

GENETICS

LESSON 9: MUTATIONS

Learning Outcomes

- I can define what a mutation is.
- I can explain when a mutation is beneficial, neutral or harmful.

Species:

- a group of individuals that can _____

- share common genes but have slight _____

Mutations:

- a permanent change in the DNA sequence of an individual
- may occur in:
 - somatic cells – _____
 - germ line cells – _____
** may result in change in all of an individual's offspring
- only _____ mutations can result in a change to a species as they are the source of new alleles
- mutations can be:
 - beneficial – _____



harmful – _____



neutral – _____



Effects of Mutations:

- remember that genes in DNA code for the proteins that carry out many of the functions in your body – structural proteins, hormones, antibodies, etc.
- when a mutation changes the sequence of a gene (DNA sequence), it can result in:

1. Point Mutation (or Substitution)

- _____

can result in:

Silent Mutation – _____

	Original Strand	Mutated Strand
DNA	TAC GCG AAT AGT ACT	TAC GCG AAT AGG ACT
mRNA		
Amino Acid		

Missense Mutation – _____

	Original Strand	Mutated Strand
DNA	TAC GCG AAT AGT ACT	TAC GCG AAT GGT ACT
mRNA		
Amino Acid		

Nonsense Mutation – _____

	Original Strand	Mutated Strand
DNA	TAC GCG AAT AGT ACT	TAC GCG ATT AGT ACT
mRNA		
Amino Acid		

2. Frameshift Mutation

- a change in the _____ of RNA caused by adding or removing bases

Results in:

Deletion Mutation – _____

	Original Strand	Mutated Strand
DNA	TAC GTG CGA AAT GAT	TAC GGC GAA ATG AT
mRNA	AUG CAC GCU UUA CUA	
Amino Acid	met – his – ala – leu – leu	

Insertion Mutation – _____

	Original Strand	Mutated Strand
DNA	TAC GTG CGA AAT GAT	TAC GTA GCG AAA TGA T
mRNA	AUG CAC GCU UUA CUA	
Amino Acid	met – his – ala – leu – leu	

- frameshift mutations usually result in more harmful effects _____

Causes of Mutation:

- can occur spontaneously during _____
- may be caused by external influences → _____ are substances or events that can cause a change in DNA

two main categories of mutagens:

1. Physical Mutagens

- _____
- examples: UV light, X-ray radiation

2. Chemical Mutagens

- _____

- examples: nitrites, gasoline fumes

Carcinogens:

- physical or chemical mutagens that _____
