Secret Pseudo-Protein Code

First Base	Second Base: U	Second Base: C	Second Base: A	Second Base: G	Third Base
U	A	h	p	w	U
	a	I	Q	X	C
	B	i	STOP !	STOP .	A
	b	J	STOP ?	x	G
C	C	j	q	Y	U
	c	K	R	y	C
	D	k	r	Z	A
	d	L	S	z	G
A	E	l	s	Ñ	U
	e	M	T	ñ	C
	F	m	t	t	A
	START	N	U	ç	G
G	f	n	u	"	U
	G	O	V	;	C
	g	o	v	,	A
	H	P	W	space	G

Name ____________
Period ____________
Date ____________
Subject ____________

Secret Pseudo-Protein Code

The table shows the secret pseudo-protein code.

To decode the symbol CGU: (1.) Follow down the leftmost column labeled “First base” until you find the letter C. All codes in this four by four block begin with the letter C. (2.) Go across the row until you are in the “Second Base” column labeled lined up with the letter G. All codes in this column have G as their second letter. (3.) Scan the “Third base” column on the far right until you find the letter U. (4.) You should now be pointing at the letter “Y.” The code CGU stands for “Y.”

To encode a the letter “ñ:” (1.) Find the letter “ñ.” (2.) Look to the left to find the first code letter, A. (3.) Look up to find the second code letter, G. (4.) Look to the right to find the third and last code letter, C. The letter “ñ” is coded as AGC.

Hints. Every message must begin with START. Every message ends when a STOP punctuation mark appears. Good luck.

Decode this sentence about DNA:

AUG GAG UUC AAA AAU GCA GCU GGG UUC GCU CUG GGG CUU CAA UCA CUC CCA GGG

CUG UCA AAU CUC GCA GAA AUC CAA AUC CUG GGG AGA GUG AUC GGG

AAU AAA CAA GAU CUC AAA GAU CAA AUC GGG GCA GUU GGG CUA ACG UUU UAA

Write a sentence about RNA and then encode it.

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______ ______ ______ ______ ______ ______ ______ ______ ______ ______ ______

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______ ______ ______ ______ ______ ______ ______ ______ ______ ______ ______

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______ ______ ______ ______ ______ ______ ______ ______ ______ ______ ______

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Name ____________________

ANSWER THE QUESTIONS:

1. How many different characters are coded for using the 3-letter word/4-letter alphabet **Secret Pseudo-Protein Code**?

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2.a. If you were to make up a new code using the same 4-letter alphabet, but only **2-letter words**, how many different characters could you code for?

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2.b. Would the 2-letter word/4-letter alphabet code be sufficient to encode only the 26 capital letters of the alphabet?

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3. Proteins are made of only 20 different amino acids. Any one of the three stop codes will end protein synthesis. The 3-letter word/4-letter alphabet code system has 43 extra codes. Would a 2-letter word/4 letter alphabet code system provide enough codes for protein synthesis?
Show why or why not.

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4. Did you have any problems decoding or encoding messages due to clerical errors?

____

5. The protein synthesis code is redundant. For example, UCA, UCC, UCG, and UCU all code for the amino acid called serine, How could this redundancy reduce the number of errors made at the ribosome during protein synthesis?

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Name
Period
Date KEY
Subject

Secret Pseudo-Protein Code

The table shows the secret pseudo-protein code.

To decode the symbol CGU: (1.) Follow down the leftmost column labeled "First base" until you find the letter C. All codes in this four by four block begin with the letter C. (2.) Go across the row until you are in the "Second Base" column labeled lined up with the letter G. All codes in this column have G as their second letter. (3.) Scan the "Third base" column on the far right until you find the letter U. (4.) You should now be pointing at the letter "Y." The code CGU stands for "Y."

To encode a the letter "ñ:" (1.) Find the letter "ñ." (2.) Look to the left to find the first code letter, A. (3.) Look up to find the second code letter, G. (4.) Look to the right to find the third and last code letter, C. The letter "ñ" is coded as AGC.

Hints. Every message must begin with START. Every message ends when a STOP punctuation mark appears. Good luck.

Decode this sentence about DNA:

start	W	a	t	s	o	n		a	n	d		C	r	i	c	k	
AUG	GAG	UUC	AAA	AAU	GCA	GCU	GGG	UUC	GCU	CUG	GGG	CUU	CAA	UCA	CUC	CCA	GGG

d	i	s	c	o	v	e	r	e	d		t	H	e	
CUG	UCA	AAU	CUC	GCA	GAA	AUC	CAA	AUC	CUG	GGG	AGA	GUG	AUC	GGG

s	t	r	u	c	t	u	r	e		o	f		D	N	A	! stop
AAU	AAA	CAA	GAU	CUC	AAA	GAU	CAA	AUC	GGG	GCA	GUU	GGG	CUA	ACG	UUU	UAA

Write a sentence about RNA and then encode it.

start	S	t	u	d	e	n	t		a	n
AUG	CAG	AAA	GAU	CUG	AUC	GCU	AAA	GGG	UUC	GCU
s	w	e	r	s		w	i	l	l	
AAU	UGU	AUC	CAA	AAU	GGG	GCU	UCA	ACU	ACU	GGG
v	a	r	y	.						
GAA	UUC	CAA	CGC	UGA						

Name ________________

ANSWER THE QUESTIONS:

1. How many different characters are coded for using the 3-letter word/4-letter alphabet **Secret Pseudo-Protein Code**?

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2.a. If you were to make up a new code using the same 4-letter alphabet, but only **2-letter words**, how many different characters could you code for?

16: UU UC UA UG
CU CC CA CG
AU AC AA AG
GU GC GA GG

2.b. Would the 2-letter word/4-letter alphabet code be sufficient to encode only the 26 capital letters of the alphabet?

NO!

3. Proteins are made of only 20 different amino acids. Any one of the three stop codes will end protein synthesis. The 3-letter word/4-letter alphabet code system has 43 extra codes. Would a 2-letter word/4 letter alphabet code system provide enough codes for protein synthesis?
Show why or why not.

NO! There are only 16 codes. 21 codes (20 amino acids + 1 stop) are needed.

4. Did you have any problems decoding or encoding messages due to clerical errors?

Probably yes! Note the "H" typo

5. The protein synthesis code is redundant. For example, UCA, UCC, UCG, and UCU all code for the amino acid called serine, How could this redundancy reduce the number of errors made at the ribosome during protein synthesis?

When DNA mutates, or RNA synthesis has error, or if ribosome misreads mRNA code; redundancy increases chance of no change in protein's amino acid order. (E.g. t = aaa & aga)