

Bug Natural Selection Model Activity Questions

Answer these questions as a group and submit one per small group. You may submit a Word document, PDF, or type the answers into the text field.

1. Natural selection...
 - a. is a mechanism of evolution
 - b. is evolution
 - c. is a process that shapes an individual over its lifetime
 - d. benefits the species

2. Select all of the requirements that need to be met for natural selection to occur.
 - a. traits must be heritable
 - b. traits must vary
 - c. must result in differential fitness
 - d. only good traits will persist

3. Which of the following is the best example of fitness gains in evolutionary terms?
 - a. A barnacle with a jagged shell produces more offspring than one with a smooth shell resulting in the next generation having more jagged-shelled barnacles than smooth shelled barnacles.
 - b. A stingray participating in social feeding gives up optimal access to food to allow an unrelated stingray to have fair access to the food.
 - c. Usain Bolt, the fastest runner in the world, trained his entire life to increase his ability to run fast as he aged.
 - d. In a chimpanzee group, one female forgoes having offspring to ensure that her unrelated group members' offspring receive enough shelter and food.

4. If you were to run another experiment with the bug simulation using the parameters below. What would you expect the result of the experiment to be?

Variable Group	Variable Name	Setting
Setup Parameters	number-birds	0
	number-bugs	50
Natural Selection Parameters	bug-color-variable?	√
	bug-color-heritable?	√
	survival-is-selective?	unchecked
Visualization Parameters	wiggle?	Your choice
	show-vision-cone?	Your choice

- a. All bug colors would be represented equally in the population.
- b. The color most similar to the grass color will have the most individuals.
- c. The color with the strongest contrast to the grass will have the most individuals.
- d. The color with the highest frequency of individuals at the beginning will have an even higher frequency at the end.

5. In terms of the scientific process, why is it important to run the simulation that contains randomness more than once before drawing a conclusion?
 - a. A group member may have entered the parameters in incorrectly, and so it is important to make sure that the result was not incorrect due to human error.
 - b. Each run of the simulation represents a single replicate, and multiple replicates are needed to have a good representative sample of natural phenomena.
 - c. A single run of the simulation represents an experiment, and doing multiple runs with different parameter settings allow for the completion of multiple experiments before drawing a single conclusion from all of the data.
 - d. Running the simulation multiple times ensures that everyone in the group gets a chance to control the model and set parameters.

6. In a population of mice that live on a beach with black sand, some have black fur, some have gray fur, and some have white fur. The black fur provides more camouflage from predators on the black sand. However, all mice are born either white or gray. Some mice have black fur because they eat a type of berry that changes their fur color from gray to black. Will new mice in the population be born with black fur?
 - a. No. Trait is not variable
 - b. No. Trait is not heritable
 - c. No. Traits do not lead to differential reproductive success
 - d. Yes. All conditions for natural selection are met

7. In a population of mice that live on a beach of black sand, all of the mice have black fur. The black fur is good camouflage from predators. Will natural selection occur?
 - a. No. Trait is not variable
 - b. No. Trait is not heritable
 - c. No. Traits do not lead to differential reproductive success
 - d. Yes. All conditions for natural selection are met

8. In a population of mice that live on a beach with white sand, some have black fur and some have gray fur. Neither type of fur color provides more camouflage from predators on the white sand. Will natural selection occur?
 - a. No. Trait is not variable
 - b. No. Trait is not heritable
 - c. No. Traits do not lead to differential reproductive success
 - d. Yes. All conditions for natural selection are met

9. Type the names of each of your group members present today