Mutations Worksheet Name

There are several types of mutation:

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 as either Deletion, Insertion, or Substitution AND as either frameshift, missense, silent or nonsense (hint: deletion or insertion will always be frameshift).

Original DNA Sequence: T A C A C C T T G G C G A C G A C T

mRNA Sequence:

Amino Acid Sequence:

Mutated DNA Sequence #1: T A C A (T) C T T G G C G A C G A C T

What's the mRNA sequence (Circle the change)

What will be the amino acid sequence?

Will there likely be effects What kind of mutation is this

Mutated DNA Sequence #2: T A C (G) A C C T T G G C G A C G A C T

What's the mRNA sequence?

What will be the amino acid sequence?

Will there likely be effects? What kind of mutation is this?

Mutated DNA Sequence #3: T A C A C C T T (A) G C G A C G A C T

What's the mRNA sequence?

What will be the amino acid sequence?

Will there likely be effects? What kind of mutation is this?

Mutated DNA Sequence #4: T A C A C C T T G G C G A C (T) A C T

What's the mRNA sequence?

What will be the amino acid sequence?

Will there likely be effects? What kind of mutation is this?

Original DNA Sequence: T A C A C C T T G G C G A C G A C T

mRNA Sequence:

Amino Acid Sequence:

Mutated DNA Sequence #5: T A C A C C T T G G G A C G A C T

What will be the *corresponding* mRNA sequence?

What will be the amino acid sequence?

Will there likely be effects? What kind of mutation is this?

Sickle Cell Anemia

Sickel cell anemia is the result of a type of mutation in the gene that codes for part of the hemoglobin molecule. Recall that hemoglobin carries oxygen in your red bloods cells. The mutation causes the red blood cells to become stiff and sickle-shaped when they release their oxygen. The sickled cells tend to get stuck in blood vessels, causing pain and increased risk of stroke, blindness, damage to the heart and lungs, and other conditions.

Analyze the DNA strands below to determine what amino acid is changed and what type of mutation occurred.

Normal hemoglobin DNA C A C G T G G A C T G A G G A C T C C T C

Normal hemoglobin mRNA

Normal hemoglobin A.A. sequence

Sickle cell hemoglobin DNA C A C G T G G A C T G A G G A C A C C T C

Sickle cell hemoglobin mRNA

Sickle cell hemoglobin A.A. sequence