## **Gene Mutations Worksheet**

There are several types of gene point mutations:

- **DELETION** (a base is lost)
- **INSERTION** (an extra base is inserted)
  - Deletion and insertion may cause what's called a **FRAMESHIFT**, meaning the reading "frame" changes, changing the amino acid sequence.
- SUBSTITUTION (one base is substituted for another)
  - If a substitution *changes* the amino acid, it's called a **MISSENSE** mutation.
  - If a substitution **does not change** the amino acid, it's called a **SILENT** mutation.
  - If a substitution changes the amino acid to a "stop," it's called a NONSENSE mutation.

Complete the boxes below. Classify each mutated strand as: Deletion, Insertion, or Substitution <u>AND</u> as either frameshift, missense, silent or nonsense (hint: deletion or insertion will always be frameshift).

Original DNA Sequence:	T	Α	с	Α	с	с	T	T	G	G	с	G	Α	С	G	Α	С	T
mRNA Sequence:																		
Amino Acid																		
Sequence:																		

Mutated DNA Sequence #1:	T	Α	с	Α	T	С	T	T	G	G	с	G	Α	с	G	Α	С	T				
mRNA Sequence:																						
Amino Acid Sequence:																						
			Circl	e the	e mut	atior	n in th	ne mu	utate	ed stro	and a	abov	е									
Circle all of				in	sertic	'n							fro	imesł	nift							
these words that apply to										missense												
the mutation					eletic									silent								
				SUC	stitut	ion							nc	nonsense								

Mutated DNA Sequence #2:	T	Α	С	G	Α	с	с	т	T	G	G	с	G	Α	с	G	Α	с	т		
mRNA																					
Sequence: Amino Acid																					
Sequence:																					
			Cir	cle tl	ne m	utati	ion ir	n the	mute	ated	strar	nd al	oove	•							
Circle all of					inser	tion								fra	mesł	nift					
these words that apply to					dele	tion					missense										
the mutation				SI	Jbstit	tutior	n							9	silent	1t					
														no	nsen	se					

Mutated DNA Sequence #3:	т	Α	С	Α	с	с	T	T	A	(	G	С	G	A	с	G	A	с	т				
mRNA Sequence:																							
Amino Acid Sequence:															<u> </u>				<u> </u>				
•	Circle the mutation in the mutated strand above																						
Circle all of these words that apply to the mutation		insertion deletion substitution											frameshift missense silent nonsense										
Mutated DNA Sequence #4:	т	Α	С	Α	с	С	Т	T	G		G	С	G	Α	С	С	Α	С	Т				
mRNA Sequence:																							
Amino Acid Sequence:																							
	T		Circl	e the	mut	ation	in th	ne m	utat	ted	strc	and a	abov										
Circle all of these words that apply to the mutation				de	sertic eletic stitut	n					frameshift missense silent nonsense												
				_		-																	
Mutated DNA Sequence #5:	T	Α	с	Α	с	С	Т		т	G	Ģ	9	G	Α	с	G	Α	с	T				
mRNA Sequence:																							
Amino Acid Sequence:																							
			Circl	e the	mute	ation	in th	ne m	utat	ted	stro	and o	voda										
Circle all of these words that apply to the mutation	insertion deletion substitution											frameshift missense silent											
										nonsense													

Looking at all of the mutated strands, which strand or strands might result in no change to the protein?

Which strand is guaranteed to result in a completely non-functional protein?