History of DNA Worksheet **Name _____**
Biology **Date _____ Block ___**

Use your Webquest to answer these questions

Griffith and Transformation

1. The strain of bacteria that **caused pneumonia** grew into _____ colonies on culture plates; **harmless** bacteria produced colonies with _____ edges.

2. Circle the true statements about Griffith's experiment.
   a. Mice injected with bacteria from *smooth* colonies died.
   b. Mice injected with bacteria from *rough* colonies died.
   c. Mice injected with heat-killed bacteria from *smooth* colonies died.
   d. Mice injected with a mixture of bacteria from heat-killed *smooth* colonies and live *rough* colonies died.

Avery and DNA

3. Avery and his group digested one component from heat-killed S cells at a time to determine which molecule (protein, RNA, DNA) was important for transformation.
Based on their results, Transformation did not occur when _____ was destroyed.

The Hershey-Chase Experiment

4. Radioactive phosphorus (32 P) was used as a radioactive marker for a _____ molecule:
   a. protein b. DNA

5. Hershey-Chase Experiment Results
   a. What happened when bacteria were infected with radioactive phosphorous?

   b. What happened when bacteria were infected with radioactive sulfur?

6. Hershey and Chase concluded that the genetic material of the bacteriophage was _____.

Components and Structure of DNA

7. According to Chargaff's rules, the percentages of _____are equal to **thymine** and the percentages of _____ are equal to **guanine** in the DNA molecule.

8. Rosalind Franklin's work with X-ray diffraction showed that the DNA molecule is shaped like a(an) _____and contains _____ strands.

9. How did Watson and Crick describe the structure of DNA?

Important Figures: Matching

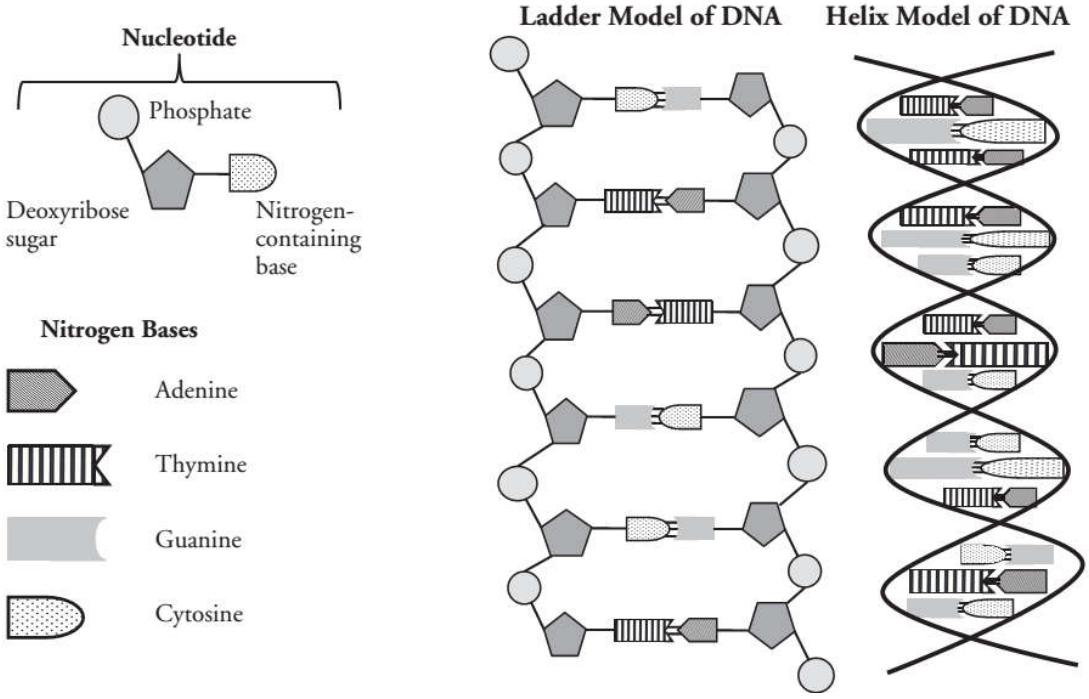
Match the statement with the scientist's experiment to which it corresponds. Answers may be used more than once.

a. Frederick Griffith
b. Oswald Avery
c. Alfred Hershey and Martha Chase
d. Erwin Chargaff
e. James Watson and Francis Crick
f. Rosalind Franklin and Maurice Wilkins

1. _____ Determined that adenine bonds to thymine and cytosine bonds to guanine
2. _____ Built 3-D models of the DNA molecule
3. _____ Took x-rays of DNA strands
4. _____ Proved that the cause of pneumonia was not a chemical poison released by bacteria
5. _____ Concluded that DNA carries genetic information
6. _____ First to demonstrate the process of transformation
7. _____ First to discover the identity of the "transforming" factor
8. _____ Tried to determine which parts of a virus infect the inside of bacteria
9. _____ Used others' x-ray photos to determine the structure of DNA
10. _____ Observed that the amount of adenine equals the amount of thymine, and that the amount of guanine equals the amount of cytosine in any sample of DNA
11. _____ Determined that the protein core of a virus is **not** what enters and infects bacteria

Structure of DNA **Name** _____
Biology **Date** _____ **Block** ____

Model 1 – The Structure of DNA



1. Refer to the diagram in Model 1.
   a. What are the three parts of a **nucleotide**?

   b. What kind of **sugar** is found in a nucleotide?

   c. Which nucleotide component contains **nitrogen**?

   d. Name the **four nitrogen bases** shown in Model 1.

2. DNA is often drawn in a "ladder model." Locate this drawing in Model 1.
   a. **Circle** a **single nucleotide** on **each side** of the ladder model of DNA.

   b. What part of the nucleotides make up the rungs of the "ladder"?

   c. What 2 parts of the nucleotides make up the sides (backbone) of the "ladder"?

   d. Look at the bottom and top of the "ladder" in Model 1. Are the rungs **parallel** (the ends of the strands match) or **antiparallel** (the ends of the strands are opposites)?

3. On the ladder model of DNA **label** each of the **bases** with the letter **A, T, C or G**.

4. Refer to Model 1. When one nucleotide contains **adenine**, what type of base is the adenine attached to on the **opposite** nucleotide strand?

5. The two strands of DNA are held together with **hydrogen bonds** between the nitrogen bases. These are weak bonds between polar molecules. How many hydrogen bonds connect the two bases from Question 4?

6. Refer to Model 1. When one nucleotide contains **cytosine**, what type of base is the cytosine attached to on the **opposite** nucleotide strand?

7. How many hydrogen bonds connect the two bases from Question 6?

8. Write a rule for how the bases are arranged/paired in the ladder model of DNA.

Read This!

Erwin Chargaff (1905–2002), an Austrian-American biochemist, investigated the ratio of nucleotide bases found in the DNA from a variety of organisms. From his research, as well as research by Rosalind Franklin and Maurice Wilkins, Watson and Crick developed the **complementary base-pair** rule during their race to discover the structure of DNA. The complementary base-pair rule states that adenine and thymine form pairs across two strands, and guanine and cytosine form pairs across two strands.

9. Fill in the **complementary** bases on the strand below according to the base-pair rule.
   A T C C A G

10. The ladder model of DNA is a simplified representation of the actual structure and shape of a DNA molecule. In reality, the strands of DNA form a **double helix**. Refer to the double helix diagram in Model 1 and describe its shape using a complete sentence.