2025

AP® Biology

Sample Student Responses and Scoring Commentary

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Free-Response Question 3

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Question 3: Scientific Investigation — 4 points

Buffelgrass, an invasive grass species in southwestern desert ecosystems, is threatening the saguaro cactus, a keystone species in these ecosystems. Buffelgrass is drought-tolerant and can survive wildfires. However, the dry buffelgrass also acts as fuel for wildfires, causing the fires to be more severe. Older saguaro cacti can survive wildfires; however, many of the young cacti cannot.

Scientists conducted an experiment to determine whether they could control the abundance of the buffelgrass population. The scientists identified several native grass species that, when grown with buffelgrass, might reduce the abundance of buffelgrass. They grew buffelgrass in the presence of several different native grass species in greenhouses, in either nondrought (watered every 3 days) or drought (watered every 9 days) conditions. After twelve weeks, they measured the height and dry weight of the buffelgrass in each treatment group.

A	**Describe** the effect that removing a keystone species will have on an ecosystem. Examples of acceptable responses may include the following: • (Removal of a keystone species) reduces biodiversity/diversity/resilience (of the ecosystem). • (Removal of a keystone species) will cause the ecosystem to collapse.	**1 point**
B	**Identify** a control group the scientists should include in their experiment. Examples of acceptable responses may include the following: • (A treatment group with) only buffelgrass planted • (A treatment group with) no native grass species	**1 point**
C	**State** the null hypothesis of the experiment in which buffelgrass is grown in the presence of native grass species. Examples of acceptable responses may include the following: • There will be no difference in/effect on the abundance/dry weight/height/size of buffelgrass (when grown alone as compared with) when grown with native plants. • There will be no difference in/effect on the abundance/dry weight/height/size of buffelgrass grown in drought and nondrought conditions.	**1 point**
D	Scientists have found that the population growth rates of native grasses are much slower than the population growth rate of buffelgrass following a wildfire. The scientists claim that wildfires will therefore increase the abundance of buffelgrass plants in the ecosystem. Based on the information given, **justify** the scientists' claim. Examples of acceptable responses may include the following: • (With fewer native plant species after a wildfire) buffelgrass will have less competition/no competition (for resources). • (With fewer native plant species after a wildfire) buffelgrass will have more resources (for growth, development, and reproduction).	**1 point**

Question 3

Write your response to **QUESTION 3** on this page. Do not skip lines.

a) Removing a keystone species would lead to a severe decrease in biodiversity and resilience in the ecosystem and could cause it to collapse.
b) buffel grass grown near no native grasses
c) The presence of native grass species will have no effect on the height and dry weight of the buffelgrass
d) This is true because buffelgrass will have no competition as it grows exponentially after a fire while the native species are slower to come back.

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Question 3

Write your response to **QUESTION 3** on this page. Do not skip lines.

A Removing a keystone species will reduce biodiversity and damage trophic levels

B A control that should be included is only buffelgrass grown in a greenhouse exposed to drought conditions or nondrought

C Native grass, when grown with buffelgrass, will not affect buffelgrass abundance

D Given that buffelgrass can survive wildfires and have faster growth rates. Following wildfires a wildfire would kill native plants leaving faster-growing buffelgrass to have a higher abundance relative to the plants that have been killed

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0182984

Q5529/08

Question 3

Write your response to **QUESTION 3** on this page. Do not skip lines.

A) Removing keystone species will cause imbalance of trophic levels because those species control the trophic levels through preventing domination of a species by regulating them through predation (usually).

B) A control group the scientist should include is simply a wildtype buffelgrass that is grown without the native species in both conditions (nondrought & drought)

C) The abundance of buffelgrass is reduced when grown with several native grass species.

D) Since native grass species reduce the abundance of buffelgrass, when grown together, if the native species are grown not at the same time as the buffelgrass, then the grass will continue to grow since the native species are not there for competition.

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Use a pencil or pen with black or dark blue ink. Do NOT write your name. Do NOT write outside the box.

0164911

Q5526/08

Question 3

Note: Student samples are quoted verbatim and may contain spelling and grammatical errors.

Overview

NEW for 2025: The question overviews can be found in the *Chief Reader Report on Student Responses* on AP Central.

Sample: 3A
Score: 4

The response earned 1 point in part A for describing the effect of removing the keystone species on the ecosystem as a "severe decrease in biodiversity and resilience" that "could cause it to collapse." The response earned 1 point in part B for identifying the control group as growing only buffelgrass. The response earned 1 point in part C for stating a null hypothesis as "presence of native grass species will have no effect on the height and dry weight of the buffelgrass." The response earned 1 point in part D for justifying the claim by stating "buffelgrass will have no competition."

Sample: 3B
Score: 3

The response earned 1 point in part A for describing the effect of removing the keystone species on the ecosystem as "will reduce biodiversity." The response earned 1 point in part B for identifying the control group as growing only buffelgrass. The response earned 1 point in part C for stating a null hypothesis as "native grass, when grown with buffelgrass, will not affect buffelgrass abundance." The response did not earn a point in part D for justifying the claim because there was no mention of reduced competition or more resources for buffelgrass after a wildfire.

Sample: 3C
Score: 2

The response did not earn a point in part A for describing the effect of removing the keystone species on the ecosystem because there is no mention of biodiversity reduction or ecosystem collapse; "imbalance of trophic levels" does not sufficiently describe the effect on an ecosystem. The response earned 1 point in part B for identifying the control group as "buffelgrass that is grown without the native species in both conditions." The response did not earn a point in part C for stating a null hypothesis because it does not indicate there is no effect on the abundance of buffelgrass, but instead the response states "the abundance of buffelgrass is reduced when grown with several native grass species." The response earned 1 point in part D for justifying the claim by stating "the grass will continue to grow since the native species are not there for competition."