

# The Double Helix

## Guided Video Notes

Video Link: <https://www.hhmi.org/biointeractive/double-helix>

Name: \_\_\_\_\_ Class Color: \_\_\_\_\_ Date: \_\_\_\_\_ (W)

**Directions:** As you watch the video, fill in the missing information.

All answers go in order. Make sure to turn on subtitles to help you!!

1. During the 20th century everyone knew that things like eye color and hair color were passed on from generation to generation. But no one knew HOW such information was stored or transmitted. Scientists were convinced that there had to be a \_\_\_\_\_ at the heart of the process.
2. The 3 dimensional arrangement of \_\_\_\_\_ in those molecules had to explain the stability of life so that traits could be passed faithfully from generation to generation.
3. It also had to explain the mutability (*ability to change*) of life. There has to be change in order for \_\_\_\_\_ to happen.
4. In 1951, This fundamental “secret” of life was taken up by two unknown scientists. One was a 23 year old American Scientist named \_\_\_\_\_. He was known for his funny haircut and shoes. He also had an extreme and intense love of \_\_\_\_\_.
5. The other scientist was an Englishman named \_\_\_\_\_.
6. He was trained as a physicist whose career was interrupted with the outbreak of the World War II. It wasn't until \_\_\_\_\_ that he got back into academic science.
7. The two men loved to talk \_\_\_\_\_!
8. Although they came from different backgrounds they both felt that finding the structure of the \_\_\_\_\_ was the key problem.
9. The idea of the gene dates back to \_\_\_\_\_'s experiments with \_\_\_\_\_ in the 1860's.
10. By the 1920's genes had been convincingly located in the \_\_\_\_\_ of cells and associated with structures called \_\_\_\_\_.
11. It was also known that chromosomes were made of \_\_\_\_\_ and \_\_\_\_\_ (Deoxyribonucleic Acid). Scientists wondered which one it was...

12. \_\_\_\_\_ seemed like the better bet, because there are many kinds of them and they do different “stuff” inside the cell.
13. \_\_\_\_\_ didn’t seem interesting. It was just repeated units of a sugar linked to a phosphate with any of four bases.
14. The readiness to dismiss DNA occurred even after \_\_\_\_\_ showed that DNA can carry genetic information.
15. Avery had isolated a substance that conveyed a \_\_\_\_\_ from one bacterium to another. This was called the \_\_\_\_\_.
16. His findings showed that it was not destroyed by a \_\_\_\_\_ - digesting enzyme but was destroyed by a \_\_\_\_\_ - digesting enzyme.
17. Watson and Crick were one of the few scientists that still believed that genes were made of DNA. They also believed that solving the molecular \_\_\_\_\_ of the molecule would reveal how genetic information was \_\_\_\_\_ on.
18. The powerful technique being designed to analyze molecular structure at the time was \_\_\_\_\_ crystallography.
19. \_\_\_\_\_ is not easy to work with and it looks like snot! (Think of the strawberry lab!)
20. Two other scientists that were interesting in solving the mystery of DNA were \_\_\_\_\_ and \_\_\_\_\_ who struggled to get along.
21. London is located only \_\_\_\_\_ miles from Cambridge where Watson and Crick were working. This made it easy for the two men to keep tabs on their competition!
22. \_\_\_\_\_ - was another great competitor located further away in \_\_\_\_\_. He was widely recognized for creating accurate models of molecules. Watson and Crick were fearful it was only a matter of time that he used these models to solve the mystery of DNA.

**Short Answer Questions: Continue watching and respond to the prompts as they are answered in the video. Respond in COMPLETE SENTENCES.**

- 1) Why is the history of DNA considered to be one of the “greatest races of all time”? Who was racing, and what were they racing to find?

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2) **Crick determined what an x-ray crystallography pattern (AKA “diffraction pattern”) would look like for a helix (spiral) molecule. Recognizing that Rosalind Franklin was known for x-ray crystallography research, he snuck into one of her talks and memorized her measurements. He then reported back to Watson and they built a model. WHY WAS THEIR MODEL WRONG?** \_\_\_\_\_  
\_\_\_\_\_

3) **The fact that Watson and Crick accidentally put the bases on the outside of the helix made everyone believe that the whole shape itself (helix/spiral) of DNA was wrong. In fact, the “Cavendish leadership” (meaning the head of the college in Cambridge they were working for) was so embarrassed by them that they responded how?** \_\_\_\_\_  
\_\_\_\_\_

4) **What is “the nature of discovery” as described in this video?** \_\_\_\_\_  
\_\_\_\_\_

5) **Watson and Crick were now working “underground” (meaning in hiding/secret) to solve the puzzle. Watson reflects back and says there were only two ways he would be happy. What were they?**  
\_\_\_\_\_  
\_\_\_\_\_

**Which one came true?!** \_\_\_\_\_

6) **In 1953 news came that Pauling was releasing a paper on the structure of DNA, thinking he had finally solved it. He thought that DNA was a \_\_\_\_\_ helix instead of a double helix. Watson knew he was wrong and happily went to tell everyone in London that the race would continue.**

7) **Wilkins took Watson into his room and showed him a recent picture that Rosalind Franklin had taken using x-ray crystallography. What was the shape visible in the picture, and what did that mean about the true shape of DNA??** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

8) **What important piece of evidence helped Crick release that the DNA bases must be on the inside of the helix and not the outside?** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

9) **What did Edwin Chargaff discovered about the structure of DNA (later to be named “Chargaff’s Rule”)?** \_\_\_\_\_  
\_\_\_\_\_

10) **One morning, Watson went into the lab alone to try and figure out the structure of DNA. What did he use to help visualize the structure?** \_\_\_\_\_  
\_\_\_\_\_

11) What is the exact date that the structure of DNA was discovered? \_\_\_\_\_

12) As best you can, describe how the structure of DNA allows a gene to be replicated.

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13) What word do they keep using to describe the DNA molecule? \_\_\_\_\_

14) Watson and Crick became rich and famous for their discovery, eventually winning the Nobel Prize for their work. See this picture of them with the sculpture that was created and named after them. Watson even has a replica of the statue in his own backyard!



Though the discovery of the structure of DNA had a profound impact on the scientific community, some people argue that Watson and Crick didn't deserve all the praise. What do YOU think? Did they alone deserve all the fame, money, and attention? If not, who else should have been given credit? Support your answer with, using Claim-Evidence- Reasoning.

**RESPOND IN MINIMUM ONE PARAGRAPH (at least 5 sentences).**

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15) What ended up happening to Rosalind Franklin, and why? (You may Google the answer). What are your thoughts after finding out what happened to her?

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