

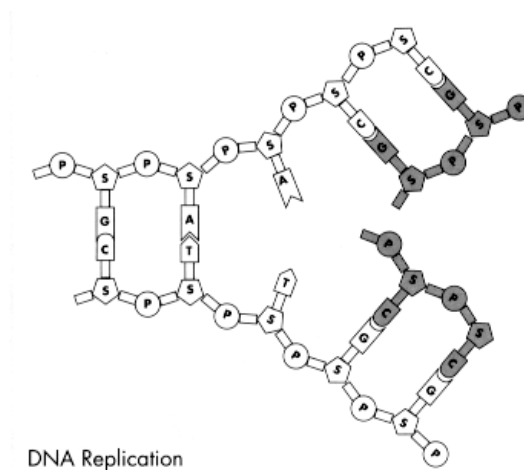
## **DNA Replication Activity**

**Please use a separate sheet of paper!**

**Objective:** Students will model the replication of DNA.

**Background Information:** Although the pairs formed between the nucleotide bases in DNA are very specific (A with T and G with C) there is no restriction to the order in which the bases are arranged on a particular DNA strand. This allows a tremendous amount of information to be stored in the long molecule of DNA. The sequence of bases can be varied in countless ways to form the code for genetic information. When DNA replicates, a particular sequence, or code, serves as a template for the information that is passed on.

The replication process begins when hydrogen bonds between the base pairs are broken by a special enzyme, and the two halves of the molecule start to unwind. The individual strands act as templates along which complementary nucleotides bond. The chains of nucleotides are then linked together by sugar and phosphoric acid chemical groups to create two daughter DNA molecules that exactly resemble the parent material. Each daughter molecule consists of one-half of the original DNA chain, and one-half new material.



### **Procedures:**

#### **PART A: (Building the DNA Molecule)**

\*You will build a complimentary strand of DNA to the one side below using the following "bases"

Adenine (A)	Thymine (T)
Guanine (G)	Cytosine (C)

**1. Copy** the single strand of DNA molecule **using one color.**

**T T C C T C A T T C C T C T G G T T A A T C T C A A A**

**2. Draw** the complementary DNA strand using the A - T and G - C base pairing rules.

3. Label the **AAA** end of this DNA **Strand I**, and label the **TTT** end of this complementary DNA **Strand II**.

*Get teacher signature #1.*

DNA Molecule drawing T.S \_\_\_\_\_

**PART B: (DNA Replication)**

4. Starting at the AAA end of **Strand I**, count 12 bases from right to left. Use an imaginary string to tie the 12th pair of bases together. Again, you are imagining tying **Strand I and II together**.

5. At the AAA end of **Strand I** separate the ends so that the molecule forms a "Y". **Draw this!**

6. Using a **different color**, Replicate Strand I starting at the AAA end and continuing toward the fork. Line up the new **Strand I** at the AAA end. **Draw this!**

7. Using **the same color** as in step 6, Replicate Strand II starting at the fork and move outward toward the TTT end of **Strand II**. Line this **new strand** up with **Strand II**. **Draw this!**

8. Now untie the imaginary string (knot) at the 12<sup>th</sup> pair and complete the replication of both strands in the opposite directions.

9. When you are done, use **the two colors to draw** your new DNA molecule and the original DNA molecule.

*Get teacher signature #2.*

DNA Replication drawings(3) T.S \_\_\_\_\_

**Discussion Questions: Please use complete sentences!**

1. **Compare the two new double stranded molecules of DNA you made. How are they similar to the original DNA molecule containing Strands I and II? Describe the similarities.**

2. **Compare the two new double stranded molecules of DNA you made. How are they different to the original DNA molecules containing Strands I and II? Describe.**

3. **Describe the difference in the way Strands I and II are replicated with respect to the fork (split)?**

4. **DNA replication results in two identical daughter molecules each consisting of one old (original) strand and one newly-synthesized strand. TRUE or FALSE?**

5. **When does DNA replication occur in the life of a cell?**

6. **What can result if the DNA molecule is miscopied?**