DNA REPLICATION KIT

1. **PREPARATION:**

***DIRECTIONS:***

1. The diagram on page two represents a very tiny segment of a DNA molecule, but from now on we will call it the “DNA molecule.” Cut out the entire DNA molecule, ***in one piece***, and carefully cut out the shaded spaces between the bases. The resulting structure should look like a ladder. It can now be twisted to show the helical shape of DNA.
2. To demonstrate the unique ability of DNA to make a copy of itself (“replicate”), cut out the DNA-nucleotides on page three. These will represent the “DNA-nucleotide pool” available in the cell’s nucleus. (When not in use, keep all pieces in an envelope.)
3. **THE PROCESS OF REPLICATION**

***DIRECTIONS: Read all steps first****.*

1. The DNA molecule looks like a ladder. Very strong bonds link the sugars and phosphates that form the sides of the ladder. These sides remain intact throughout the replication process. The “rungs” of the ladder are formed by weak bonds between the nitrogen bases that face each other across the center of the molecule. This is where the molecule will come apart during replication.
2. Replication begins when an enzyme “unzips” the DNA molecule by breaking the weak bonds between nucleotides down the center of the molecule. Demonstrate this by cutting down the middle of “ladder,” **carefully following the curved and angled outlines of the ends of each base pair** where they meet in the middle of each “rung”.
3. You should now have two strands, left and right. Move these two strands apart.
4. Lay the DNA nucleotides out on the table. These represent the “pool” of nucleotides always available in the nucleus.
5. Now, bring complementary DNA-nucleotides into position from the nucleotide pool so that their base-ends fit with the exposed base-ends of both of the original, unzipped DNA strands. (There will be some nucleotides left over in the pool).
6. Once all the matching nucleotides are in position, the sugars and phosphates would normally bond and weak bonds would form with the complementary bases on the two original DNA strands. You would then have two identical DNA molecules, both exactly like the original molecule. HOWEVER, so that you can practice replication again (and demonstrate it to others), leave the nucleotides unattached for now.

*Be prepared to demonstrate DNA replication to your teacher using the terms below:*

* + Strong bonds
  + weak bonds
  + enzyme
  + unzip
  + complementary DNA nucleotides
  + nucleotide pool
  + identical