



More than Skin Deep

DNA Fingerprinting and Profiling



K20 Center, Alexandra Parsons

Published by K20 Center

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Grade Level	9th – 12th Grade	Time Frame	2-3 class period(s)
Course	Biology	Duration	120 minutes

Essential Question

Is DNA fingerprinting an ethical practice?

Summary

This lesson explores DNA fingerprinting and how it relates to paternity (or familial) tests and police investigations. After talking about what DNA fingerprinting is and what it covers, students will read an article to decide whether they agree or disagree with the practice of DNA fingerprinting in law enforcement. Knowing the role and function of DNA, as well as how DNA is passed along in sexually-reproducing organisms to create new generations, is the prior background needed for the lesson.

Snapshot

Engage

Students watch a video about paternity.

Explore

Students complete a card sort about DNA fingerprinting tools.

Explain

Students verify their answers from the Card Sort.

Extend

Students read and discuss an article about DNA fingerprinting.

Evaluate

Students engage in a Fold the Line activity to debate DNA fingerprinting.

Standards

ACT College and Career Readiness Standards - Science (6-12)

IOD203: Find basic information in text that describes a simple data presentation

IOD301: Select two or more pieces of data from a simple data presentation

Next Generation Science Standards (Grades 9, 10, 11, 12)

HS-LS3-1: Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

Oklahoma Academic Standards (Biology)

B.LS2.5 : Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.

B.LS3.1 : Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

Attachments

- [Card Sort Answers Explain Advanced.pptx](#)
- [Card Sort Answers Explain.pptx](#)
- [Explore DNA Tools Card Sort - Spanish.docx](#)
- [Explore DNA Tools Card Sort - Spanish.pdf](#)
- [Explore DNA Tools Card Sort Advanced - Spanish.docx](#)
- [Explore DNA Tools Card Sort Advanced - Spanish.pdf](#)
- [Explore DNA Tools Card Sort Advanced.docx](#)
- [Explore DNA Tools Card Sort Advanced.pdf](#)
- [Explore DNA Tools Card Sort.docx](#)
- [Explore DNA Tools Card Sort.pdf](#)

Materials

- DNA Tools Card Sort (attached, one per student)
- DNA fingerprinting article (one per student)

Engage

Show students the Maury show video clip in which [child paternity is being debated](#). Allow students to watch eight minutes of the clip and pause the video *before* the results are read (which is at 6:30 in the video).

Have the students do a modified [C.E.R.](#) in response to the question “Do you think he’s the father?” There are no other resources to offer, just ask the students if they think he is the father, what evidence they saw that created their claim, and their reasoning for their claim. Have students share their responses with an elbow partner, then take an informal poll of whether the class thinks he’s the father or not. After the poll has been taken, play the rest of the video to see if he is the father.

Explore

Different Levels

There are two different sets of card sorts and corresponding PowerPoints. The ones with "Advanced" in the title focus on the steps of DNA analysis and would be better suited for a forensic sciences class or a Biology II class. The other Card Sort and PowerPoint are comparisons of all police investigation techniques and resources.

Bio I Option: Give each pair of students a [Card Sort](#) associated with the various investigation techniques. Direct the students to put the cards into groups of what techniques would be appropriate for DNA analysis. They can be grouped in different ways; and some of the cards don't relate to DNA at all, which is OK because the way the cards are constructed are intended to help the students differentiate multiple variables and determine which of the cards could be the most precise investigation tool.

Advanced Option: Give each pair of students a [Card Sort](#) associated with the various genetic tools. First, direct the students to match the tool with its use/definition. When they've completed that task, ask them to sort the items based on relevancy to the task of DNA fingerprinting and, then, the order of importance. Once pairs decide on the most important item and why they feel that way, ask various groups to share their answers with the whole group.

Explain

Present the included PowerPoint of the correct answers to the [Card Sort](#). Give the students time to fix their Card Sorts and discuss with their partner why they made that error. Also, now is the time to address any misconceptions or curiosities the students have about these tools.

Create A Conversation

Use this time to do more than flip through a few PowerPoint slides. This is when you have conversations to help students understand the Explore Card Sort. The Explain portion of the 5E lesson model is meant to fill the gaps that still exist from Explore and to "make sense" of what students experienced in the Explore. So, talk with the students and listen to their justifications. They may be correct, just not what you or I thought of, and this is totally OK. The more correct ideas and thoughts that are shared, the better.

Extend

Pass a copy of the article over [DNA fingerprinting in law enforcement](#) to each student. Group students in fours for the strategy [jigsaw](#). The article is seven pages long with six sections. However, some of the sections are short so it'll be easy to make four chunks out of the article. Students will read the entire article, then reread the section they were assigned. For sharing, have students not only give both a summary of the information in their section and the most important detail that relates to DNA analysis in law enforcement or the ethics of DNA analysis.

Don't Carry The Load

If this is the first time the students do a jigsaw, they will resist in-depth sharing and default to the "I dunno." It may be tempting to just let them go and figure it out, but walking around and asking questions needs to happen. Just because it's a student-led activity doesn't mean the teacher's job is done. However, don't facilitate too much; just be present enough to know that they are on task, rather than feeding them answers.

Evaluate

Show this video about the [BTK serial killer](#). Just have students watch, but tell them that if something really stood out to them, either in the article or video, to write it down because they may be using it later.

At Your Discretion

The purpose of showing the video, in conjunction with the article, is to give students as many perspectives as possible, and letting the student decide how they feel. However, the video does talk about gruesome things (BTK was a serial killer, after all). If you feel that the video will be too hard for your students to watch, then don't show the video. Try to find some other media source that would help the students understand both the gravity of his crimes as well as the gravity of the choice to use his daughter to catch him.

In this modified [Fold the Line](#) activity, have the statement "Using DNA family fingerprinting in police investigations should be allowed." Students will go to the right side of the room if they agree with the statement and to the left side of the room if they disagree with the statement. In those groups, have students discuss together why they agree or disagree. Then, have them form two lines facing one another, so someone from the agree side is facing someone from the disagree side. Have the students who face one another become partners. These made partners will then share their logic and feelings on the topic. When they're done sharing, ask if any students want to change their minds based on their conversation. To wrap up their thinking, have students write their view and reasoning on a piece of paper and turn it in as an exit ticket.

Optional Activity: Forensic Activities

Consider having students apply their DNA fingerprinting knowledge and skills within a forensic case context. By stepping into the role of a forensic scientist, students can examine evidence, make comparisons, and draw conclusions using authentic investigative techniques. [A Murder Mystery - DNA Fingerprinting kit](#) and [Flinn Fingerprinting Station Kit](#) both include cases with various suspects and their DNA samples that supports this type of analysis and that reinforce a range of core skills essential to forensic science.

Resources

- *A murder mystery: DNA fingerprinting, full size lab kit, refill.* (n.d.). https://www.flinnsci.com/a-murder-mystery-dna-fingerprinting-full-size-lab-kit-refill/ap10331/?srsltid=AfmBOoo9L1URMm8SITjlu_Lx6QM36RtNFUgUrueS-403oLf37ltdzza
- *Forensic Flinn Fingerprinting Super Value Activity-Stations Kit.* (n.d.). https://www.flinnsci.com/flinn-fingerprinting---super-value-activity-stations-kit/ap7612/?_gl=1*19a8ukz*_up*MQ..&gclid=CjwKCAjw1tLOBhAMEiwAiPkRHmOj75BEiTeaKJ1usFJAj1zAYVBdeZZv0y7N5XDj7-q2lzsMiXD63hoCRTwQAvD_BwE&gbraid=0AAAAADgmlc863S1f-WEn69MnX5qWba8-K
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- Rob Dyke. (2015). BTK killer - Dennis Rader [Video]. <https://www.youtube.com/watch?v=CsE1zjr965U>
- TheMauryShowOfficial. (2015). I could tell by the ultrasound picture... that's not my baby! [Video]. https://www.youtube.com/watch?v=u0Sctv_GiM