



**Game Phase
Two & Three
WINDOJO™
& FUSION™
Lesson Plans**

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HOW TO USE GAME PHASE TWO & THREE LESSON PLANS

The next 3 pages are facilitator instructions for phase two: Windojo™ activities and extensions for phase three: Fusion™. Pages 18-20 are handouts for Windojo™ that can be copied for one-on-one, small group, or total class instruction. You will need the 111 card deck of *Science fusion™, the Elements of the Sciencians™*, T-Bone dice, and Electrocoins. To simplify game play, Mole cards are not used (see rules for more details).

LESSON PLAN TWO Game Phase WINDOJO™

Grades: 4th and up

Objectives: Element uses and properties, ionization potential, and valence shells.

STEP 1: Uses of Elements - Activating & Developing Participants' Knowledge

Materials: White/chalk board or butcher paper and writing materials for small groups may be desirable. * Portions of the 111 element character deck grouped into families/factions as shown on the Faction Modifier chart on the right hand corner of each card that are abbreviated as follows: RE = Rare Earth; MDS = Metalloids; M = Metals; H = Halogens; TM = Transition Metals; AEM = Alkaline Earth Metals; AM = Alkali Metals; and NM = Nonmetals. Factions are also color coded on the back, character side; e.g., cards with a yellow border on the character side are Transition Metals OR consider using the ATN

worksheets, pages 7-13, to group cards. * Encyclopedia set, element books, and/or access to computer with an internet connection.

Objective: Participants will learn about element history and uses through discussion and a research activity.

Discussion and Activities:

a) Discussion: Using additional historical facts from an encyclopedia, discuss how Chemistry can trace its roots to the Greeks who attempted to explain all things with earth, air, water, and fire and that for 1,500 years, alchemists were obsessed with turning lead into gold. Only over the last 350 years has Chemistry developed into the science that it is today. Next, mention how they have been learning the names and states of different elements and that many of them have common uses such as gold. Ask participants to share what they know about some everyday uses for elements.

After discussion, share the following information:

* 4 elements account for 99% of all atoms in the human body: Hydrogen, Oxygen, Carbon, and Nitrogen.

b) Pass Out Cards: Depending on the number of participants, pass out a set of faction cards to an individual or group. For example, if you have 7 participants, you could randomly pass out the 7 Nonmetal element character cards to each person. Another option could be to pass out all of one faction set to each participant. For example, one person would receive all 7 Nonmetal faction cards, another all 5 Halogens, and so forth.

c) Activity – Research and Presentation: Looking at their card(s), each participant uses encyclopedias, element books, and/or the internet to answer and present the following 2 questions:

- 1) When and who discovered your element?
- 2) What are some everyday uses of the element?

STEP 2: Prepare & Play Windojo™

Materials: 111 element character deck. * T-Bone dice * Electrocoins (you will need to attach the stickers to nickels) * Copies of pages 18-20 for each pair or team.

Objective: Participants will learn the how an element's Ionization Potential and Valence Shells have roles in making compounds.

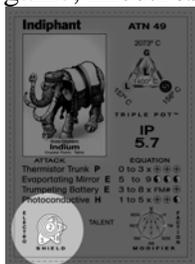
Discussion and Activities:

a) Review and Presentation: Remind all participants of the following information from Lesson One:

- The atomic number is based on the number of protons in a nucleus that also determines the number of electrons in an element's valence shells.
- An element is stable when the number of electrons and protons of equal but opposite charges are kept in balance.

Next, introduce the following concept and game mechanic:

- Valence electrons are electrons in the outermost shells that are involved in making compounds. The left hand corner of each card represents an element's Valence Shells or as referred to in the game, **Electroshields**.



Then, mention from Lesson One that:

- Compounds or chemical reactions are most easily created by adding or removing electrons and disrupting the balance of the positive and negative charge.

Next, introduce the term **Ionization Potential**, which is the energy required to remove an electron from an element's atom. Point out that the element character card's Ionization

Potential, **I.P.**, is located in the middle right hand side of the card as shown:



Summarize that element atoms are combined into compounds with other element atoms by overcoming an element atom's ionization potential with energy used to remove an electron from an atom's outer

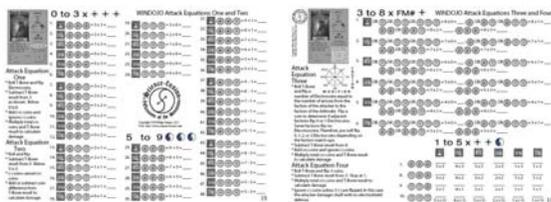
Valence Shell.

Note, that this is a simple definition. More advance concepts include adding electrons rather than removing, sharing electrons rather than binding with opposing charges, discovering that atoms with similar valence shells are easier to combine, and exploring techniques used to generate electron-removing energy.

Finally, point out that the second phase of the game is a fantasy simulation of battling elements using physical, chemical, and hybrid attacks based on real element uses and occurrences in nature. The object of phase two is to liberate the most elements from your opponent using positive electrons and defending with negative electrons. Attacks are conducted with 4 attack equations – see pages 18 and 19.

b) Form Groups: Place participants into groups of 1 player versus 1 player but when instructing participants numbering greater than 26 individuals, group participants into teams of 2 players versus 2 players.

c) Pass Out Pages 18-19: Model the first question of each equation section on pages 18 and 19. It is important for participants to understand the math behind each equation. Every possible combination of coin flips and dice rolls is shown. It may help students to have them turn the dice and flip up the coins to match each question. Note: Consider working out all of these equations on your own before providing instruction.



e) Pass Out Page 20: After participants have practiced the equations, read page 20, aloud with participants to model a sample battle using the first two attack equations. Mention the game sequence for phase two is shown on the left side of the paper.

f) Independent Play: Now it's the participant's turn to play phase two on their own with one card each. Later, equally divide up the 111 element character card deck and have participants play through phases one and two. Consider using only the first attack equation for all attacks if participants are having trouble understanding equations 2-4.

g) Closure: Have participants look and share elements' attacks that are mostly based on manmade and natural element uses. For example, Calciumoo has the attack powers of *Milk Mortar*, *Cement Ceiling*, *Stalagmite Horns*, and *Hard Water Cannon*.

LESSON PLAN THREE
Game Phase FUSION™
Grades: 5th and up
Objectives: Compounds.

STEP 1: Game Play & Extension Activity

Materials: White/chalk board or butcher paper and writing materials for small groups may be desirable. * Encyclopedia set, element books, and/or access to computer with an internet connection.

Objective: Participants will identify elements that make-up compounds.

Discussion and Activities:

a) **Game Play:** The third phase of the game is played with element character cards that survive phase two. Although the rulebook includes more detailed game play with Mole cards, for the purposes of this lesson, participants will receive victory points for each compound they can make with their surviving cards. For example, if David's 'Hydrogena' and 'Oxygent' make it through the battle, then he could make water for 1 victory point. The player with the most victory points wins phase three.

b) **Extension Activity:** Whether or not you play phase three, hand out the cards to participants to see what compounds they can make using books or the following online references of organic and inorganic compounds:

http://en.wikipedia.org/wiki/List_of_inorganic_compounds

http://en.wikipedia.org/wiki/List_of_organic_compounds

Mention that 12,000,000 organic compounds are currently known with the element Carbon being a key element among the majority. They may remember from lesson two that Carbon is one of the elements that make-up 99% percent of the atoms in the human body.

As an additional activity, consider having students bring in empty food boxes (e.g., cereal) to identify the compounds and elements humans consume on a daily basis and share the following with them:

- 7 elements are needed daily:
- Calcium – bones, teeth, blood clotting, and muscle contraction;
- Chlorine – maintain body's salt balance;
- Magnesium – bones, teeth, muscle action;
- Phosphorus – bones and teeth;
- Potassium – body fluids and nerve action;
- Sulfur – blood clotting; and
- Sodium – nerve and muscle action.