**Genetic Mutations**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

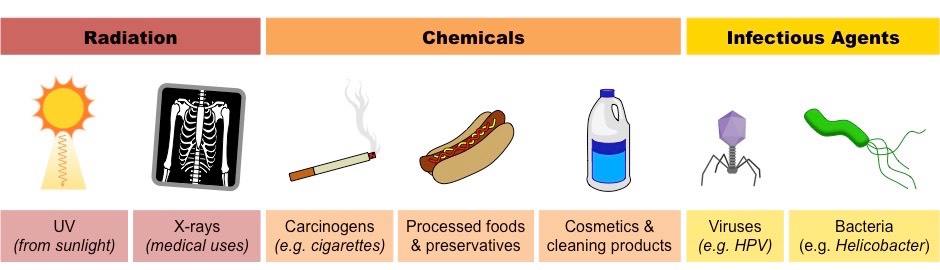
Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| Basic Vocabulary |

A **gene mutation**, or mutation for short, is a change in the genetic material (DNA) of a gene.

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| **Think:** What might be some consequences of mutations? |

While mutations are naturally occurring, there are also factors in the environment, called **mutagens**, can that can cause mutations.



Some mutations can be helpful to an organism. Helpful mutations are called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_**.

An example of this is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Most mutations have no effect on an organism. These mutations are called **\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.

An example of this is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



Some mutations can be harmful to an organism. Harmful mutations are called **\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.

For example, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. Use the words in the word bank below to fill in the blanks. Each term may be used more than once, or not at all.

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| DNA  gene mutation  gene therapy  organism | healthy gene  mutagens  mutated gene  proteins | negative mutations  neutral mutations  positive mutation |

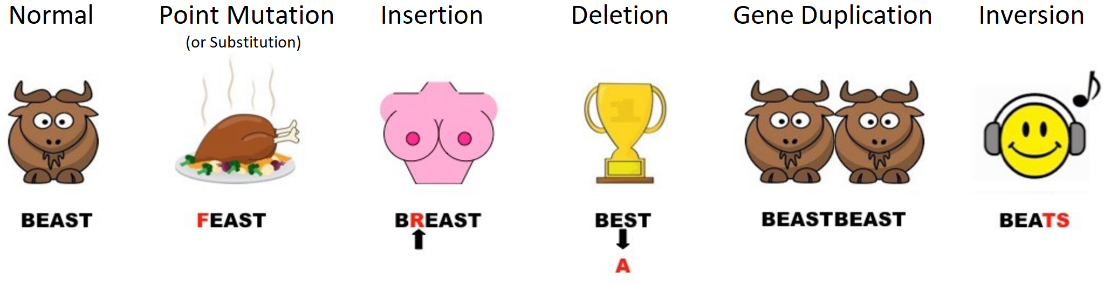
1. A is a change in the genetic material of a gene.
2. Changes to DNA may cause \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_to be made incorrectly or with an incorrect shape.
3. Factors in the environment, called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ can cause mutations.
4. Radiation, cigarette smoke, and pesticides are examples of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
5. Mutations that are harmful to an organism are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
6. Mutations that are helpful to an organism are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

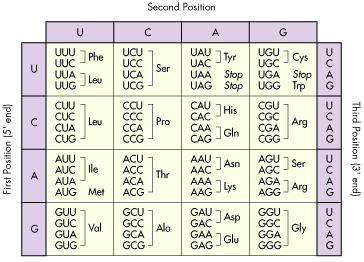
For instance, some plants carry a mutated gene that protects them from disease.

1. Mutations that have no effect on an organism are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. New techniques for treating gene mutations are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and may involve replacing a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. Mutations can result from exposure to mutagens, however, they can also happen in the body naturally. How might this occur?

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| Basic Types of Mutations |







1. A portion of the genetic sequence for a strand of your DNA is shown below. The gene expressing protein X is in bold.

AATTGTCC**TACTGATCGACCCCCACT**GCTTAGCGC

1. What is the mRNA strand of this gene sequence and what amino acids would this translate to?
2. What would happen to the amino acid chain if the T indicated by the arrow is mutated to A?
3. What would happen to the amino acid chain if the T indicated by the arrow is deleted?
4. What consequences might result if there were to be a point mutation at the final T in the DNA sequence to C?
5. If there was a deletion mutation of the TAC region of the gene, what would be a consequence? Explain.

**RESEARCH**: What is the difference between a **silent mutation**, a **nonsense mutation** and a **missense mutation**?

**RESEARCH**: What type of mutation: point, insertion, or deletion, will have the greatest impact on your genetic sequence when coding for a protein? Find an example that supports your explanation.

**RESEARCH**: Describe three different types of chemical mutagens. What kinds of mutations would each cause, and how?