



High School Science Virtual Learning

**Applied Biological Science**

**DNA Sequencing**

**May 20, 2020**



# High School Forensic Science

## Lesson: May 20, 2020

### **Objective/Learning Target:**

Students will be able to describe DNA sequencing techniques and see how it relates to other areas of science.

1. What makes your DNA different from everyone else's?  
What structures are different to distinguish your DNA from someone else's DNA?
2. What kinds of samples from humans can be collected to test for DNA (think crime investigation situations)?



1. Your DNA is unique to you because of the sequence of DNA. This is the order that the bases appear in your DNA.
2. Almost all cells will have your DNA. This means that many samples can be used for DNA testing. Examples include... saliva, blood, semen, hair roots.



# Lesson Activity:

**Directions:** Read the NIH article about DNA sequencing. Answer the questions on the following pages.

**Link(s):** [NIH DNA Sequencing](#)



# Practice

You will use the information from the activity on slide 5 to answer the following questions.



# Practice Questions

1. What is DNA sequencing?
2. What improvements have been made to DNA sequencing in recent years?
3. What are the two new styles of DNA sequencing currently in use?
4. What is the benefit of DNA sequencing in terms of human health?



# Practice Questions **Answer Key**

1. What is DNA sequencing? **Scientific techniques that determine the order of the bases of a strand of DNA.**
2. What improvements have been made to DNA sequencing in recent years? **Technology improvements and automation have increased the speed and allowed for lower costs of testing.**
3. What are the two new styles of DNA sequencing currently in use?
  - a. The first new style involves watching the DNA polymerase as it makes copies of the DNA template sequence. A camera is viewing this and 'reading' different colored dyes associated with each of the 4 bases.
  - b. The second style involves nanopores. The DNA strand is thread through a surface filled with tiny pores. As the DNA flows through, changes in electric potential get measured to determine which base passed through most recently.
4. What is the benefit of DNA sequencing in terms of human health? **The hope is that DNA sequencing will become cheap enough that it can be used as personalized health. DNA tests could be done to check for genetic diseases or potential to develop certain diseases (such as cancer).**





# More Practice

Now we will take a look at how one important area of science is using DNA testing on a daily basis. Watch [this](#) about DNA testing in forensic science to see how criminal investigators are using this new technology to catch criminals. Then watch this more [detailed video](#) to understand the science behind it.



# More Practice Questions

1. What is a short tandem repeat?
2. What varies from individual to individual?
3. DNA fingerprinting relies on how now many STRs?
4. Why is using more STRs better?
5. How can this technology be used to determine paternity?
6. What makes identical twins difficult to distinguish?



## More Practice Questions

1. What is a short tandem repeat? **A short section of repeating DNA bases. For example AATG AATG AATG**
2. What varies from individual to individual? **The number of STRs at each location**
3. DNA fingerprinting relies on how now many STRs?
  - a. **US uses 13**
  - b. **UK uses 10**
4. Why is using more STRs better? **The chances of the STR matching is very very low if you are using 10+ STR sites.**
5. How can this technology be used to determine paternity? **A child's STRs must come from either the mother or the father. The spikes of the child will match up with either parent.**
6. What makes identical twins difficult to distinguish? **Usually the STRs of identical twins are the same, so more detailed (and expensive analysis must be done)**



# Additional Information

[Khan Academy, DNA sequencing](#)

[Overview of DNA and sequencing](#)

[30 Years of DNA](#)