

NTTI Media-Rich Lesson Template

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YOUR NAME

Nothing Comes Between Me and My Genes

LESSON TITLE

Nineth and Tenth Grade

GRADE LEVELS

1 – 90 minute class period

TIME ALLOTMENT

OVERVIEW

Genetics is the branch of biology that seeks to explain inherited variations. These variations may include physical differences in a species, or mutations that result in a disease or attribute that promotes survival of the species in a particular environment. To study these variations one must examine the DNA molecule. DNA forms the genes, units of genetic information, which pass from parent to offspring. The structure of DNA explains how DNA functions as the molecule of genetic information. In brief, DNA is a long molecule of stored information. Students will be introduced to the DNA molecule through activities that include, model construction, video clips, and virtual website interaction activities.

Clips from the video, Understanding: The Power of Genetics will introduce the DNA molecule, gene, and the societal impact of genetic study.

Students will work in groups of two to construct a DNA model from a “recipe”, and they will work independently building virtual DNA models on the website: Genes -The Basics and Beyond which links to other sites on DNA concepts. Exit cards will be used as a closure activity.



SUBJECT MATTER

LEARNING OBJECTIVES

Students will be able to:

1. Analyze the structure of DNA.
2. Determine how the structure of DNA enables it to reproduce itself accurately.

STANDARDS

Georgia Learning Connections (<http://glc.k12.ga.us/homepg.htm>)

Standard: Describes patterns of inheritance and genetic engineering.

11.1 Relates normal patterns of genetic inheritance to genetic variation (e.g., crossing over).

11.3 Lists significant contributions of genetic engineering to agricultural and medical practices.

MEDIA COMPONENTS

Video from Discover “Understanding: The Power of Genes”

Website: <http://qslc.genetics.utah.edu/units/basics/>

Genetics Basics and Beyond – this site provides a comprehensive review of genetics with interactive activities

<http://qslc.genetics.utah.edu/units/basics/builddna>

Genetics Basics and Beyond – Build DNA

This interactive site allows students to build DNA models and simulate DNA replication

MATERIALS / CLASS

TV/VCR

Overhead projector and transparency film

Computer and LCD projector

computers for each student (or groups of 2)

DNA recipes (1 for each group of 2)

DNA ingredients in a Ziploc bag (1 bag per group)

- Play-Doh
- Poster board square (6 x 6)
- Glue stick
- Straws (20 1-2.5 cm pieces)
- Construction paper (20 1-2.5 cm strips)
- 2 8-inch pipe cleaners



PREP FOR TEACHERS

1. Combine the DNA materials in a Ziploc bag.
 - Select red construction paper for adenine bases, cut into 1-inch strips and label A
 - Select green construction paper for thymine bases, cut into 1-2.5 cm strips and label T
 - Select yellow construction paper for cytosine bases, cut into 1-2,5 cm strips and label C
 - Select blue construction paper for guanine bases, cut into 1-2.5 cm strips and label G
 - Cut straws into 1-inch pieces and glue a labeled 1-2.5 cm strip of construction paper to it, repeat until there are 6 sequenced pairs and 4 non-sequenced pairs
 - Place 2 tablespoons of Play-Doh in a separate bag and place in the Ziploc bag
2. Advance the video to the Introduction.
3. Copy the following sheets:
 - DNA recipe (1 per group)
 - Computer Questionnaire (1 per student)
4. **BOOKMARK** the websites on the computers that your students will be use instead of having students type out the actual URL address to save time. To bookmark (Netscape Navigator) or add a web page to a Favorites (Internet Explorer) list:
 - Go to the page that you want to Bookmark or add to the Favorites list.
 - On the Bookmark menu or Favorites menu, click or Ad to Bookmarks. Add to Favorites.
 - To open one of your Bookmark or Favorites pages, on the Bookmarks or Favorites menu, click the page you want to open.
5. Bookmark genetics websites, <http://qslc.genetics.utah.edu/units/basics/> and <http://qslc.genetics.utah.edu/units/basics/builddna>

INTRODUCTORY ACTIVITY: SETTING THE STAGE

Step 1

SAY to the students, “You are about to view a 40 second video clip introducing genetics without sound, at the end of the clip, you will write four questions or comments about the video clip and each of you will share your questions or comments. I will then repeat the video clip with sound and you will write four questions or comments about the video clip and each of you will share your questions or comments. A class list of your responses will be compiled and we will compare them. As we address each response during the lesson it will be checked off. Any responses left after the lesson will be used for independent research”.



Step 2

Begin the Introduction with no sound and stop when the questions appear. Instruct the students to record their comments or questions under the heading NO SOUND.

Begin the Introduction with sound and stop when the questions appear. Instruct the students to record their comments or questions under the heading SOUND.

Step 3

Ask each student to read one of their questions or comments from each of their lists. Record the student responses on transparency paper and place on the overhead projector. As each response is addressed during the lesson check it off.

Step 4

Advance the video past the questions and **Play** the video until the operation / surgery scene.

Do not engage or encourage statements! Ask students to reflect on the video clip and previous experiences. They may record notes or alter their previous responses. The purpose is to get them to recall what they know or remember about genetics. There will be a hands-on-activity to give them an opportunity to apply the concepts learned.

LEARNING ACTIVITIES

Step 1

Pass out the **Genetics Questionnaire**. Allow the students 4 minutes to complete the questionnaire. Upon student completion **use** the **answer key** to provide the students with the correct answers and the reference they are to use to review.

Step 2

Instruct the students that the website, <http://gslc.genetics.utah.edu/units/basics/>, will explain the terminology and concepts they viewed in the video clip and is to be used as a refresher of genetic concepts from the questionnaire.

Step 3

Website Activity : Basics and Beyond (students should be at a computer, this activity will last 15-20 minutes)

Students should **select** the Genetics bookmark, or type the web address , <http://gslc.genetics.utah.edu/units/basics/> into the address/search space. When they have opened this site they are to scroll down to the list of links, highlighted in blue. Provide students with a **Focus for Media Interaction** by asking them to use their questionnaire as a guide for selecting the appropriate link.

Step 4

Instruct the students to record corrections or notes on their questionnaires. Instruct them to visit the other links and take notes for review.



Step 5

Website : Basics and Beyond – Tour of the Basics

Provide the students with a **Focus for media interaction by asking** “How are a gene and DNA similar and different?” Ask students for comments; instruct them to use the links to help them formulate their responses. Provide the students with a **Focus for media interaction by asking** “What is the relationship between DNA and chromosomes?” Ask students for comments, and instruct them to use the links to help find the answer. Provide the students with a **Focus for media interaction by asking** “How are mitosis and meiosis similar and different? Ask students for comments, and instruct them to use the links to help find the answer.

Provide the students with a **Focus for media interaction by asking**, “What is DNA made of? Ask students for comments, and instruct them to use the links to help find the answer.

Culminating Activity

Step 1

(approximately 30 minutes needed to complete the activity)

Students will now engage in a hands-on activity in groups of 2 or 3 with their mystery “Recipe”. Give each group one copy of the “Recipe” and a plastic bag of “ingredients”. Give students time to complete their “Recipe” and present to you the finished product.

Step 2

Allow students to return to their computers to check their model construction. The website is, <http://qslc.genetics.utah.edu/units/basics/builddna>. Provide a **Focus for media interaction by asking** the students to build their own DNA model using the interactive website given. They may return to their models and make corrections as needed after they have used the interactive website.

Extension Questions

- How are nitrogen bases paired in the DNA molecule? (A-T and G-C)
- A pipe-cleaner is used to build the DNA molecule, what does this represent in the DNA structure? (the phosphate group and sugar)
- When the DNA molecule twists and coils tightly, what new structure is formed? (a double helix)

CROSS-CURRICULAR EXTENSIONS

1. **Language Arts** – writing across the curriculum, presentations (oral and written)
Students could write research papers or abstracts explaining the role of genetics in medicine, agriculture, household products, and ancestry of animals.
See websites for topic links:



- genetically developed detergents
- genetically altered foods
- impact of genetics on humans
- the genetic link between dogs and wolves

2. **Social Studies** – Construct a timeline of genetic discoveries and the scientists and countries involved.

COMMUNITY CONNECTIONS

- Students can interview genetic counselors about the various hereditary diseases within the African-American community.
- Students can interview family members and make pedigree charts, tracking the heredity of traits through a family.

STUDENT MATERIALS

Genetics Questionnaire Handout (1 per student)

“Mystery Recipe” Handout (1 per group)

Ziploc bag of “ingredients” (1 per group)

Materials per Ziploc bag

- Play-doh (2 pieces, each the size of a half dollar)
- 2 pipe cleaners (15 cm in length)
- 8 strips of construction paper in varying colors (1 x 2 inches, colors should make 3 base pairs and 3 colors should not make a base pair)
- 1 glue stick
- 1 black marker
- 1 6x6 square of cardboard



