# RESET | CSI

AN AEOP EFFORT aeop

## Using DNA Fingerprinting

## TEACHER

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## SUBJECT/GRADE LEVEL

**Subject:** Life Science, Biotechnology

**Grade:** 9-12

## Materials

- scissors
- white cone-style coffee filters
- clear containers, such as Mason jars or plastic cups
- water
- ruler
- pencils or dowels
- tape
- Solution 1- (red, yellow, blue)
- Solution 2- (yellow, green, blue)
- Solution 3- (red, yellow, blue)
- pipette
- paper towels

## STANDARDS

### Next Generation Science Standards

HS-LS1 From Molecules to Organisms: Structures and Processes

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

## LESSON OBJECTIVE(S)

Students will compare DNA fingerprints from gel electrophoresis to determine the suspect in a crime scene.

## CAREER CONNECTION(S)

Mentor Background: Dr. Bryn Adams, Research Scientist Dr. Adams's work is centered around developing synthetic biology tools for the genetic engineering microbes for biotechnology applications in military relevant environments.

STEM Careers: Biomedical Engineer, Biochemist, Medical Scientist, Biological/Clinical Technician, Microbiologist, Process Development Scientist, Biomanufacturing Specialists, Forensic Scientist, Business Development Manager

## ENGAGEMENT

**Teacher Actions:**
The teacher will use the following video to engage students with the genetic engineering unit:
Video 1: How is DNA fingerprinting used to identify a criminal
Video 2: The Real Science of Forensics

**Student Actions:**
The students can watch one or both of the following videos:
Video 1: How is DNA fingerprinting used to identify a criminal
The students will be provided a copy of the following questions through the google classroom to complete using a google doc.

1. Name the career that studies crime scenes (mentioned in this video)
2. Name the genetic engineering technology used in this video.
3. Describe how the DNA fragments travel in a gel.

Video 2: The Real Science of Forensics

1. Describe the job of a forensic scientist.
2. What type of college degree(s) do forensic scientists obtain/pursue?
3. Describe the difference between “real world forensics” and “tv crime show forensics.”
4. To which group of macromolecules do phenolphthalein. Describe the relationship between DNA and this group of macromolecules.

## EXPLORATION

**Teacher Actions:**
The teacher will assign and explain the Gel Electrophoresis Lab for students to complete.

**Student Actions:**
The students will complete and answer the questions for the Gel Electrophoresis Lab.

## EXPLANATION

**Teacher Actions:**
The teacher will discuss the results of the Gel Electrophoresis Lab and Explanation Worksheet.

**Student Actions:**
The students will explain the results of the Gel Electrophoresis Lab and Explanation Worksheet.

## ELABORATION

**Teacher Actions:**
The teacher will give the students (or groups of students) a section of DNA that they will transcribe to mRNA and then translate to protein.

The teacher will ask the students to elaborate on the following: How does the structure of DNA determine the structure of a protein?

Can be completed in Google Docs.

**Student Actions:**

The students will transcribe and translate the section of DNA provided by the teacher. The students will answer the above question.

## EVALUATION

**Teacher Actions:**
The teacher will provide feedback/grade the lab and explanation assignments.

**Student Actions:**
The student will turn in the lab and explanation assignments for a grade.