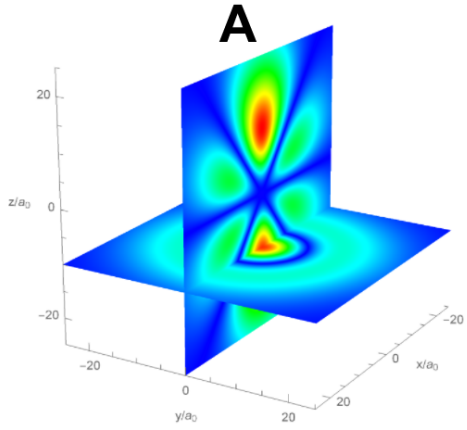
1 Hydrogen Atom Representation Matching

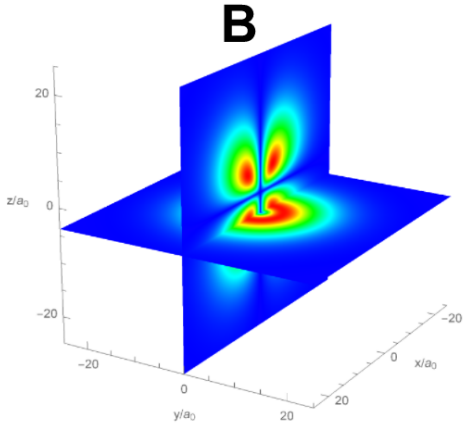
The following page contains 5 different representations for 3 different Hydrogen states. There are Hydrogen Probability Density Plots, Radial Function Probability Density Plots, Spherical Harmonic Probability Density Plots, Wavefunctions, and Kets. Your task is match all of the different representations of each state. (You should have 3 groups, each with 5 letters). You must give some short reasoning on how each piece is connected to at least one other piece in the group. You do not need to use the *Mathematica* notebook to solve this question. Using it will probably slow you down. Credit will be given for your reasoning on why the pieces belong together, not for proper matching.

Hydrogen Atom Representation Matching

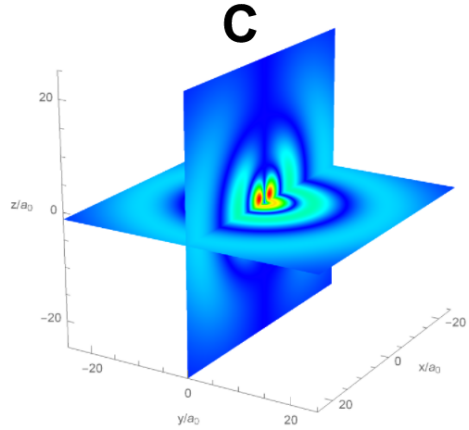
A



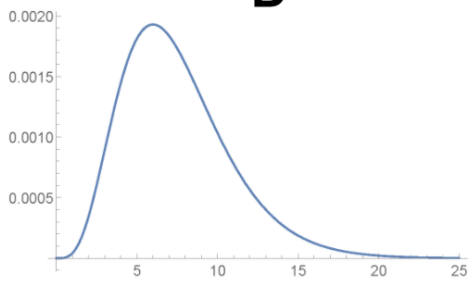
B



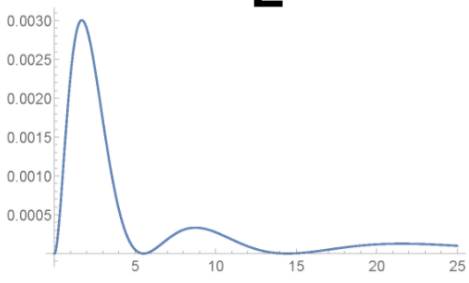
C



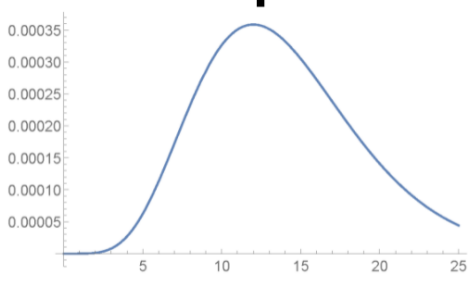
D



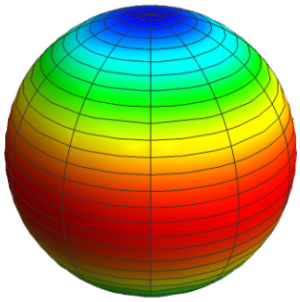
E



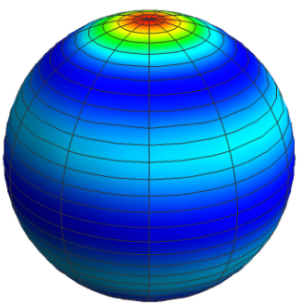
F



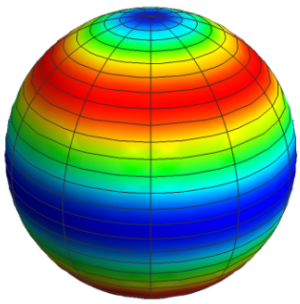
G



H



I



J $\left(\frac{2\sqrt{2}}{81\sqrt{15a_o^7}}\ r^2 e^{\frac{-r}{3a_o}}\right)\left(\sqrt{\frac{15}{8\pi}}\sin\theta\cos\theta e^{-i\phi}\right)$

K $\left(\frac{1}{768\sqrt{35a_o^9}}\ r^3 e^{\frac{-r}{4a_o}}\right)\left(\sqrt{\frac{7}{16\pi}}\left(5\cos^3\theta-3\cos\theta\right)\right)$

L $\left(\frac{\sqrt{5}}{16\sqrt{3a_o^5}}\left(r-\frac{r^2}{4a_o}+\frac{r^3}{80a_o^2}\right)e^{\frac{-r}{4a_o}}\right)_2\left(-\sqrt{\frac{3}{8\pi}}\sin\theta e^{i\phi}\right)$

M $|4\ 1\ 1\rangle$

N $|3\ 2\ -1\rangle$

O $|4\ 3\ 0\rangle$