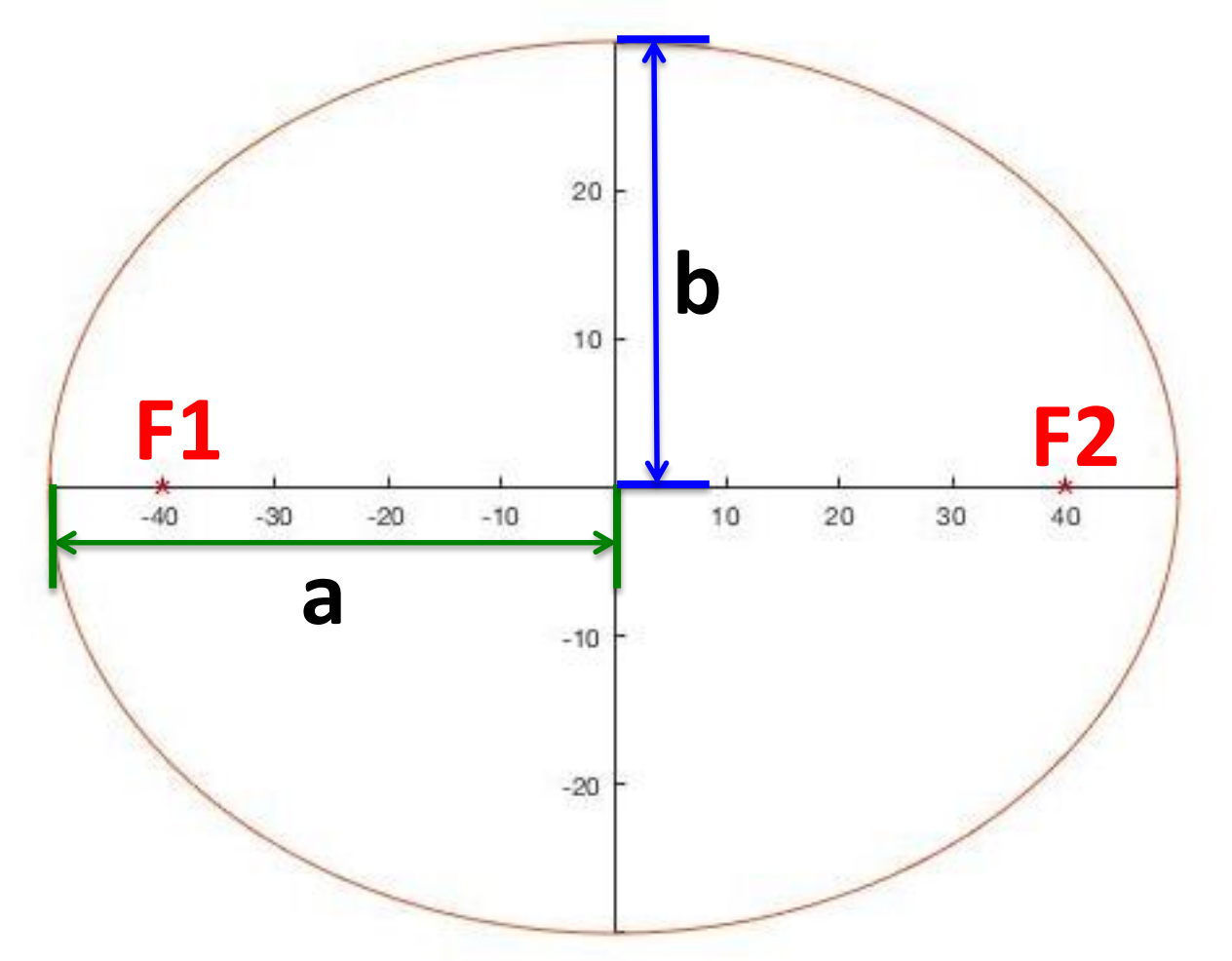
Ellipses

What makes an ellipse?



$$\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$$

F1 and F2 = foci

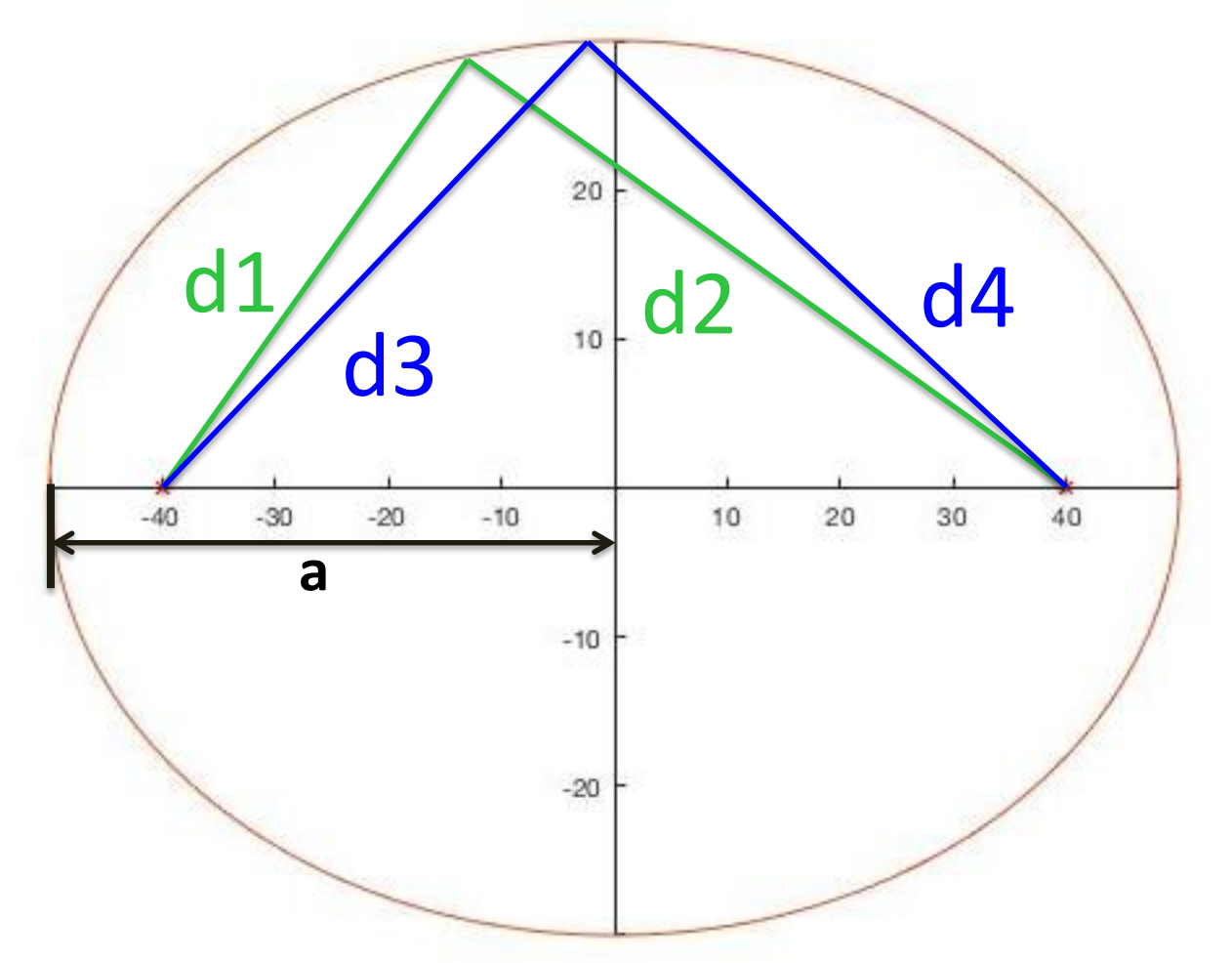
a = major axis

b = minor axis

What makes an ellipse?

- Definition:
  - A curve in a plane surrounding 2 focal points
  - The sum of the distances from each focal point to the curve is constant for every point of the curve
- Major axis is the longer axis
- Foci always located along the major axis
- A circle is one type of ellipse

Special property of ellipses

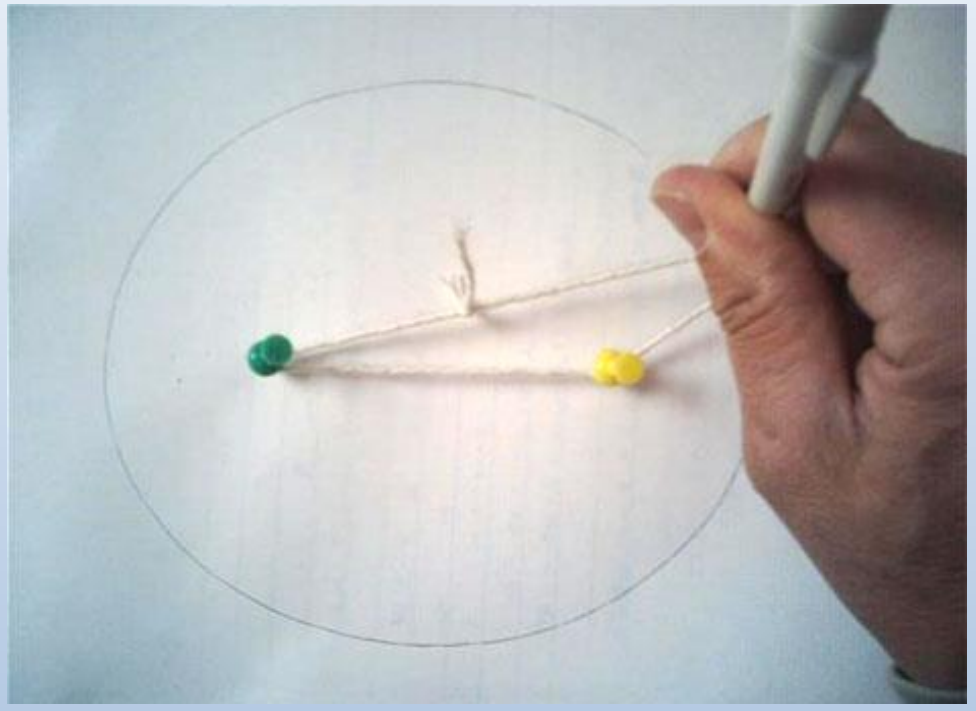


The sum of the distances from each focal point to the curve is constant for every point of the curve

$d1+d2=2a$

$d3+d4=2a$

Test this property yourself



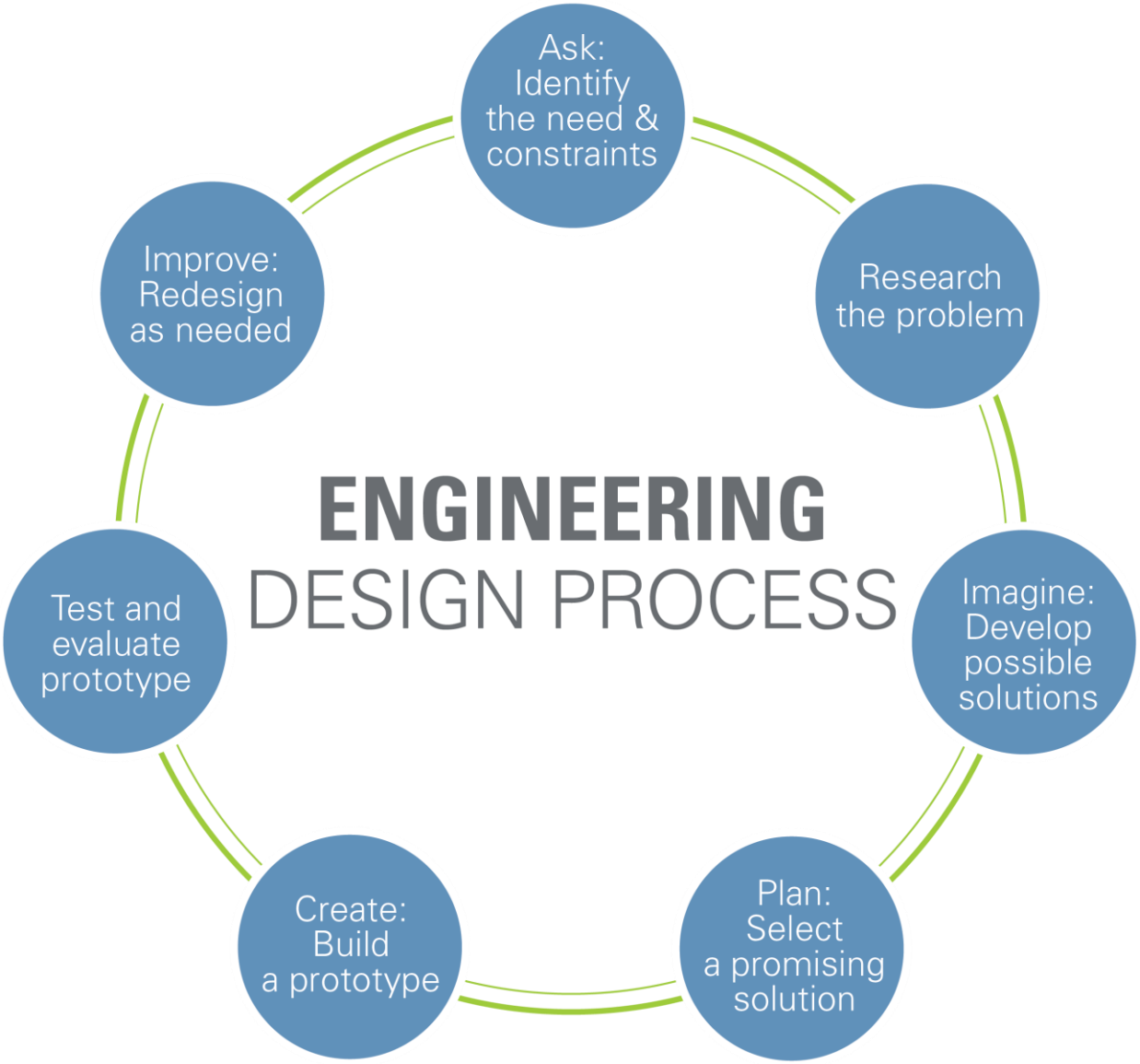
Use graph paper
to draw an ellipse:

- Find the foci
- Cut a length of string that is equal to 2a
- Pin down each end of the string to the foci
- Trace the string around the edge of the ellipse

Your engineering design challenge

Today's task is to demonstrate your knowledge of ellipses by creating an **elliptical pool table**

Steps to guide you…



Follow the steps of the engineering design process to create your table

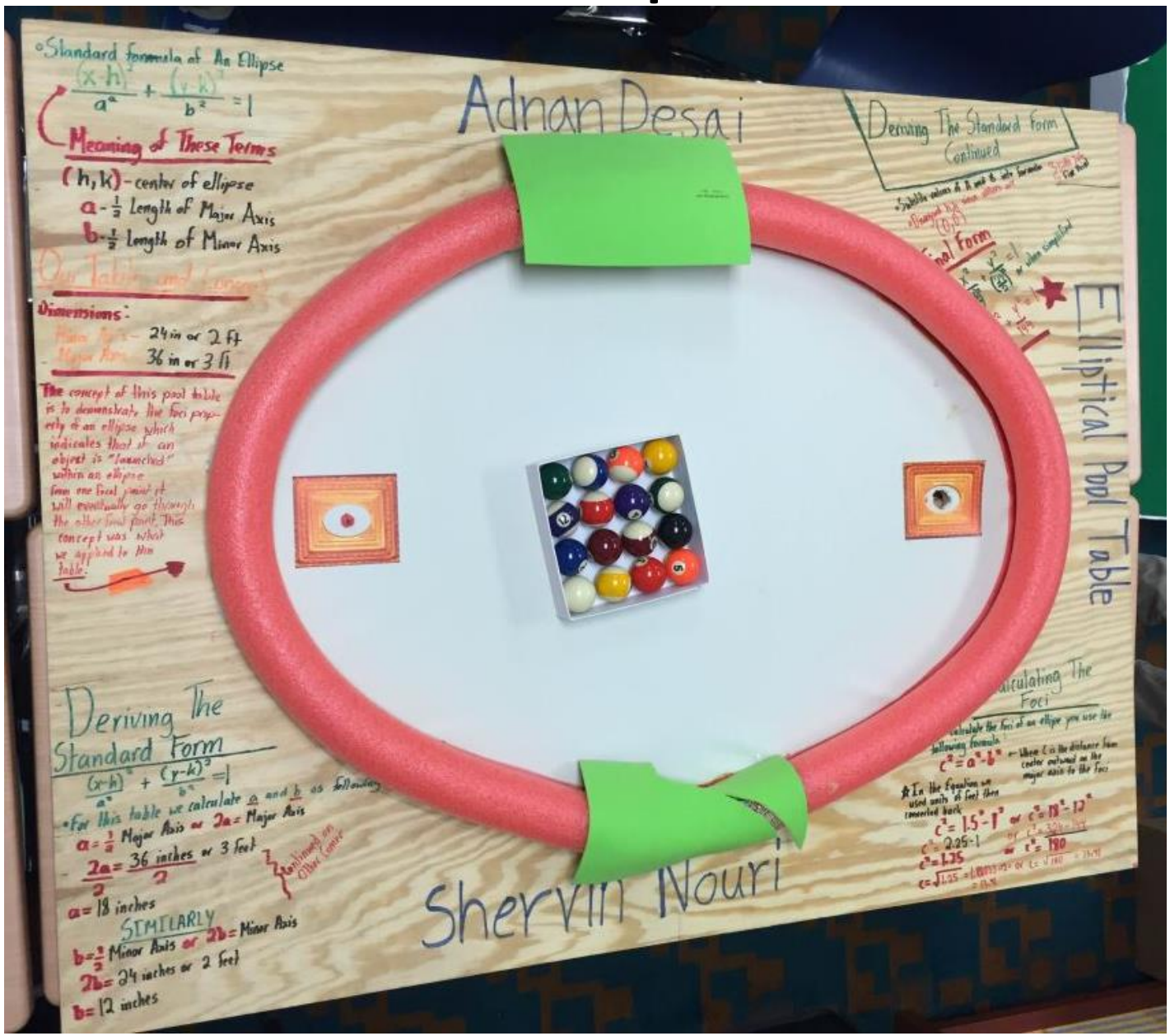
Note the brainstorming, planning and redesigning steps!

Design Constraints

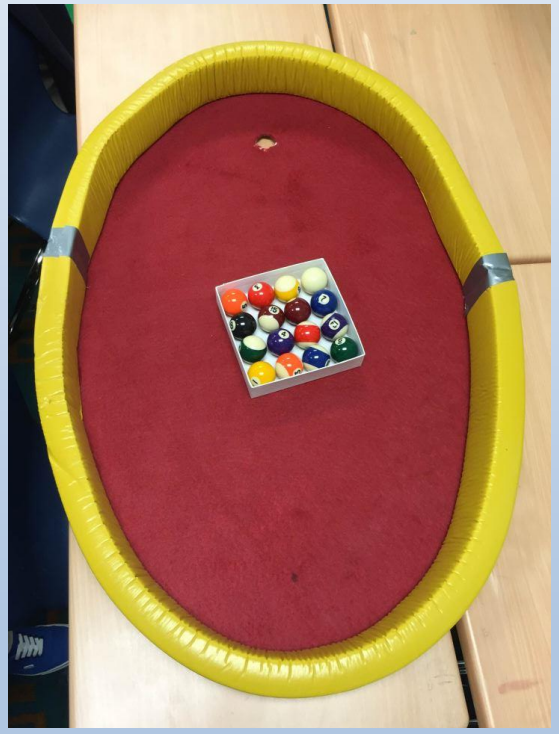
- Elliptical-shaped pool table
  - One focal point is the pocket
  - The other focal point is the break spot
- Group budget = $10
- Maximum table size = 2 feet x 2 feet

For engineers, design constraints are the requirements and limitations that final design solutions must meet.

Past student examples (for the teacher)



Past student examples
(for the teacher)



Past student examples

(for the teacher)