# Critical Path Game Instructions

## Objective:

All players start as an atom of Uranium 235 on the chart of the nuclides. The player who reaches Lead 207 first wins the game!

## Component Description:

One six-fold game board. The board contains a portion of the chart of the nuclides colored based on each isotope’s half-life.

|  |  |
| --- | --- |
|  | Isotope space description  U = Isotope element symbol. This isotope is an atom of Uranium  235 = Mass number for this isotope of Uranium. The mass number is the total number of protons and neutrons in this isotope’s nucleus  Background color = Grey. This indicates the isotope is stable  The star border indicates this is the starting isotope for all players. |
|  | Uranium 234 is an isotope with a half-life greater than 100 years |
|  | Neptunium 235 is an isotope with a half-life greater than 1 year |
|  | Polonium 210 is an isotope with a half-life greater than 30 days |
|  | Thorium 227 is an isotope with a half-life greater than 1 hour |
|  | Bismuth 217 is an isotope with a half-life greater than 1 minute |
|  | Francium 209 is an isotope with a half-life greater than 1 second |
|  | Protactinium 216 is an isotope with a half-life greater than 100 milliseconds |
|  | Radon 217 is an isotope with a very short half-life |
|  | Uranium 220 is an isotope that has not yet been discovered and research and development (R&D) is required |

One deck of decay cards. Each deck includes five different types of radioactive decay cards plus one “wild” card. These cards are used to move yourself or your opponents on the game board. An example with a description of each part of the card is described below

|  |  |
| --- | --- |
|  | This is the “wild” card. Players who choose to play this card can move two spaces on the board in any direction.  The **parent** indicates the player’s starting atom. The **daughter** indicates the player’s ending atom. |
|  | This is the **attack** symbol. Players force an opponent to move if the dice rolled is greater than or equal to the number inside this symbol (≥4) |
|  | This is the **defense** symbol. Players may move their own token if the dice rolled is greater than or equal to the number inside this symbol (≥3) |
|  | This is the **dice** symbol. The player rolls a D10 dice when playing the wild card. |

Dice. Each type of dice is colored and the four types listed below:

|  |  |  |  |
| --- | --- | --- | --- |
| *Type* | *Number included* | *Color* | *To be used during* |
| Four-sided (D4) | 5 | Red | Alpha Decay |
| Six-sided (D6) | 15 | White | Neutron Absorption, Neutron Emission, or spontaneous decay |
| Eight-sided (D8) | 5 | Blue | Beta or Beta-Positron Emission |
| Ten-sided (D10) | 5 | Green | “Wild” card |

R&D Cone. If a player ends a turn on a space marked “R&D Required”, that player loses her next turn. 

## Setup:

Choose your player disc and take one six-sided dice (D6). Shuffle the deck of decay cards and deal **four** cards to each player. Place the remaining cards in a draw pile near the board.

Organize the remaining dice by color and place the dice near the board.

Each player places the player disc on Uranium 235 (U-235). U-235 is the starting isotope for all players.

Each player rolls their six-sided dice to determine who plays first. The player with the highest dice roll begins. In the event of a tie, the tied players reroll until one player has the highest result.

## Round Summary:

During each player’s turn, they may choose one of these two actions:

1. Draw two more decay cards
   * Draw the top two cards from the decay card draw pile. If there are not enough cards to draw, take the discard pile and reshuffle the cards to create a new draw pile.
   * If after drawing two more cards the player has more than 10 cards, they must discard down to 10 cards.
2. Play decay cards
   * The player may choose some or all of the cards from their hand and reveal them to all other players. Collect each dice needed to roll for a successfully decay event. Each card has an icon with the dice name. **The player must declare if they will use the decay cards on themselves or on another player.** 
     + Attack: the decay is successful if the dice result is greater than or equal to 4.
     + Defend: The player gets to move one card played of their choice. For the remaining cards played, the decay is successful if the dice result is greater than or equal to 3. Roll all of the dice and move the player disc based on each successful decay roll.

## Completing a Round:

After each player has played one turn, every player spontaneously decays. Look at the isotope occupied by your player piece and determine the successful spontaneously decay roll from the isotope half-life legend on the game board. Roll a six-sided dice (D6). If the result is greater than or equal to the number in the half-life legend, the spontaneous decay occurs successfully. Move your player disc equal to the half-life legend number in any direction (see example described on page 4).

## Special Rules:

**R&D Required**. If a player lands on an undiscovered isotope (indicated by the grey background), the player must take the R&D cone and place it on their disc. The player then loses their next turn researching the undiscovered element!

## Example of Completing a Round:

Your player disc is on Radium (Ra-214) during the spontaneous decay phase. Ra-214 has a half-life longer than 1 minute. Based on the half-life legend, the successful decay roll is greater than or equal to 3. You roll a six-sided dice (D6) and the result is 5. This is a successful spontaneous decay. You choose to move your token three spaces from Ra-214 to At-211.