

EMS Lesson 8: And The Verdict Is...

(Pre-Exhibit Visit)

Objective:

By the end of this lesson, students will have a greater understanding of the unique pattern DNA forms in each individual, and how that pattern can be used to identify criminals.

Curriculum Link:

This lesson would work well following a discussion of genetic testing (see elementary/middle school Lesson 7) and patients' rights to privacy.

Exhibit Link:

DNA Detective

In this section of the exhibit, viewers will see samples of real DNA and have the opportunity to manipulate an interactive display to simulate the process of matching DNA samples to those taken at a crime scene.

Time Required:

Teacher Preparation: One hour *Class Time:* 30 minutes

Materials Needed:

- Enough commercial bar codes with numbers cut off for each pair of students to have seven — six that are different, plus a seventh that is the same as one of the six (mounted on heavy paper for re-use)
- Lab sheets or paper with room for recording observations.
- Hand magnifiers
- Ink pad(s)
- baby wipes or moistened paper towels

Lesson Steps/Activity:

1. Introduce the lesson with a discussion about the unique identity contained in an individual's genes.
2. Discuss the fact that DNA is like a fingerprint, in that it is unique to each individual and can be used to identify them, even though it is not visible to the naked eye.
3. Have students make their own fingerprints on the lab sheet. Have them get with a partner to compare fingerprints for similarities and differences.
4. Give each pair of students six bar codes, and tell them these represent the DNA samples of six suspects in a crime. Have them use the hand magnifiers to study the specimens and note the similarities and differences.
5. Give each pair of students one more bar code, representing the DNA of the blood found at the scene of a crime.
6. The bar code representing the crime scene sample will match that of one of the suspects.
7. Have a follow-up discussion that focuses on how DNA assists in solving crimes and in exonerating those who are accused but are innocent.

Extensions & Modifications:

Elementary:

- Make enlarged copies of the suspect bar codes and copy or glue them onto a piece of paper.
- Use fewer than six suspects.
- Emphasize that the genetic "fingerprint" is seen only with a powerful microscope.
- Math extension: Extending on the idea that a bar code is a series of geometric shapes, have students use geometric shapes — not limited to lines or elongated ellipses — to create a design on paper and exchange with another student. Have students try to recreate a "match" to the design without tracing the original.



Middle:

- It may not be necessary to do the introductory activity of student fingerprints.
- To increase the challenge, do one of the following:
 - o Give the matching set to only one group of students.
 - o Tell students the case is “urgent” and set a time limit.
 - o Give one set one-half of the bar code (left or right) and ask if they can say with certainty who did it.
- Have student groups come up with scenarios for a crime involving six suspects but only one is guilty of the crime, and thanks to DNA evidence, the guilty party is convicted.

Important terms: bar code, genetic code, fingerprint, DNA

Writing Prompts/Discussion Questions:

1. Name some ways genetic fingerprinting could save lives.
2. How might genetic fingerprinting influence the outcome of a murder trial? How would the case be affected if the suspect whose DNA matched the evidence was an identical twin?
3. There are many examples of people in prison who were convicted without the aid of DNA evidence. For many, there is the ability today to test the evidence for DNA samples and compare it with samples of the convicted person; however, it is expensive to do so. Do you think that people who were convicted without DNA evidence should have their cases reexamined and DNA tested?
4. In your opinion, who should have easier access to your DNA, a trial judge or your employer? Why?

National Standards Addressed:

K-4 Content Standard C – Life Cycles of Organisms

- Many characteristics of an organism are inherited from the parents of the organism, but other characteristics result from an individual's interactions with the environment. Inherited characteristics include the color of flowers and the number of limbs of an animal. Other features, such as the ability to ride a bicycle, are learned through interactions with the environment and cannot be passed on to the next generation.

5-8 Content Standard C – The Molecular Basis of Heredity

- Hereditary information is contained in genes, located in the chromosomes of each cell. Each gene carries a single unit of information. An inherited trait of an individual can be determined by one or by many genes, and a single gene can influence more than one trait. A human cell contains many thousands of different genes.