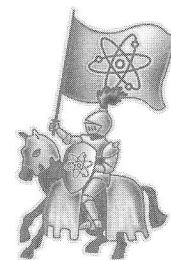


Nuclear Quest

Nuclear Reactions

Name _____

Date _____ Period _____



Purpose

To explore nuclear reactions.

Part 1: Play Nuclear Quest

Play the game. You will need a game board, a pair of dice, Nuclear Quest cards, Gamma Radiation cards, and a game piece for each player. See the handout for instructions.

Part 2: Nuclear Chemistry

Work in your groups to answer these questions.

1. Describe the particle that is emitted during alpha decay. How do you think an atom changes when it undergoes alpha decay?
2. Examine the beta decay card. If the letter n on the card represents a neutron, describe what you think is going on.
3. When does gamma radiation occur?
4. Name four things you can learn about nuclear fission from this game.
5. Name four things you can learn about nuclear fusion from this game.
6. What is your group's new name for element 112? Do you think your element is radioactive? Explain your reasoning.
9. **Making Sense** Describe what a nuclear reaction is.

Object of the Game

The goal of Nuclear Quest is to move your nucleus (game piece) along the periodic table until you reach and “discover” element 112.

Starting the Game: Shuffle each card deck and place it facedown on the gameboard. Place your nucleus on Start and roll a die. The player with the highest number goes first. After that, play proceeds to the left.

Moving Your Nucleus: On your turn, roll the dice and move your nucleus that many spaces on the periodic table, following the order of the atomic numbers.

- **Rolling doubles:** If you roll doubles you can double the amount on the two dice and move that many spaces.
- **Space is occupied:** If you land on a space occupied by another player, nuclear bombardment occurs. The other player must roll one die and move back that many spaces.
- **Going to the Hospital:** Lose one turn in the hospital. Return to the first element of the period you were in.

Drawing a Card: After your move, draw a card from the Nuclear Quest deck and follow the directions. Return the card to the bottom of the pile.

- **Gamma Radiation Cards:** If you draw an Alpha Decay card, a Beta Decay card, or a Fission card, you must also draw a card from the Gamma Radiation deck. (If you are in the radioactive zone, you must draw *two* cards.) You must hold on to the Gamma Radiation cards until you can block them with a Lead Shield, or until you collect 30 roentgens and lose a turn. (At that point, you return the cards to the bottom of the Gamma Radiation pile.)
- **Lead Shield Card:** You can use a Lead Shield at the end of any turn to block up to 25 roentgens of radiation from the Gamma Radiation Cards. Once you have used the Lead Shield card, return it to the bottom of the Nuclear Quest deck. Return the blocked radiation cards to the bottom of the Radiation Cards pile.
- **Radiation Sickness Cards:** If you draw a Radiation Sickness card, you can use it to send any player to the hospital with radiation sickness. They can't block this with a Lead Shield Card.
- **Chemistry Award Card:** Use this card to skip ahead. You must be in either the lanthanides or the actinides before you can use this card. If you land in the lanthanides, use this card to move your nucleus to element 71. If you land in the actinides, use this card to move your nucleus to element 103. Once you have used the Chemistry Award card, return it to the bottom of the Nuclear Quest deck.

Winning the Game: The first player to reach element 112 wins the game.

- A player does not need to roll the exact number on the dice to land on element 112.
- To win, the player must be free of Gamma Radiation cards. The player may use a Lead Shield card or lose one turn to block the remaining Gamma Radiation cards. Once a player has won, come up with a name for element 112.