DNA Structure Lesson

Subject / Course:	HS Biology		
Topic:	DNA and Genetics		
Lesson Title:	Structure of DNA		
Level:	High School	**Lesson Duration:**	45 minutes

Lesson Objectives:

1. Students will be able to identify the components that make up the structure of DNA.

2. Students will be able to correctly model the complementary sequence of a single strand of DNA.

This lesson is centered around learning about the structure of DNA, which will then build up to meeting the standard, HS-LS1-1, as the students progress in their understanding of the importance of the order of nucleotides in DNA.

Summary of Tasks / Actions:

Considerations for teaching students with blindness or visual impairments:

For clarity when using the models, the instructor will need to identify the shape/texture of each of the nucleotide bases that are to be used. Each base has a 3D printed braille and print letter on its surface, but they can also be identified by their external textures.

Bell Ringer/Introductory Activity:

What is DNA? What do you know about it? What does it do? Where is it found?

Discussion:

Discuss shape (double helix), components, and structure of DNA. Go over Adenosine, Thiamine, Guanine, and Cytosine and their pairing exclusivity in DNA.

Discuss the name of DNA (deoxyribonucleic acid). "Deoxyribo" refers to the backbone molecular structure that attaches to each of the nucleotide bases with phosphate groups between each deoxyribose (a type of sugar). "Nucleic" refers to the nucleotides, A, T, G, and C. Describe the phosphate groups that attach between each deoxyribose to form a chain.

Have students explore images or 3D models of DNA to get an idea of its shape and structure. Use the printed model as appropriate to show the way that it can wrap into a double helix and unwrap/unzip (relevant for later lessons when discussing gene transcription).

Activity:

Modeling activity - use 3D models to generate sequences of dual strands of DNA based on examples provided by the instructor.

Students will piece together sequences of DNA using either the 3D printed models or a separate tactile DNA kit.

Review:

A = adenosine

T = thymine

G = guanine

C = cytosine

A pairs with T

G pairs with C

DNA stands for deoxyribonucleic acid.

DNA Structure Lesson

Double helix shape.

Sugar-phosphate backbone that holds the nucleotides together.

Exit Slip:

Which nucleotide pairs with Adenosine?

Which nucleotide pairs with Cytosine?

Write out the complementary sequence for the following nucleotide sequence: ATT GCA CCT GAT

Materials / Equipment:

STEIL DNA 3D models for understanding interlocking exclusivity (A-T and G-C) ([Link](#))

Physical model puzzle pieces for DNA sequencing (if not producing more 3D models) (Not adapted: [Link](#))

Written (or Braille, as appropriate) example DNA sequences ([Example Practice Problems](#))

NGSS Alignment:

HS-LS1-1 **Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.** [*Assessment Boundary: Assessment does not include identification of specific cell or tissue types, whole body systems, specific protein structures and functions, or the biochemistry of protein synthesis.*]