Begin with the following DNA sequence: T A C T G T T C T C C A A A C A T C

Write the mRNA transcript that will be formed from this section of DNA below:

 AUG ACA AGA GGU UUG UAG

Use the chart to determine the sequence of amino acids in the polypeptide that will be translated from this transcript (include the STOP codon):

 Met – Thr – Arg – Gly – Leu – [Stop]

Mutation Type #1 - Now compare the following sequence to the original sequence:

T A C T G T T C T C C A A A C A T C (Original sequence)

T A C G T T C T C C A A A C A T C (New mutated sequence)

Explain the type of mutation this is: (Substitution, Deletion or Insertion)

Which mutation category does it belong to (frameshift or point mutation)?

What is the sequence of the NEW mRNA (after the mutation):

 AUG – CAA – GAG – GUU – UGU - AG

Use the chart above to determine the sequence of amino acids in the new polypeptide:

 Met – Gln – Glu – Val - Cys

Mutation Type #2 - Now compare the following sequence to the original sequence:

T A C T G T T C T C C A A A C A T C (original sequence)

T A C T G T C C T C C A A A C A T C (new mutated sequence)

Explain the type of mutation this is. (Substitution, Deletion or Insertion)

Which mutation category does it belong to (frameshift or point mutation)?

What is the sequence of the NEW mRNA (after the mutation):

AUG – ACA – GGA – GGU – UUG - UAG

Use the chart above to determine the sequence of amino acids in the new polypeptide:

Met – Thr – Gly – Gly – Leu – [Stop]

Which mutations had the most detrimental effect on the final protein - the first mutation or the second mutation?

First Mutation

Explain your choice. Be sure to discuss the structure and function of the final protein, include the possible structure/function results of BOTH mutated sequences in your answer.

A deletion mutation occurs in #1 while a substitution mutation happens in #2. A deletion results in a frameshift. Frameshifts change the entire amino acid sequence from the point where the mutation happens. A substitution mutation however changes only the amino acid coded for by the substituted nucleotide. Mutation type #1 has a greater effect on the final protein than mutation type #2 does.

 Begin with the following DNA sequence: T A C T T G G G C A T A A A A C G C A T T

 Write the mRNA transcript that will be formed from this section of DNA below:

AUG – AAC – CCG – UAU – UUU – GCG - UAA

Use the chart to determine the sequence of amino acids in the polypeptide that will be translated from this transcript (include the STOP codon):

Met – Asn – Pro – Tyr – Phe – Ala – [Stop]

Mutation Type #1 - Now compare the following sequence to the original sequence:

T A C T T G G G C A T A A A A C G C A T T (original sequence)

T A C T T G G G C A T A A A G C G C A T T (new mutated sequence)

Explain the type of mutation this is. (Substitution, Deletion or Insertion)

Which mutation category does it belong to (frameshift or point mutation)?

What is the sequence of the NEW mRNA (after the mutatation):

AUG – AAC – CCG – UAU – UUC – GCG - UAA

Use the chart above to determine the sequence of amino acids in the new polypeptide:

Met – Asn – Pro – Tyr – Phe – Ala – [Stop]

Mutation Type #2 - Now compare the following sequence to the original sequence:

T A C T T G G G C A T A A A A C G C A T T (original sequence)

T A C T T G G G C A T C A A A C G C A T T (new mutated sequence)

Explain the type of mutation this is. (Substitution, Deletion or Insertion)

Which mutation category does it belong to (frameshift or point mutation)?

What is the sequence of the NEW mRNA (after the mutatation):

AUG – AAC – CCG – UAG – UUU – GCG - UAA

Use the chart above to determine the sequence of amino acids in the new polypeptide :

Met – Asn – Pro – [Stop] – Phe – Ala – [Stop]

Which mutations had the most detrimental effect on the final protein - the first mutation or the second mutation?

Explain your choice. Be sure to discuss the structure and function of the final protein, include the possible structure/function results of BOTH mutated sequences in your answer for full credit:

 Mutation type #2 has a greater effect on the final protein. Mutation type #2 results in a protein that stops too early (this is an example of a nonsense mutation). Mutation type #1 however doesn’t change the final protein at all (this is an example of a silent mutation).