**Title Understanding Survival Due to Genetic Variations**

**TIME:** 60 minutes total within 2-3 Days

**ESSENTIAL QUESTION:**

**How do genetic variations increase the chance that an organism will survive and reproduce?**

**EXPECTATIONS:** Complete the instructions below in order. You can break it up in 20-30 minute sessions OR do as much as you prefer, then take a break. Since your goal is to be able to construct an explanation using evidence to show how genetic variations of traits increase the chances of some populations to survive in specific environments, you need to study resources that will help this make sense. If the resources provided in the lesson don’t help you, check out the other resources below instead.

**PART 1 (20-30 minutes)**

**WARM-UP:**  Watch this video then answer the questions

Video Link: <https://thekidshouldseethis.com/post/leaf-mimicking-grasshopper-camouflage-video>

Answer these questions to prepare for what you’re about to learn. (It’s okay not to know the answers yet. Thinking about them first helps prepare your brain for learning).

Q1: ***How do genetic variations allow a species to adapt to a new environment?***

Q2:  ***How do environmental factors affect selection of specific traits?***

**RESEARCH:**  Read this article and watch the video to take notes.

Article Link: <https://thekidshouldseethis.com/post/evolution-101-how-natural-selection-works-nova-pbs>

 Q1:  ***Why is it called “Natural Selection”?***

 Q2:  ***Why is evolution responsible for the thousands of species on Earth?***

**EXPLORE:** Click on the link to play with the activity then answer the review questions

 Link: <http://archive.fossweb.com/beta/Heredity_Adaptation/stebbins-walkingsticks/stebbins2.html>

**REVIEW:** Try to answer the questions again. (They should make more sense now).

Q1: ***How do genetic variations allow a species to adapt to a new environment?***

Q2:  ***How do environmental factors affect selection of specific traits?***

**FINISHED EARLY? GOT QUESTIONS? NEED DIFFERENT RESOURCES?**

**Video Link:** <https://www.youtube.com/watch?v=BcpB_986wyk>

**Video Link:** <https://www.youtube.com/watch?v=3zS8vdK7xTs>

**PART 2 (20-30 minutes)**

**RESEARCH:** Watch this video to look for reasons why certain variations help species survive better in certain environments

Video Link: <https://www.youtube.com/watch?v=jUHokSPkzT8>

**EXPLORE:**  Follow this link to complete the rabbit population simulation and answer the questions in your notebook

Resource Link: <https://phet.colorado.edu/en/simulation/natural-selection>

 1.When you first open the simulation, one bunny will be shown on your screen. If you don’t do anything with the simulation, what happens to the bunny?

2. The simulation allows you to control types of mutations that occur in the bunnies. Look for the area that says “add mutation.” What kind of changes can you make to your bunny?

3. There are two selection factors listed that can also be changed. What are they?

4. What are the two environments you can choose?

5. Click on the RESET ALL button and you will get another bunny. This time, click the button that says “add a friend.” What happens to the bunnies this time?

6. In nature, populations don’t get out of control because there are limiting factors in the environment. Start your simulation over and click to add food as a selection factor. **Describe** what happens to the bunnies when food is added as a selection factor.

7. Animals have adaptations that can help them survive in their environment. Reset the simulation and add the “long teeth” mutation to your bunnies and use “food” as your selection factor. **Describe** what happens to the bunnies this time.

8. The graph at the bottom of the simulation will show that bunnies with long teeth seem to have an advantage when food is a selection factor. **Suggest a reason** for this trait providing an advantage to the bunnies. a) brown fur b) long tail c) long teeth

10. Develop a way to test the prediction and describe your test and results below. What did you do to test this?

11. Which trait seemed to provide the greatest advantage when wolves were the selection factor and equator was the environment?

12. Describe what happens to the brown bunnies if you change the environment to “arctic?”

**PART 3 (20-30 minutes)**

**PRACTICE:**  Watch the video and write down how many “Adaptations” the mantis has to help it survive.

**Video Link:**  <https://www.youtube.com/watch?v=7wKu13wmHog>

Consider what you have learned in the bunny simulation. If you are not sure of the answer, you can always go to the simulation and check. Answer True or False

\_\_\_\_ 1. Tooth length is a type of selection factor.
\_\_\_\_ 2. White bunnies that live in arctic environments will ONLY have an advantage if wolves are present.
\_\_\_\_ 3. Selection factors, like food, will limit the population size.
\_\_\_\_ 4. Mutation factors, like long tails, will limit the population size.
\_\_\_\_ 5. Bunnies will overpopulate if you do not have a selection factor chosen.
\_\_\_\_ 6. Bunnies with long teeth are more likely to survive when food is limited.
\_\_\_\_ 7. Bunnies with brown fur that live at the equator are more likely to survive when wolves are present.
\_\_\_\_ 8. A mutation can be an advantage in one environment, but not the other

**LEARNING TARGET:** Write evidence with reasoning to complete CERER for this claim and send it to your teacher.

***CLAIM: “Some species of animals have a greater chance of survival if their adaptations are made for a specific environment”.***

**REVISED THOUGHTS:** Complete these reflection questions to see how much you’ve grown your learning and email your teacher a copy so they know how to help you.

 Q1: ***What was surprising about Natural Selection?***

 Q2: ***What did you already know but see in a new way?***

 *Q3:* ***What do you still need help with?***

**FINISHED EARLY? GOT QUESTIONS? NEED DIFFERENT RESOURCES? WANT A CHALLENGE?**

**Experiment:**

**Video:** <https://www.youtube.com/watch?v=-6oKJ5FGk24>

**Bug Wars Video Link:** <https://www.youtube.com/watch?v=JtRrNfbKKLg>