CONCLUSION QUESTIONS

1. What must occur to excite an electron from a lower energy level to a higher one?

2. Complete Table 3 with the missing values for the spectral lines of hydrogen.

Table 3. Spectral Lines of Hydrogen

Wavelength		Frequency	Energy
nm	m	Hz	J
410			
		6.91×10^{14}	
			4.09×10^{-19}
656			

3. The visible light spectrum represents only a small portion of the electromagnetic spectrum between approximately 400 nm and 700 nm. On Figure 1 label the wavelengths of hydrogen's visible spectral lines, called the *Balmer series*, using the values from Table 3 above.

Figure 1. Balmer series

CONCLUSION QUESTIONS (CONTINUED)

4. Match each Bohr diagram in Figure 2 to one of the visible spectral lines for hydrogen from Figure 1. Write the wavelength of the line in the space provided below each diagram.

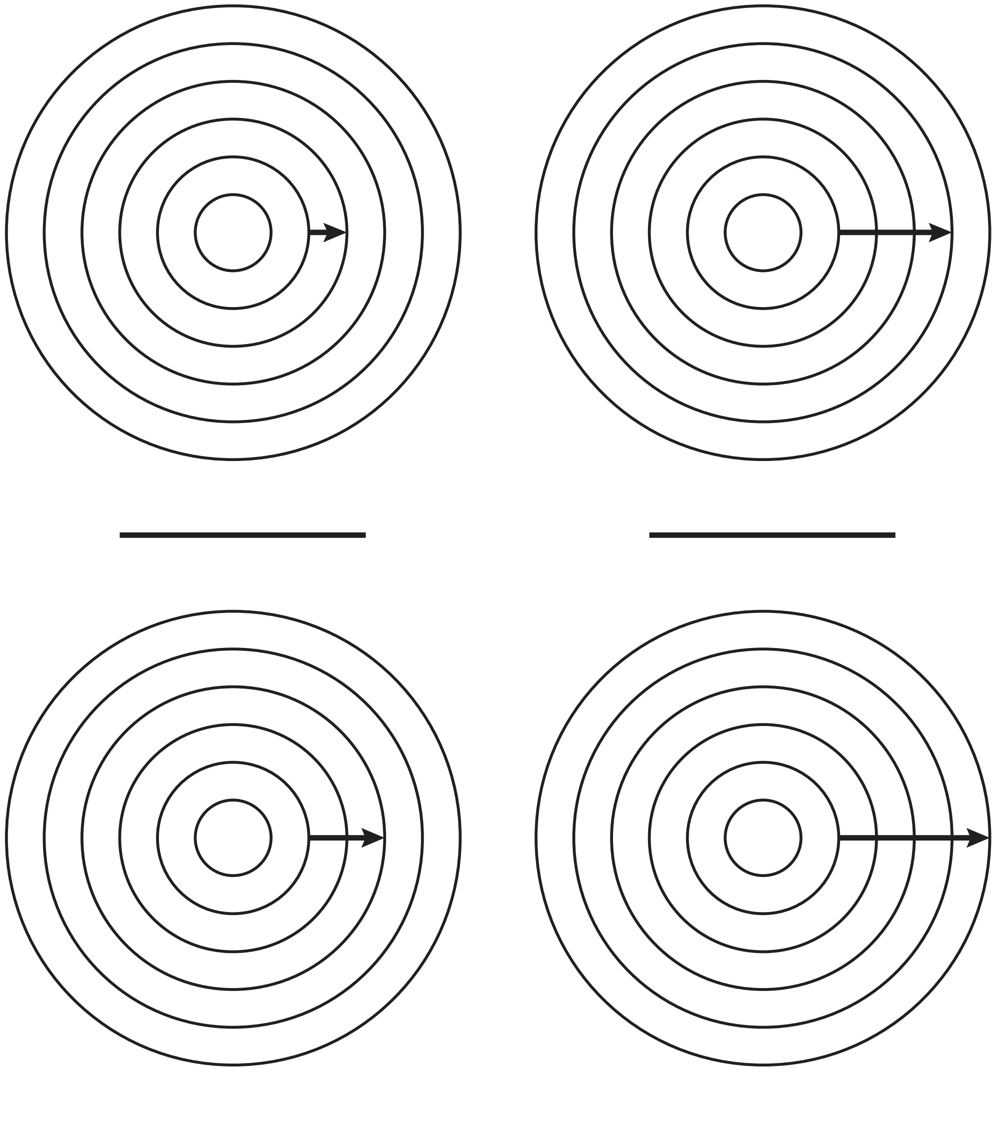

Figure 2. Bohr diagrams of atoms (not to scale)

CONCLUSION QUESTIONS (CONTINUED)

5. Write a generalization relating the distance the electron moves to the energy of the photon associated with such a move.

6. In addition to the Balmer series in the visible region, hydrogen atoms also produce a series in the ultraviolet region and the infrared region. Consider the following:
   - An electron transitioning between $n = 1$ and $n = 2$ has a wavelength of 122 nm.
   - An electron transitioning between $n = 2$ and $n = 3$ has a wavelength of 656 nm.
   - An electron transitioning between $n = 3$ and $n = 4$ has a wavelength of 1875 nm.

   Given that all of these transitions involve only a single energy level difference, what can be inferred about the distance separating energy levels as you move farther away from the nucleus?