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| What is a **GENE MUTATION?**  PointMutationGEN | A mutation which causes a change in…  EX. Substitutions, insertions, and deletions |
|  | A mutation which involves changes in one or a few nucleotides. (i.e. it occurs at a SINGLE POINT in a DNA sequence) |
| **SUBSTITUTION**  **\*In the example to the right, draw a circle around the nucleotide where the mutation occurred.** | * Usually affects no more than 1 amino acid * EX. T A C G C A T G G A A T   T A C G T A T G G A A T |
| **INSERTION**  **\*In the example to the right, draw a circle around the nucleotide where the mutation occurred.** | * 1 base (nucleotide) is inserted into a DNA sequence * EX. T A C G C A T G G A A T   T A T C G C A T G G A A T |
| Briefly explain what has happened to the nucleotide sequence in the mutated strand of DNA as a result of the insertion. |  |
| **DELETION**  **\*In the example to the right, draw a circle around the nucleotide where the mutation occurred.** | * Usually has more dramatic effects * EX. T A C G C A T G G A A T   T \_ C G C A T G G A A T  T C G C A T G G A A T |
| Briefly explain what has happened to the nucleotide sequence in the mutated strand of DNA as a result of the deletion. |  |
| **FRAMESHIFT MUTATIONS**  **\*Frameshift Mutations Cont.**  **Examples include…** | * Shift the reading frame of a genetic message * May make a protein unable to perform its original function…WHY? |
| CoMNov97karyo | * Involve changes in the number or structure of chromosomes * May change the location of genes on a chromosome * May change the number of copies of some genes |
| **gene_deletionDELETIONS** |  |
| **gene_duplicationDUPLICATIONS** |  |
| **gene_inversionINVERSIONS** |  |
| **gene_translocationTRANSLOCATIONS** |  |
| **Significance of Mutations** | * Most are neutral (i.e. they have little or no effect on gene expression or protein function) * Some are harmful (causing genetic disorders or cancer) or lethal |