Amoeba Sisters Video Recap of *Mutations: The Potential Power of a Small Change*

Note: You will need an mRNA chart for many of these questions. If you don't have one, they are easy to find online with your favorite search engine.

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1. Mutations can be **harmful**, **helpful** (unlikely), or **neutral** in their effect. Often a neutral mutation will not result in an altered amino acid. Using your mRNA chart, give another mRNA codon that this CUU could mutate to and still code for Leucine.

The mRNA codon CUU could mutate to **C_____** and still code for Leucine, which could be a neutral mutation.

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2. It is important to understand that in mutations, a specific part of a **nucleic acid** experiences the mutation. In the below cartoon, fill in the blank that describes the part of the DNA molecule that is experiencing the mutation. Then label where that part is found on the DNA in the picture below.

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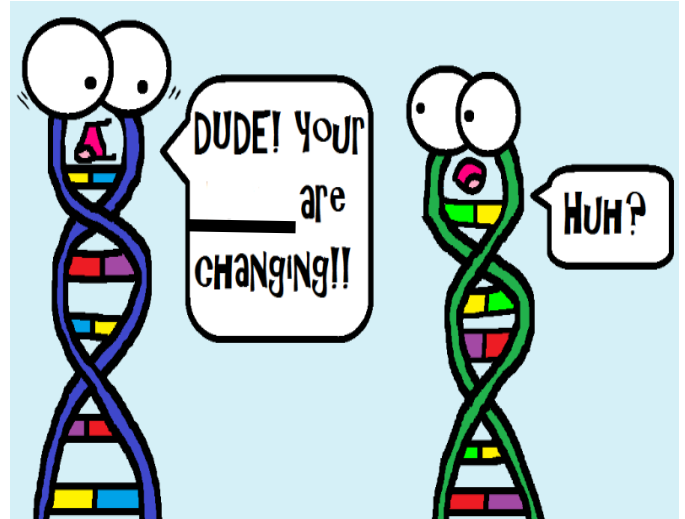
3. Even a **gene mutation** that is a **point mutation**, meaning it affects one nucleotide base, can still make a major change. Sickle Cell Anemia is caused by a point mutation knows as a **substitution.** Complete the following example of a substitution:

If the following is for normal hemoglobin:

Portion of Hemoglobin DNA	GGA CTC CTC
MRNA	CCU GAG GAG
AMINO ACIDS	Proline-Glutamic Acid-Glutamic Acid

Show what would occur if the first T ("thymine") DNA base in the portion shown above mutated to an A ("adenine").
Sickle Cell Hemoglobin:

Portion of mutated hemoglobin DNA: _____

mRNA: _____

Amino Acids:_____

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4. An **insertion or deletion** can result in a **frameshift mutation**. To demonstrate this, complete the following:

Normal Strand:

DNA: GCA   ATG   CAC

mRNA: _____

Amino Acids: _____

Deletion (causing a frameshift):

Taking out the first "G" in the original DNA above results in:

DNA: CAA   TGC   AC

mRNA:_____

Amino Acids:_____

How did the frameshift change the amino acids that were coded?
_____

_____

What do you remember about mutations?

For the following, place an "X" if it is true statement.

_____Mutations are random.

_____Mutations can occur in both DNA and RNA.

_____Not all DNA codes for proteins.

_____Substitution mutations typically result in frameshift.

_____Mutations are mostly beneficial and useful for an organism.

_____Mutations can only occur during interphase.

_____Not all genes are "turned on" or activated.

_____Mutations can be genetically inherited.

Illustrate That Chromosome Mutation

Sketch your own cartoon for the following chromosome mutations. Creativity is encouraged!

Duplication	Deletion

Inversion	Translocation