

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

		FREE SPACE		

CODON BINGO

		FREE SPACE		

		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									

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