2025

AP® Environmental Science

Sample Student Responses and Scoring Commentary Set 2

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Free-Response Question 1

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Question 1: Design an Investigation — 10 points

A — **Point 01**

Based on the data in the graph, **identify** the number of Common Tern breeding pairs in 1995.

Acceptable identification point:

- 1400

B — **Point 02**

Based on the data in the graph, **describe** the trend in the number of Common Tern breeding pairs from 1995 to 2008.

Examples of acceptable responses may include the following:

- The number of breeding pairs varies but shows an overall decrease.
- The number of breeding pairs decreases.

C — **Point 03**

A group of students hypothesized that sea level rise will lead to an increase in Common Tern populations. **Describe** one reason the data in the graph refute this hypothesis.

Examples of acceptable responses may include the following:

- The data suggest that a rise in sea level will decrease the number of breeding pairs.
- As sea level rises, fewer breeding pairs will likely lead to smaller populations.

D — **Point 04**

Explain how climate change can lead to sea level rise.

Examples of acceptable responses may include the following:

- Increasing global temperatures results in melting glaciers/land-based ice sheets.
- Increasing global temperatures causes ocean water expansion.

E — **Point 05**

(i) Identify a hypothesis that researchers are likely investigating in the wading bird study.

Examples of acceptable responses may include the following:

- If sea level rises, wading bird diversity/species richness will decrease.
- If sea level rises, wading bird diversity/species richness will increase.
- Sea level rise will/will not affect wading bird diversity/species richness.
- Wading bird diversity/species richness is correlated with sea level rise.

Point 06

(ii) Identify the dependent variable in this study.

Examples of acceptable responses may include the following:

- Number of wading bird species
- Species richness of wading birds

F	If the researchers repeated their study, **explain** how this environmental change could affect the results of the study. Examples of acceptable responses may include the following: • There would be a decrease in wading birds because PCBs tend to magnify/concentrate in higher trophic levels. • There would be a decrease in wading birds because PCBs can bioaccumulate (in fatty tissue). • There would be a decrease in wading birds because PCBs are toxic/kill birds/make birds sick when ingested. • There would be a decrease in wading birds because of eggshell thinning/developmental deformities/reproductive problems caused by PCBs.	**Point 07**
G	**Describe** a regulating ecosystem service that can be provided by wetlands. Examples of acceptable responses may include the following: • (Wetlands) filter/purify/improve water (quality). • (Wetlands) provide flood regulation/erosion control. • (Wetlands) store/sequester carbon.	**Point 08**
H	**Explain** how increased sediment might lead to a change in the size of the wading bird populations. Examples of acceptable responses may include the following: • (Increased sediment) can reduce the ability of wading birds to see prey/food/fish. • (Increased sediment) can reduce/increase the ability of wading birds to hunt. • (Increased sediment) negatively impacts organisms in lower trophic levels, reducing food/energy for the wading birds. • Reduced light infiltration can decrease the (number of) primary producers, resulting in less energy for higher trophic levels.	**Point 09**

I	**Describe** an environmental problem, other than an increase in sediment, that can occur in wetlands that is associated with increased urbanization and development. Examples of acceptable responses may include the following: • Construction projects can reduce/fragment wetland habitats. • Runoff of fertilizers/wastewater effluent can lead to eutrophication, (decreasing DO and killing fish). • Runoff of litter can kill animals when ingested/tangled. • More impervious structures/roads/buildings/sidewalks/parking lots can lead to flooding. • Runoff of heavy metals/pesticides can kill/weaken organisms when absorbed/ingested. • Noise/light pollution can disrupt hunting/migrating/behavior. • Runoff of oil can block light, preventing photosynthesis. • Increased water use can decrease the amount of groundwater/cause wetlands to dry up.	**Point 10**

----Response A----
The number of Common Tern breeding pairs in 1995 is 1,400.
----Response B----
The trend in the number of Common Tern breeding pairs from 1995 to 2008 was an overall decrease. While some years had a slight increase in pairs, the pairs ultimately deacreased over this period of time.
----Response C----
One way that the data in the graph refutes this hypothesis is that as the sea levels rose, the number of paairs decreased. The year 2001 had the highest sea level rise but the lowest breeding pairs.
----Response D----
Climate change can lead to sea level rise because increased temperature in the atmosphere leads to the melting of land ice. When land ice melts, it runs into the ocean. With the addition of this water, the sea level rises.
----Response E----
i. A hypothesis that researchers are likely investigating in the wading bird study is as the sea level increases, the number of wading bird species in the coastal areas will increase.
ii. The dependent variable in this study is the number of wading bird species.
----Response F----
The environmental change of an increase in concentration of PCBs running off into the water could affect the results of the study by decreasing the amount of wading bird species present. PCBs are persistent organic pollutants, meaning that they accumulate in the fat of organisms and cannot be excreted. If there is an increase in PCBs, they will accumulate in the fat of the birds making it difficult for the birds to survive and will decrease their populations.
----Response G----
A regulating ecosystem service that can be provided by wetlands is flood control. Wetlands help to absorb excess water and prevent it from flooding urban areas nearby.
----Response H----
Increased sediment might lead to a change in the size of the wading bird populations by increasing the turbidity of the water. When a body of water has high turbidity, it becomes difficult to see through the water. This means that the birds will not be able to locate their prey, which will decrease their survival rates and populations.
----Response I----
An environmental problem that can occur in wetlands that is associated with increased urbanization and development is habitat destruction. If more homes are being built near a wetland, areas around the wetland will be cleared out for space, causing a decrease in vegetation that provides homes for many species.

----Response A----
1,400
----Response B----
From 1995 to 2008, there is a decline in the number of breeding pairs.
----Response C----
The graph displays a rise in sea level from 1989 to 2008. Meanwhile, the number of breeding pairs decreases.
----Response D----
Increasing temperatures due to climate change can melt sea ice. The melting ice raises the sea level.
----Response E----
i.
An increase in sea level will affect the number of wading birds.
ii.
The number of wading birds.
----Response F----
Locations A and B could have reduced numbers of wading bird species in the new study. The PCBs could bioaccumulate within the birds and kill them, leading to a decline in their populations.
----Response G----
Wetlands regulate the amount of carbon in the atmosphere by taking in the carbon and acting as a carbon sink.
----Response H----
Increased sediment could increase the turbidity of the water, making it harder for the wading bird species to locate prey. This could result in a decline in the wading bird populations since it is harder for them to find food.
----Response I----
Increased urbanization can result in increased runoff of chemicals from the urban area into wetlands, polluting the water.

----Response A----
The common tern breading pairs is 1,338 because acording to the graph it shows the number of breeeding pairs is one of the highest pairs compared to the others. This also shows that their has been an increase in breeding pairs.
----Response B----
Acording to the data that is shown, it tells us that in 1995 their was a big increase in breeding pairs, then years passed and their has been a slow decrease until 2001. Then after 2001, it increased a little until 2004, but after that year sea levels increased and the number of breeding pairs decreased.
----Response C----
According to the collected data, the sea level has been increasing since 1990. With the sea levels rising , this can lead to an even more decrease in the number of breeding pairs.
----Response D----
Climate change affects the sea level rising because with the weather temperatures increasing in the artic, it causes huge glacers of ice to melt and cause our oceans to rise year after year. The water rising is showing in our data that its causing the Number of breeding pairs to decrease because of the increase of our ocean waters.
----Response E----
i - The hypothosis in this investigation is showing that the more increase of our oceans water, the more wading birds their are going to be.
ii - The dependant variable in this study is how many wading birds their are in each of the different beaches.
----Response F----
This affects their enviorment because this pollution can cause many types of species to die from these chemicals and especially the wading birds population and food source at the same time.
----Response G----
One regulating ecosystem that can be provided is to find an area that is away from any kind of harm like cities because if we keep these species where they could be in danger or an accident that can occur in the future. This can be very dangerous for their species and can cause a major reduction. The best place for them could be in a national park or a sanctuary.
----Response H----
With the increase of sediment in the wetlands, this can cause many sources of food to decrease for them and cause the population to shrink. This can also cause lots of water contamination and lots of trash from the urban areas.
----Response I----
One enviormental problem is the big amount of trash pollution because this can cause a lot of harm to many different species in that area. This can also cause the decline of the population of the breeding pairs and different types of birds.

Question 1

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: 1A
Score: 10

One point was earned in part A for identifying "1,400" as the number of Common Tern breeding pairs in 1995. One point was earned in part B for describing "The trend in the number of Common Tern breeding pairs from 1995 to 2008 was an overall decrease." One point was earned in part C for describing "the data in the graph refutes this hypothesis … as the sea levels rose, the number of paairs decreased." One point was earned in part D for explaining "Climate change can lead to sea level rise because increased temperature in the atmosphere leads to the melting of land ice." One point was earned in part E (i) for identifying "A hypothesis that researchers are likely investigating in the wading bird study is as the sea level increases, the number of wading bird species in the coastal areas will increase." One point was earned in part E (ii) for identifying the dependent variable as "the number of wading bird species." One point was earned in part F for explaining "The environmental change of an increase in concentration of PCBs … will accumulate in the fat of the birds making it difficult for the birds to survive and will decrease their populations" and that could affect the results of the study. One point was earned in part G for describing "flood control" as a regulating ecosystem service. One point was earned in part H for explaining "Increased sediment might lead to a change in the size of the wading bird populations by increasing the turbidity of the water … it becomes difficult to see through the water … the birds will not be able to locate their prey." One point was earned in part I for describing an environmental problem as "If more homes are being built near a wetland … causing a decrease in vegetation that provides homes for many species."

Sample: 1B
Score: 6

One point was earned in part A for identifying "1,400" as the number of Common Tern breeding pairs in 1995. One point was earned in part B for describing the trend "From 1995 to 2008, there is a decline in the number of breeding pairs." One point was earned in part C for describing "The graph displays a rise in sea level from 1989 to 2008. Meanwhile, the number of breeding pairs decreases." No point was earned in part D. No point was earned in part E (i). No point was earned in part E (ii). One point was earned in part F for explaining "PCBs could bioaccumulate within the birds and kill them, leading to a decline in their populations." One point was earned in part G for describing a regulating ecosystem service as "Wetlands regulate the amount of carbon in the atmosphere by taking in the carbon and acting as a carbon sink." One point was earned in part H for explaining "Increased sediment could increase the turbidity of the water, making it harder for the wading bird species to locate prey," leading to a change in the size of the wading bird population. No point was earned in part I.

Question 1 (continued)

Sample: 1C
Score: 3

No point was earned in part A. One point was earned in part B for describing the trend as "after 2001, it increased a little until 2004, but after that year sea levels increased and the number of breeding pairs decreased." One point was earned in part C for describing "According to the collected data, the sea level has been increasing since 1990. With the sea levels rising, this can lead to an even more decrease in the number of breeding pairs." One point was earned in part D for explaining "temperatures increasing in the artic, it causes huge glacers of ice to melt" as how climate change can lead to sea level rise. No point was earned in part E (i). No point was earned in part E (ii). No point was earned in part F. No point was earned in part G. No point was earned in part H. No point was earned in part I.