Name: _____ Period: _____

Gene Mutations Activity

Background: There are two types of mutations, small-scale gene mutations and large-scale chromosomal mutations. In this activity you will be learning about gene mutations. There are two basic types of gene mutations, point (base substitution) and frameshift (insertions and deletions). In frameshift mutations, an insertion or deletion of a base changes the reading frame of the sequence since mRNA is read in groups of three nitrogen bases (codons). This causes several amino acids to be affected unless the deletion or insertion is a group of three. There are very few examples of frameshift mutation diseases in organisms because they are usually fatal to the organism because the proteins do not function. In point mutations, a simple base substitution does not change the reading frame because one nitrogen base is simply substituted with a different nitrogen base, so only one amino acid is affected unless there are several base substitutions.

Part 1: Frameshift Mutations

Example 1: Insertion Frameshift

DNA Sequence Sentence: THE BOY CUT HIS LIP AND ATE THE HOT DOG

Affect of Insertion: THE BOY CUT HIS **S**LI PAN DAT ETH EHO TDO

Insert a nitrogen base

Example 2: Deletion Frameshift

Delete a nitrogen base

DNA Sequence Sentence: THE BOY CUT HIS LIP AN**D** ATE THE HOT DOG

Affect of Deletion: THE BOY CUT HIS LIP ANA TET HEH OTD OG

The insertion shifts the reading frame to the right. The deletion shifts the reading frame to the left. Complete the following lines for frameshift mutations.

Write each codon per line:

DNA Sequence: THE DOG AND FOX DID NOT EAT THE FAT CAT

Insertion: THE DOG _____ _____ _____ _____ _____ _____ _____ _____

Insert a nitrogen base

Deletion: THE DOG AND _____ _____ _____ _____ _____ _____ _____

Delete a nitrogen base