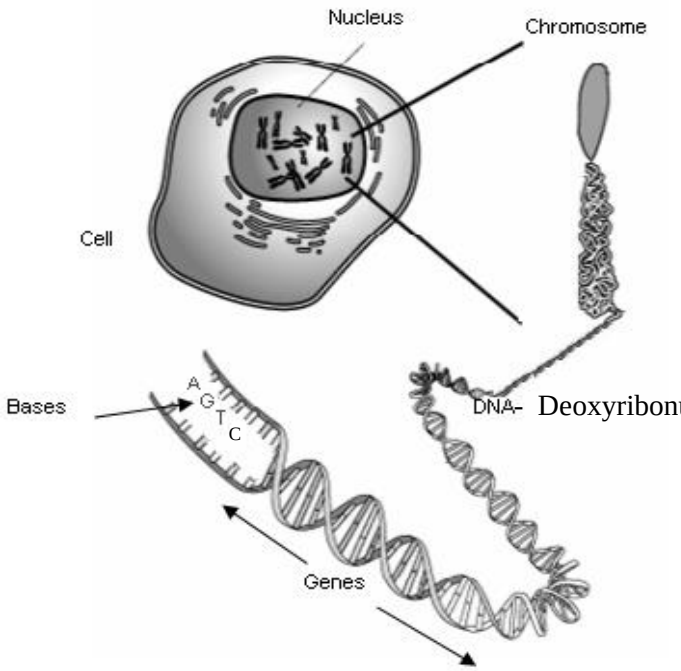
Name _____ Period: _____

Introduction to DNA POGIL (Process-Oriented Guided Inquiry Lesson)

Part I: The Big Picture

Use the diagram to the right to answer questions 1 – 5.



1. What does DNA stand for?

2. Based on its name, what type of organic compound is DNA?
   (1) Carbohydrate (2) Protein
   (3) Nucleic Acid (4) Lipid

3. In what organelle is DNA found?

4. What are the four bases that make up DNA?

5. Put the following terms in order of DECREASING size:

Terms: DNA, Cell, Gene, Chromosome, Nucleus, Base

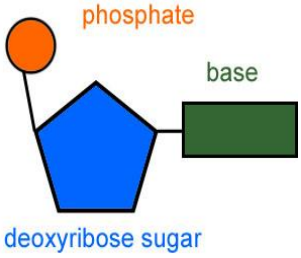
_____ → _____ → _____ → _____ → _____ → _____

Part II: Looking Closer – The Small Picture

Use the diagram and information below to answer questions 6 – 9.

Nucleotides are the building blocks of DNA. These are the structures that bond together to create the larger DNA molecule. The diagram below shows the structure of a nucleotide. The base can be any of the four bases found in DNA (A, T, C or G).

A Nucleotide



6. What is a nucleotide?

7. Identify the three parts of a nucleotide.

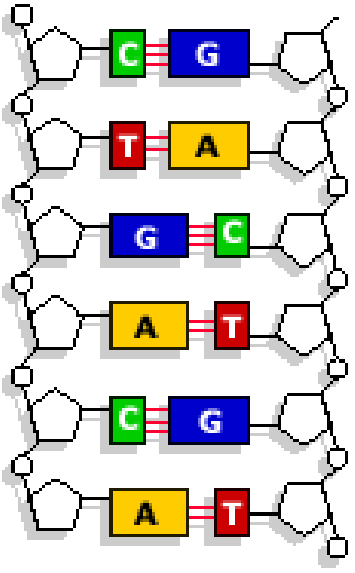
8. What is the sugar in DNA called?

9. Which two components attach to the sugar?

Name _____ Period: _____

Part III: The BIG Picture – The Structure of DNA

Use the information and diagram below to answer questions 10 and 11.



Nucleotides bond together to create a large DNA molecule. The diagram part of a DNA molecule, which is made up of a number of nucleotide buil

10. In the diagram to the right, put a circle around ONE nucleotide.

11. How many total nucleotides are shown in this DNA molecule?

Use the information and diagram below to answer questions 12– 14.

A DNA molecule is made up of two strands of nucleotides. The resulting structure is often compared to a ladder. Examine the two diagrams below. The DNA molecule in diagram 1 below looks like a straight ladder. This is not the usual shape of DNA however. Normally, DNA is tightly wound around itself, in a shape referred to as a **double helix,** which is shown in diagram 2.

Diagram 1: DNA Ladder

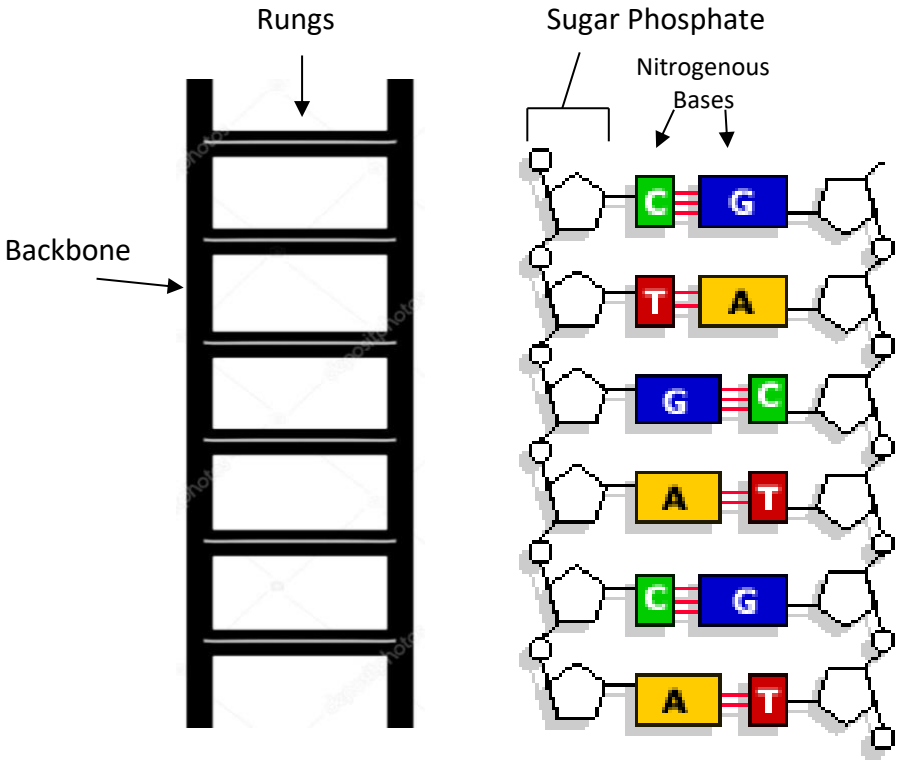
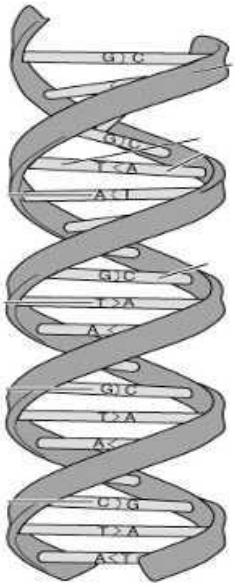


Diagram 2: Double Helix



12. What parts of the DNA molecule would be considered the "Rungs" of the ladder?

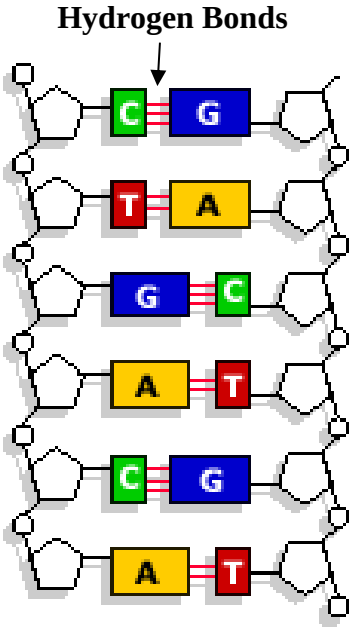
Name _____ Period: _____

13. What parts of the DNA molecule would be considered the "Backbone" of the ladder?

14. What is the name for the shape of DNA?

Part IV: Examining the Bases

Use the information and diagram below to answer questions 15 and 16.

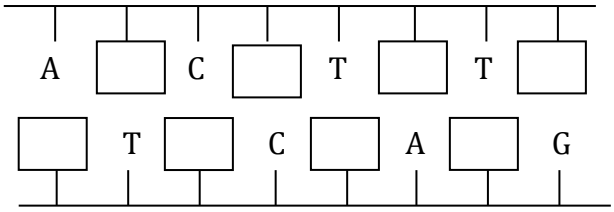


Let's examine the DNA double helix in more detail now. The diagram to the right shows the two strands of DNA. In order to keep the two strands of DNA tightly coiled, the two strands are held together by **hydrogen bonds.** If you look at the bases in the DNA molecule, you will notice a pattern in which bases are held together by these hydrogen bonds. C always base pairs with G and T always base pairs with A. These are called the **base pairing rules**.

15. What holds the two DNA strands together?

16. Describe the base pairing rules.

The diagram below represents a portion of a DNA molecule. Use this diagram to answer questions 17 – 20.



17. Fill in the missing bases in the boxes in the diagram above. ***Explain how you knew which base belonged in each box.***

Name _____ Period: _____

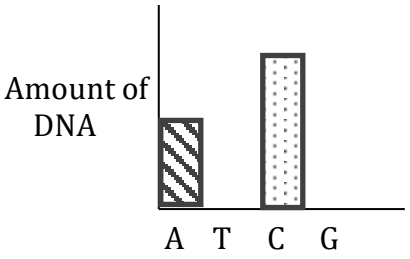
18. Fill in the table below by referring to the diagram you completed in question 17.
    - Count the number of each base (A, T, C, G) in the completed diagram and fill in the number of each base in the second column of the table below.
    - Determine the total number of bases in the entire molecule by adding the numbers in the second column.
    - Last, determine the percent of each base in the DNA molecule.

Example: % of A = $\frac{\text{\# of A}}{\text{Total \# bases}}$ X 100%

Base	Total # in Diagram	% of Base in Diagram
A		
C		
T		
G		
Total # bases		

19. Write a general rule that explains the amount of A, T, C, and G bases in a DNA molecule.

20. The graph below shows the relative amount of bases (A and C) that are found in a particular segment of DNA. Draw bars that would represent the relative amounts of the remaining bases (T and G).



21. If 15% of a DNA sample is made up of thymine, T, what percentage of the sample is made up of adenine, A? _____ Explain your answer.

22. If 22% of a DNA sample is made up of cytosine, C, what percentage of the sample is made up of adenine, A? _____ Show your work in the space below.