Overview of DNA Assessment
Instructor Guide

Note to Instructor

This assessment evaluates the participants' knowledge of DNA, its components, structure and replication process, as well as its applications in microsystems. This assessment could be compared with the results of the knowledge probe to estimate a participant's level of learning as a result of completing this learning module.

This assessment is part of the *Overview of DNA Learning Module*.
- Knowledge Probe (KP)
- Overview of DNA Primary Knowledge (PK)
- DNA Activity: Exploration of DNA Concepts
- DNA Activity: Exploring DNA Applications
- **Overview of DNA Assessment**

There are 12 assessment questions. The answers are indicated in red.

Introduction

The purpose of this assessment is to determine your basic understanding of the DNA molecule, its role as genetic material, its molecular components, structure, and replication process, as well as its applications in microsystems. This knowledge is necessary to better understand the role of microelectromechanical systems (MEMS) in DNA analysis, disease diagnostics and gene therapy.

There are 12 assessment questions.

1. A double-stranded DNA molecule looks like a twisted ladder. The steps of that ladder are made up of
   a. Nucleotides and phosphate chains
   b. Phosphate and sugar with a nitrogenous base
   c. Nitrogenous base pairs with hydrogen bonds
   d. Nucleotides with sugar / phosphate bonds

2. What is a nucleotide?
   a. A nitrogenous base pair with 2 to 3 hydrogen bonds
   b. A single nitrogenous base with an attached sugar and phosphate
   c. A nitrogenous base pair with an attached sugar and phosphate
   d. A complementary base pair with a phosphate /hydrogen bond

3. The rail or backbone of a double-stranded DNA helix is made up of
   a. Nucleotides
   b. Complementary base pairs
   c. Single base pairs
   d. Oligonucleotides

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. The genes of worker bees, gnomes and queen bees are almost exactly alike. However, there are some differences in their DNA sequences. These differences are called…..
   a. Mutations
   b. Nucleotides
   c. Oligonucleotides
   d. Polymorphisms

7. Which of the following identified DNA molecules, not proteins, as being the carriers of genetic information?
    a. Chargaff's Rule
    b. **Hershey-Chase Blender Experiments**
    c. Human Genome Sequencing Project
    d. DNA / Protein Microarrays

8. Which of the following showed , that 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?
    a. **Chargaff's Rule**
    b. Hershey-Chase Blender Experiments
    c. Human Genome Sequencing Project
    d. DNA / Protein Microarrays

9. During DNA replication, the function of DNA polymerase is to…
    a. separate the two strands of the DNA helix as it unwinds into two, single strands templates that can be copied.
    b. translate the genetic information in the mRNA into a string of amino acids.
    c. **"read" a single DNA strand and use what it reads as a template to synthesize a complementary strand.**
    d. to extract the mRNA and use the information from the mRNA to create two complementary DNA single strands.

10. During DNA replication, the function of the ribosome is to…
    a. separate the two strands of the DNA helix as it unwinds into two, single strands templates that can be copied.
    b. **translate the genetic information in the mRNA into a string of amino acids.**
    c. "read" a single DNA strand and use what it reads as a template to synthesize a complementary strand.
    d. to extract the mRNA and use the information from the mRNA to create two complementary DNA single strands.

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. Which of the following BEST describes the use of DNA microarrays in the biomedical field?

    a. To identify and extract mutated genes from within a sample

    b. To identify the unique genes of an individual and to compare the genes of two different individuals

    c. To analyze a person's genome to determine if an inherited or infectious disease exists.

    d. To identify specific genes, gene mutations, and gene activity within given samples.