MUTATIONS

A gene mutation is a change in the \_\_\_\_\_\_\_\_\_\_\_ of nitrogen bases in DNA. It can happen at any time in the cell’s life. A mutation causes different \_\_\_\_\_\_\_\_\_\_\_\_ to be produced.

Types of mutations include:

* Deletion -
* Addition -
* Substitution –

Mutations can be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Positive Mutations:**

* Beneficial to the survival of an organism.
* HIV Resistance –
* Bacterial and Fungal Resistant Plants –

**Negative Mutations:**

* Harmful to the survival of an organism. Can cause it to become \_\_\_\_\_\_\_\_\_\_\_\_.
* Hemoglobin –
* Cystic Fibrosis –

**Neutral Mutations:**

* Does not affect the survival of an organism.
* Spirit Bear –

Substances that cause mutations are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_. Examples of mutagens include:

\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is being tested as a way to treat mutated genes. In gene therapy, a mutated gene may be replaced with a \_\_\_\_\_\_\_\_\_\_\_\_ copy of the same gene. The normal gene is placed inside an \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_. This virus is then placed inside the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the patient’s cells. The patient’s cells must be able to “switch on” the healthy genes so that the healthy proteins are then produced.