BIOL 1120L

Name:

Date:

**Work in Groups**

Part 1: Thinking about Evolved Immunity

Question 1: In a few sentences sentence explain how you think *evolved immunity* functions? Feel free to add simple diagrams to help you explain this idea.

Question 2: Create a simple equation to describe a population.

Hints and givens

* P= total population
* N = not immune individuals
* I = immune individuals
* 70% of population not immune
* 30% not immune
* To use a percentage in your model you might need to convert to decimal form.

N= \_\_\_\_\_\_\_\_\_\_ \* \_\_\_\_\_\_\_\_\_\_\_

I = \_\_\_\_\_\_\_\_\_\_ \* \_\_\_\_\_\_\_\_\_\_\_

P = \_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_\_

Feel free to use the space below to draft out different ideas.

Part 2: To MATH BENCH!

1. Go to this link: https://mathbench.umd.edu/modules/env-science\_acquired-immunity/page01.htm
2. Complete questions as you work through the Math Bench exercises.

Question 3: Exercise 1 “The case of the resistant hoppers.”

1. Describe the bug population in the garden without pesticides. Then create a graph to compare the percentages of immune bugs at the start and finish of the simulation.
2. Describe the bug population in the garden with pesticides. Then create a graph to compare the percentages of immune bugs at the start and finish of the simulation.
3. Now, create an algebraic model that explains each population at the beginning and the end of the exercise. Which model changes more drastically?

|  |  |
| --- | --- |
| Garden without Pesticides | Garden with Pesticides |
| N= \_\_\_\_\_\_\_\_\_\_ \* \_\_\_\_\_\_\_\_\_\_\_  I = \_\_\_\_\_\_\_\_\_\_ \* \_\_\_\_\_\_\_\_\_\_\_  P = \_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_\_ | N= \_\_\_\_\_\_\_\_\_\_ \* \_\_\_\_\_\_\_\_\_\_\_  I = \_\_\_\_\_\_\_\_\_\_ \* \_\_\_\_\_\_\_\_\_\_\_  P = \_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_\_ |
| N= \_\_\_\_\_\_\_\_\_\_ \* \_\_\_\_\_\_\_\_\_\_\_  I = \_\_\_\_\_\_\_\_\_\_ \* \_\_\_\_\_\_\_\_\_\_\_  P = \_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_\_ | N= \_\_\_\_\_\_\_\_\_\_ \* \_\_\_\_\_\_\_\_\_\_\_  I = \_\_\_\_\_\_\_\_\_\_ \* \_\_\_\_\_\_\_\_\_\_\_  P = \_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_\_ |

Question 4: Exercise 2 “Hoppers evolve resistance.”

What are the three major ideas that contribute to evolved immunity?

Question 5: Exercise 3 “Variability”

1. Explain why genetic variability contributes to evolved immunity.
2. Why do non-immune genes persist in populations exposed to lethal chemicals?

Question 6: Exercise 4 “Inheritance”

1. Explain how heritability functions.
2. How does variability interact with heritability?

Question 7: Exercise 5 “Selection pressure”

1. Explain how a selection pressure functions on a population.
2. Why do non-immune traits persist in the face of selection pressures?

Part 3: Application

Question 8: Exercise 6 “Quick review”

Create a scenario where people could evolve rainbow hair, orange finger nails, and radical punk rock tattoo designs (not tattoos) on their skin. Specifically explain how each evolved train satisfies all pre-requisites of evolution. You may use figures to help you demonstrate your ideas.

Question 9: Exercise 7 “Evolution and immunity”

1. How do humans facilitate the evolution of diseases?
2. Why is it a bad idea to take antibiotics when you have a viral infection?

Question 10: Exercise 8 “Immunity in prokaryotes and eukaryotes”

Create a figure/diagram that compares and contrasts prokaryotic and eukaryotic immune systems.