

Cat. # S-80 Molecular Biology Toys & Games

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Cat. #	Title	Price
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1504	EDVO-Links (set of 2)	20

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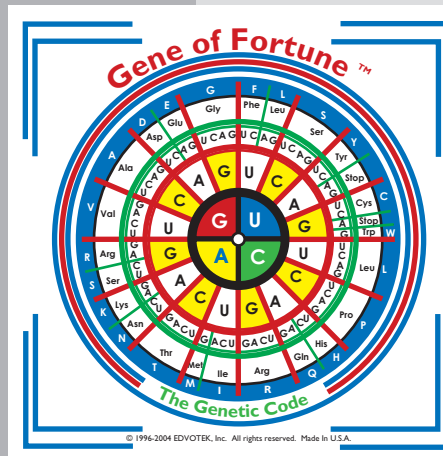
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Classroom Molecular Biology Toys and Games

Cat. #
S-80

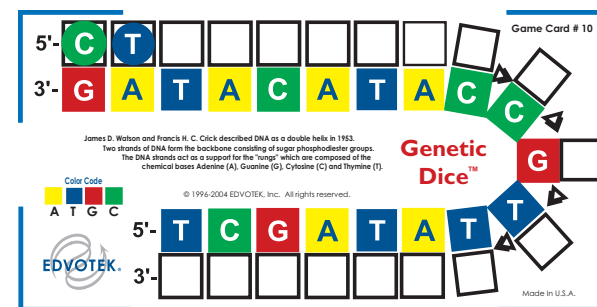
Gene of Fortune™ Game



This novel set of "Bingo" games, which can be played over several class periods, use a Gene Wheel™ and colorful game chips. Concepts highlighted include the genetic code, single and three letter amino acid abbreviations, as well as the characteristics of amino acids.

Genetic Dice™ Game

Using special Genetic dice, students will have fun while they learn biotechnology concepts. This resource includes a set of game boards, genetic dice and colorful game chips to reinforce concepts centering around Watson-Crick DNA base pair rules.



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Gene of Fortune™ (BINGO) Game

Gene of Fortune™

Game Card # 1

Amino Acids and their Abbreviations

Amino Acid Characteristic	Amino Acid	Abbreviation
Hydrophobic	Alanine	Ala A
Hydrophobic	Arginine	Arg R
Hydrophobic	Asparagine	Asn N
Aromatic	Aspartic Acid	Asp D
Sulfur containing	Cysteine	Cys C
Positively charged	Glutamine	Gln Q
Negatively charged	Glutamic acid	Glu E
Polar	Glycine	Gly G
One of a kind	Histidine	His H
	Isoleucine	Ile I
	Leucine	Leu L
	Lysine	Lys K
	Methionine	Met M
	Phenylalanine	Phe F
	Proline	Pro P
	Serine	Ser S
	Threonine	Thr T
	Tryptophan	Trp W
	Tyrosine	Tyr Y
	Valine	Val V

Initiation Codon
AUG (Met)

Stop Codons
UAA
UAG
UGA

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THE GAME CARD

Each game card shows a figure consisting of 25 squares. Each of the squares contain an abbreviation for 20 amino acids, 3 stop codons and 1 initiation codon. There is a FREE square in the center of the card.

THE GAME CHIPS

The game chips for this game are all one color.

Gene of Fortune™

The Genetic Code

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Warning:

This game contains small parts which may pose a safety hazard to children under three years of age.

Game Play - Version 1: Synthesize DNA

Add one base at a time to simulate how DNA polymerase (the enzyme that synthesizes DNA in the cell) conducts DNA synthesis.

1. Throw one die
 - If the die matches the complementary base (A-T, T-A, G-C, C-G) on the 3' to 5' DNA (inside) strand, cover the empty square in the 5' to 3' strand with the appropriately colored chip.
 - If a match is made, the same player takes an additional turn. If a match is not made, the next player takes a turn.
2. The first player to fill all blank squares in sequential order wins.

Game Play - Version 2: Match Bases by Pairs

Add one base at a time to simulate how DNA polymerase (the enzyme that synthesizes DNA in the cell) conducts DNA synthesis.

1. Throw two dice
 - If one of the two bases on the dice matches the 3' to 5' strand (inside strand), and if the pair follows Watson-Crick base pair rules (A-T, T-A, G-C, C-G), then cover the empty base square with the appropriately colored game chip.
 - If a match is made, take an additional turn. If a match is not made, the next player takes a turn.
2. The first player to fill all blank squares in sequential order wins.

Game Play - Version 3: Reinforce Base Pair Rules

Fill the empty base squares (randomly) until all base pairs on the card are filled.

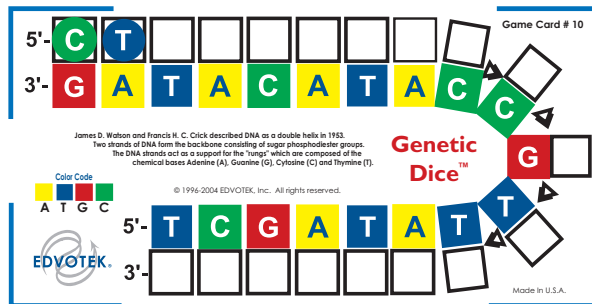
1. Throw two dice
 - If the bases on the two dice match any base pair combination on the figure, cover the empty base pair square with the appropriately colored game chip. Only one base pair combination can be covered per turn.
 - If a match is made, take an additional turn. If a match is not made, the next player takes a turn.
2. The first player to fill all the base pairs on his/her card wins.

ASSEMBLY OF PYRAMID DICE

Assemble two pyramid dice as outlined in the separate instructions included in the set. Allow the glue to dry completely.

THE RULES OF THE GAME

DNA strands are arranged in pairs. When A occurs on one strand of DNA, T occurs on the opposite strand. When G is on one strand, then C is on the opposite strand.



1. Each player should select one card.
2. Divide the game chips of four different colors (Blue, Yellow, Red and Green) between the players.
3. The player whose full name has the most number of combined A, T, C, and G letters (representing the four nucleotides) gets to start the game.
4. Select one of the three game versions for play.

Throwing the dice for game play:

Throw one pyramid die high in the air. The side that lands on the table or bench represents the nucleotide in play.

Example:

One die is tossed and lands on the table. You pick it up, turn it over and a "T" is visible - "T" is the nucleotide in play.

THE RULES OF THE GAME

There are three versions of the Gene of Fortune™ Game . All three games are variations of the traditional game of BINGO.

VERSION 1: Five-in-a-row BINGO:

The objective is to obtain 5 in any row, vertically, horizontally or diagonally.

VERSION 2: Amino Acid Families BINGO:

The objective is to obtain all amino acids in a family, which are designated on the game cards by color. For this game version, the three Stop Codons can also be considered a family.

VERSION 3: Combination BINGO:

The objective is to play both game versions simultaneously. The winner is the first player to obtain 5 in any row, and/or the amino acids in a family.

GAME SET UP

1. Choose one person to be the caller. The caller will be responsible for spinning the Gene Wheel and keeping track of the amino acids called by maintaining the Master Game Card.
2. Divide the game chips between all the players.
3. Each player selects a bingo card and places a game chip on the free square in the middle.
4. Select one of the game versions described previously.

GAME PLAY

1. The caller spins the Gene Wheel , announces the three-letter codon, the name of the amino acid, the three-letter abbreviation, and one-letter abbreviation. The caller places a marker on the appropriate square on the master card.
2. Each player checks his or her card for a match, and covers the matching square with a game chip.
3. The first player to match the pattern of the game version being played calls "BINGO".

If playing game versions with AminoAcids Families, the player should also call the family name, e.g. "HYDROPHILIC BINGO".
4. The winning squares are checked against the master card. The winner becomes the caller for the next game.

Gene of Fortune™ Master Card

Ala A	Arg R	Asn N	Asp D	Cys C
Gln Q	Glu E	Gly G	His H	Ile I
Leu L	Lys K	FREE	Met M (AUG)	Phe F
Pro P	Ser S	Thr T	Tyr Y	Trp W
Val V	Met M (AUG)	Stop UGA	Stop UAG	Stop UAA

Amino Acid Characteristics

- Hydrophobic
- Hydrophilic
- Aromatic
- Sulfur containing
- Positively charged
- Negatively charged
- Polar
- One of a kind

Amino Acids and their Abbreviations

Alanine	Ala	A
Arginine	Arg	R
Asparagine	Asn	N
Aspartic Acid	Asp	D
Cysteine	Cys	C
Glutamine	Gln	Q
Glutamic acid	Glu	E
Glycine	Gly	G
Histidine	His	H
Isoleucine	Ile	I
Leucine	Leu	L
Lysine	Lys	K
Methionine	Met	M
Phenylalanine	Phe	F
Proline	Pro	P
Serine	Ser	S
Threonine	Thr	T
Tryptophan	Trp	W
Tyrosine	Tyr	Y
Valine	Val	V

Initiation Codon
AUG (Met)

Stop Codons
UAA
UAG
UGA

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Genetic Dice™ Game

THE GAME CARD

Each game card shows a figure consisting of two rows of squares which follow a circular shape. These series of squares represent two strands of DNA. Each of the inner squares contains one of the four DNA bases. The outer strand contains blank squares.

Game Card # 10

5'- C T [] [] [] [] [] [] [] []
3'- G A T A C A T A C C

James D. Watson and Francis H. C. Crick described DNA as a double helix in 1953. Two strands of DNA form the backbone consisting of sugar phosphate groups. The DNA strands act as a support for the "rungs" which are composed of the chemical bases Adenine (A), Guanine (G), Cytosine (C) and Thymine (T).

Color Code
A T G C

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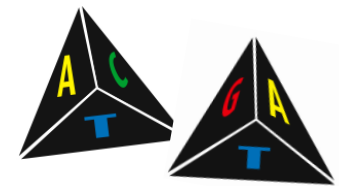
THE GAME CHIPS

Four colors of game chips are used in this game to represent the four DNA bases.

Yellow = A Blue = T Red = G Green = C

THE DICE

The special dice contained in this game have the following four faces:



- 1 Adenine (A)
- 2 Thymine (T)
- 3 Guanine (G)
- 4 Cytosine (C)

Warning:

This game contains small parts which may pose a safety hazard to children under three years of age.