

Stimulus 1

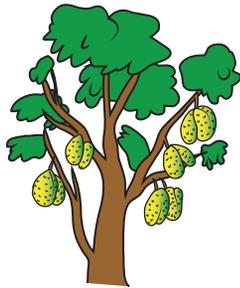
Southeast Asia is experiencing a loss of biodiversity. Some organisms that could be affected by this are durian trees, flying fox bats, Asian elephants, and stem boring beetles.

Native durian trees are found in tropical rain forests in Southeast Asia. Flying fox bats land on durian flowers to drink nectar at night. They transfer pollen from one flower to the next, which helps the tree grow fruit. Asian elephants eat the fruit and spread the seeds of the fruit in their waste. Stem boring beetles lay their eggs in durian trees, and the larvae eat the wood (harming the tree).

Durian fruits have become a popular and valuable cash crop in recent years. Many people like to eat the fruit. Farmers clear land in the rain forest to plant more durian trees. This reduces biodiversity in tropical rain forests. Figure 1 shows the various organisms from a rain forest in Southeast Asia. Durian trees will grow with smaller plants underneath.

Scientists are very concerned about flying fox bats. The bats may quickly become extinct because of a loss of habitat. Bats typically feed at night and return to their homes to sleep during the day. When land is cleared, areas where they make their homes are destroyed. People also hunt flying fox bats for meat.

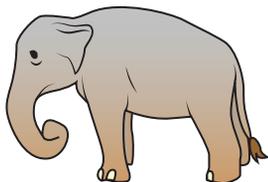
Figure 1. Organisms from Southeast Asia



Durian tree



Stem boring
beetle



Asian elephant



Flying fox bat

Stimulus 2

Table 1 describes characteristics of some organisms that live in Southeast Asia.

Table 1. Characteristics of Organisms in Southeast Asia

Organism	Habitat	Diet	Benefits to Humans
Durian tree	Tropical rain forests	--	Nutritional value, medicinal uses
Flying fox bat	Tropical rain forests	Nectar, fruit, leaves	Pollination, meat
Asian elephant	Tropical rain forests, grasslands, and scrublands	Bark, leaves, roots, fruit	Tourism
Stem boring beetle	Tropical rain forests	Fruit trees	No human use; considered a pest to trees

Item 1

According to the information and Table 1, how will the Asian elephants likely be affected as the tropical rain forest is changed to durian tree farms?

- A. Elephant populations will decline due to the presence of flying fox bats.
- B. Elephant populations will move elsewhere to look for another food source.
- C. Elephant populations will increase because they will live in the tree farms to eat the durian fruits.
- D. Elephant populations will increase because stem boring beetles help produce more durian trees.

Item 2

Based on information in Table 1, which statement describes an effect of the change of tropical rain forest land to durian tree farms?

- A. Elephant droppings will no longer contain durian tree seeds.
- B. Stem boring beetles will have fewer places in which to lay their eggs.
- C. Flying fox bats will no longer have access to the nectar of durian tree flowers.
- D. The Asian elephant population will have a smaller area of land on which to live.

Item 3

Based on the information and on Table 1, what is most likely to happen to the population of the stem boring beetles in the areas where tropical rain forest land is changed to durian tree farms?

Circle the correct answers from the lists to complete the sentence.

The population of the stem boring beetle will

increase
decrease

 because there

will be

an increase
a decrease

 in the area for them to lay eggs.

Rubric	
Score	Description
1	The population of the stem boring beetle will increase because there will be an increase in the area for them to lay eggs.
0	The response is incorrect or irrelevant.

Item 4

The scientists consider different information as they develop a solution that will support farmers and increase biodiversity. Choose which information statements are helpful and which information statements are not helpful for the scientists' solution.

Write each statement in the correct box. All statements will be used.

A. Amount of durian fruit needed by farmers

B. Habitat requirements of flying fox bats

C. Speed at which land can be cleared

D. Cost of seeds used to grow durian trees

Helpful Information

Not Helpful Information

Rubric	
Score	Description
1	Helpful Information: <ul style="list-style-type: none">• Amount of durian fruit needed by farmers• Habitat requirements of flying fox bats Not Helpful Information: <ul style="list-style-type: none">• Speed at which land can be cleared• Cost of seeds used to grow durian trees
0	The response is incorrect or irrelevant.

Item 5

The optimal temperature range for durian flowers to bloom is 68°F–86°F. At lower temperatures, the flowers begin to fall from the trees before the bats can drink their nectar. Predict what may happen if temperatures stay at 59°F for a long period of time.

Circle the correct answers from the lists to complete the sentence.

Because of cold temperatures, the availability of fruit may

decrease
increase

,

which may lead to a decrease in

flying fox bats
stem boring beetles

.

Rubric	
Score	Description
2	Because of cold temperatures, the availability of fruit may decrease , which may lead to a decrease in flying fox bats .
0	The response is incorrect or irrelevant.

Item 6

As land is cleared to grow durian trees, the amount of shade from the sun decreases. Some plants that require shade cannot survive, and biodiversity is reduced. Scientists consider planting another plant species to increase biodiversity. Plant Species X and Plant Species Y grow in the rain forest. Table 2 gives some requirements for these two plants.

Table 2. Requirements of Two Plant Species

Plant Species	Requirements			Height Relative to Durian Trees
	Shade	Temperature	Water	
X	Must have shade most of the day	Needs cool temperatures	Grows best with wet conditions	Taller
Y	Can grow in both shade and sunlight	Tolerates warm temperatures	Grows in both wet and dry conditions	Shorter

Use the information in Table 2 to construct an argument about whether Plant Species X or Plant Species Y will survive better as land is cleared to grow durian trees.

- State which of the two plant species will survive better as the land is cleared to grow durian trees.
- Explain how the shade and water requirements of the species support your argument.
- Explain how the temperature requirements of the species support your argument.

Analyze the information carefully. Then write your response in the space provided. Support your answer with details.

B <i>I</i> <u>U</u>     ABC 

Scoring Rubric	
Score	Description
3	The student answers all 3 parts correctly.
2	The student answers any 2 parts correctly.
1	The student answers any 1 part correctly.

0	The response is blank, incorrect, or irrelevant.
	<ul style="list-style-type: none">• Plant Y• As the rain forest is cleared, plants on the ground will have less shade. As more sunlight hits the ground, temperatures will go up, and the soil will dry out somewhat. Plant Y is tolerant of less shade and drier conditions. Because Plant Y is shorter than durian trees, it may receive partial shade on the durian tree farm. Plant X is taller than durian trees and would not receive any shade on a durian tree farm.• Plant Y tolerates warm temperatures. The removal of the upper layers of leaves in the rain forest will result in warmer temperatures.