Unit 1.2

Preface

DNA is the fundamental building block of life. It resides in the nucleus of cells and consists of thousands of *genes* that contain the instructions for building the different parts of the cell. DNA is what makes us who we are. It determines what physical characteristics we have, such as hair and eye color, as well as some of the diseases we may develop. DNA found at the scene of a mysterious death can be analyzed to identify the owner, potentially placing that person at the scene. This process can help an investigator determine whether the death was the result of foul play.

In the last lesson, students processed and analyzed evidence found at Anna's house at the time of her death, including blood samples found near her body. In this lesson students will begin to explore DNA in order to determine whose blood was found at the scene. Students will explore the relationship between DNA, genes, and chromosomes. They will extract DNA from both plant and animal cells, investigate the structural composition of DNA by building a three-dimensional model of the molecule, explore the methods used to analyze DNA, and then work as a forensic DNA analyst to compare the DNA found at the crime scene with the DNA obtained from each of the suspects.

Understandings

1. Human DNA is a unique code of over three billion base pairs that provides a genetic blueprint of an individual.
2. DNA is packaged as chromosomes, which each contain numerous genes or segments of DNA sequence that code for traits.
3. DNA from all living organisms has the same basic structure – the differences are in the sequences of the nucleotides.
4. Restriction enzymes recognize and cut specific sequences in DNA.
5. Gel electrophoresis separates DNA fragments based on size and is used in Restriction Fragment Length Polymorphism (RFLP) analysis.

Knowledge and Skills

It is expected that students will:

- Describe the relationship between DNA, genes, and chromosomes.
- Describe the structure of DNA.
- Describe the structure of a nucleotide.
- Explain how restriction enzymes cut DNA.
- Describe how gel electrophoresis separates DNA fragments.
- Recognize that gel electrophoresis can be used to examine DNA differences between individuals.
- Demonstrate how restriction enzymes work.
- Demonstrate the steps of gel electrophoresis and analyze the resulting restriction fragment length polymorphisms (RFLPs).