Wrap-Up & Reflections

Name_____

Of the four stations you visited today, which topic did you find most interesting or made you think you might want to learn more about this concept? Explain.

If someone asked you what is synthetic biology, what would you tell them?

Did anything you learned today inspire you to want to explore future classes or summer camps in the areas of biology, biotechnology, bioengineering, computer science, or engineering? Explain.

Mini-Lab Notebook

RAIN INCUBATOR

School Name

Date

Station A - Cell Biology
Microscopes & Cells

Purpose: View real cells and create your own cell model.

1. Describe a specialized type of cell. What makes it unique?

2. Explain what happens if a mutation causes a cell to continuously undergo mitosis. What would this condition be called?

3. Under what conditions do you want to have lots of cell growth? What about low cell growth?

Synthetic Biology with Fluorescent Bacteria:
The bacteria have been transformed to express a specific protein called *Green Fluorescent Protein (GFP)*. Each tube is expressing GFP, BUT under the control of different *promoters*. Promoters help determine how much GFP is made by each cell.

1. Carefully examine the bacteria colonies. Fill in the following table.

Sample Name	Rank Fluorescence Intensity (least to most (1-4))
1	
2	
3	
4	

1. Which tube is the negative control? Which has the most Which has the most GFP in the cells?

2. How can you tell it has the most GFP? What can you infer about the promoter?

3. Did everyone in your group agree on the intensity ranking? Can you propose a method to determine fluorescence intensity beyond your eyes?

Station D - Microbiology
Antibiotic resistance & Synthetic Biology

Purpose: See the effects of antibiotics on bacteria and understand how bacteria can be manipulated to benefit humans.

1. Examine the bacteria plates for zones of inhibition (ZOI). Work together as a group to measure the diameter (in mm) of each ZOI for each antibiotic disk.

Chloramphenicol	
0mg/ml:	2mg/ml:
1mg/ml:	4mg/ml:

Ampicillin	
0mg/ml:	2mg/ml:
1mg/ml:	4mg/ml:

2. Based on your observations, which antibiotic has the lowest Minimum Inhibitory Concentration (ie, which is the strongest bacterial inhibitor)? Explain.

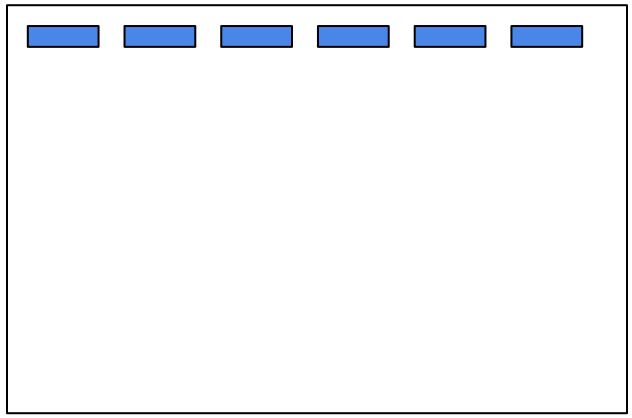
Station B - Biotechnology
Gel Electrophoresis & Blue LED Transilluminator

Purpose: Practice using a micropipette to load a gel and analyze a gel using the imager.

1. What is the purpose of gel electrophoresis? Describe how it works.

2. Why is blue light used in the gel imager?

3. Label and draw the DNA gel from the imager below. Label each lane.

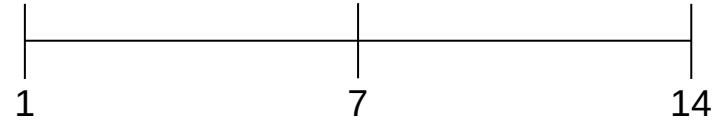


4. Interpret the gel.

Station C - (Bio)chemistry
pH & PTC

Purpose: Experiment with fast detection systems using (bio)chemistry.

1. pH is a measure of the hydrogen ions in solution. Using the number line below, label the regions of acidic, basic, and neutral.



Solution	Prediction (Acid, Base, or Neutral?)	pH Value	Acid, Base or Neutral
Baking Soda			
Vinegar			
Gatorade			
Creamer			
Soda			
Antacid (Mylanta)			
Coffee			
Ammonia			

2. The pH range of blood is from 7.35 to 7.45. This is slightly

_____ (acidic/basic).

PTC Taste Testing:

1. The ability to taste phenylthiocarbamide (PTC) is a dominant trait. On a scale of 1 to 3, rank the following genotypes in order of least (1) to most (3) sensitive to PTC taste.

Homozygous dominant (TT)	
Homozygous recessive (tt)	
Heterozygous (Tt)	

2. Describe the taste of PTC strip.

First Strip	
Second Strip	

3. Are you a super taster? How many people in your group are super tasters, regular tasters, or non-tasters?

4. Sensitivity to the PTC is passed along from parents to offspring in a Mendelian fashion. This pattern can be analyzed using a Punnett square. In the example below, we observe the four possible genotypes for the offspring of two parents for the “Taster Gene”, where “T” represents the dominant allele (Taster phenotype) and “t” represents the recessive allele (Non-Taster). Predict the genotypes and phenotypes of the children from two heterozygous parents using the Punnett Square below:
