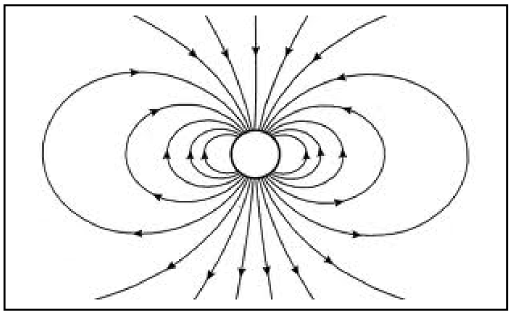
Mathematical Model of Magnetic Field Lines - I



Magnets have a north and a south pole. If you make this magnet small enough so that it looks like a point, all you will see are the looping lines of force mapped out by iron fillings or by using a compass.

Physicists call these patterns of lines, magnetic lines of force, and they can describe them mathematically!

Problem 1 - Create a standard Cartesian 'X-Y' graph with all four quadrants shown. Select a domain [-5.0, + 5.0] and a range [-2.0, +2.0] and include tic marks every 0.1 along each axis.

Problem 2 - Plot the following points in the order given and connect them with a smooth curve.

X	Y
+0.0	+0.0
+0.1	+0.3
+0.6	+1.1
+1.8	+1.8
+3.2	+1.9
+4.1	+1.6
+4.5	+1.2
+4.9	+0.6
+5.0	+0.0

Problem 2 - Reflect the curve you drew into Quadrant 4, then reflect the curve in Quadrant 1 and 4 into Quadrants 2 and 3 to complete a single magnetic line of force for a magnet located at the origin!

Problem 3 - Add two additional lines of force to your picture by re-scaling the figure you drew so that the X-Y coordinates are now A) 1/4 as large and B) 1.5 times larger.

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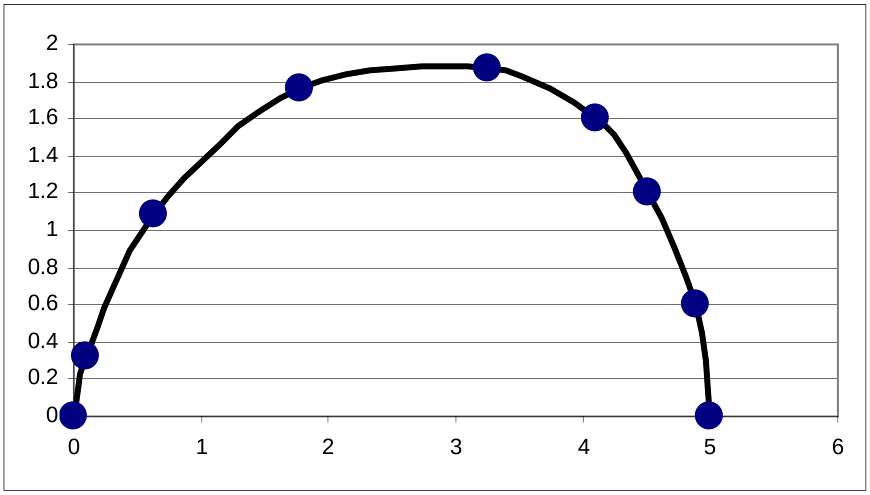
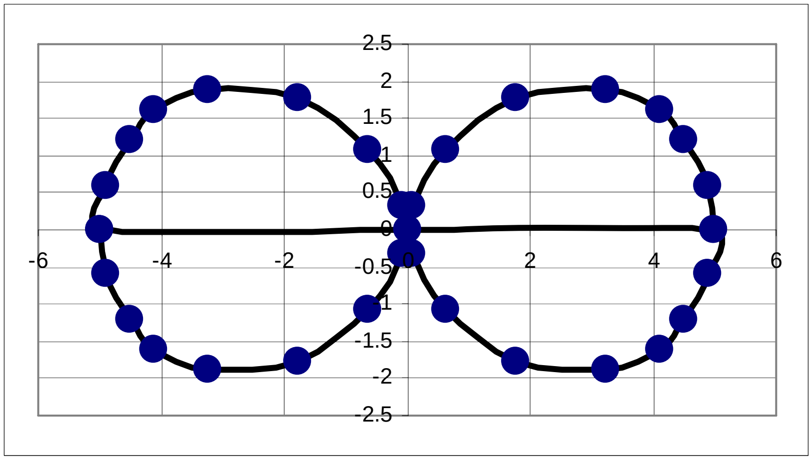


Problem 2 - Reflect the curve you drew into Quadrant 4, and then reflect the curve in Quadrant 1 and 4 into Quadrants 2 and 3 to complete a single magnetic line of force for a magnet located at the origin!



Problem 3 - Add two additional lines of force to your picture by re-scaling (dilating or contracting) the figure you drew so that the X-Y coordinates are now A) 1/4 as large (contraction) and B) 1.5 times larger (dilation).