DNA Mutations Practice Worksheet

DIRECTIONS: Transcribe and translate the original DNA sequence. Then, do the same for each mutated DNA sequence. Then, determine the consequence, if any, for each mutation, by circling your choice for each question. **You will need a Genetic Code Chart.**

Original DNA sequence:	**TAC**	**ACC**	**TTG**	**GCG**	**ACG**	**ACT**	
mRNA transcript:							
amino acids:							

Mutated DNA sequence #1:	**TAC ATC TTG GCG ACG ACT**					
mRNA transcript: ***(Circle any changes)***						
amino acids:						
Type of mutation (Circle one.)	Point ⇨ Substitution			Frameshift ⇨ Insertion or Deletion		
How did the mutation affect the amino acid sequence (protein)? (Circle one.)	No change	1 amino acid changed	Premature stop signal	No stop signal	1 amino acid added/ deleted	All the amino acids changed after the point of mutation

Mutated DNA sequence #2:	**TAC GAC CTT GGC GAC GAC T**					
mRNA transcript: ***(Circle any changes)***						
amino acids:						
Type of mutation (Circle one.)	Point ⇨ Substitution			Frameshift ⇨ Insertion or Deletion		
How did the mutation affect the amino acid sequence (protein)? (Circle one.)	No change	1 amino acid changed	Premature stop signal	No stop signal	1 amino acid added/ deleted	All the amino acids changed after the point of mutation

Mutated DNA sequence #3:	**TAC ACC TTA GCG ACG ACT**					
mRNA transcript: ***(Circle any changes)***						
amino acids:						
Type of mutation (Circle one.)	Point ⇨ Substitution			Frameshift ⇨ Insertion or Deletion		
How did the mutation affect the amino acid sequence (protein)? (Circle one.)	No change	1 amino acid changed	Premature stop signal	No stop signal	1 amino acid added/ deleted	All the amino acids changed after the point of mutation

Mutated DNA sequence #4:	**TAC ACC TTG GCG ACT ACT**					
mRNA transcript: ***(Circle any changes)***						
amino acids:						
Type of mutation (Circle one.)	Point ⇨ Substitution			Frameshift ⇨ Insertion or Deletion		
How did the mutation affect the amino acid sequence (protein)? (Circle one.)	No change	1 amino acid changed	Premature stop signal	No stop signal	1 amino acid added/ deleted	All the amino acids changed after the point of mutation

Mutated DNA sequence #5:	**TAC ACC TTG GGA CGA CT**					
mRNA transcript: ***(Circle any changes)***						
amino acids:						
Type of mutation (Circle one.)	Point ⇨ Substitution			Frameshift ⇨ Insertion or Deletion		
How did the mutation affect the amino acid sequence (protein)? (Circle one.)	No change	1 amino acid changed	Premature stop signal	No stop signal	1 amino acid added/ deleted	All the amino acids changed after the point of mutation

CONCLUSIONS

1. Which type of mutation is responsible for new variations (alleles) of a trait?

2. Which type of mutation results in abnormal amino acid sequence?

3. Which type of mutation stops the translation of the mRNA?

2. A geneticist found that a particular mutation had no effect on the protein coded by a gene. What do you think is the most likely type of mutation in this gene? Why?

4. Examine your genetic code chart. Name one amino acid that has more than one codon. Name an amino acid that has only one codon.

5. Look at the following sequence: THE FAT CAT ATE THE RAT. Delete the first H and regroup the letters in groups of three- write out the new groups of three. Does the sentence still make sense? What type of mutation is this an example of?

6. Given the following three mRNA sequences, determine which two code for the same protein. Circle them.

	mRNA #1	**mRNA #2**	**mRNA #3**
Transcript	AGU UUA GCA ACG AGA UCA	UCG CUA GCG ACC AGU UCA	AGC CUC GCC ACU CGU AGU
Translate			

BONUS: You have a DNA sequence that codes for a protein and is 105 nucleotides long. A frameshift mutation occurs at the 85th base - how many amino acids will be correct in this protein? **SHOW YOUR WORK.**