

Name: _____

Date: _____

Pd: _____

HONORS - Unit 3, Section 4 - Orbital Diagrams and Electron Configuration

Orbital Diagrams:

An orbital diagram is a visual representation of where _____ are in an atom. Electrons in atoms will completely fill the _____ energy levels before filling higher energy levels. In an orbital diagram, the _____ are represented with their corresponding number, the _____ is represented with the letter (s, p, d, or f), and _____ are written as arrows.

Examples:

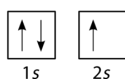
Hydrogen



Helium



Lithium

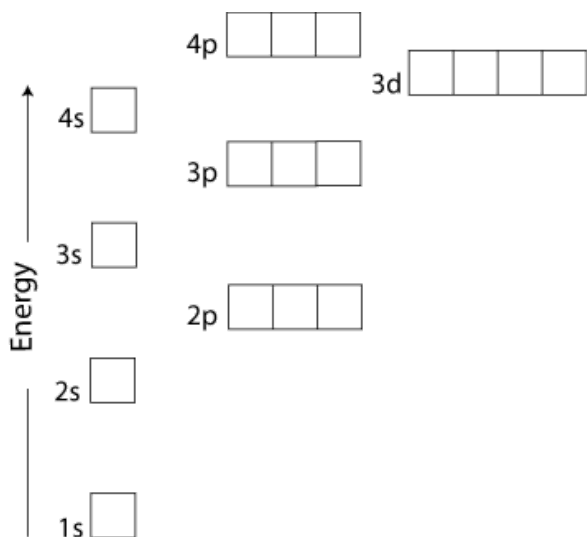


Rules:

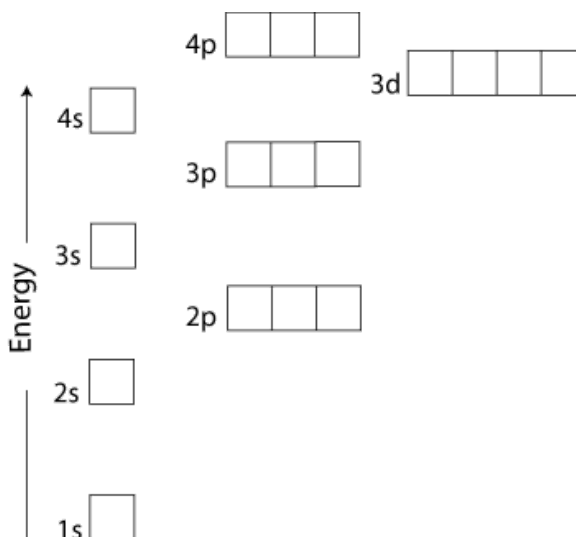
1. **Arrows** (electrons) are placed so that they fill the **lowest energy levels and lowest sublevels first**.
2. Electrons are placed so that they are all pointing the **same direction in different orbitals** first, then go back and double up with the second electron pointing the **opposite direction**.

Practice:

a. Complete the orbital diagram for **Carbon**



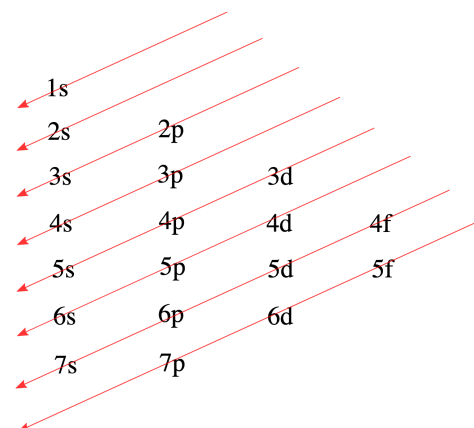
b. Complete the orbital diagram for **Neon**



The exceptions to the rules include the _____ and _____ sublevels. The shape of these sublevels can cause orbitals of these sublevels to extend beyond the s and p sublevels of the next energy level. For example, the **3d** sublevel is filled with electrons **AFTER** the **4s**, even though the **4s** is **TECHNICALLY** at a **higher energy level**.

To the right is a chart to follow to help with placing electrons, but the periodic table can also be used!

Write directions for using your periodic table below:



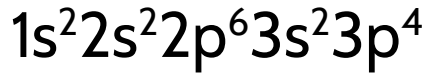
Name:

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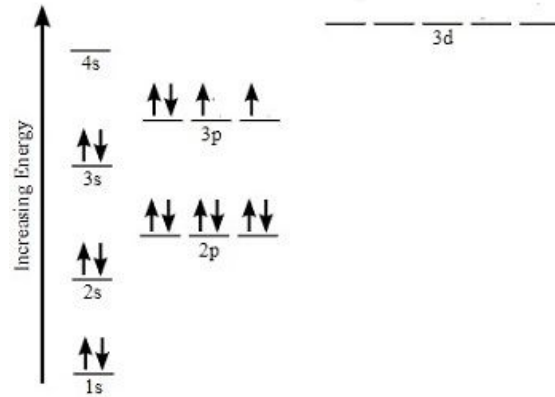
Pd:

Electron Configuration:

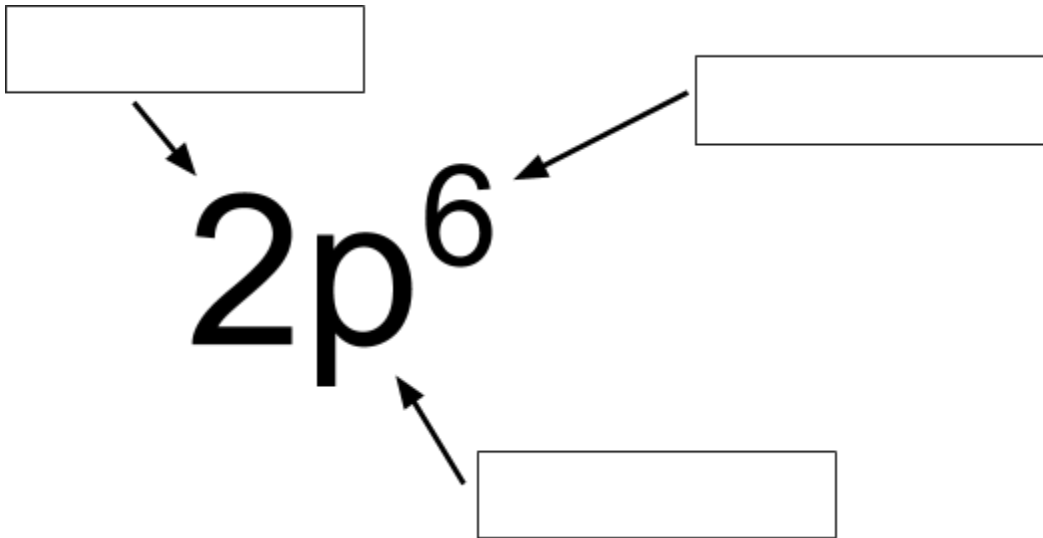
Electron configurations are a _____ way of showing where electrons are likely to be in the atom. It represents the same process as orbital diagrams, but just using the numbers and letters. Here is an example of the **electron configuration** for an atom of **Sulfur** along with its **orbital diagram**:



*Discuss with your tablemate
what the numbers mean!*



Now, let's label the diagram below!



Practice - Write the electron configuration for the following:

- Helium

- Oxygen

- Argon

- Calcium

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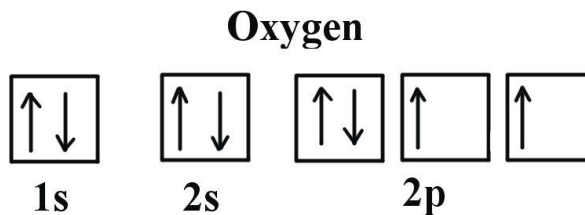
Pd: _____

Ions in Orbital Diagrams and Electron Configuration:

When atoms gain and lose electrons, they are gained and lost from the _____ energy level and therefore the outermost sublevel in that energy level.

Anions:

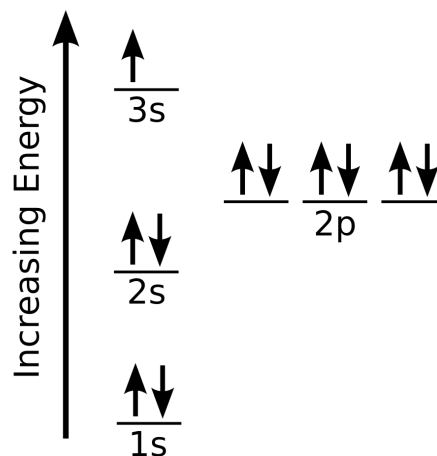
Oxygen atoms most commonly form a 2- ion. This means it will (gain / lose) _____ electron(s) to form this ion. These will be placed in its _____ energy level, in the _____ sublevel.



- Draw them in now with a color other than black!
- How many valence electrons does this oxygen now have? _____
- How does this help to visualize the **octet rule**?

Cations:

Sodium atoms most commonly form a 1+ ion. This means it will (gain / lose) _____ electron(s) to form this ion. These will be removed from its _____ energy level, in the _____ sublevel.



- Cross them out now with a color other than black!
- How many valence electrons does this Sodium now have? _____
- How does this help to visualize the **octet rule**?

Atom/Ion Exceptions:

Elements in the d-block of the periodic table will traditionally fill the s sublevel of their highest energy level before they fill the d sublevel. Likewise, they traditionally lose electrons from this sublevel as well. However, there are two exceptions. They are...

Copper:	Chromium:
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