

Do not lose this piece of paper!!!! It is required for grading this project!!!!

Name: _____

TOC# _____

DNA MODEL PROJECT

Requirements and Guidelines:

Objective: First, identify materials to build a realistic model of a nucleotide, the building block of DNA. These nucleotides must be able to link together to form a larger DNA model. Building a realistic model of DNA will help you understand the structure more clearly through showing the bonding and arrangement in a 3D manner. The goal of this assignment is to help assist you in understanding how the complex structure of DNA will lead to the definition of organism's traits.

Materials: The only restriction is that you cannot use food items. Models built with food create problems with ants and other pests and they do not last very long. Any other building materials are encouraged. It is a good idea to be creative when thinking of materials. Most times, the most unique and creative materials build the best models.

Model Requirements:

- 1. Molecular Structure:** your DNA structure must accurately represent all of DNA structure.
 - a. Must be an accurate portrayal of a **nucleotide** (phosphate, sugar, and nitrogenous base must be linked together in the correct arrangement).
 - b. These **nucleotides** need to be able to **link together** correctly to form the **backbone** of DNA.
 - c. These nucleotides must link together so the **familiar 3D structure** of the double helix is visible.
 - d. You must represent the **correct number of hydrogen bonds** between each base pair.
 - e. Your helix must make **at least 1 full turn** (360 degrees).
 - f. You must have **at least 5 and no more than 10 base pairs** (Actual DNA has 10.5 base pairs) per turn. This means at least 5-10 "ladder rungs" for every 360 degrees.
 - g. The only thing that is **not** required but is recommended for a stellar grade is portraying the major and minor groove.
- 2. Structural Integrity:** DNA is incredibly important to express an organism's traits. The structure plays a large part in ensuring these traits are expressed correctly and DNA is kept intact.
 - a. Must be sturdy enough that it will not break when handled. Ideally, I should be able to use your model as an example for next year's class. And the next year's class...and the next year's...and the next year's.
 - b. Actual DNA must have structural integrity in order to express traits; yours must also have structural integrity to ensure I can grade it.
- 3. Legend:** will explain to the viewer what each piece represent
 - a. Labeling over 20 tiny hydrogen bonds can be complicated. Your legend will make it so you do not have to do that.
 - b. You must have a **legend that depicts what each base (A/T/C/G), phosphate, deoxyribose, and hydrogen bond** is represented by.
 - c. Use **actual pieces** on your legend rather than drawings or color coordination.
- 4. Creativity:** when choosing materials you must be creative.
 - a. Try not use the materials that Ms. Pender listed as overused (i.e. Styrofoam balls and pipe cleaners)
 - b. The model **must be visually pleasing** to look at. Try to link things together nicely and not haphazardly.
 - c. Try to have some sort of fun theme (but don't be cliché – i.e. Christmas)

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Due Dates and Project Completion

There are several parts of completing this project:

- The Project is due Tuesday 10/1.** This give you just over two weeks to build it, including 3 weekends
- This project can be done **alone** *or* with a **partner**. However, the entire project will be completed outside of class time. It is more than do-able on your own. So only work with a partner who you can trust and know you will see outside of school and you do not have conflicting schedules with. You may complete it with someone in any of my three classes.
 - However, if you work with a partner there are two of you-so I expect “two brains to be bigger than one” and will expect an impeccable design.
- Along the way, there will be check in dates to ensure you do not leave this to the last minute (they never turn out as an A project this way). See the calendar below for the required due dates.
- If for any reason you cannot get your own supplies, please see me by Thursday 9/19

Requirement	Date Due	Stamp
Decision to work alone or with a partner. Partner Name: _____ Contact Info: Email: _____ Phone #: _____ Sign below to agree that you accept the responsibility of working with this person and will not leave them “high and dry” X _____	Tuesday 9/17	
Planning A written plan of: how you think you will build your model, what materials you plan to use, where you plan on getting them, and when you plan to build it.	Thursday 9/19	
Nucleotide You need to bring in a sample nucleotide on this day. This will ensure you are connecting the parts correctly and that you are on track to completing the project on time.	Thursday 9/24 <i>(please realize that if you have not started putting it all together by this time-you have one week left)</i>	
Completed Project AND this sheet	Tuesday 10/1	

Grading

Criteria	Points earned
Accuracy	
a. Must be an accurate portrayal of a nucleotide (phosphate, sugar, and nitrogenous base must be linked together in the correct arrangement).	/5
b. These nucleotides need to be able to link together correctly to form the backbone of DNA.	/5
c. These nucleotides must link together so the familiar 3D structure of the double helix is visible.	/5
d. You must represent the correct number of hydrogen bonds between each base pair.	/5
e. Your helix must make at least 1 full turn.	/5
f. You must have at least 5 and no more than 10 (Actual DNA has 10.5) base pairs per turn of the helix	/5
Creativity – original use of materials, visually pleasing and interesting to look at	/10
Quality of Construction – Does your project fall apart when handled? Could I keep your project and use it as an example for the next five years?	/10
Legend – ALL parts are clearly labeled and there is NO doubt about what each base is, where the sugars and phosphates are, where the bonds are, etc.	/10
Stamps above – do you have them all?	/5
Total Points Earned	/66