Mutations

Gene Mutation

A gene mutation is a change in the order of the A, G,C and T bases in a gene

Types of Gene Mutations

Deletion (one base missing)

Addition (an extra base is added)

Substitution (one base is substituted for another)

Positive Mutations

Errors in the sequence of DNA bases may produce proteins that could be **beneficial** to an organism and therefore to the survival of its species.

Example: HIV and AIDS

No known cure or vaccine but there are individuals who carry a mutated gene that produces the instructions for a protein that prevents HIV from infecting the person

Remember: HIV Infects T Cells



Negative Mutations

Harmful mutations can cause a species to become extinct.

Negative mutations reduce the probability that organisms with the mutation will produce offspring or survive in their environment.

Negative Mutation cont.

Example:

A substitution of the base A for the base T in only one position on the gene causes the protein hemoglobin to take a different shape.

Red blood cells are C shaped instead of disc shaped



Negative Mutation: Sickle Cell Anemia

Abnormally shaped molecules cannot carry oxygen efficiently.

They also block blood flow, causing pain and often organ damage.

Organ damage as a result of blood carrying nutrients cannot reach organs such as lungs, liver and kidneys.

Neutral Mutation

Most often, however, errors in the base sequence of DNA appear to have no effect on the organism.

For example, if a mutation occurs in a gene for brown coat colour in mice, the gene may still produce the same brown pigment.

The change caused by mutation does not increase or decrease the survival rate of the organism

Mutagens

Are substances or factors that can cause mutations in DNA

Biological viruses can cause genes to be misread or copied incorrectly.

Examples:

Cigarette smoke, radiation from X rays or UV rays, pollutants such as mercury, household chemicals

Gene Therapy

Read pages 141-143 in textbook