Name:_____ Period:_____ Date:_____

<div align="center">**DNA Model Project**</div>

Background Information:
The DNA in a chromosome is made up of thousands of small units called nucleic acids. Within each unit there is one of four bases. The possible bases are Adenine, Thymine, Cytosine, or Guanine.

When DNA replication occurs, the double-helix ladder of DNA is split down the center by a special enzyme. Free bases join with the proper base along each side of the open DNA ladder.   The result is two identical DNA molecules that each has half of the original molecule. Usually, DNA replication occurs accurately, but not always, which results in some type of mutation. Remember, this replication process must occur during interphase before cell division (mitosis) can begin.

Goals:
In this project, you will either construct a 3-D model of DNA and/or simulate the process of DNA replication on a poster presentation. Your model will represent the DNA that makes up one chromosome. ****You will be expected to complete the CRITICAL THINKING QUESTIONS to accompany your project, as well as do the self-assessment on your rubric.**

Instructions:
OPTION 1: You may draw a flat-dimension double-helix model of DNA on a full-sized sheet of poster board and illustrate, frame by frame, how replication occurs with that sample of DNA. If you choose this option, you MUST include ALL stages of replication (unwinding, unzipping, replicating, rezipping, and recoiling of each new strand). You must label each base (the structure of the bases must match the chemical shape as illustrated in the textbook) and the drawings must be in color (no pen or pencil drawings). Include a key or legend on your poster to show which chemical structure is which nitrogen base. You must also illustrate the bonds between each complimentary base pair. You are to draw at LEAST 15 base pairs in your sequence---INCLUDING the phosphate and sugar compound backbone. **Neatness counts. You must include your name and block on the back of the poster, and your question/answers & rubric.

OPTION 2: You may construct a 3-D model of DNA by suing crafts to represent the base pairs attached to the sugar and phosphate compound backbone of the "ladder". Some materials you may want to use include Styrofoam balls (painted), pompom balls, plastic beads, etc. You may use coat hangers, pipe cleaners, paperclips, fishing wire, eye hooks, etc. to attach the bases to the backbone. You will need to use separate materials to represent phosphates and sugars, apart from the bases themselves. You should use at least 12 base pairs in your model (any sequence you wish). **It MUST be coiling in a helical shape.** Your model must be able to show/ must have a segment representing DNA replication. Include a card with a key or legend with your model identifying each structure. Your name and period must be on the model as well.

EXTRA CREDIT (for both options): show RNA transcription & translation on a sheet from your original DNA template strand, with the correct amino acid sequence (5 pts)

ALL projects, regardless of which option you chose, MUST include answers to the following questions..in COMPLETE SENTENCES. You may write the answers on this sheet.

Critical Thinking Questions:

1. How many bases are possible on EACH individual DNA nucleotide? What are the names of each of the possible bases?

2. What compounds make up the entire DNA nucleotide? How does this form a polymer of DNA?

3. How may your model differ from another student's model? (Consider the sequence you chose). Where did your DNA come from?

4. Based on your answer to the previous question, would the DNA in your chromosomes be the same as someone else's? Why or why not? Is the DNA in each of <u>your own</u> somatic cells identical to each other?

5. Write a paragraph overview of how DNA molecules can be replicated.

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SCORING RUBRIC FOR PROJECT   **Self / Teacher**

    I.   Bases are correctly paired to each other (10 points)………………..   _____/ _____

    II.   At least 12 (3-D) or 15 (poster) bases represented (10 points)……..   _____/ _____

    III.   Original DNA molecule is in the helical configuration (10 points)...   _____/ _____

    IV.   A key or legend is included with your model/poster (10 points)……   _____/ _____

    V.   Project is neat and attractive in appearance, and in color (10 points).   _____/ _____

    VI.   Name and class period are clearly identified on project (5 points)….   _____/ _____

    VII. Critical Thinking Questions answered (complete sentences)(45 points) _____/ _____

SUBTOTAL :   _____/ _____

+ Extra Credit   _____/ _____

TOTAL :   _____/ _____