

BIOL 1114 Exam #3 (STAR Form) April 13, 2015

Use a #2 pencil to fill in the information on your NCS answer sheet. Put your **O-Key Account Username** in the boxes indicated for **LAST NAME** and darken the appropriate circles. **Write your Name (Last, First)** and **“Star”** in the space above the boxes containing your **O-Key Account Username**. Darken the **(S)** in the **last column of the name circles**. Enter the number **1513** and **darken the corresponding circles** in the **first 4 columns** of the **“Student ID.”** Failure to perform this correctly will incur a **-10pt handling fee**. Read all questions and answers *carefully* before choosing the **single BEST response** for each question. Feel free to ask the instructor for clarification.

mRNA-Codon-to-Amino-Acid Decoder Chart										
1 st Letter	U		C		2 nd Letter			G		3 rd Letter
U	UUU	Phenylalanine	UCU	Serine	UAU	Tyrosine	UGU	Cysteine	U	
	UUC		UCC		UAC		UGC		C	
	UUA	Leucine	UCA		UAA	STOP	UGA	STOP	A	
	UUG		UCG		UAG		UGG	Tryptophan	G	
C	CUU	Leucine	CCU	Proline	CAU	Histidine	CGU	Arginine	U	
	CUC		CCC		CAC		CGC		C	
	CUA		CCA		CAA	CGA	A			
	CUG		CCG		CAG	CGG	G			
A	AUU	Isoleucine	ACU	Threonine	AAU	Asparagine	AGU	Serine	U	
	AUC		ACC		AAC		AGC		C	
	AUA		ACA		AAA	Lysine	AGA	A		
	AUG	Methionine; START	ACG		AAG		AGG	G		
G	GUU	Valine	GCU	Alanine	GAU	Aspartate	GGU	Glycine	U	
	GUC		GCC		GAC		GGC		C	
	GUA		GCA		GAA	Glutamate	GGA		A	
	GUG		GCG		GAG		GGG		G	

Important Equations:	$r = b - d$	$G = rN$	$G = rN [(K - N) / K]$
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Smurf	Sex	Color vision (is X-linked recessive)	Blood Type	Skin color (blue is autosomal recessive; pink is autosomal dominant)	Notes
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Adults

Papa	male	Color blind	A	blue skin	
Mama	female	Normal Vision	O	pink skin	
Uncle	male	Normal Vision	A	blue skin	
Auntie	female	Color Blind	B	pink skin	

Cousins

Smooth	female	Normal Vision	O	pink skin	Papa & Mama
Smidgen	male	Color Blind	AB	blue skin	Uncle & Auntie
Scooter	male	Color Blind	B	blue skin	Uncle & Auntie
Smore	male	Color Blind	O	blue skin	Uncle & Auntie
Silky	female	Normal Vision	A	blue skin	Uncle & Auntie

Cousin's parents

Suitor

Slinky	male	Normal Vision	O	pink skin	father is blue-skinned
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In the Land of the Smurfs, blue skin color is common, even though it is an **autosomal recessive** trait. Smurf physicians call this condition *methemoglobinemia*. Diaphorase is an enzyme responsible for the normal conversion of methemoglobin (a bluish protein) to hemoglobin (a protein that is red when carrying oxygen in the blood). Some researchers hypothesize that methemoglobinemia is caused by a decrease or lack of diaphorase enzyme, causing the skin to appear blue.

On the Smurf Farm dwell Papa & Mama; Auntie & Uncle and 5 Smurf cousins: Smidgen, Scooter, Smore, Silky and Smooth. Slinky, a pink-skinned Smurf from another village, wants to marry Silky, a daughter of Uncle and Auntie. A significant number of Smurfs in the community are also color-blind, an **X-linked recessive** trait. Phenotypes for these Smurfs are listed above. When they were children, Uncle and Auntie Smurf were both vaccinated against the Smurf Infective Convulsive Coughing (SICC) virus.

Pigs are diploid animals with 38 chromosomes. Coat color in pigs is encoded by the *extension coat color* gene that regulates the synthesis of eumelanin (black) and pheomelanin (red/yellow). The gene is 948 base pairs long. A mutation in the middle of the gene changes the codon from GCG to GTG. Pigs that are **e/e** have a red coat, whereas animals with an **E** allele have a black coat.