

Stick Insect (Natural Selection) Simulation

Scientific Background

Charles Darwin, a scientist who lived in the mid-1800s, developed the theory of *natural selection* to explain how species changed and evolved over time. Evolution is a series of small changes that occur in populations of organisms, not changes within individual organisms. It occurs when members of a species have favorable genetic variations and successfully reproduce to pass on these variations to their offspring.

Natural selection assures the survival and reproduction of those organisms best adapted to their environment or surroundings. It is often described as "survival of the fittest," because organisms not best adapted to their environment or surroundings are more likely to die or leave fewer offspring.

Special adaptations make some organisms more successful than others. For example, organisms that use camouflage make it very difficult for predators to find and prey upon them. This gives the organisms an advantage over organisms that are easier to detect by predators.

In the Stick Insect (Natural Selection) Simulation, students observe the effects of natural selection on three colors of stick insects within three different colored environments. This activity can be found by navigating to the Stick Insect screen, then clicking the stick insect icon at the bottom of the screen.

Vocabulary

- adaptation
- camouflage
- natural selection
- population
- prey
- behavior
- environment
- organism
- predator
- reproduction

*Vocabulary definitions can be found in the **Backyard Bugs** Glossary.*

Thinking Question

What other behaviors do stick insects use to ensure their survival?

Exploratory and Extension Activities

Additional Exploratory and Extension activities are available in the *Backyard Bugs Teacher's Guide*.

Stick Insect Cake Walk

The music activity will focus on the stick insect's six legs, its ability to regenerate a leg and its ability to use camouflage to be safe.

Cut several large squares from green, yellow, and brown paper. On one square of each color, write the word regenerate a leg. Tape the squares in a circle on the floor. Assign students to be either green, yellow, or brown stick insects. Each student will be given six strips of their color. The strips represent each of their six legs.

When the music starts, students will walk in a circle with the colored squares to their left. This will avoid having the floor squares torn up. Students are not allowed to step on a colored square. If they do, they are automatically out of the game. When the music stops, if the color square to the immediate left matches the students' camouflage, they are safe. If it is a different color, they have to forfeit a leg. The leg will be placed in a lost leg pile. If students are opposite their own color square and that square has "grow a new leg" on it, the student can fetch a previously lost leg. The music will continue in this manner. Repeat the walk as desired.

After the game has been played, ask students what some of the consequences would be if a stick insect lost all its legs.

Read About Stick Insects

Read different selections about stick insects. Suggested titles are:

Walking Sticks (The New Creepy Crawly Collection), Tamara Green and Tony Gibbons (Gareth Stevens Publishing, 1997, ISBN: 0836819179).

The stick insect section of *Stink Bugs, Stick Insects, and Stag Beetles: And 18 More of the Strangest Insects on Earth*, Sally Kneidel (Wiley, 2000, ISBN: 047135712X).

While the teacher reads from the chosen selection, students can use crayons, paper, and other technology-based drawing media to create impressions and reactions to the reading. At the end of the story, have students share their impressions and ideas.

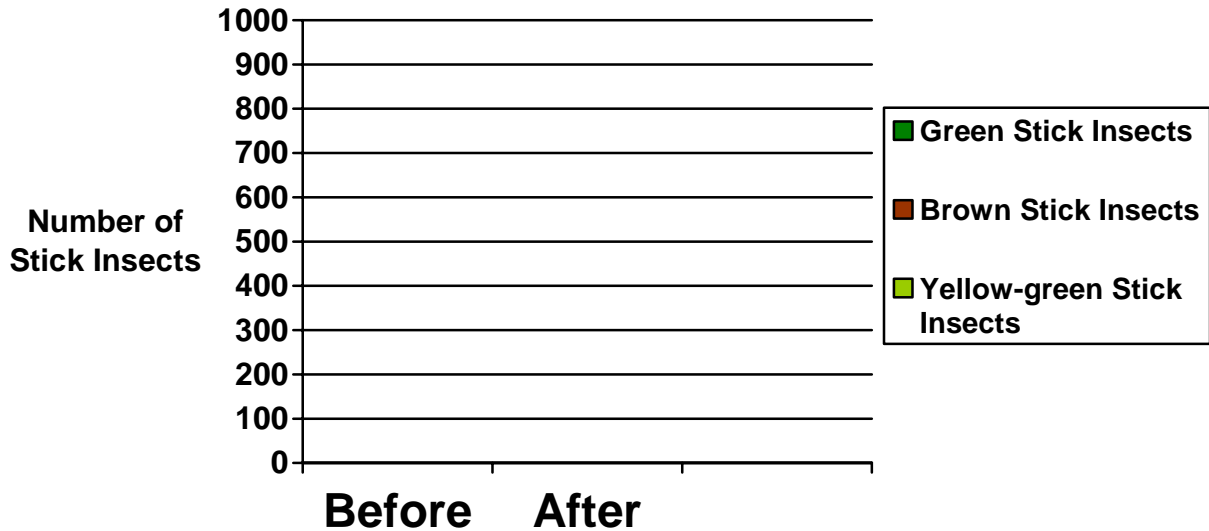
Name: _____

Stick Insect (Natural Selection) Simulation – Brown Environment

Use the Stick Insect (Natural Selection) Simulation. Record data for the brown environment.			
Color of Stick Insect	Number of Stick Insects Before the Blue Jays Eat Them	Number of Stick Insects That Survive	Number of Stick Insects Eaten by Blue Jays & Percent of Total Eaten
Green			
Brown			
Yellow-green			

Make a graph of the different colored stick insects survival in the brown environment.

Stick Insect Survival Data in Brown Environment



Which stick insects survive best in the brown environment? Why?

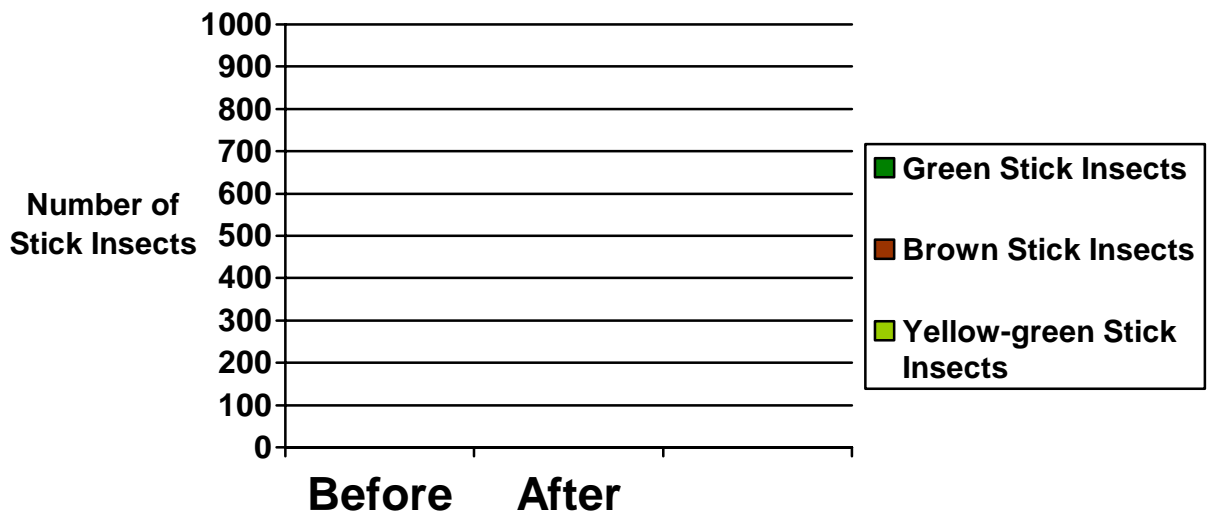
Name: _____

Stick Insect (Natural Selection) Simulation – Yellow-green Environment

Use the Stick Insect (Natural Selection) Simulation. Record data for the yellow-green environment.			
Color of Stick Insect	Number of Stick Insects Before the Blue Jays Eat Them	Number of Stick Insects that Survive	Number of Stick Insects Eaten by Blue Jays & Percent of Total Eaten
Green			
Brown			
Yellow-green			

Make a graph of the different colored stick insects survival in the yellow-green environment.

Stick Insect Survival Data in Yellow-green Environment



Which stick insects survive best in the yellow-green environment? Why?

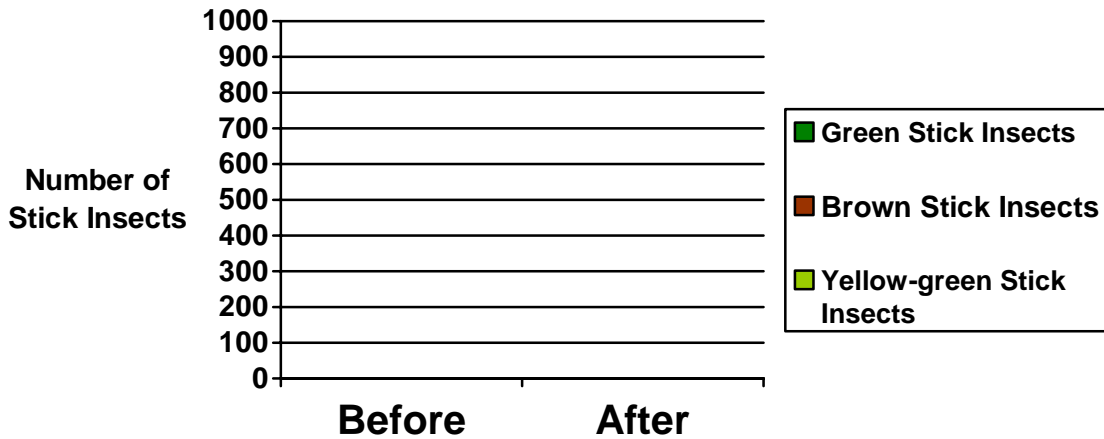
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Stick Insect (Natural Selection) Simulation – Green Environment

Use the Stick Insect (Natural Selection) Simulation. Record data for the green environment.			
Color of Stick Insect	Number of Stick Insects Before the Blue Jays Eat Them	Number of Stick Insects that Survive	Number of Stick Insects Eaten by Blue Jays & Percent of Total Eaten
Green			
Brown			
Yellow-green			

Make a graph of the different colored stick insects survival in the green environment.

Stick Insect Survival Data in Green Environment



Which stick insects survive best in the green environment? Why?

Answer Key

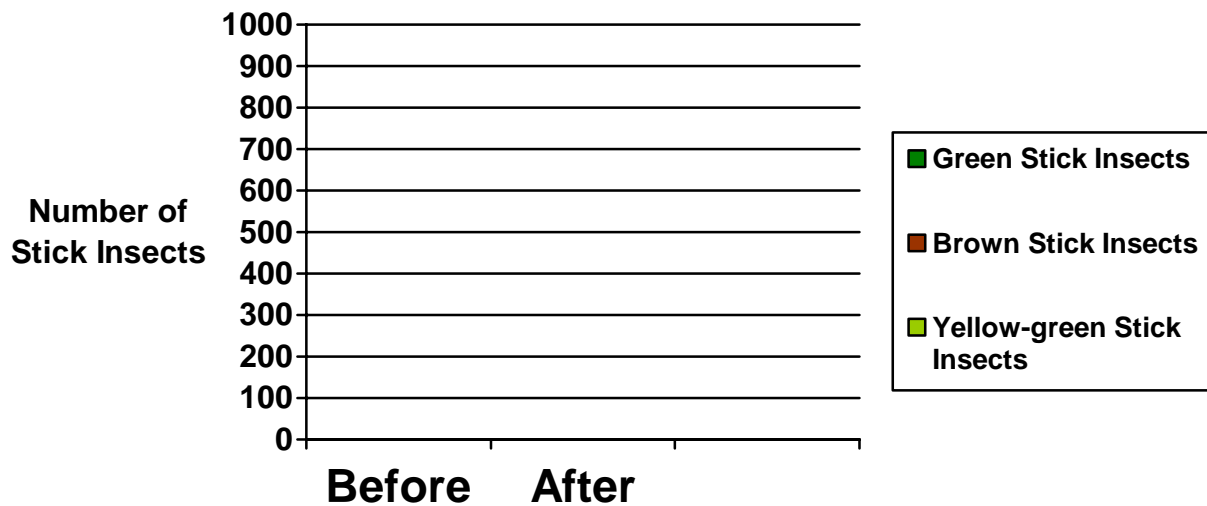
Stick Insect (Natural Selection) Simulation – Brown Environment

Use the Stick Insect (Natural Selection) Simulation. Record data for the brown environment.			
Color of Stick Insect	Number of Stick Insects Before the Blue Jays Eat Them	Number of Stick Insects that Survive	Number of Stick Insects Eaten by Blue Jays & Percent of Total Eaten
Green	<i>Answers vary between 100-150</i>	<i>Answers vary between 20-30</i>	<i>Answers vary. Number eaten is difference between 1st column data and 2nd column data; percent is number eaten divided by 100</i>
Brown	<i>Answers vary between 50-200</i>	<i>Answers vary between 48-190</i>	<i>Answers vary. Number eaten is difference between 1st column data and 2nd column data; percent is number eaten divided by 100</i>
Yellow-green	<i>Answers vary between 200-300</i>	<i>Answers vary between 20-30</i>	<i>Answers vary. Number eaten is difference between 1st column data and 2nd column data; percent is number eaten divided by 100</i>

Make a graph of the different colored stick insects survival in the brown environment.

Student answers to the bar graph below should match the 1st column data and the 2nd column data from the brown data in the table above.

Stick Insect Survival Data in Brown Environment



Which stick insects survive best in the brown environment? Why?

Brown stick insects survive best because they match their environment. This makes it harder for a predator to find them.

Answer Key

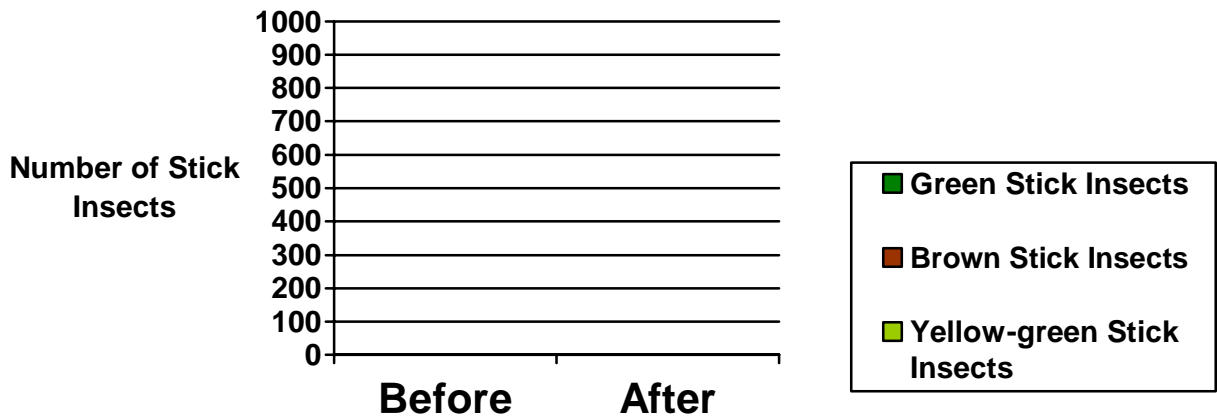
Stick Insect (Natural Selection) Simulation – Yellow-green Environment

Use the Stick Insect (Natural Selection) Simulation. Record data for the yellow-green environment.			
Color of Stick Insect	Number of Stick Insects Before the Blue Jays Eat Them	Number of Stick Insects that Survive	Number of Stick Insects Eaten by Blue Jays & Percent of Total Eaten
Green	<i>Answers vary between 100-150</i>	<i>Answers vary between 20-30</i>	<i>Answers vary. Number eaten is difference between 1st column data and 2nd column data; percent is number eaten divided by 100</i>
Brown	<i>Answers vary between 50-200</i>	<i>Answers vary between 10-40</i>	<i>Answers vary. Number eaten is difference between 1st column data and 2nd column data; percent is number eaten divided by 100</i>
Yellow-green	<i>Answers vary between 200-300</i>	<i>Answers vary between 190-285</i>	<i>Answers vary. Number eaten is difference between 1st column data and 2nd column data; percent is number eaten divided by 100</i>

Make a graph of the different colored stick insects survival in the yellow-green environment.

Student answers to the bar graph below should match the 1st column data and the 2nd column data from the yellow-green data in the table above.

Stick Insect Survival Data in Yellow-green Environment



Which stick insects survive best in the yellow-green environment? Why?

Yellow-green stick insects survive best because they match their environment. This makes it harder for a predator to find them.

Answer Key

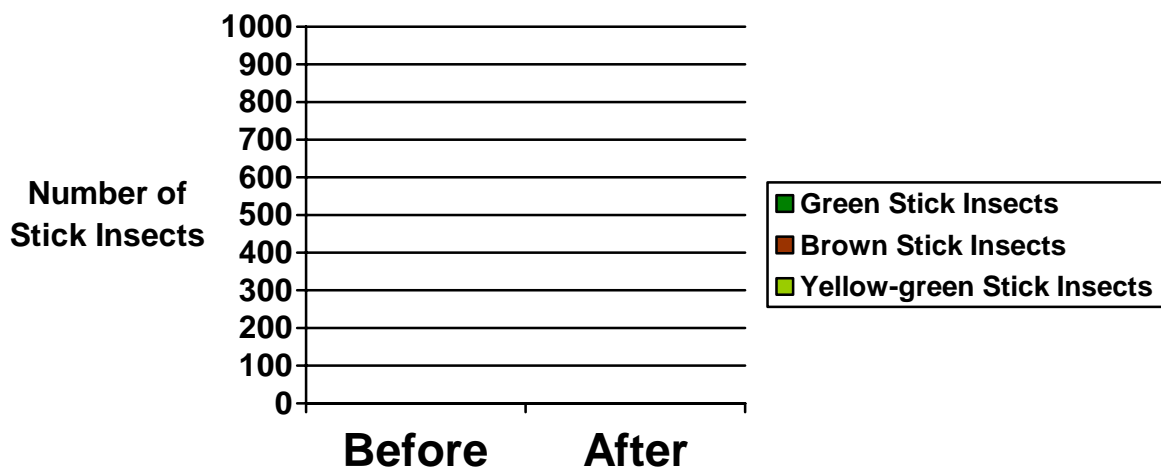
Stick Insect (Natural Selection) Simulation – Green Environment

Use the Stick Insect (Natural Selection) Simulation. Record data for the green environment.			
Color of Stick Insect	Number of Stick Insects Before the Blue Jays Eat Them	Number of Stick Insects that Survive	Number of Stick Insects Eaten by Blue Jays & Percent of Total Eaten
Green	<i>Answers vary between 100-150</i>	<i>Answers vary between 95-143</i>	<i>Answers vary. Number eaten is difference between 1st column data and 2nd column data; percent is number eaten divided by 100</i>
Brown	<i>Answers vary between 50-200</i>	<i>Answers vary between 10-40</i>	<i>Answers vary. Number eaten is difference between 1st column data and 2nd column data; percent is number eaten divided by 100</i>
Yellow-green	<i>Answers vary between 200-300</i>	<i>Answers vary between 60-90</i>	<i>Answers vary. Number eaten is difference between 1st column data and 2nd column data; percent is number eaten divided by 100</i>

Make a graph of the different colored stick insects survival in the green environment.

Student answers to the bar graph below should match the 1st column data and the 2nd column data from the green data in the table above.

Stick Insect Survival Data in Green Environment



Which stick insects survive best in the green environment? Why?

Green stick insects survive best because they match their environment. This makes it harder for a predator to find them.