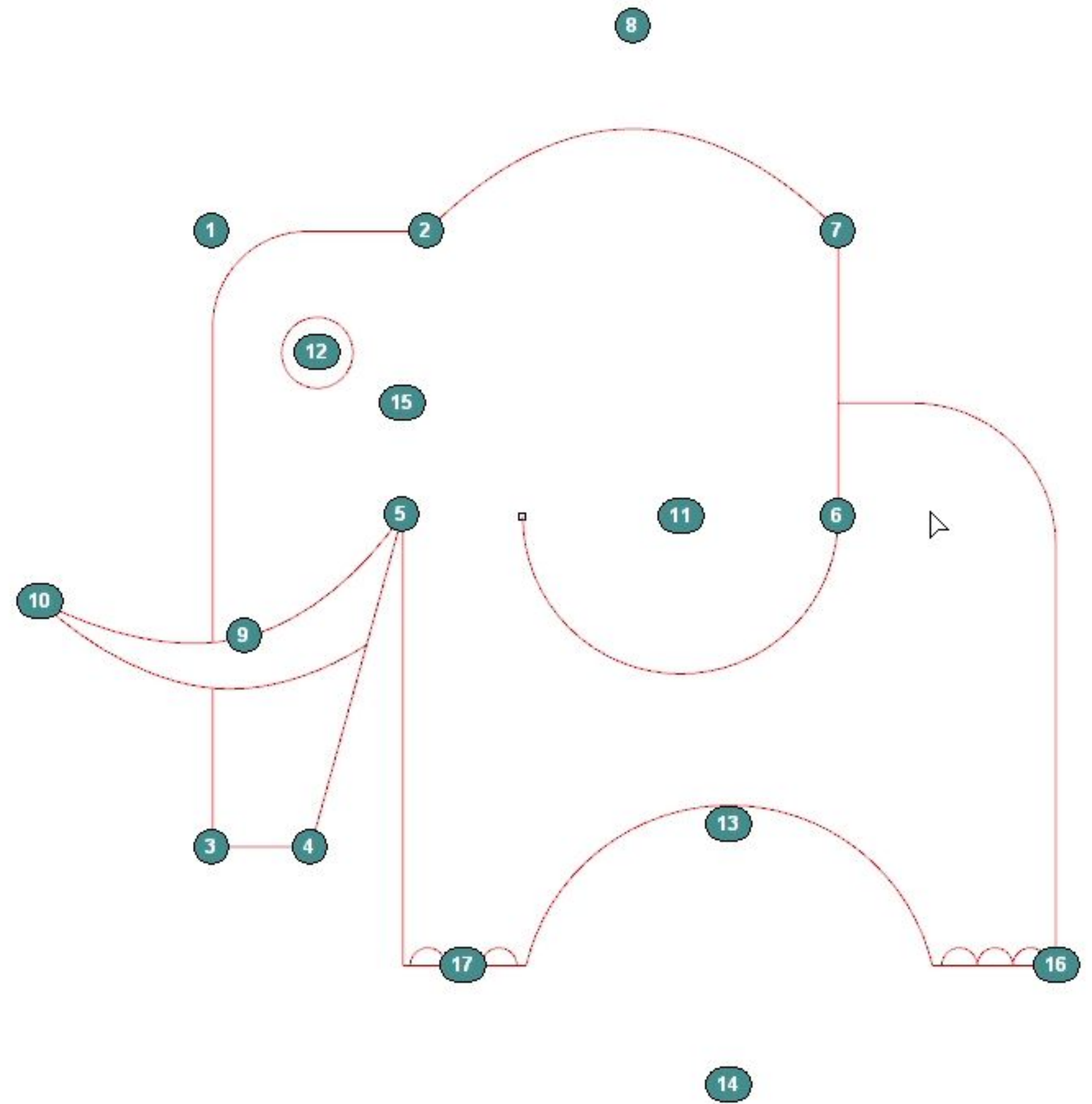
By now, you've probably guessed what we're drawing...

TRIM off the extra lines by selecting all curves and points and clicking on the line segments you wish to delete.



STEP 14

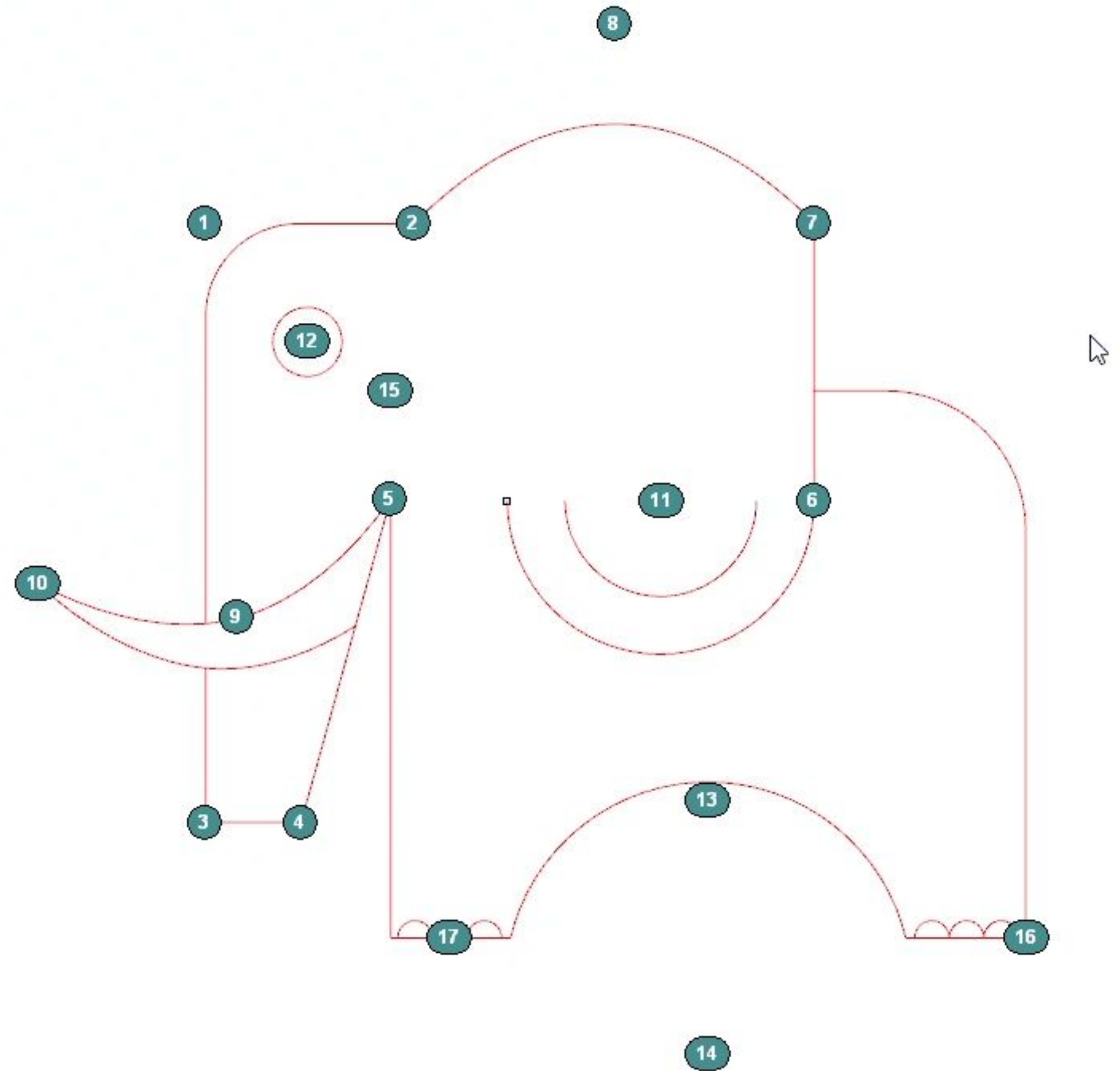
OFFSET the half-circle at point 11 by 5mm



STEP 15

SPLIT the ends of the elephant's tusks using the vertical line between points 1 & 3 as the cutting line.

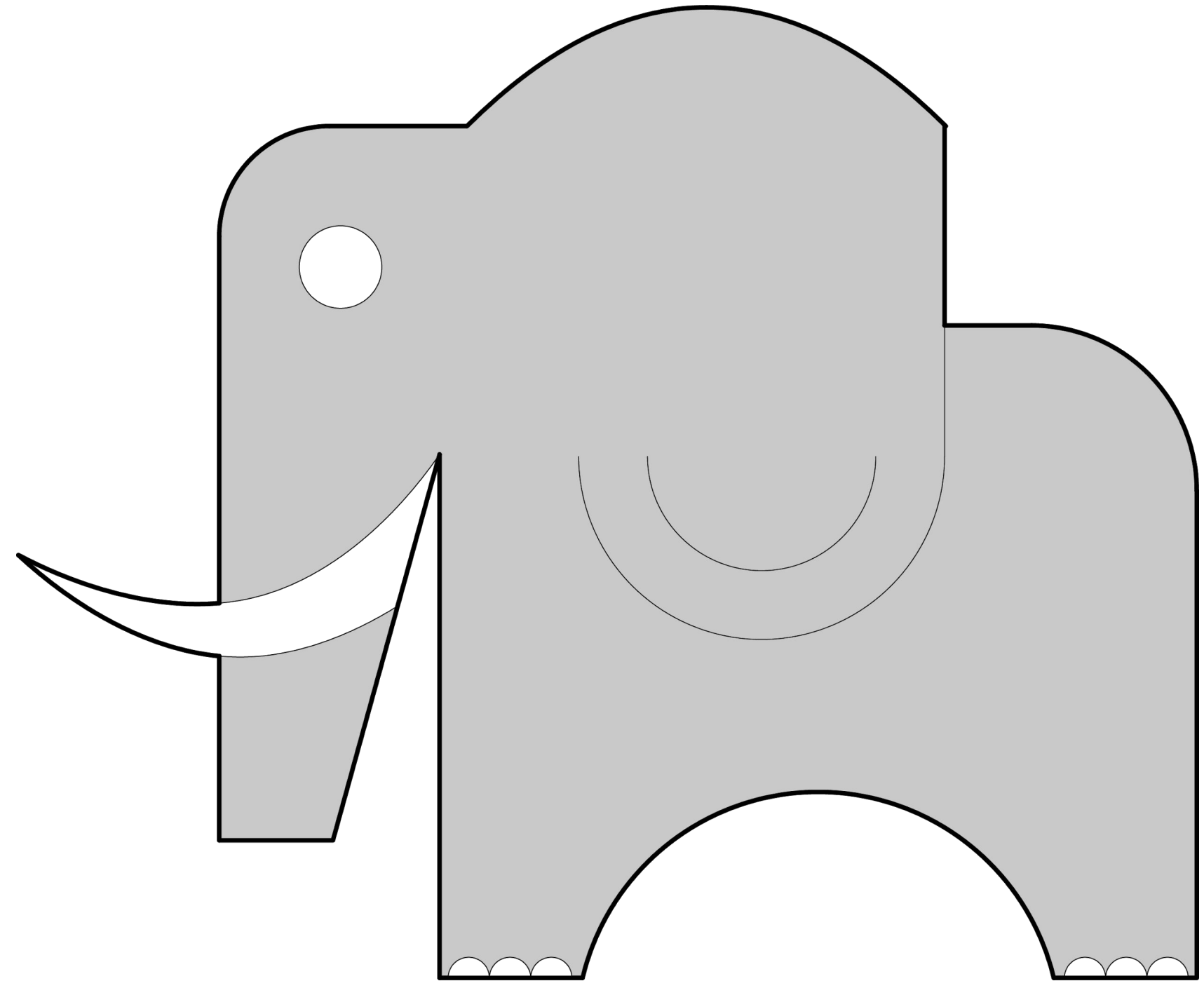
JOIN the outer lines together into one closed curve. The final drawing should look similar to the image below. .



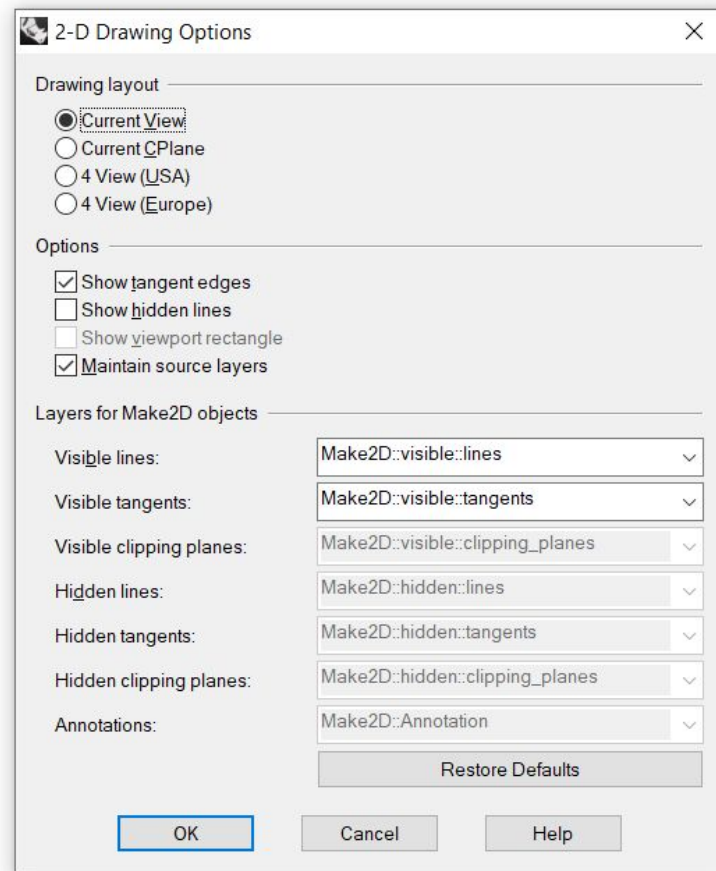
CONGRATULATIONS!

You've completed the drawing!

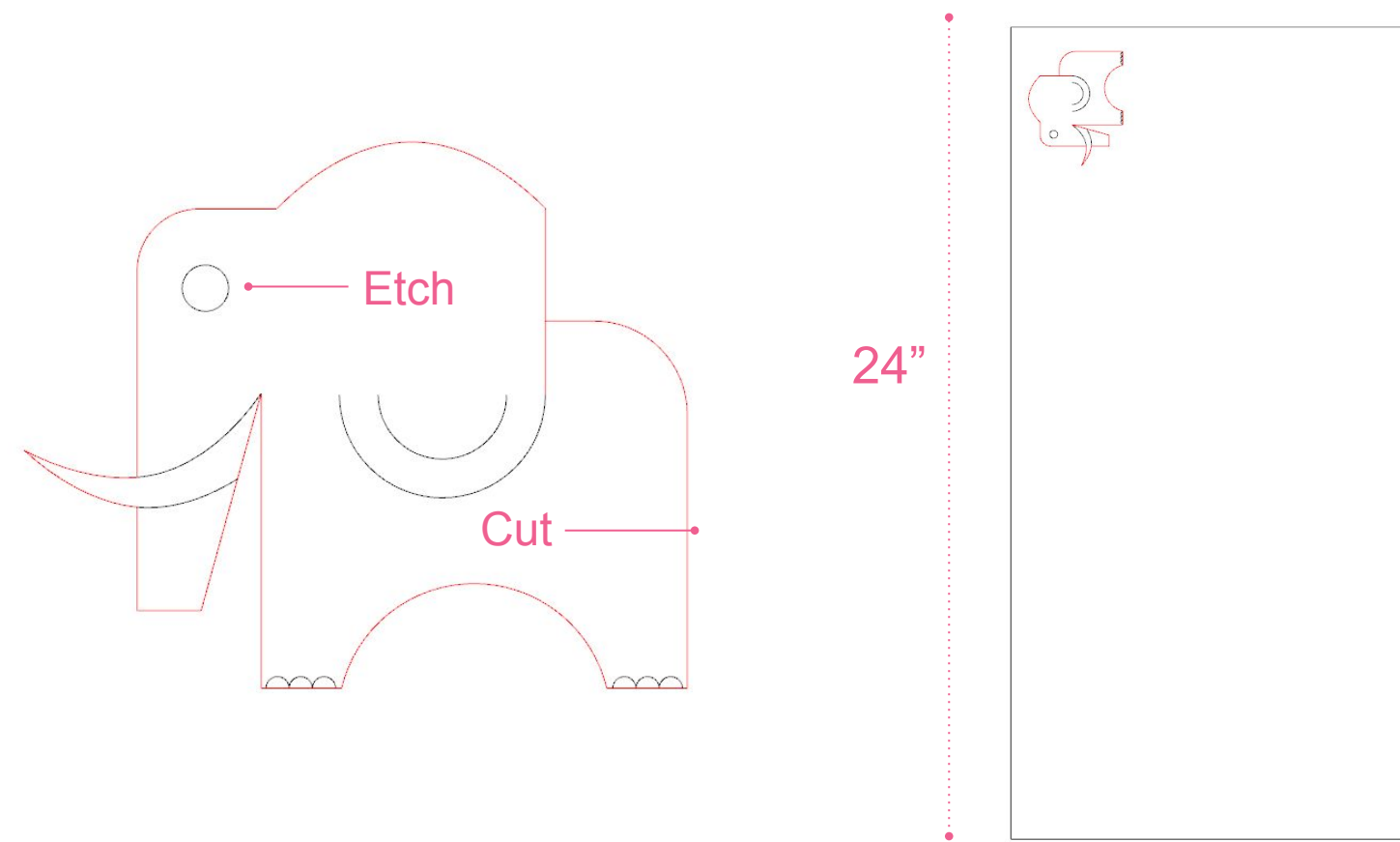
Now we will walk through how to prep the file for laser cutting.



LASER CUTTER WORKFLOW

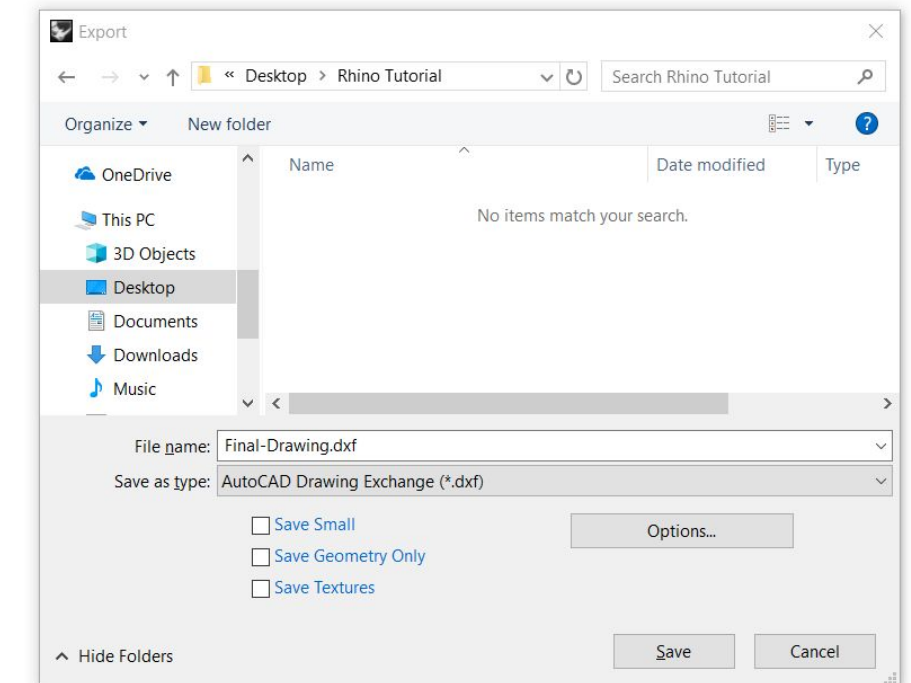


Select all lines
Make 2D



Designate Layers
for Cut & Etch

Draw Sheet
Boundary



Export as .DXF
(2007 Polylines)

FINAL PRODUCT

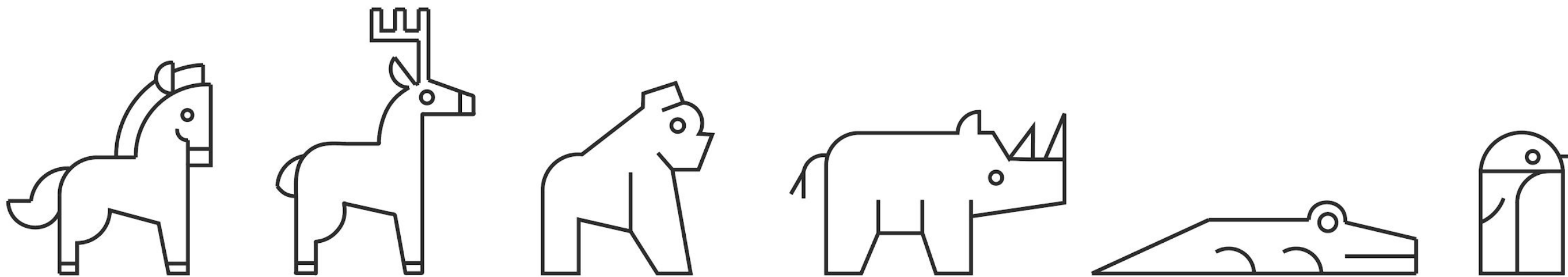
If you've followed instructions thoroughly, you should arrive at a final product that looks something like this!



MAKE YOUR OWN DESIGN!

Now that you've mastered the basic commands and drawing tools, spend some time developing your own unique creatures.

By turning on the REFERENCE layer, you will discover some more animals for inspiration.

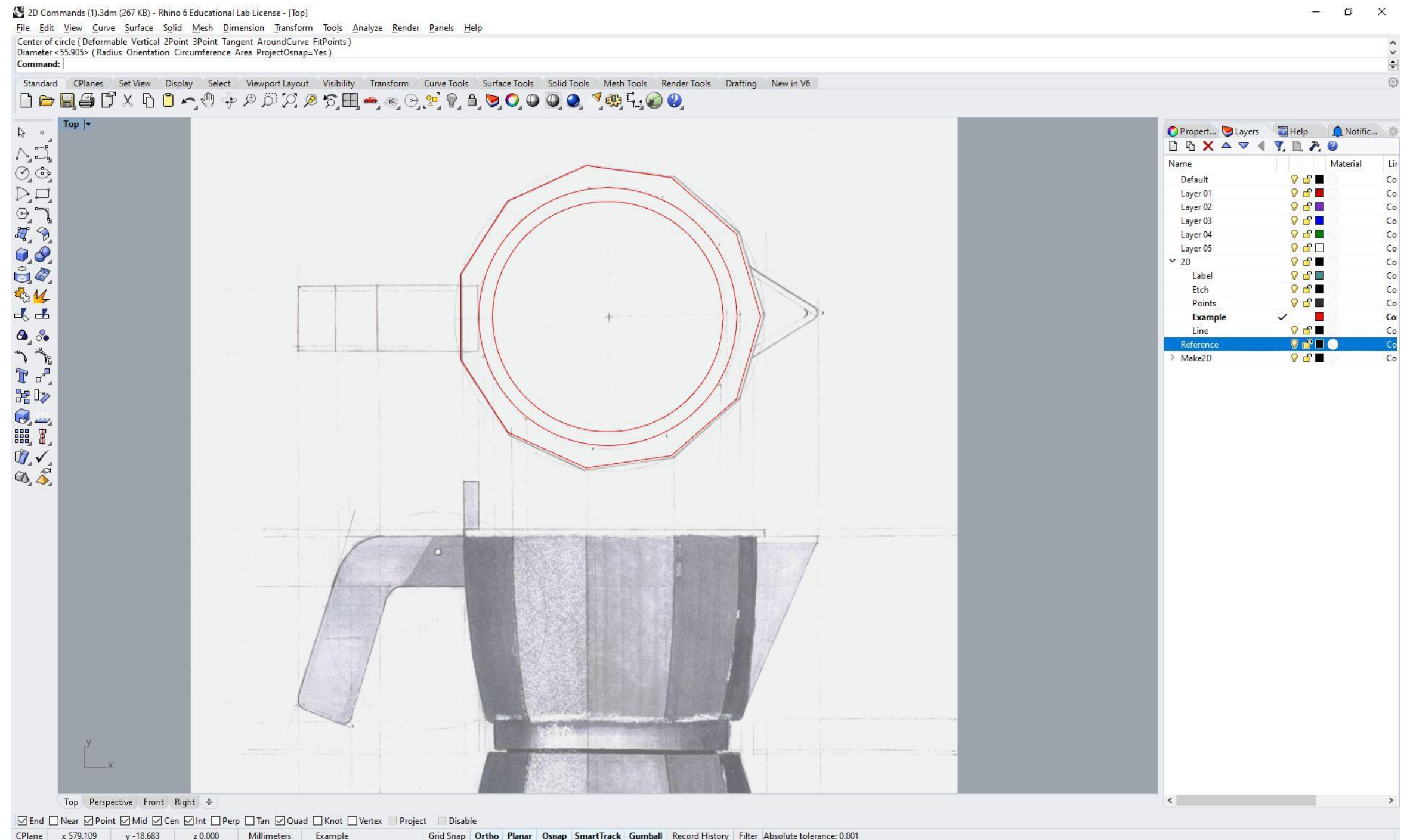


NOW DRAW YOUR OBJECT!

Now that you're a Rhino Master, try to recreate your hand-drawn orthographic drawings using the tools introduced in this exercise.

You can import an image into Rhino using the "Picture" command, then you can scale the image appropriately to your object and use it as a reference to trace over.

Use the same method of projecting lines to construct the various views (top, side, and front)



THANK YOU

NuNu