

## DNA Replication

- DNA replication begins when the two sides of the DNA molecule unwind and separate, like a zipper unzipping.
- The molecules separate between the paired nitrogen bases on each rung.
- Next, nitrogen bases floating in the nucleus pair up with the bases on each half of the DNA molecule: A with T and C with G.

## April 11 - Individual Assignments

Hand In all work at 2:55

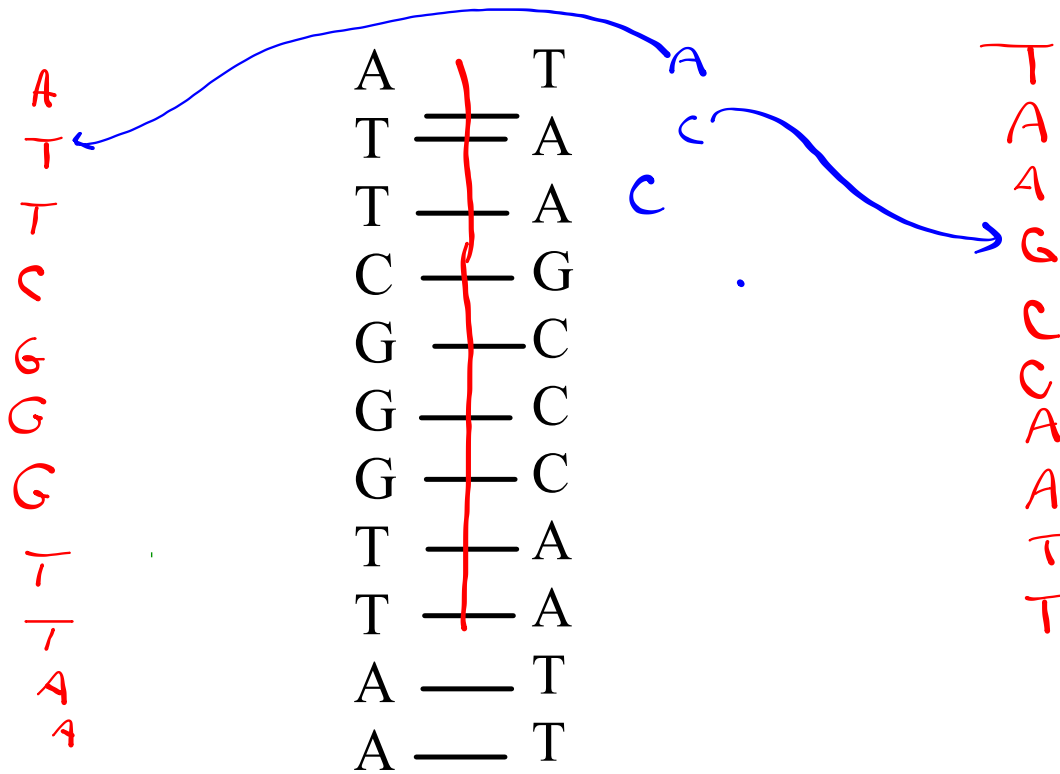
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Read Page 208 -209 Answer # 1,2,3,4,5

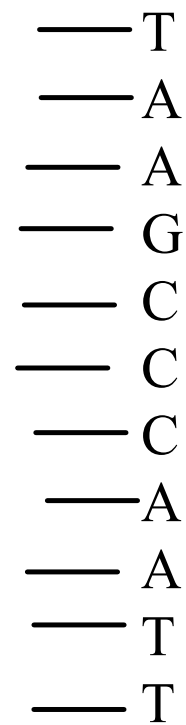
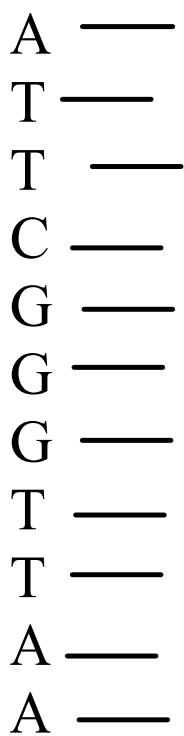
Read Page 212 -213 Answer # 1,2,3,4,5

Read Page 214 -215 Answer # 1,2,3,4,5,6

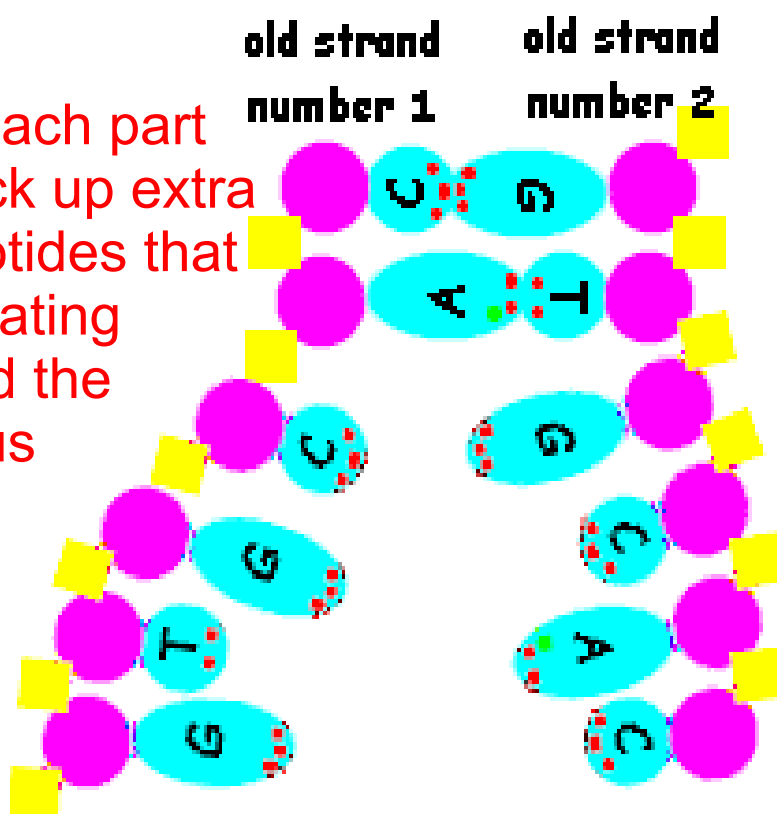
Read Page 216 -218 Answer # 1,2,3,4,5,6

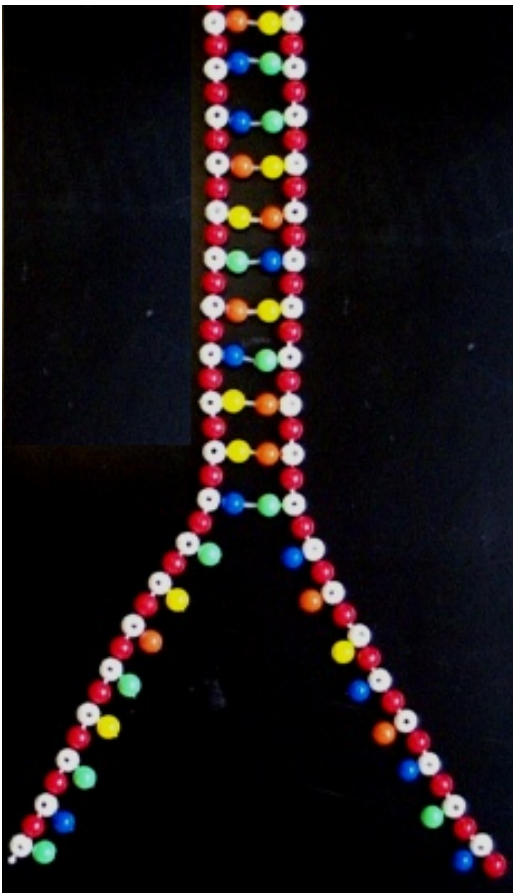


Each strand  
split apart by an enzyme



Now each part will pick up extra nucleotides that are floating around the nucleus





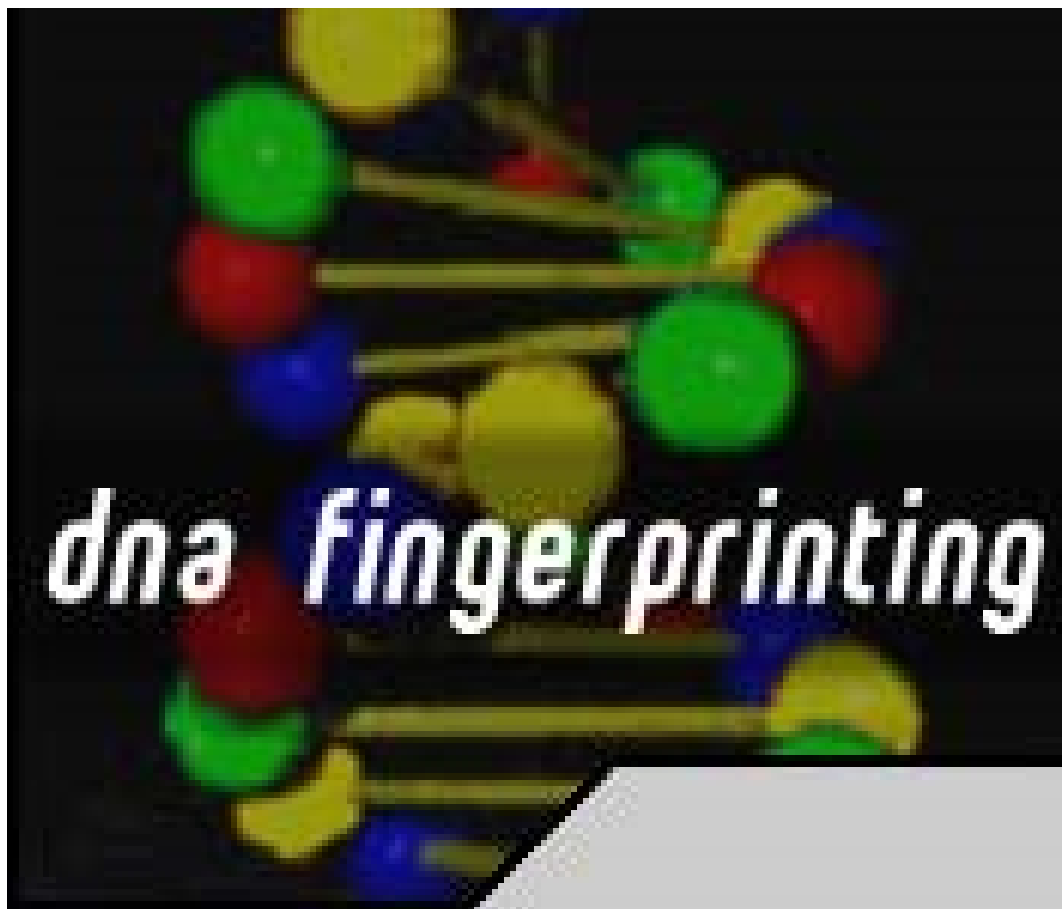
<http://www.youtube.com/watch?v=hfZ8o9D1tus>

<http://www.youtube.com/watch?v=cDIKrLJjRIY>



<https://www.youtube.com/watch?v=DyVawKgp0YY>  
Bill Nye - Genes

<https://www.youtube.com/watch?v=7cGN1sLYMhA>



## What is DNA Fingerprinting?

The chemical structure of everyone's DNA is the same. The only difference between people (or any animal) is the order of the base pairs. There are so many millions of base pairs in each person's DNA that every person has a different sequence.

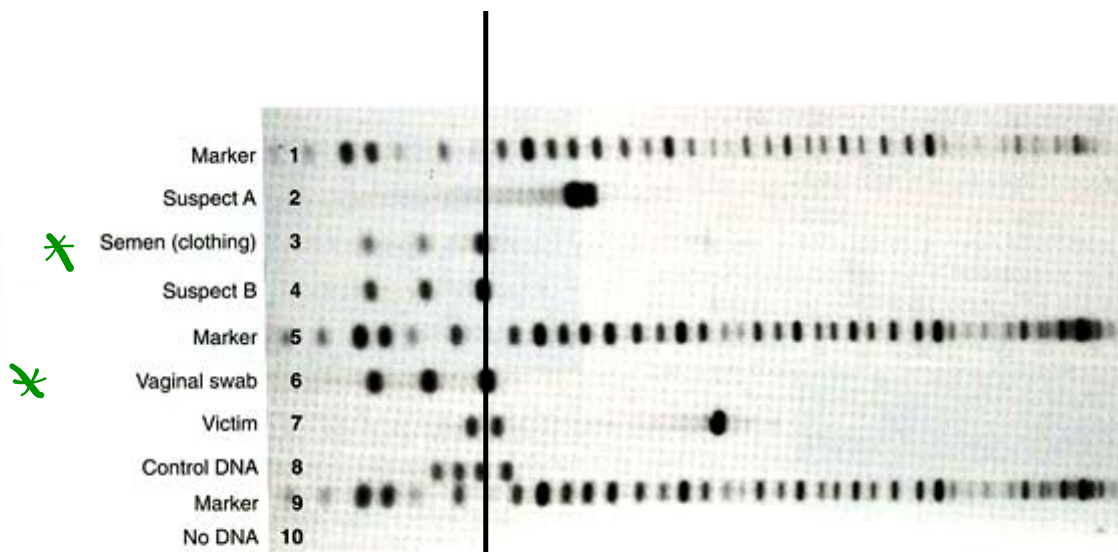
Using these sequences, every person could be identified solely by the sequence of their base pairs. However, because there are so many millions of base pairs, the task would be very time-consuming. Instead, scientists are able to use a shorter method, because of repeating patterns in DNA.

These patterns do not, however, give an individual "fingerprint," but they are able to determine whether two DNA samples are from the same person, related people, or non-related people. Scientists use a small number of sequences of DNA that are known to vary among individuals a great deal, and analyze those to get a certain probability of a match.



A  
A  
T  
C  
C  
C  
A  
T  
T  
T  
C  
T  
C  
C

T  
T  
A  
G  
G  
G  
T  
A  
A



**Figure Use of DNA typing to help identify a rapist.** Two suspects have been accused of attacking and raping a young woman, and DNA analyses have been performed on various samples from the suspects and the woman. Lanes 1, 5, and 9 contain marker DNAs. Lane 2 contains DNA from the blood cells of suspect A. Lane 3 contains DNA from a semen sample found on the woman's clothing. Lane 4 contains DNA from the blood cells of suspect B. Lane 6 contains DNA obtained by swabbing the woman's vaginal canal. (Too

little of the victim's own DNA was present to detect.) Lane 7 contains DNA from the woman's blood cells. Lane 8 contains a control DNA. Lane 10 is a control containing no DNA. Partly on the basis of this evidence, suspect B was found guilty of the crime. Note how his DNA fragments in lane 4 match the DNA fragments from the semen in lane 3 and the vaginal swab in lane 6. (Source: Courtesy Lifecodes Corporation, Stamford, CT.)

## **DNA fingerprints**

**Every person has unique DNA. Identical twins are the only people who would have the same DNA.**

**Allan Legere case was the first case in Canada that used DNA fingerprinting.**

<http://fig.cox.miami.edu/~cmallery/150/gene/DNA.forensics.jpg>

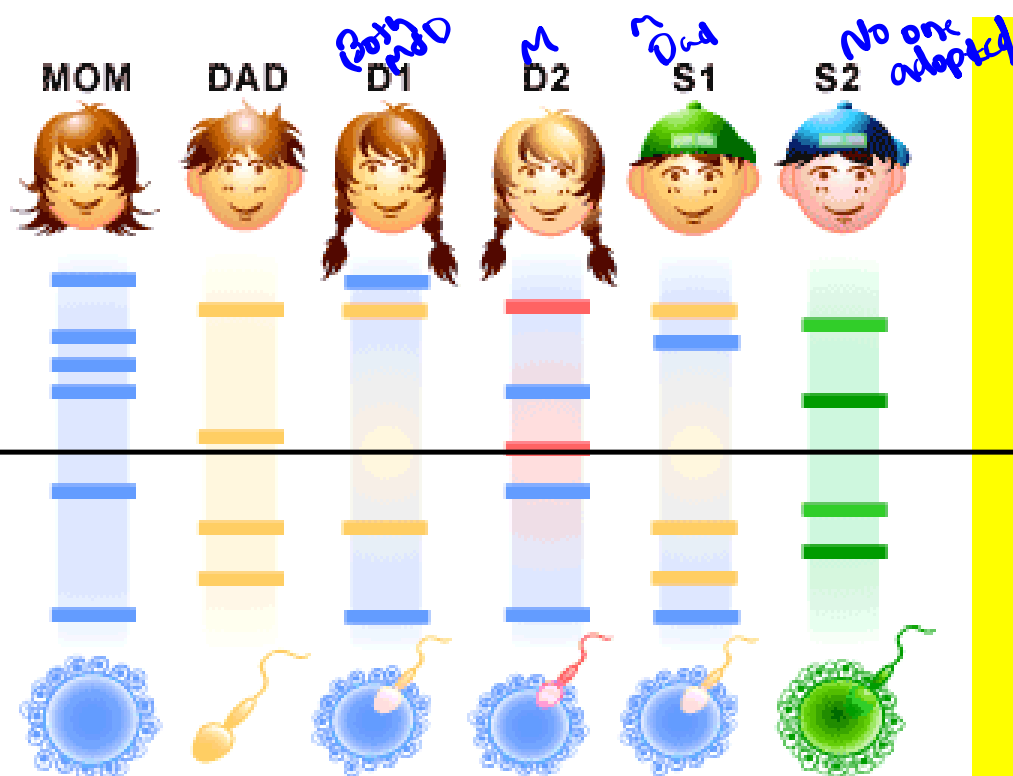


**DNA fingerprinting can be used to identify a child's parents. Each child inherits one set of chromosomes from each parent. This is why children resemble both of their parents.**

**A child who has a mom with brown hair and blue eyes and a dad with blond hair and brown eyes might end up with brown hair from his mom and brown eyes from his dad. RFLPs are inherited in the same way, some from the mother and some from the father.**

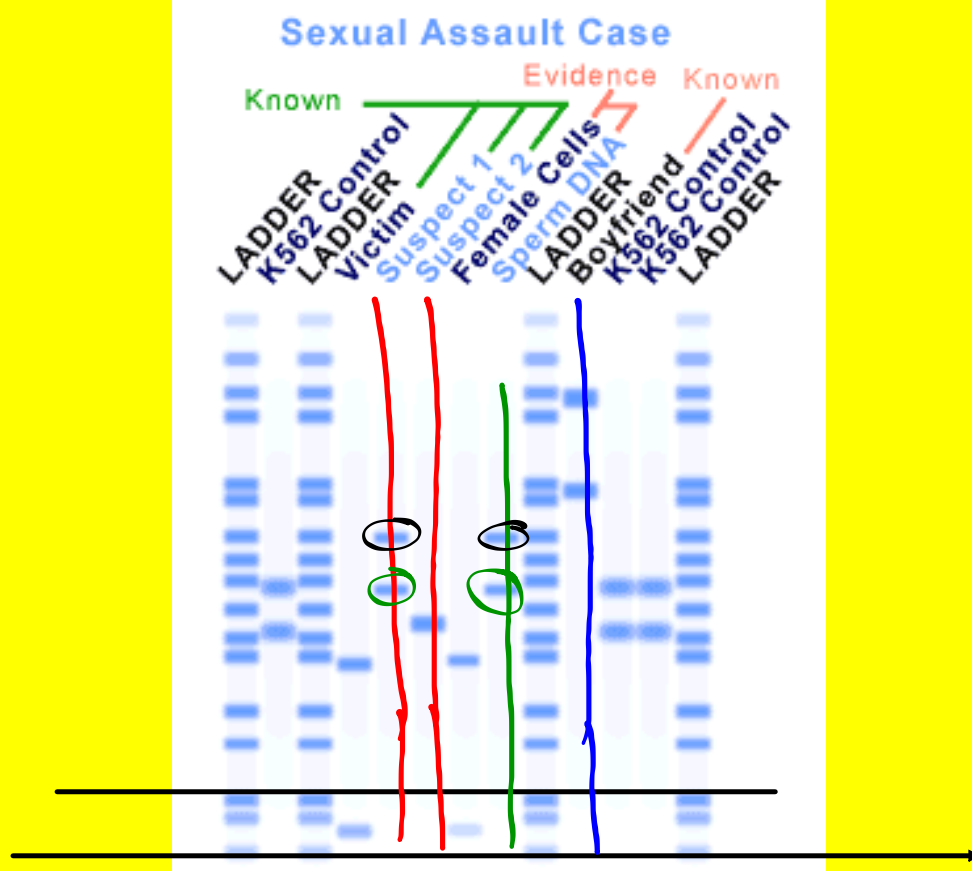
RFLP-restriction fragment length polymorphism

In this example, a family consists of a mom and dad, two daughters and two sons. The parents have one daughter and one son together, one daughter is from the mother's previous marriage, and one son is adopted, sharing no genetic material with either parent. After amplifying the VNTR DNA from each member of the family, it is cut with a restriction enzyme and run on an agarose gel. Here are the results:



It is easy to see in this example that daughter 2 is the child from the mother's previous marriage and son 2 is adopted. You can see that both daughter 1 and son 1 share RFLPs with both the mom and dad (coloured blue and yellow respectively), while daughter 2 has RFLPs of the mom but not the dad, and son 2 does not have RFLPs from either parent.

The next example shows how DNA fingerprinting can point to a criminal. DNA samples were taken from a crime scene, the female victim and two suspects in a sexual assault case. The victim's boyfriend was also tested. The DNA ladders are used to judge the sizes of the DNA fragments. Control samples are also run, to ensure that the experiment is done correctly. Can you determine which suspect is likely the criminal?



The DNA fingerprint from suspect 1 matches up with the fingerprint of the sperm DNA from the crime scene. You can also see that the female cells from the scene match the victim's DNA.

**Identical twins, formed when one fertilized egg splits, are the only people in the world with identical DNA.**

**Fraternal twins, on the other hand, are formed when two different eggs are fertilized.**

**Genetically speaking, fraternal twins are no closer than normal siblings, sharing only about 50% of their genes.**

**Although identical twins have the same genotype, or DNA, they have different phenotypes, meaning that the same DNA is expressed in different ways.**

**Traits determined by phenotype, such as fingerprints and physical appearance, are the result of "the interaction of the individuals genes and the developmental environment in the uterus." Thus, a DNA test can't determine the difference between identical twins, while a simple fingerprint can.**