

## BIOLOGY ACTIVITY

### Gene Mutations and Proteins

Names: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Objective:** To demonstrate how gene mutations affect the production of proteins?

**Procedure:**

1. Use the following base sequence of one strand of an imaginary DNA molecule:  
AATGTG AAC ACA TGC GCC C.
2. Write the base sequence for an mRNA strand that would be transcribed from the given DNA sequence. Place your results in the table below.
3. Use the table on page 2 to determine the sequence of amino acids in the resulting protein fragment. Place your results in the table below.
4. If the fifth base in the original DNA strand were changed from G to C, how would this affect the resulting protein fragment? Write the new protein fragment in the table below.
5. If G were added to the original DNA strand after the third base, what would the resulting mRNA look like? How would this addition affect the protein? Show your results in the table below.

**Data:**

<b>mRNA from Step 2</b>	
<b>Protein Sequence from Step 3</b>	
<b>Protein Sequence from Step 4</b>	
<b>MRNA from Step 5</b>	
<b>Protein Sequence from Step 5</b>	

**Conclusions:**

1. Which change in DNA was a point mutation? Which was a frameshift mutation?

\_\_\_\_\_  
\_\_\_\_\_

2. In what way did the point mutation affect the protein?

\_\_\_\_\_  
\_\_\_\_\_

3. How did the frameshift mutation affect the protein?

\_\_\_\_\_  
\_\_\_\_\_

Second nucleotide					
	U	C	A	G	
U	UUU <b>Phenylalanine</b> (Phe)	UCU <b>Serine</b> (Ser)	UAU <b>Tyrosine</b> (Tyr)	UGU <b>Cysteine</b> (Cys)	U
	UUC Phe	UCC Ser	UAC Tyr	UGC Cys	C
	UUA <b>Leucine</b> (Leu)	UCA Ser	UAA <b>STOP</b>	UGA <b>STOP</b>	A
	UUG Leu	UCG Ser	UAG <b>STOP</b>	UGG <b>Tryptophan</b> (Trp)	G
C	CUU <b>Leucine</b> (Leu)	CCU <b>Proline</b> (Pro)	CAU <b>Histidine</b> (His)	CGU <b>Arginine</b> (Arg)	U
	CUC Leu	CCC Pro	CAC His	CGC Arg	C
	CUA Leu	CCA Pro	CAA <b>Glutamine</b> (Gln)	CGA Arg	A
	CUG Leu	CCG Pro	CAG Gln	CGG Arg	G
A	AUU <b>Isoleucine</b> (Ile)	ACU <b>Threonine</b> (Thr)	AAU <b>Asparagine</b> (Asn)	AGU <b>Serine</b> (Ser)	U
	AUC Ile	ACC Thr	AAC Asn	AGC Ser	C
	AUA Ile	ACA Thr	AAA <b>Lysine</b> (Lys)	AGA <b>Arginine</b> (Arg)	A
	AUG <b>Methionine</b> (Met) or <b>START</b>	ACG Thr	AAG Lys	AGG Arg	G
G	GUU <b>Valine</b> Val	GCU <b>Alanine</b> (Ala)	GAU <b>Aspartic acid</b> (Asp)	GGU <b>Glycine</b> (Gly)	U
	GUC (Val)	GCC Ala	GAC Asp	GGC Gly	C
	GUA Val	GCA Ala	GAA <b>Glutamic acid</b> (Glu)	GGA Gly	A
	GUG Val	GCG Ala	GAG Glu	GGG Gly	G

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