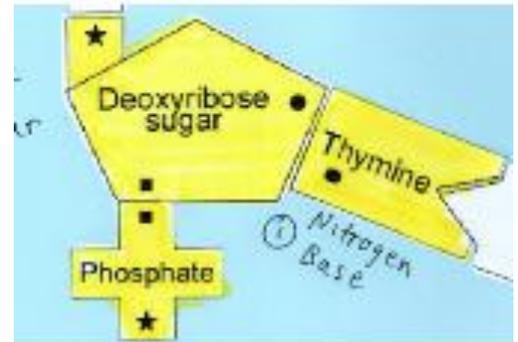


## SB2 Looping Lab; SB2 a, b, c, d, f

**Instructions:** You may complete the stations in any order. For each station include and clearly label the title and purpose. Next, complete the task(s) and answer questions as prompted by the station instructions. ALWAYS return all materials to “homeostasis” for the next group. **READ BEFORE YOU PROCEED!**

**Station 1 (SB2a):** The purpose of this station is to differentiate between DNA and RNA.

Empty the contents of the bag labeled #1 onto the desk. Follow the “instruction card” to complete steps 1-5. You will need to have your teacher confirm that you have successfully completed this task before proceeding. View the example of a nucleotide to the right to help you to get started.



1. Describe in detail how the nucleotides of DNA differ from those found in RNA.
2. What is the process of replication and where does it occur?
3. Identify three major differences in the structure of DNA and RNA.

**Station 2 (SB2a):** The purpose of this station is to understand the process of transcription. Turn to page 5-9 in the DNA Model Instructional Guide. Work together to complete the steps highlighted in orange. Disassemble everything upon completion. You will need to answer questions 10-12, which are highlighted in orange in the booklet and also listed below.

10. Based upon this information what are the mRNA molecules that the left side of your DNA molecule would construct? What about the right side?
11. A base sequence of A, A, A in mRNA would only join in what sequence of tRNA?
12. What specific amino acid is brought to the mRNA by a tRNA molecule with the following sequence: A, A, U?

**Station 3 (SB2a):** The purpose of this station is to differentiate between the DNA found in prokaryotic and eukaryotic cells. Now, examine the two models labeled A and B at this station. Answer the following questions:

1. Identify each model and thoroughly explain the relationship between these two models.
2. What are the three components that make up model B? What do the grey areas on model A represent?
3. How many of these (referring to model B) molecules are found in a tobacco worm’s gametes if the worms have 64 of them in their diploid cells?
4. Explain how these two models relate to prokaryotes and eukaryotes.

**Station 4 (SB2b):** The purpose of this station is to understand the role of DNA in storing and transmitting cellular information. For this station you will simulate the final steps of protein synthesis (RTT) that occur during translation. Examine the item labeled #1 and also empty and sort out the contents from the bag labeled #2 onto the desk.

1. What does the large red object represent on item #1? What does the blue strip represent? Remember that this station represents the final step of protein synthesis (RTT; translation).
2. Consider the contents of bag #2 to answer the following three questions. What do the pink items represent? What do the three letters on the pink items represent? What do the yellow items represent? Remember that this station represents the final step of protein synthesis (RTT; translation).

Next, use your knowledge of protein synthesis and translation to manipulate the items in bag #2 to their appropriate locations on item #1. You are essentially translating the genetic code into a protein (one gene, one protein), but do not forget to use the orange codon sheet to help you. When you are finished, ask the teacher for the answer key to ensure you understand this process. After completing this task, answer the questions below.

3. Where in eukaryotic cells does this process occur?
4. Thoroughly explain the role of DNA and RNA in storing and transmitting cellular information. In other words, explain the entire protein synthesis (RTT) process.

**Station 5 (SB2b):** The purpose of this station is to understand the entire process of protein synthesis. Open the PowerPoint titled “SB2 Looping Station 5 Directions.” Simultaneously work through the PowerPoint, while also using the manipulatives per the instructions on the PowerPoint. This may be completed on the laptop or the Smart Board.

1. What is the function of RNA polymerase and which bonds are broken in the process?
2. Describe what happens after transcription is complete (slide 16)?
3. Considering the entire protein synthesis process, what is the role of DNA in storing and transmitting information?

**Station 6 (SB2b):** The purpose of this station is to understand where in eukaryotic cells each step of RTT takes place. Empty the contents of the bag and examine the animal cell. Place each of the labels onto the appropriate Velcro tab.

1. Make a simple sketch of the labeled cell when you are finished.

**Station 7 (SB2d):** The purpose of this station is to understand how mutations can lead to new traits. Use a vis-à-vis pen to complete the sheet titled “mutations” Be sure to erase your answers when completed with the station.

- 1-5. Answer questions 1-5 that accompany this station

**Station 8 (SB2f):** The purpose of this station is to understand the use of DNA technology. On either side of the room you will find three posters on DNA Technology. Read through each poster and answer the questions that follow. There are a total of 7 questions for this station.

- 1-7. Answer the 7 questions that accompany this station.

**Station 9 (SB2c):** The purpose of this station is to use Mendel’s laws to explain the role of meiosis in reproductive variability.

Draw two punnett squares to solve the following monohybrid crosses. Label them Cross #1 and Cross #2.

1. Cross#1: Read the genetics problem on the laminated sheet dealing with the cockroaches. You may choose to use the vis-à-vis markers to write on the laminated sheet. Once you believe you have the correct answer fill in your punnett square on your lab write-up and list the genotypic and phenotypic percentages for the four offspring. ERASE the laminated sheet.

2. Cross#2: Read the genetics problem on the laminated sheet dealing with the kelp. You may choose to use the vis-à-vis markers to write on the laminated sheet. Once you believe you have the correct answer fill in your punnett square on your lab write-up and list the genotypic and phenotypic ratios for the four offspring. ERASE the laminated sheet.

3. Describe Mendel’s three laws and explain how they relate to the process of meiosis.

4. What are the five ways in which variation can occur in sexually reproducing organisms?

5. Describe at least five other patterns of inheritance discussed throughout the course.

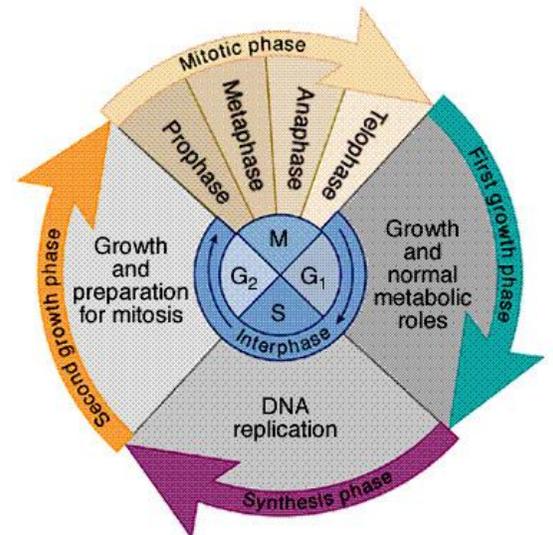
**Station 10 (SB2 c,e):** The purpose of this station distinguish between mitosis and meiosis and to connect this with the advantages and disadvantages of sexual/asexual reproduction. Start by carefully placing the individual models into their correct locations for each process (labeled 1 and 2). As you place them in order pay attention to the chromosomes and make note of what is occurring during each step. Do not simply fit the models into place. Take some time to reflect upon the myriad connections that can be made at this station.

1. Create a Venn diagram or double bubble map that differentiates between these two processes. You may choose to use the laminated sheet that accompanies this station.

2. On model 2, locate the individual pieces labeled 2-a and 2-b. What is occurring between these steps and why is this so important.

3. On model 2, locate the individual piece labeled 2-c. What might occur if unequal numbers of chromosomes separated during this step? What do we can this mistake? How could a doctor identify this mistake?

4. Briefly describe the cell life cycle.



**Station 11 (SB2 a,b,c,d,e,f):** The purpose of this station is to understand the overall “big picture” of SB2. This station is located at the Magnet coral corner. You may want to pull up a stool, as you will probably be there for a while.

1. Construct a detailed essay that describes how each sub-standard of SB2 can be related to the biotic processes occurring in these tanks. Have fun and be creative, but be sure to plan out the essay prior to writing.

Congratulations you have made it through the infamous SB2 Looping Lab!