

Mutations

Matching: p373-374 can help

- | | | |
|----------|---|-----------------|
| 1. _____ | mutation that does not have an affect | a. frameshift |
| 2. _____ | one base is changed to another | b. substitution |
| 3. _____ | shift in reading frame of genetic message | c. point |
| 4. _____ | one base is removed | d. insertion |
| 5. _____ | change in one base | e. deletion |
| 6. _____ | one base is added | f. silent |

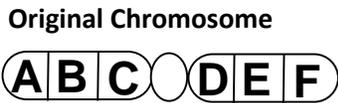
7. Which of the following can result in a frameshift mutation? Circle each correct answer.

- A. deletion B. substitution C. insertion

8. Why is a frameshift mutation more damaging than a substitution? _____

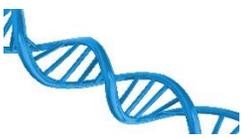
Types of Mutations

Mutations that change whole chromosomes are called chromosomal mutations. The diagrams below show chromosomal mutations. Each diagram represents an original chromosome and a possible mutation of the chromosome.



9. Use the diagrams to help you complete the table.

Mutation	Description
	Part of the chromosome is lost.
	Extra copies of a part of a chromosome are made.
	Part of a chromosome breaks off and attaches to another chromosome.
	Sections of a chromosome are reversed.



DNA and Protein Synthesis

Name: _____

Per: _____

12/13

10. Which types of mutations can add genes to a chromosome? _____
11. Which type of mutation can take genes away from a chromosome? _____
12. Which type of mutation changes the order of the genes, but not the number of genes in a chromosome? _____

Part II

The sequence below contains a gene to make the protein insulin in humans. Insulin is necessary for the uptake of sugar from the blood. Without insulin, a person cannot digest sugars the same way others can, and they have a disease called diabetes.

DNA: C C A T A G C A C G T T A C A A C G T G A A G G T A A

mrNA:

Amino Acids:

1. Could two humans have some differences in the DNA sequence for insulin, yet still make exactly the same insulin proteins? Explain.
2. Diabetes is a disease characterized by the inability to break down _____.
3. Suppose a person has a change in his DNA, and the first triplet for the gene coding for insulin is C C C (instead of C C A). Determine what the amino acid the new DNA triplet codes for. Will this person be diabetic?
4. How many amino acids are affected by the above change?

If only one amino acid is affected by the change in DNA it is called a point mutation. Is the above a point mutation?

Another type of mutation is a frameshift mutation. A frameshift mutation occurs when a base is added or removed from a DNA/mRNA sequence.

5. Determine the polypeptide chain coded for by the following sequence:

A C C U C A G C U C C A

Amino Acids:

6. Suppose a mutation occurs where another A is added after the first codon. What would the new polypeptide chain be?
7. Explain which type of mutation had more of an effect on the amino acid sequence
8. How is it that a code consisting of only four letters, as in DNA can specify all the different parts of an organism and account for all the diversity of organism on this planet?