11.3 Atomic Orbitals
Chemistry

Name _____ Date _____ Per. _____
Directions: Answer all open-ended questions in complete sentences, using evidence to support your answers. For math questions, show all of your work and include appropriate units and significant figures in your final answer to receive **FULL** credit.

1. Why are the orbitals of the hydrogen atom described as “probability maps”? Why are the edges of the hydrogen orbitals sometimes drawn to appear “fuzzy”?

2. When we draw a picture of an orbital, we are indicating that the probability of finding the electron within this region of space is greater than 90%. Why is this probability never 100%?

3. What are the differences between the 2s orbital and the 1s orbital of hydrogen? How are they similar?

4. How is the distance of an electron from the nucleus related to the principal energy level?

5. Does a higher principal energy level mean that the electron is closer to or farther away from the nucleus?

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6. What is the Pauli exclusion principle? How many electrons can occupy an orbital, according to this principle? Why?

7. How does the energy of a principal energy level depend on the value of n? Does a higher value of n mean a higher or lower energy?

8. The number of sublevels in a principal energy level (increases/decreases) as n increases.

9. If an electron moves from the 1s orbital to the 2s orbital, its energy (increases/decreases).

10. Why do the two electrons in the 2p sublevel of carbon occupy different 2p orbitals?

11. Which of the following orbital designations is (are) not correct?

    a. 2p

    b. 1d

    c. 3f

    d. 4s