

As a progression of thought, describe the Bohr model of the atom (be sure to include the concept of orbit). Then, how did the Heisenberg Uncertainty Principle cause scientists to need to extend the concept of the atom. Finally, describe Schrodinger's model of the atom (include the concepts of probability and orbital).

Bohr described an atom using the solar system model. In this model, electrons circle the nucleus in paths described as orbits. The HUP required that this model be extended because it questioned the validity of studying electrons as particles. Instead, Schrodinger's model studies electrons as waves, no longer trying to specifically locate the electron, but describing the locations of greatest probability as orbitals.

Explain how the movement of an electron is similar to a fan blade. How does the fan blade analogy not properly describe the movement of electrons?

The movement of electrons is similar a fan blade in that they are not actually solid. Instead, they behave as a solid because they are moving quickly around the nucleus. The fan blade model doesn't accurately describe the movement of electrons because electrons move randomly around the nucleus, not in circular paths.

What does the energy level quantum number ( $n$ ) represent? What happens to an atom's electron cloud as  $n$  increases?

$n$  represents the size of the energy level. As  $n$  increase, the size and capacity of the energy level increases.

What mathematical expression is used to determine how many electrons can occupy an energy level?  $2n^2$  Using this expression, fill in the following chart:

Energy Level	Max # of e <sup>-</sup> s
1	2
2	8
3	18
4	32
5	50
6	72
7	98

What does the second quantum number (*l*) represent? What are the four types of sublevels? How many sublevels can exist in each energy level? Use these ideas to fill in the following chart:

*l* represents the sublevel quantum number. The 4 types are *s*, *p*, *d*, and *f*. *n* sublevels can exist in each energy level

Energy Level	Possible sublevels
1	s
2	s,p
3	s,p,d
4	s,p,d,f
5	s,p,d,f
6	s,p,d,f
7	s,p,d,f

What is an orbital? How many electrons can each orbital hold? What has to be true of the electrons that occupy the same orbital? What does the concept of “spin” actually tell us about the two paired electrons in an orbital?

An orbital is the cloud-like space seemingly occupied by electrons. Each orbital can contain up to 2 electrons. These two paired electrons must have opposite “spins.” The concept of “spin” tells us that the two electrons have magnetic poles oriented in opposite directions.