John B. Johnston, The Faraday Center, 103 Creamery Rd., Livingston Manor, NY 12758
(845) 439 - 4706

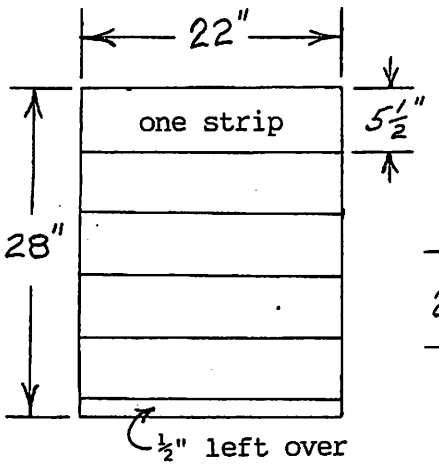
Standing Waves in the Hydrogen Atom - a teaching model (and the necessary patterns)

Materials: 22" x 28" posterboard (white?), meter stick (English scale), pencil, metric ruler, protractor, shears or other cardboard cutting methods, paperclips, "wide" felt marker (black?)

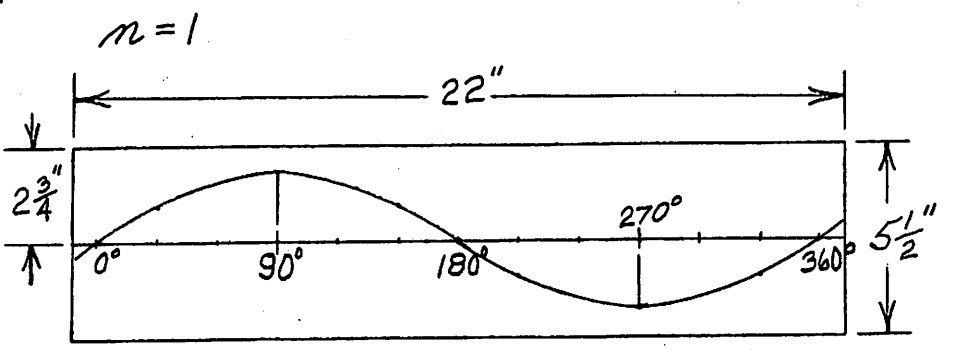
Uses: (a) To show the standing waves and stationary orbits (energy levels) of the Bohr - de Broglie model of the hydrogen atom.

(b) To show the possible quantum (energy) jumps up or down that correspond to hydrogen, especially the first two visible photons of the Balmer Series, red and blue-green.

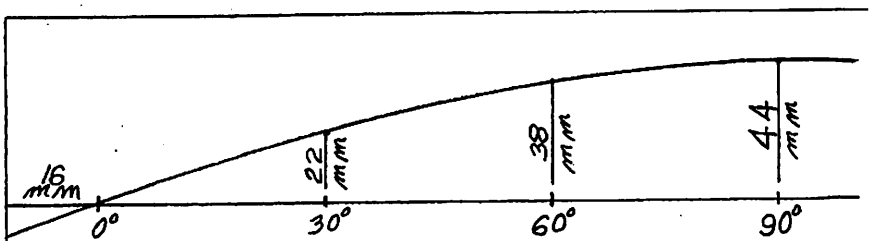
Comment: This model is not to any scale, nor is it truly three-dimensional, but it is a start in concept-building. This model does show, however, wave motion and the wavelengths associated with the electron in its various possible orbits around the proton nucleus in the hydrogen atom.



Note: five strips per sheet; two patterns per strip



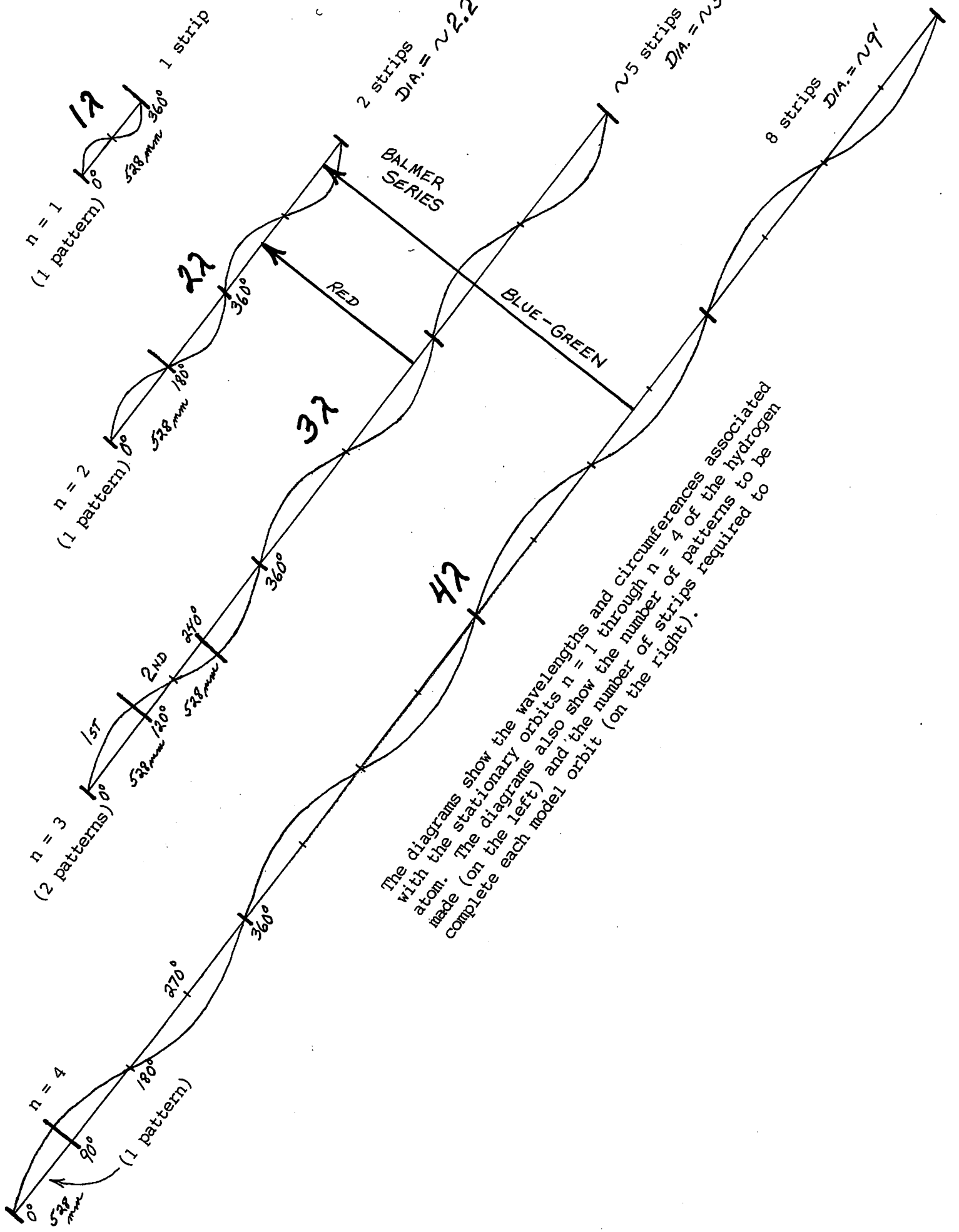
n = 1
(ground state)



n = 1	44 mm	44 mm	44 mm
n = 2	88 mm	88 mm	88 mm
n = 3	132 mm	132 mm	132 mm
n = 4	176 mm	176 mm	176 mm

Note: amplitude is a constant in this model.

Repeat!



The diagrams show the wavelengths and circumferences associated with the stationary orbits n = 1 through n = 4 of the hydrogen atom. The diagrams also show the number of patterns to be made (on the left) and the number of strips required to complete each model orbit (on the right).