

Translation and Mutations

Name _____

Period _____ Date _____

In this activity you will be practicing transcription of DNA, translation of RNA and looking at the effects of different point mutations on the resulting proteins. To do this, you will need to know how mRNA is transcribed from DNA and how mRNA codes for amino acids.

- mRNA is transcribed from DNA using complimentary base pairing:

C – G, T – A, A – U (T is only in DNA, not RNA)

So a sequence of **DNA** that reads: T A C T A T T T C G C T A T T

Becomes a sequence of **mRNA** that reads: *A U G A U A A A G C G A U A A*

- mRNA codes for **amino acids** in 3 letter codons and creates a **protein**.

Using the mRNA codon chart the above sequence becomes:

(start) – Iso – Lys – Arg – (stop)

For each of the DNA sequences below, transcribe to mRNA and then translate to the amino acid chain. (Just use the first three letters to name the amino acids in the chain.)

1) DNA = T A C T G G T T A A C A A A A A T T

mRNA = *A U G A C C*

amino acids = *start - Thr -*

2) DNA = T A C G T A G C G G G G G T T C C A A C T

mRNA =

amino acids =

3) DNA = T A C C G C A G A A A C A T C

mRNA =

amino acids =

4) DNA = T A C T C G C C A A T A A T G G A A A T T

mRNA =

amino acids =

Now let's look at how a single point mutation can change the resulting protein.
First, transcribe and translate the following **original** DNA sequence:

5) DNA = T A C A C A G C T T C G G T A T G A C G A A C T
mRNA =
amino acids =

On # 6-8, CIRCLE each AMINO ACID that is DIFFERENT from the ORIGINAL.

6) Transcribe and translate the same sequence with a substitution mutation:

DNA = T A C A C A G C T T A G G T A T G A C G A A C T
mRNA =
amino acids =

Explain the effect on the resulting protein. _____

7) Transcribe and translate the same sequence with a different substitution mutation:

DNA = T A C A C A A C T T C G G T A T G A C G A A C T
mRNA =
amino acids =

Explain the effect on the resulting protein. _____

8) Transcribe and translate the same sequence with a deletion mutation causing a frameshift:

DNA = T A C A C A G T T C G G T A T G A C G A A C T
mRNA =
amino acids =

Explain the effect on the resulting protein. _____

9) What would be the likely result of an insertion mutation that added one letter to the middle of the sequence? _____

10) In your opinion, which type of mutation is the most damaging to the resulting protein?
_____ Explain why _____

