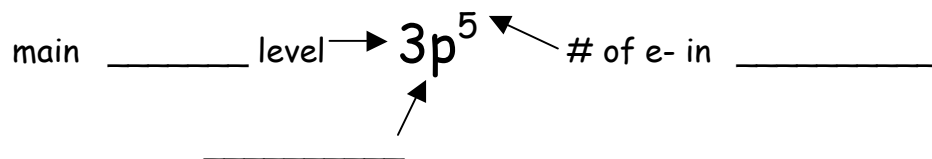


1. There are four types of orbitals:
- s** : shaped like a \_\_\_\_\_  
An E level can contain only \_\_\_\_\_ s orbital, making up the "s sublevel".
  - p** : shaped like \_\_\_\_\_  
An E level can contain \_\_\_\_\_ p orbitals, making up the "p sublevel".
  - d** : shaped like double dumbbells  
An E level can contain \_\_\_\_\_ d orbitals, making up the "d sublevel".
  - f** : too complex to draw or describe  
An E level can contain \_\_\_\_\_ f orbitals, making up the "f sublevel".
2. Each orbital can hold a maximum of \_\_\_\_\_ electrons. Since both electrons have a \_\_\_\_\_ charge, they \_\_\_\_\_. What keeps them from flying apart?  
*Each electron \_\_\_\_\_ on its axis. One spins \_\_\_\_\_ and the other spins \_\_\_\_\_. When charged particles spin, they act like tiny magnets. Since the two electrons spin in \_\_\_\_\_ directions, one acts like the north pole of a magnet and the other acts like the south pole. This makes the electrons \_\_\_\_\_.*
3. Since each orbital can hold \_\_\_\_\_ electrons:
- The "s sublevel" can hold \_\_\_\_\_ electrons.
  - The "p sublevel" can hold \_\_\_\_\_ electrons.
  - The "d sublevel" can hold \_\_\_\_\_ electrons.
  - The "f sublevel" can hold \_\_\_\_\_ electrons.

We use this notation to describe an electron:



How are electrons distributed within a sublevel?

*According to Hund's Rule, each \_\_\_\_\_ within a sublevel is half-filled before any is \_\_\_\_\_.*

We draw **orbital diagrams** to show the distribution of electrons in a sublevel. Circles are used to represent the individual \_\_\_\_\_. \_\_\_\_\_ are used to represent electrons in the orbital. The first electron in an orbital is represented by a  $\uparrow$  and the second by a  $\downarrow$ .

A set of four \_\_\_\_\_ numbers is assigned to each \_\_\_\_\_ to describe its energy and location within the atom. The quantum numbers use the symbols \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.

\_\_\_\_\_ is the principle quantum number and represents the \_\_\_\_\_ level of the electron.

\_\_\_\_\_ represents the sublevel of the electron, which depends on the type of \_\_\_\_\_.

**Pauli's Exclusion Principle** states that within an atom, no two electrons can have the same set of \_\_\_\_\_. If two electrons have the same  $n$ ,  $l$ , and  $m$  numbers, they are in the same \_\_\_\_\_ level, the same \_\_\_\_\_, and the same \_\_\_\_\_. They must then have \_\_\_\_\_ spins! So, the  $s$  quantum numbers must be different.

Practice: Write electron distributions and do the orbital notation for the following:

1. P :

2. Ca:

Only do the electron distributions for the following:

1. Co:

2. Eu:

3. Tc: