**Southwest Center for Microsystems Education (SCME)**
**University of New Mexico**

# Overview of DNA Learning Module

This Learning Module contains five (5) units:
Knowledge Probe (KP or pre-test)
Primary Knowledge (PK)
Exploration of DNA Concepts Activity
Exploring DNA Applications Activity
Final Assessment

*This learning module provides an overview of the DNA molecule, its role as genetic material, its molecular components and structure and DNA replication. This information is necessary to understand the role of DNA in bioMEMS (bio MicroElectroMechanical Systems). Activities provide the opportunity for more exploration in DNA concepts and DNA applications in microtechnologies.*

Target audiences: High School, Community College, University

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Southwest Center for Microsystems Education (SCME) NSF ATE Center


Website: www.scme-nm.org

# Overview of DNA
# Knowledge Probe (Pre-Test)
# Participant Guide

**Introduction**

*This learning module provides an overview of the DNA molecule, its role as genetic material, its molecular components and structure, and DNA replication. This information is necessary to understand the role of DNA in bioMEMS (bio MicroElectroMechanical Systems). Activities provide the opportunity for more exploration in DNA concepts and DNA applications in microtechnologies.*

This knowledge probe is a short quiz to help you to identify your current understanding of DNA and its role in microsystems devices prior to completing this learning module. Please answer the following to the best of your knowledge.

There are 12 questions.

1. DNA molecules are formed by nucleotide base pairs. Which of the following represents a normal, non-mutated base pair sequence?
    a. C-A, C-A, T-G, A-C
    b. A-T, T-A, T-A, C-G
    c. T-C, G-A, A-G, A-G
    d. A-T, G-C, C-T, G-C

2. A single nitrogenous base (A, T, C, G) with an attached sugar and phosphate is called a(n)
    a. Protein
    b. Polymorphism
    c. Nucleotide
    d. Oligonucleotide

3. The rail or backbone of a double-stranded DNA helix is made up of
    a. Sugar, phosphate groups and nitrogenous bases
    b. Complementary nitrogenous bases and hydrogen bonds
    c. Complementary nitrogenous base pairs and sugar / phosphate groups
    d. Any nitrogenous base with hydrogen molecules on both sides

4. A length of DNA sequence that contains information that is capable of being translated into a polypeptide product is called a …
    a. SNP
    b. Gene
    c. PCR
    d. Nucleotide

5. Changes in the DNA of an individual caused by errors in DNA replication, radiation, and ultraviolet light are called …
    a. Mutations
    b. Nucleotides
    c. Oligonucleotides
    d. Polymorphisms

6. Changes in a DNA sequence and found in a population are called…
    a. Mutations
    b. Nucleotides
    c. Oligonucleotides
    d. Polymorphisms

7. What were the findings of the Hershey-Chase Blender Experiments?
    a. In a DNA molecule, the number of A and T bases are the same, and the number of G and C bases is the same.
    b. DNA molecules, not proteins, carry genetic information.
    c. When DNA replicates, each single strand serves as a template for another DNA molecule.
    d. The nitrogenous bases of DNA are joined together by hydrogen bonds (2 for A-T, 3 for C-G).

8. What is Chargaff's Rule?
    a. In a DNA molecule, the number of A and T bases is the same, and the number of G and C bases is the same.
    b. DNA molecules, not proteins, carry genetic information.
    c. When DNA replicates, each single strand serves as a template for another DNA molecule.
    d. The nitrogenous bases of DNA are joined together by hydrogen bonds (2 for A-T, 3 for C-G).

9. During DNA replication, which molecule "reads" a single DNA strand and uses what it "reads" as a template to synthesize a complementary strand?
    a. Protein
    b. Ribosome
    c. DNA polymerase
    d. RNA or ribonucleic acid

10. During DNA replication, which molecule translates the genetic information in the mRNA into a string of amino acids?
    a. Protein
    b. Ribosome
    c. DNA polymerase
    d. RNA or ribonucleic acid

11. For forensics applications the CODIS (Combined DNA Index System) stores information that is unique to each person in the database. This information consists of
    a. 13 regions or DNA sequences in the genome that have been found to vary from person to person in high frequency.
    b. 25 DNA sequences that are not shared by all humans and that are unique to a specific individual.
    c. Any specific polymorphisms that are unique to a specific individual or small group of individuals.
    d. The complete genome or set of genes for each individual that is in the CODIS system.

12. DNA probes are used in _____ to identify genes, gene mutations, and gene activity.
    a. PCR microarrays
    b. SNP microarrays
    c. RNA microarrays
    d. DNA microarrays

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