

Block 032:

NAME: _____

The Periodic Table – Part 2

Reviewing the elements and their position on the periodic table will be enjoyable with this fun game. Students play in pairs, with each student challenged to find out the mystery element of an opponent who is trying to do the same! The first one to discover the opponent's mystery element by careful deductive reasoning is the winner.

The purpose of this activity is to review 24 common elements and their properties by playing a game. The objective of the game is to be the first to determine an opponent's mystery element by asking a series of questions with yes or no answers. The challenge is to ask questions that will eliminate all but one possibility for the mystery element.

Listed below are the 24 elements included in the *What's My Element?* game (atomic numbers 1-20 and 26-29). Each playing card includes the name and symbol of the element, the atomic number, and a graphic that represents where the element may be found or a common use of the element.

Atomic Number	Element	Description
1	Hydrogen	The most abundant element in the universe, the fusion of hydrogen nuclei fuels the sun and other stars.
2	Helium	An inert gas less dense than air, helium is used in airships known as blimps.
3	Lithium	Batteries with lithium or lithium compounds as the anode are used in many portable electronic devices.
4	Beryllium	The beautiful emerald is a gemstone form of the mineral beryl, beryllium aluminum silicate.
5	Boron	A common boron compound is sodium borate, also known as borax. Borax is often used in laundry products.
6	Carbon	The structure of a diamond consists of strong covalent carbon-carbon single bonds in all directions, making diamond the hardest of all minerals.
7	Nitrogen	Nitrogen makes up 78% of the Earth's atmosphere and is an essential building block of amino acids. Nitrogen-fixing bacteria live in root nodules of legumes, converting elemental nitrogen to a form that can be used by higher organisms.
8	Oxygen	Produced by plants during photosynthesis, oxygen is used in cellular respiration for all complex life.

9	Fluorine	Fluorine is added to toothpaste as sodium fluoride (NaF) or stannous fluoride (SnF ₂) to help prevent dental cavities.
10	Neon	Although other inert gases may be found in neon signs, the noble gas neon-emitting a reddish-orange glow when subjected to an electrical discharge-was the first gas used in these electric light-emitting tubes.
11	Sodium	Sodium chloride (also known as table salt) is a common compound of sodium. NaCl is often used as a preservative or flavor enhancer for foods and is responsible for the salinity of ocean water.
12	Magnesium	Magnesium burns with a brilliant white light and is used in flares and fireworks.
13	Aluminum	Aluminum is the most abundant metal in the Earth's crust and is 100% recyclable. The prevalent use of aluminum beverage cans has made aluminum recycling an important industry.
14	Silicon	The most common metalloid, silicon is the main component of many semiconductor devices, e.g., integrated circuits, LEDs, and solar cells.
15	Phosphorus	Safety matches require the match head to be struck against a special surface on the side of the box. This rough surface contains phosphorus that reacts with a compound on the match head and ignites with heat from friction. A "strike anywhere" match head contains a phosphorus sulfide compound.
16	Sulfur	Sulfur dioxide is the third most abundant gas released from volcanic eruptions (after water vapor and carbon dioxide). The emission of sulfur dioxide into the atmosphere can lead to the production of air pollution and acid rain.
17	Chlorine	Chlorine compounds are used as disinfectants to kill microorganisms and algae in swimming pools.
18	Argon	Incandescent lightbulbs are often filled with the inert gas argon to prevent the metal filament from burning out too quickly.
19	Potassium	Potassium is an essential micronutrient for healthy cell function. Many fruits are rich in potassium, including bananas.
20	Calcium	An important macronutrient, most of the calcium in humans is found in the bones and teeth. Dairy products are a common source of calcium in the human diet.
26	Iron	The famous Eiffel Tower is made of wrought iron, which was used to make many building materials before effective steel production methods were developed. Iron is also the main component of steel.
27	Cobalt	Much of the produced cobalt is manufactured into alloys, one of which is alnico (aluminum, nickel, and cobalt), used to make strong permanent magnets.
28	Nickel	Even though it is named the nickel, the U.S. five-cent coin is only 25% nickel – the rest is copper. Nickels produced during World War II contained no nickel at all!
29	Copper	Copper has been used as a coinage metal since ancient times. The first U.S. pennies were 100% copper; the composition was later reduced to 95%. Due to the rising value of copper, the composition of pennies was changed in 1982 to a zinc core with copper plating.

Game Instructions (for two players)

The object of the game is to be the first to guess an opponent's mystery element.

Before playing the game, answer the *Pre-Activity Questions*. Refer to the directions below for specific instructions for the game. Be sure to return all cards according to the teacher's instructions.

The Play

1. Both players shuffle their respective decks and place them face down on the table.
2. The players pick the top card from their decks. Whoever picks the element with the lower atomic number goes first. This card is placed back into the deck and the deck is reshuffled.
3. The players pick a card at random from their respective decks, but do not show their cards to their opponents.
4. The chosen element is marked with an X or checkmark in the box as the player's mystery element for Round 1 on the Master Elements List. This list is then hidden from the opponent.
5. The chosen mystery element card is placed back in the deck and the cards are once again mixed.
6. The complete deck is spread out face up in front of each player. *Note:* Players may wish to place the cards in order of atomic number or arrange them in groups as they would be found on the periodic table.
7. The first player asks a question regarding the opponent's mystery element that can be answered by a "yes" or a "no."
8. After the opponent answers the question, the first player may be able to eliminate one or more element playing cards. These cards are flipped over so they are facing down (see *Example* below). The first player's turn is then over.

Example

Player 1: *Is your element a metal?*

Player 2: *No*

Player 1 turns over all metal element playing cards (3-4, 11-13, 19-20, and 26-30). Only nonmetal and metalloid element cards are now face up.

9. The second player follows steps 7-8.
10. Play continues in the same manner until a player is ready to guess the mystery element.

Guessing the Mystery Element

When a player is ready to guess the mystery element, the guess is made at the beginning of a turn. The specific question is asked, "Is your element _____?" If the answer is yes, the opponent reveals the Master Element List with the marked element and the player who guessed correctly wins the round.

Penalty for an Incorrect Guess

If a player asks, "Is your element _____?" and the answer is no, the player who guessed incorrectly loses a turn and the opponent gets to ask two questions in a row. The game continues as before until one player correctly guesses the mystery element. If it is determined that during the round a player answered a question incorrectly, that player forfeits the round.

Championship Play

If a series of games is desired, repeat the play starting with step 3, allowing the losing player to go first. Use the Master Element List to mark the chosen mystery element for subsequent rounds. The first player to win five rounds is the Champion!

Pre-Game Questions

1. Identify the questions below as "least specific", "most specific", and "moderately specific". Which would be the best question to ask near the beginning of the game? Why?

a. Does your element have an atomic number less than 5? _____

b. Is your element boron? _____

c. Is your element solid at room temperature? _____

Best question at beginning? ___ Why?

2. Write two other sample questions that would be suitable to ask near the beginning of the game.

3. What is the penalty for an incorrect guess? Why might a player choose to take that risk?

Post-Game Questions

1. Elements in the first column of the periodic table belong to the alkali metal family. Name the alkali metals and describe two physical or chemical properties that all alkali metals share.

2. To which family of elements do helium, neon, and argon belong? Describe two physical or chemical properties that these elements share.

3. Suppose you were playing with a deck of 36 element cards that included all the elements in periods four and five. Read the following questions and answers. After each answer, write the symbols of the elements from the deck of 36 that have *not* been excluded based on this answer. What is the mystery element?

Q1: Is the element a metal?

A: No

Q3: Is the element a noble gas?

A: No

Q2: Is the element in the last two families?

A: Yes

Q4: Is the element solid at room temperature?

A: Yes

Identity of mystery element:

