2025

AP® Environmental Science

Scoring Guidelines
Set 2

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**

Question 2: Analyze an Environmental Problem and Propose a Solution — 10 points

A	Based on the information in Figure 1, **identify** the type of plate boundary that runs beneath Serengeti National Park. Acceptable identification point: • Divergent (boundary)	**Point 01**
B	Based on the information provided, **identify** the dominant biome within the Serengeti. Examples of acceptable responses may include the following: • Savanna • Tropical grassland	**Point 02**
C	Wildebeest give birth to their young when new grasses are growing. Based on the information in Figure 2, **identify** the location in the Serengeti where wildebeest are most likely to give birth. Examples of acceptable responses may include the following: • Grumeti Game Reserve • The west/northwestern side/edge (of Serengeti National Park)	**Point 03**
D	**Explain** why resource partitioning allows for the coexistence of the wildebeest and the gazelle in the Serengeti. Examples of acceptable responses may include the following: • (Resource partitioning) reduces the (negative) impact of competition for (limited) resources. • (Resource partitioning) allows species to use (limited) resources in different ways/places/at different times.	**Point 04**
E	**Describe** one way the proposed highway shown in Figure 2 could negatively affect the wildebeest population in the Serengeti. Examples of acceptable responses may include the following: • Building the highway would fragment/destroy habitat/food/resources. • The highway could prevent/reduce/disturb migration. • Wildebeest could be hit/killed by vehicles. • Noise pollution could cause stress/change migratory routes.	**Point 05**

F **Propose** a solution to the negative effect created by the planned highway described in part E. **Point 06**

Examples of acceptable responses may include the following:

Problem in part E	Realistic Potential Solution
Building the highway would fragment/destroy habitat/food/resources.	• Construct a habitat corridor over/under the highway • Construct the highway over/above the habitat • Relocate the highway north/outside of the migratory path • Expand the national park/create additional protected habitat
The highway could prevent/ reduce/disturb migration. Wildebeest could be hit/killed by vehicles.	• Relocate the highway north/outside of the migratory path • Construct a habitat corridor over/under the highway
Noise pollution could cause stress/change migratory routes.	• Install a sound barrier to mitigate noise pollution • Relocate the highway north/outside of the migratory path

G **Describe** a characteristic of an invasive species, such as the spotted knapweed, that allows them to outcompete native species. **Point 07**

Examples of acceptable responses may include the following:

- They have many offspring/reproduce quickly/mature early/invest minimal energy in each offspring (tend to be r-selected).
- They can feed on/use many different types of resources.
- They can survive in conditions outside their normal habitat/have a wide range of tolerance (tend to be generalists).

H **Justify** the use of crop rotation as an environmental solution by providing an additional advantage, other than controlling pest populations. **Point 08**

Examples of acceptable responses may include the following:

- Improved soil fertility/soil structure/soil quality
- Increased nutrient cycling/reduction in fertilizer use
- Reduced soil erosion
- Increased food security/crop yield
- Increased biological activity (in the soil)

I	**Describe** an environmental problem associated with controlling pest populations with large amounts of pesticide. Examples of acceptable responses may include the following: • Pesticides can harm/kill nontarget species. • Pests can develop resistance to the pesticide.	**Point 09**
J	**Propose** a solution to controlling pests, other than pesticides or crop rotation. Examples of acceptable responses may include the following: • Use biocontrol/intercropping/natural predators • Trap insects/use mechanical controls to eliminate the pests • Use genetically modified crops that are pest resistant	**Point 10**

Question 3: Analyze an Environmental Problem and Propose a Solution (Doing Calculations) — 10 points

A — **Point 01**

Identify a type of surface mining the company could use to access the coal.

Examples of acceptable responses may include the following:

- Strip mining
- Open pit
- Mountain top removal

B — **Point 02**

Describe an environmental problem associated with surface mining.

Examples of acceptable responses may include the following:

- Removal of vegetation/soil/rock causes loss/destruction of habitat.
- (Surface mining) causes loss of habitat, which results in loss of biodiversity.
- Removal of vegetation can increase rates of erosion.
- (Surface mining) can lead to contamination of groundwater/surface water/waterways from runoff of sediments/pollutants.
- Removal of vegetation/soil/bedrock/parent material can release dust particles/methane.
- High energy/fossil fuel consumption is needed to operate equipment and leads to air pollution.

C — **Point 03**

Describe an environmental problem the town could experience as a result of the electricity generation at the coal-burning power plant.

Examples of acceptable responses may include the following:

- Release of air pollutants/toxic metals/particulates/NO_X/SO_X could lower air quality/result in respiratory problems.
- Release of air pollutants/sulfur dioxides/nitrogen oxides could cause acid rain.
- Greenhouse gas emissions/carbon dioxide/methane/water vapor could lead to altered precipitation/climate/weather/temperature patterns.

D — **Point 04**

Propose a realistic solution the local government could enact that would reduce the negative environmental consequences of using coal to generate electricity.

Examples of acceptable responses may include the following:

- Require/incentivize the plant to install scrubbers/electrostatic precipitators.
- Incentivize the use of alternative energy sources/energy efficient appliances.
- Incentivize green building design/conservation landscaping/planting trees as carbon sinks.

E	**Calculate** how many pounds of coal would need to be burned to generate enough electricity to power a town with 11,000 houses for a year. **Show** your work.	**Point 05**
	One point for the correct setup to calculate how many pounds of coal would be needed. Examples of acceptable responses may include the following: • (11,000 houses x 10,640 kWh per house) / 0.88 kWh per lb of coal • (11,000 x 10,640) / 0.88	
	One point for the correct calculation of how many pounds of coal would be needed. Examples of acceptable responses may include the following: • 133,000,000 • 1.33 x 10^8	**Point 06**
F	**Calculate** the percent change in bird species per hectare since the power plant was installed. **Show** your work.	**Point 07**
	One point for the correct setup to calculate the percent change in bird species per hectare. Examples of acceptable responses may include the following: • (6.0 species / ha – 7.5 species / ha) / 7.5 species / ha x 100 • (6.0 – 7.5) / 7.5 x 100	
	One point for the correct calculation of the percent change in bird species per hectare. Examples of acceptable responses may include the following: • -20% • 20% decrease • -20	**Point 08**
G	Assuming that the growth rate remains constant, **calculate** the year in which the population will reach 52,500. **Show** your work.	**Point 09**
	One point for the correct setup to calculate the year the population will reach 52,500. Acceptable setup point: • (70 / 5.38) + 2022	
	One point for the correct calculation of the year the population will reach 52,500. Acceptable calculation point: • 2035	**Point 10**