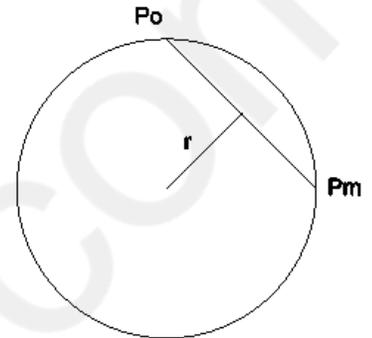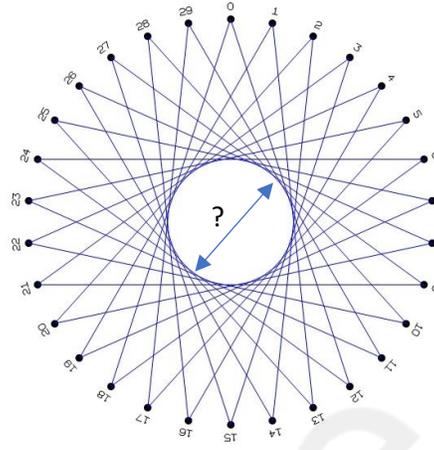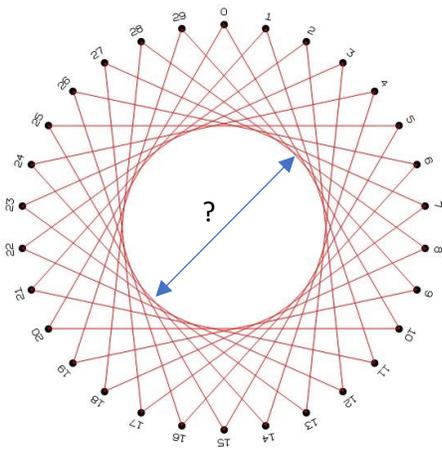# Advanced Math Questions on String Art

1. Given a frame with N holes and if you are skipping by M holes at a time (0, m, 2m…...). Prove that you will come back to the starting hole in X jumps, X<= N.
2. Find the diameter of the hole formed in the centre? (30-hole, 10 addition disc of dia 100mm).

    Hint: Find the equation of the line passing through Po and Pm
    (Ax +By +c) and then find the shortest distance of the line from the centre (0,0).   r = C/ ((A^2 + B^2) ^1/2)
    Also verify this by dropping a ball through the centre.

3. If there are 20 holes, and you do jump counting by M (0, m, 2m…...)
    Find the set of M's for which you will come back to the starting hole, only after 20 jumps, covering all the vertices.
4. Find the points that are to be joined to form an ellipse in the centre.
5. Calculate length of string needed for given N and K in "addition" case!
6. Calculate length of string needed for given N and K in "multiplication" case!
7. In back-forth method: Calculate length of string used on the FRONT side and BACK side for given N and K in add and multiply case! Also Calculate TOTAL string length (Front + Back side length).
8. You have a string of length 2 meters. Will it be sufficient to string a 30-hole, 10 addition disc of dia 100mm using method1 (0 – 10F – 1B – 11F – 2B) ? Will it be sufficient to string a 30-hole, 10 addition disc of dia 100mm using method2 (0 – 10f – 9b – 19f – 18b) ?
9. Student 1 has stringed 40 hole, 8-addition string art in back forth method. Now he needs the same color string to make a 30 hole, 10-addition string art, but it is out of stock! Can he dismantle the 40-hole-8-add string and complete the 30hole-10-add art?
10. A cardioid shape is forming when we do 2 times multiplication. What you will do if you want to form new shapes like an ellipse, Rouleaux triangle etc.