Turkey Towers and Electron Configuration!

YOU ARE THE MANAGER OF A PRESTIGIOUS NEW HOTEL IN DOWNTOWN CLEVELAND— "TURKEY TOWERS".

IT'S JUST THE "GOBBLE OF THE TOWN" AND YOU WANT TO KEEP ITS REPUTATION A CUT ABOVE ALL THE OTHER HOTELS.

YOUR PROBLEM IS YOUR CLIENTELE... THEY ARE A BUNCH OF TURKEYS.

Your major task is to fill rooms in your hotel. Turkey Towers only has stairs. You must fill up your hotel keeping the following RULES in mind:

- Turkeys have SHORT LEGS, they don't want to walk up stairs, if they don't have to!

- Turkeys are FEISTY and want to room by themselves, but they would rather room with another turkey than walk up more stairs.

- Turkeys think they are UGLY (which is sad). If turkeys are in the same room they will face in opposite directions (1 up, 1 down).

- Turkeys are LOUD, and they keep each other awake with all their gobbling, so you can't put more than two turkeys in each room.

The floor plan to Turkey Towers looks like this:

Turkey Towers diagram:

6th floor _____

5th floor _____ _____ _____

4th floor _____

3rd floor _____ _____ _____

2nd floor _____

On the next slide we will use the RULES from slide 3 to book the rooms in the hotel!

1st floor _____

We have **7 TURKEYS** booked tonight! Let's fill up the rooms based on the RULES from slide 3!!!

Turkey Towers diagram:

6th floor _____

5th floor _____ _____ _____

4th floor _____

3rd floor _____ _____ _____

2nd floor _____

1st floor _____

TURKEYS TO DRAG AND DROP

Tomorrow there are **11 TURKEYS** booked tonight! Fill up the rooms based on the RULES from slide 3!!!

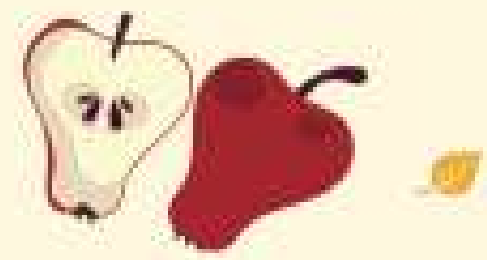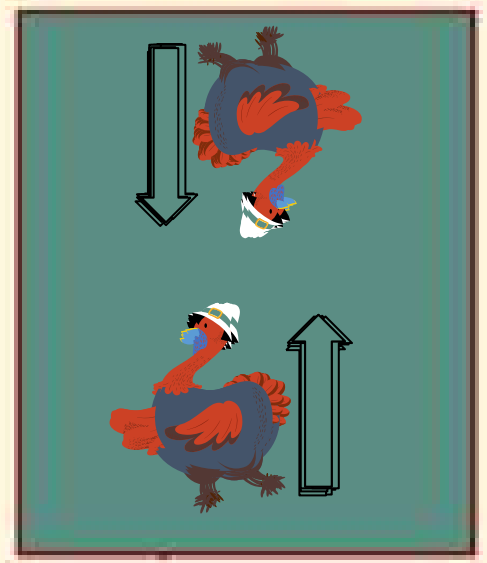## Turkey Towers diagram:

6th floor _____

5th floor _____ _____ _____

4th floor _____

3rd floor _____ _____ _____

2nd floor _____

1st floor _____

TURKEYS TO DRAG AND DROP

We have **9 Turkeys** booked Thursday! Fill up the rooms based on the rules from slide 3!!!
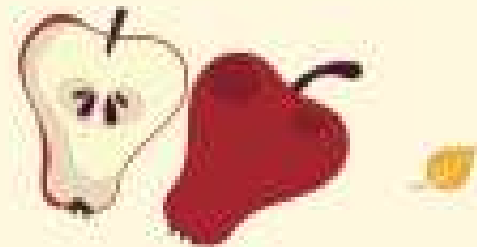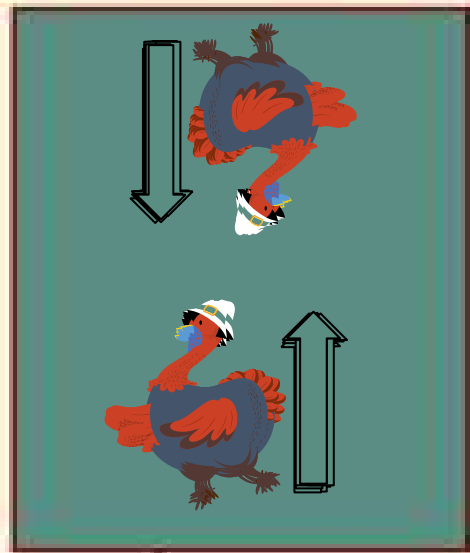
Turkey Towers diagram:

6th floor _____

5th floor _____ _____ _____

4th floor _____

3rd floor _____ _____ _____

2nd floor _____

1st floor _____

Turkeys To Drag and Drop
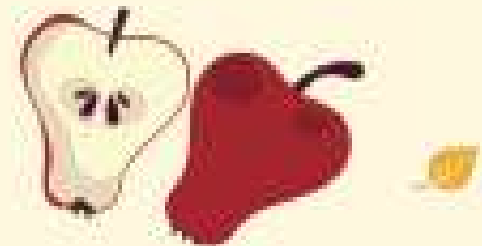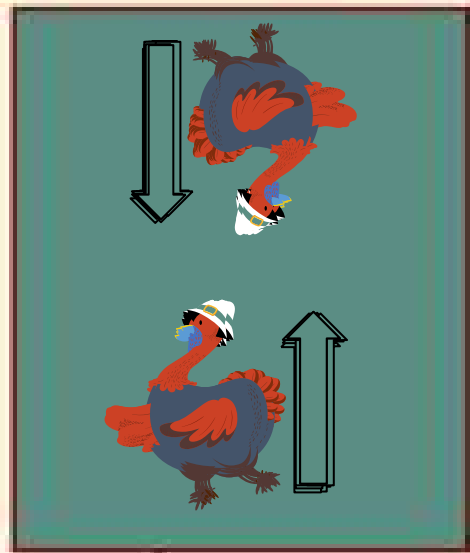
BUT WHAT DOES THIS HAVE TO DO WITH CHEMISTRY?

Now you will relate the "Hog Hilton" to electron orbitals. Electron orbitals are modeled by the picture on the left and are grouped into principal energy levels.

3d ___ ___ ___ ___ ___ n=3
4s ___ n=4
3p ___ ___ ___ n=3
3s ___ n=3
2p ___ ___ ___ n=2
2s ___ n=2
1s ___ n=1

ELECTRON ORBITAL DIAGRAM

6th floor _____
5th floor _____ _____ _____
4th floor _____
3rd floor _____ _____ _____
2nd floor _____
1st floor _____

TURKEY TOWERS

Q.1 In the text box below, compare and contrast the electron orbital diagram and Turkey Towers.

Type Here:

THE ARRANGEMENT OF ELECTRONS IS PREDICTABLE

Electrons follow predictable patterns when filling the Orbitals in the atom's electron cloud. The following are the RULES for *electron configuration and orbital notation.* You will compare these to the Turkey Towers Rules from <u>SLIDE 3</u> in the space below!

e- configuration Rule 1. <u>Aufbau principle</u>: electrons fill the lowest energy orbitals first.

Q.2 In the text box below, type the Turkey Towers RULE that correlates with the Aufbau Principle.

Type Here:

e- conf. Rule 2. <u>Pauli Exclusion principle</u>: each orbital can hold **TWO** electrons with opposite spins.

Q.3 In the text box, type the Turkey Towers RULE that correlates with the Pauli Exclusion Principle.
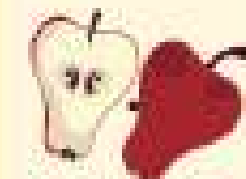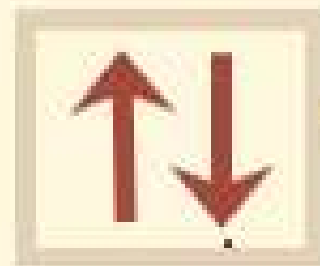
Type Here:

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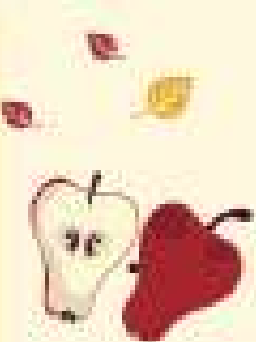
e- conf. Rule 3. <u>Hund's rule</u>: within a sublevel, place one e⁻ per orbital before pairing them.

See the image to the right for a visual depiction of this rule.

WRONG   RIGHT

Q.3 In the text box, type the Turkey Towers RULE that correlates with the Hund's Rule.

Type Here:

Let's look at the orbital notation of Chlorine.

Orbital Notation is a visual depiction of the electron arrangement in the different energy sublevels and uses arrows to represent the electrons and their "spin" and lines to represent the energy sub-levels and their orbitals.

- Each line represents an orbital, or region that holds up to two electrons.
- Each arrow represents an electron.
- Since Chlorine's atomic # is 17, each atom of Cl has 17 protons and, therefore in a neutral atom, there are 17 electrons.
- The electrons fill according to the rules outlined in the previous slides!

4p ___ ___ ___

3d ___ ___ ___ ___ ___

4s ___

3p ↑↓ ↑↓ ↑

3s ↑↓

2p ↑↓ ↑↓ ↑↓

2s ↑↓

1s ↑↓

Let's look at the electron configuration of Chlorine

- Electron configuration displays the sublevels that contain electrons and the number of electrons that are contained.
- The number indicates the **Principal Energy Level!** *You can kind of think of these as Bohr's rings...*
- The sublevels are the collection of orbitals that can be filled on each energy level. These are called <u>s, p, d, and f</u>
- The exponent next to each sublevel indicates the number of electrons that the sublevel contains.
- Each sublevel has an amount of electrons it can hold.
- Notice that there are exceptions to Aufbau's principle. We will learn more about this next week!

Exponent is number of e- in the sublevel

$$1s^2 \, 2s^2 \, 2p^6 \, 3s^2 \, 3p^5$$

Add the exponents to check your answer

Use your draw and text tools to draw the orbital notation and electron configuration of Nitrogen

3d ___ ___ ___ ___ ___

4s ___

3p ___ ___ ___

3s ___

2p ___ ___ ___

2s ___

1s ___

Orbital Notation

1s 2s 2p

Electron Configuration

Note that Nitrogen's electrons cannot fill past 2p! There are not enough electrons to move beyond the second principal energy level.

Have a great break!