

Codon Bingo

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Introduction

Codon Bingo is a stimulating game that involves deciphering the genetic code. It is a game designed for students to practice transcription and translation of codons. It has the advantage that it is a game that students enjoy while they actively participate. All students become engaged in this activity as it generates a lot of enthusiasm. As they play the game, they develop increased proficiency at unravelling the genetic code found in the base pairs. After playing this game, the task of transcribing the DNA base pair messages into mRNA codons and then translating the mRNA codons into amino acids becomes much easier.

Teacher Information

Preparation

- Copy 1 blank bingo card for each student or team (included).
- Copy a set of the "codon game cards" (included). Cut these "codon game cards" into individual squares and place in a bingo basket for drawing.

Instructions for Playing Codon Bingo

1. Provide each student or team with the following:
 - 1 blank bingo card
 - several markers
 - 1 codon chart with RNA codons and their respective amino acids (found in texts)
2. Students are to write the name of all 20 amino acids on their cards. They may choose where they wish to position them. They will have some amino acids on their cards twice as there are 24 empty spaces to fill.
3. Once the bingo cards are ready, draw 1 "codon game card" from the basket and read the DNA triplet code to the class. {Please note: on the "codon game cards" the small 'D' is the DNA triplet (sense strand) and the small 'R' is the mRNA codon.} They must then transcribe the DNA base pair triplet into the RNA transcript. Then using a codon chart, they translate the mRNA codon into an amino acid. If they have that amino acid on their card somewhere they may place a marker on that space.

4. Discard the used "codon game card" by laying it to one side. You will need it for the checking process. Give the students enough time before drawing the next card - especially in the beginning of the game.
5. Continue drawing and reading cards until someone yells "Bingo!" At this point check his or her decoding by having the student read the four or five marked amino acids. Point out that this is now a polypeptide. While the student reads out the amino acids, check for accuracy in the discard pile. If a student has made a mistake and marked an inappropriate amino acid, he or she is out of the game for this round.
6. Reward the winner(s) in some way to enhance motivation. Play the next round.

Variation #1: Instead of calling out the DNA triplet code on the "codon game card" call out the RNA codon and have them only translate into an amino acid. This is an easier variation and might be a way you would want to begin the first few rounds of the game for beginners.

Variation #2: When preparing the cards, allow the students to choose as many or as few of the amino acids as they like and position them on the bingo cards. {Note: It might be wise to restrict them from using fewer than two or three amino acids.}

Variation #3: The pace of the game can be slow or fast depending on the student population. After a few rounds of practice, picking up the pace can add a new challenge.

The teacher and students can create all sorts of variations and rules to add interest.

CODON BINGO

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| | | | | |
| | | | | |
| | | FREE SPACE | | |
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CODON BINGO

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| | | | | |
| | | FREE SPACE | | |
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| | | Seconded Position | | | | | | | | | |
|----------------|---|-------------------|------------|------|------------|------|------------|------|------------|---|--|
| | | U | | C | | A | | G | | | |
| | | code | Amino Acid | code | Amino Acid | code | Amino Acid | code | Amino Acid | | |
| First Position | U | UUU | phe | UCU | ser | UAU | tyr | UGU | cys | U | |
| | | UUC | | UCC | | UAC | | UGC | | C | |
| | | UUA | leu | UCA | | UAA | STOP | UGA | STOP | A | |
| | | UUG | | UCG | | UAG | STOP | UGG | trp | G | |
| | C | CUU | leu | CCU | pro | CAU | his | CGU | arg | U | |
| | | CUC | | CCC | | CAC | | CGC | | C | |
| | | CUA | | CCA | | CAA | gln | CGA | | A | |
| | | CUG | | CCG | | CAG | | CGG | | G | |
| | A | AUU | ile | ACU | thr | AAU | asn | AGU | ser | U | |
| | | AUC | | ACC | | AAC | | AGC | | C | |
| | | AUA | | ACA | | AAA | lys | AGA | arg | A | |
| | | AUG | ACG | AAG | | AGG | | G | | | |
| | G | GUU | val | GCU | ala | GAU | asp | GGU | gly | U | |
| | | GUC | | GCC | | GAC | | GGC | | C | |
| | | GUA | | GCA | | GAA | glu | GGA | | A | |
| | | GUG | | GCG | | GAG | | GGG | | G | |
| | | Third Position | | | | | | | | | |

| | | Seconded Position | | | | | | | | | |
|----------------|---|-------------------|------------|------|------------|------|------------|------|------------|---|--|
| | | U | | C | | A | | G | | | |
| | | code | Amino Acid | code | Amino Acid | code | Amino Acid | code | Amino Acid | | |
| First Position | U | UUU | phe | UCU | ser | UAU | tyr | UGU | cys | U | |
| | | UUC | | UCC | | UAC | | UGC | | C | |
| | | UUA | leu | UCA | | UAA | STOP | UGA | STOP | A | |
| | | UUG | | UCG | | UAG | STOP | UGG | trp | G | |
| | C | CUU | leu | CCU | pro | CAU | his | CGU | arg | U | |
| | | CUC | | CCC | | CAC | | CGC | | C | |
| | | CUA | | CCA | | CAA | gln | CGA | | A | |
| | | CUG | | CCG | | CAG | | CGG | | G | |
| | A | AUU | ile | ACU | thr | AAU | asn | AGU | ser | U | |
| | | AUC | | ACC | | AAC | | AGC | | C | |
| | | AUA | | ACA | | AAA | lys | AGA | arg | A | |
| | | AUG | ACG | AAG | | AGG | | G | | | |
| | G | GUU | val | GCU | ala | GAU | asp | GGU | gly | U | |
| | | GUC | | GCC | | GAC | | GGC | | C | |
| | | GUA | | GCA | | GAA | glu | GGA | | A | |
| | | GUG | | GCG | | GAG | | GGG | | G | |
| | | Third Position | | | | | | | | | |

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|--------|---|--------|---|--------|---|--------|---------------------------------------|
| D R | AAG phenylalanine | D R | TAA AUU isoleucine | D R | AGA UCU serine | D R | TGA ACU threonine |
| D R | AAI UUA leucine | D R | TAG AUC isoleucine | D R | AGG UCC serine | D R | TGG ACC threonine |
| D R | AAC UUG leucine | D R | TAI AUA isoleucine | D R | AGI UCA serine | D R | TGI ACA threonine |
| D R | GAA CUU leucine | D R | TAC AUG methionine | D R | AGG UCG serine | D R | TGC ACG threonine |
| D R | GAG CUC leucine | D R | CAA GUU valine | D R | GGA CCU proline | D R | CGA GCU alanine |
| D R | GAI CUA leucine | D R | CAG GUC valine | D R | GGG CCC proline | D R | CGG GCC alanine |
| D R | AAA UUU phenylalanine | D R | CAI GUA valine | D R | GGI CCA proline | D R | CGI GCA alanine |
| D R | GAC CUG leucine | D R | CAC GUG valine | D R | GGC CCG proline | D R | CGC GCG alanine |
| D R | ATA UAU tyrosine | D R | TTA AAU asparagine | D R | CTI GAA glutamic acid | D R | TCA AGU serine |
| D R | ATG UAC tyrosine | D R | TTG AAC asparagine | D R | CTC GAG glutamic acid | D R | TCG AGC serine |
| D R | ATT UAA stop pick another card | D R | TTI AAA lysine | D R | ACA UGA stop pick another card | D R | TCI AGA arginine |
| D R | ATC UAG stop pick another card | D R | TTC AAG lysine | D R | ACC UGG tryptophan | D R | TCC AGG arginine |
| D R | GIA CAU histidine | D R | CTA GAU aspartic acid | D R | GCA CGU arginine | D R | CCA GGU glycine |
| D R | GTC CAC histidine | D R | CTG GAC aspartic acid | D R | GCG CGC arginine | D R | CCG GGC glycine |
| D R | GTI CAR glutamine | D R | ACA UGU cysteine | D R | GCI CGA arginine | D R | CCI GGA glycine |
| D R | GTC CAG glutamine | D R | ACG UGC cysteine | D R | GCC CGG arginine | D R | CCC GGG glycine |