DNA Dudes Timeline

Directions:

The story of how we learned much about DNA as the molecule of heredity is a fascinating chapter of science history. For a brief taste of this story, read pages 184-189 in the textbook and use this information to help you with the following tasks:

1. Write the date each of the 8 researchers made an important discovery about DNA next to their name in the box below.
2. Identify where each researcher fits on the timeline by writing their initials and the date of their important discovery.
3. Below the timeline, list the 8 researchers in chronological order and summarize their KEY contribution which furthered our understanding about DNA: the genetic "blueprint" molecule.

8 DNA DUDES and DUDETTES

Hershey & Chase	Friedrich Meischer	Watson & Crick	Erwin Chargaff
Fred Griffith	P.A. Levene	Franklin & Wilkins	Oswald Avery (et al)

DNA History TIMELINE

Name ______________________________ Class ______________ Date ______________

Chapter 4 Life Processes

Use after Section 4-3.

Determining the Structure of DNA

The discovery of the structure of DNA, announced in 1953, is one of the most important scientific breakthroughs of the twentieth century. Two men were mainly responsible for this great scientific achievement: James Watson and Francis Crick. Watson, an American geneticist, had come to Cambridge University in England to do work in biochemistry. Crick, a physicist-turned-biochemist also working at Cambridge, was involved in research on the structure of proteins. Both scientists became interested in solving the structure of chromosomes, which were known to be made up of protein and DNA. They were also interested in understanding how the structure relates to the function of chromosomes as carriers of hereditary information.

The two scientists concentrated on the structure of DNA. It was already known that DNA consists of phosphate groups, sugar molecules, and four bases—adenine, thymine, guanine, and cytosine. Watson and Crick wanted to know how these various molecules were joined together in three dimensions in the large DNA molecule. They knew that a protein molecule consists of amino acids joined together to form a string that coils about itself to form a structure called a helix, like one strand of the twisted ladder mentioned in your textbook. Could it be that DNA also has a helical structure? Crick and Watson asked themselves this question many times.

Working with short sticks that represented chemical bonds and atoms, the two scientists made many different models of DNA. But a model they felt certain was correct eluded them. They could not be sure if the helix was the basic structure of DNA or, if a helix was correct, how many helixes made up the DNA molecule.

At the same time, Rosalind Franklin, a researcher working with Maurice Wilkins at Kings College in London, was carrying out X-ray diffraction studies. The way molecules diffract, or bend, X-rays can indicate the structure of the molecules. A breakthrough in Watson's and Crick's work came with one of Franklin's X-ray photographs of a crystal of the DNA molecule. Watson recognized at once the helical structure of the molecule. Moreover, the X-ray pattern suggested that DNA consisted of at most three, but most likely, two helixes.

With this data, Watson and Crick set out to build a new model of the mysterious DNA molecule. Finally, they created the double helix model. Their model was supported both by chemical facts and X-ray diffraction data. Furthermore, their model supported the biological data, including the ability of DNA to form exact copies of itself. With the Watson-Crick model, other researchers have gone on to learn much more about how heredity operates—knowledge that continues to grow nearly 40 years after the Watson-Crick model was proposed.

1. Since DNA's chemical makeup was already known, what new knowledge about DNA did Watson and Crick contribute to science? ______________________________

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2. What contribution did Rosalind Franklin make to the discovery of the structure of DNA?

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