You are used to a Rectangular (Cartesian) Coordinate System. The Polar Coordinate system is a different way to graph!

Learning how to Graph:

First there is an Origin or pole (represented by a snow ball).

Directly to the right of the origin is a flat, horizontal line (black arrow) called the polar axis.

Instead of naming a point \((x, y)\), in this system we use \((r, \theta)\).

Let’s plot the point \(\left(4, \frac{3\pi}{4}\right)\).

\(r\) is the distance from the origin to the point you are about to plot. Here, using the candy cane stripes, count 4 red stripes from the snowball a.k.a. “the origin.” Do not plot the point yet!!!!

\(\theta\) is the angle from the polar axis (black arrow) to where you are going to plot your point. Keeping your finger on the 4th red stripe turn the candy cane to \(\frac{3\pi}{4}\). This is where you would plot your point!!!!

For a review of degrees to radians, I’ve provided the North Pole (yellow circle) as a guide!! Remember that going counterclockwise is positive radians. To find negative radians turn the arrow clockwise.

Review: To plot a point \((r, \theta)\):

1. count distance \(r\) from the origin
2. move \(\theta\) away from the polar axis
3. mark your point

with the same candy cane, plot \(\left(6, \frac{5\pi}{4}\right)\). What sticker do you find? ______________________

Who is the man pictured on this board? ______________________

What polar equation is he famous for? ______________________

What is the shape of the equation? _______________________

Jan and Hector were playing Polar Coordinate Tic-Tac-Toe. They need to get 4 in a row to win. On the bulletin board are the three ways you can win at this game. Look at the game Jan and Hector are playing.

What point can Jan win at?
What point can Hector win at?

Play your own game of Tic-Tac-Toe with a friend. List the points for each player.
Pick either the limaçon or the flower to find $r$ for the following points:

Equation: ________________________________

Shape: ________________________________

<table>
<thead>
<tr>
<th>$r$</th>
<th>$\theta$</th>
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<tbody>
<tr>
<td>$\frac{\pi}{4}$</td>
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<tr>
<td>$\frac{\pi}{2}$</td>
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<td>$\frac{3\pi}{4}$</td>
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