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| MutationsTypes of Mutations\_\_\_\_\_\_\_\_\_Mutations\_\_\_\_\_\_\_\_\_Mutations\_\_\_\_\_\_\_\_\_ Mutations | 63* **change in the\_\_\_\_\_\_ or \_\_\_\_\_\_\_ sequence**
* **May result in new \_\_\_\_\_\_**
* **Important for\_\_\_\_\_\_\_\_\_\_\_\_**
	+ Can be \_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_
* **May be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (due to \_\_\_\_\_\_\_\_\_\_ during transcription/translation or mitosis/meiosis)**
* **May be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ endued!**
* **There are also \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mutations, large changes with \_\_\_\_\_\_\_\_\_\_\_ effects.**
* **\_\_\_\_\_\_\_\_ mutations**
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mutations (Mutations that disrupt the reading frame by insertions or deletions of a non-multiple of 3 nucleotide bases.)**
* **\_\_\_\_\_\_\_\_\_\_\_ alterations**
* **They lead to \_\_\_\_\_\_\_ versions of \_\_\_\_\_\_\_\_\_\_\_\_ that help organisms**

 **\_\_\_\_\_\_\_\_\_ to changes in their environment.** * **\_\_\_\_\_\_\_\_\_\_\_ for evolution**
* **increase an organism’s changes of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* **Example: Mutations in many \_\_\_\_\_\_\_\_\_\_\_\_ that allow them to survive in the presence of \_\_\_\_\_\_\_\_\_\_\_\_ drugs.**

 **The mutations lead to antibiotic-\_\_\_\_\_\_\_\_\_\_\_ strains of bacteria.** * **When a mutation \_\_\_\_\_\_\_ a protein that plays a \_\_\_\_\_\_\_\_\_ role in the cell it may not function properly, resulting in a \_\_\_\_\_\_\_\_\_\_\_ condition.**
* **Harmful mutations may cause genetic disorders or \_\_\_\_\_\_\_\_\_\_\_.**
* **A genetic disorder is a \_\_\_\_\_\_\_\_\_ caused by a \_\_\_\_\_\_\_\_\_\_\_\_ in one or a few genes.**
* **Example: \_\_\_\_\_\_\_\_\_\_\_. A mutation in a single gene causes the body to produce thick, sticky mucus that clogs the \_\_\_\_\_\_\_\_\_ and blocks ducts in digestive organs.**

**\_\_\_\_\_\_\_\_\_\_\_ is a disease in which cells \_\_\_\_\_\_\_\_\_ out of control and form \_\_\_\_\_\_\_\_\_\_\_ masses of cells. It is generally \_\_\_\_\_\_\_\_\_\_\_ by mutations in genes that \_\_\_\_\_\_\_\_\_\_ the cell cycle. Because of the mutations, cells with \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_ are allowed to divide without limits. Cancer genes can be \_\_\_\_\_\_\_\_\_\_\_\_\_\_.*** **Cancer is caused by a \_\_\_\_\_\_\_ of mutations**
* **Cells have developed a number of control mechanisms to \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_**
* **A mutation in \_\_\_\_\_ proto-oncogene would \_\_\_\_\_\_\_\_\_ cause cancer**
* **effects would be \_\_\_\_\_\_\_\_\_\_\_\_\_ by \_\_\_\_\_\_\_\_\_\_ and tumor \_\_\_\_\_\_\_\_\_\_\_\_\_\_ genes.**

* **\_\_\_\_\_\_\_\_\_\_ for cell growth overwhelm the signals for growth \_\_\_\_\_\_\_\_\_\_\_\_, and the cell quickly spirals out of control**
* **(Often, because many of these genes \_\_\_\_\_\_\_\_\_\_\_ the processes that prevent most \_\_\_\_\_\_\_\_\_\_\_\_\_ to the genes themselves, DNA damage accumulates as one \_\_\_\_\_\_.)**

* **Cancers are caused by a series of mutations. \_\_\_\_\_ mutation alters the behavior of the \_\_\_\_\_\_.**
* **For example, the \_\_\_\_\_\_\_\_ mutation\_\_\_\_\_\_\_\_\_\_\_\_ a tumor suppressor gene, the second mutation \_\_\_\_\_\_\_\_\_\_\_\_ a DNA \_\_\_\_\_\_\_\_\_ gene, the third mutation creates an \_\_\_\_\_\_\_\_\_\_\_, and a fourth mutation inactivates several more tumor suppressor genes, resulting in \_\_\_\_\_\_\_\_\_\_\_.**
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