

2026



AP[®] Environmental Science

Scoring Guidelines

Question 1: Design an Investigation**10 points**

A Based on the information in the diagram, **identify** the elevation zone that has the highest species richness for the current distribution. **Point 01**

Acceptable identification:

- Low elevations

B **Describe** a climate condition at high elevations that is different than it is at low elevations. **Point 02**

Examples of acceptable responses may include the following:

- Temperature decreases with elevation.
- High elevations/It/They may be wetter/have more precipitation/more clouds.
- High elevations/It/They may be drier/have decreased humidity/decreased water vapor.
- There will be more wind (at higher elevations).
- There will be lower atmospheric/air pressure.

C A predator at low elevations currently feeds on Species C and D. Based on the information in the diagram, **describe** what could happen to the predator species in the future in response to the predicted changes in the prey community. **Point 03**

Examples of acceptable responses may include the following:

- The predator (population)/It would decrease/could go extinct.
- It could adapt/begin to eat new food sources.
- It could move/relocate to a higher elevation.

D Species C is considered a generalist, while Species E is considered a specialist. **Explain** why Species C and E are predicted to respond differently to climate change. **Point 04**

Examples of acceptable responses may include the following:

- Species E is more likely to become extinct because it has a narrower range of tolerance than Species C.
- Temperatures may no longer be cold enough at high elevations for Species E to survive because it has a narrow range of tolerance/prefers colder temperatures.
- Species E might be outcompeted (by Species C/by other species) as resources become scarce because Species C has a broader diet/is a generalist.
- Loss of habitat will drive Species E to extinction, while Species C can survive in changing habitats.

E	Based on the information in the diagram, explain why the bird community at low elevations in the future would be less likely to recover from natural disruptions than the current low-elevation bird community. Examples of acceptable responses may include the following: • Low elevations are predicted to have fewer species and therefore will be less likely to recover from/withstand an ecological disturbance. • Communities with higher species richness have a greater chance that (at least) some species can adapt to/cope with disturbance. • A disturbance might cause a loss of a species that plays a critical role and cause a crash in the food web.	Point 05
F	Identify the independent variable in Experiment 1. Acceptable identification: • (Water/Tank) temperature	Point 06
G	Identify a likely scientific question for Experiment 1. Examples of acceptable responses may include the following: • Does temperature affect coral bleaching/the number of bleached corals? • The scientists were interested in asking if temperature has an effect on coral bleaching.	Point 07
H	In Experiment 2 the temperature of the tanks was held constant, while the amount of sediment was varied. Explain how this modification could affect the results of this experiment. Examples of acceptable responses may include the following: • There will be more bleached/dead corals in tanks with high sediment because (symbiotic/photosynthetic) algae will receive less sunlight/be unable to photosynthesize. • There will be fewer bleached/dead corals in the control tank/tank with no sediment because the algae will receive more sunlight/be able to photosynthesize. • There will be fewer living algae in the tank with high sediment content because the algae will receive less sunlight/be unable to photosynthesize. • There will be more algae in the tank with no sediment because the algae will be able to photosynthesize/receive the most sunlight.	Point 08

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- I** Changes in climate also affect Arctic ecosystems. One impact of climate change is the loss of ice and snow in polar regions. **Describe** a positive feedback loop that results from the loss of ice and snow in polar regions. **Point 09**

Examples of acceptable responses may include the following:

- (As ice/snow melts) less solar energy/light is reflected back into space, which leads to more warming.
- Albedo decreases, which leads to more warming.
- More solar energy/light is absorbed by Earth's surface, which leads to more warming.
- Trapped greenhouse gases are/methane is released as the tundra thaws, which leads to more warming.

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- J** **Describe** one problem that Arctic species, such as the polar bear or ringed seals, face because of warming in polar regions. **Point 10**

Examples of acceptable responses may include the following:

- (Warming/It causes) melting/loss of ice or snow can cause loss of habitat/breeding grounds/mating grounds/biodiversity/access to food resources.
 - Melting/Loss of ice or snow can force polar bears/ringed seals/arctic predators to swim farther looking for food.
 - Melting/Loss of ice or snow can cause habitat fragmentation, leading to isolated populations/loss of (genetic/ecosystem) biodiversity.
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Question 2: Analyze an Environmental Problem and Propose a Solution**10 points**

A **Identify** one renewable energy source that is used to generate electricity. **Point 01**

Examples of acceptable responses may include the following:

- Solar
- Wind
- Geothermal
- Biomass/Biogas
- Hydroelectricity/Tidal/Wave/Moving or flowing water

B Based on the data in the graph, **identify** the energy source that had the highest consumption in 2010. **Point 02**

Acceptable identification:

- Petroleum

C Based on the data in the graph, **describe** the pattern in the energy consumption from coal in the United States from 1960 to 2020. **Point 03**

Examples of acceptable responses may include the following:

- The use of coal in the United States/It increased from 1960 to about 2000, (then leveled off,) and then decreased from about 2008 to 2020.
- It increased until about 2008 and then decreased until 2020.

D Based on the data in the graph and your knowledge of energy consumption, **explain** one likely reason why the use of coal for energy changed between 2010 and 2020. **Point 04**

Examples of acceptable responses may include the following:

- The use of coal/It decreased because energy needs were met by natural gas/renewables, which increased at the same time.
- It decreased because coal production became more expensive compared to natural gas/other sources of energy.
- It became more strictly regulated than natural gas/nuclear/renewables, leading to the closure of coal plants.
- It decreased because of increased awareness of pollution/environmental/health costs of coal use.

E **Explain** how fossil fuels are used to generate electricity. **Point 05**

Examples of acceptable responses may include the following:

- Heat from combustion/burning of fossil fuels (boils water, which) generates steam, which spins/turns a turbine/rotates a generator.
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- F** In addition to fossil fuels, nuclear power can be used to generate electricity. **Identify** one **Point 06**
negative impact associated with nuclear energy.

Examples of acceptable responses may include the following:

- Thermal pollution
- Nuclear waste
- Impacts of mining
- Construction cost
- Loss of habitat (due to construction)
- Nuclear accidents

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- G** Fossil fuel combustion leads to ocean warming. **Describe** one environmental problem **Point 07**
other than coral bleaching that is associated with warming oceans.

Examples of acceptable responses may include the following:

- Marine organisms may be pushed beyond their limit of ecological tolerance.
- Melting sea ice reduces habitat for arctic animals/organisms.
- Terrestrial habitat is lost when warm water expands/sea level rises.
- Ocean warming/It may result in decreased dissolved oxygen levels.
- Ocean warming/It disrupts ocean currents/upwelling.
- Thermal expansion leads to rising sea levels.
- Ocean warming/It leads to stronger storms/hurricanes.
- Warmer temperatures can affect fish development leading to disproportionate sex ratios (in the population).
- If sea level rises, deeper communities may no longer be in the photic zone.

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- H** **Explain** how an increase in nutrients, such as nitrates and phosphates, can negatively **Point 08**
affect an aquatic ecosystem.

Examples of acceptable responses may include the following:

- Algal blooms can lead to low oxygen levels/hypoxic conditions when algae die/are decomposed (and this leads to fish kills).
 - Algal blooms from increased nutrients can block sunlight, reducing photosynthetic activity (in aquatic plants) and killing (aquatic) plants.
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- I (i) Propose** a realistic solution that would reduce nutrient pollution of waterways, while still allowing cultivation of crops. **Point 09**

Examples of acceptable responses may include the following:

- Use (soil/water conservation techniques such as) terracing/contour plowing/drip irrigation/intercropping/cover crops to reduce/prevent runoff/erosion.
- Use organic fertilizers/compost/legume crops/crop rotation to help retain nutrients in the soil.
- Leave/Add a buffer zone (of trees/vegetation) to prevent runoff.
- Use GMOs that need less fertilizer to reduce the amount of fertilizer entering waterways.

- I (ii) Justify** the solution proposed in part I (i) by explaining one potential advantage other than reducing nutrient runoff. **Point 10**

Examples of acceptable responses may include the following:

Solution proposed in part I (i)	Justification of solution
Use (soil/water conservation techniques such as) terracing/contour plowing/drip irrigation/intercropping/cover crops to reduce/prevent runoff/erosion.	• Reduces erosion, which can improve soil fertility/crop production/yield • Reduces water loss, which can improve crop production/yield • Reduces water loss/fertilizer use, which can reduce irrigation/fertilizer costs/impacts • Reduces sediment pollution, which improves water quality • Reduces/Prevents salt buildup (in soils), which extends the life of the soil
Use organic fertilizers/compost/legume crops/crop rotation to help retain nutrients in the soil.	• Conserves/Restores soil, which improves crop production/yield • Conserves biodiversity by providing better habitat for soil organisms • Compost diverts municipal solid waste from landfills
Leave/Add a buffer zone (of trees/vegetation) to prevent runoff.	• Supports biodiversity by restoring habitat • Reduces fertilizer costs by conserving soil • Protects waterways from erosion/warming • Creates a carbon sink/removes carbon dioxide from the atmosphere
Use GMOs that need less fertilizer to reduce the amount of fertilizer entering waterways.	• Increases crop yield, which increases food availability/reduces pressure to clear habitats for agriculture • Decreases cost for water/pesticides/fertilizer due to more tolerant/resistant/resilient crops

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

A **Identify** one environmental consequence that could result from having a smaller population of ocelots. **Point 01**

Examples of acceptable responses may include the following:

- Low genetic diversity/genetic bottleneck
- Extinction (local)
- Growth of lizards/mice/prey populations (due to lack of predators)
- Disturbed food web

B **Calculate** the percent change in the number of Texas counties where ocelots have been found historically as compared to today. **Show** your work. **Point 02**

One point for the correct setup to calculate the percent change in the number of Texas counties where ocelots have been found.

Examples of acceptable responses may include the following:

- $(4 \text{ counties} - 25 \text{ counties}) / 25 \text{ counties} \times 100$
- $(4 - 25) / 25 \times 100$
- $(4 / 25 \times 100) - 100$

One point for the correct calculation of the percent change in the number of Texas counties where ocelots have been found. **Point 03**

Examples of acceptable responses may include the following:

- 84% decrease
- -84%
- -84
- 84 decrease

C Researchers expect the ocelot population to grow at a constant rate of 2.8% per year. **Calculate** the number of years it will take for the ocelot population to double based on a constant rate of growth. **Show** your work. **Point 04**

One point for the correct setup to calculate the number of years it will take for the ocelot population to double.

Examples of acceptable responses may include the following:

- $70 / 2.8$
- $\ln(2) / 0.028$

One point for the correct calculation of the number of years it will take for the ocelot population to double. **Point 05**

Acceptable calculation:

- 25 (years)

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- D** Pocket mice eat plants in the shrubland, while snakes are carnivores. **Explain** why the amount of primary production energy available to ocelots would change if ocelots ate only carnivores such as snakes and not pocket mice. **Point 06**

Examples of acceptable responses may include the following:

- Because only 10% of energy is passed on to higher trophic levels, carnivores/snakes will have less primary production energy than mice.
- (The amount of primary production) energy/It decreases at each trophic level, so carnivores/snakes will have less primary production energy than mice.

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- E** Ocelots need 720 grams of food per day. Pocket mice weigh an average of 43 grams each. If the ocelot diet consists of 46% pocket mice by weight, **calculate** how many pocket mice an ocelot would need to consume in one day, assuming each mouse weighs the average amount. **Show** your work. **Point 07**

One point for the correct setup to calculate how many pocket mice an ocelot would need to consume in one day.

Examples of acceptable responses may include the following:

- $0.46 \times 720 \text{ g/day} \times 1 \text{ pocket mouse}/43 \text{ g}$
- $720/43 \times 0.46$
- $720/43 \times 46\%$

One point for the correct calculation of how many pocket mice an ocelot would need to consume in one day. **Point 08**

Examples of acceptable responses may include the following:

- 7.7 (pocket mice)
- 8 (pocket mice)

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- F (i)** **Propose** a realistic solution to reduce the number of ocelots killed by vehicles. **Point 09**

Examples of acceptable responses may include the following:

- Create/Build wildlife over/under passes or habitat corridors.
 - Create or restore protected/preserved areas away from vehicle traffic (and large enough to support ocelot territories).
 - Install warning signs on roadsides in areas of ocelot habitat/Use speed limit reductions/enforcement.
 - Install wildlife barriers/fences/Route new roads/construction around ocelot habitat.
 - Provide public transportation to reduce (the number of) vehicles on roads.
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F (ii) **Justify** the solution proposed in part F (i) by explaining an additional advantage, other than reducing the number of ocelots killed by vehicles.

Point 10

Examples of acceptable responses may include the following:

Solution proposed in part F (i)	Justification of solution
Create/Build wildlife over/underpasses, habitat corridors.	- Increases available food sources/access to food for ocelots/other species to maintain/increase populations - Provides (access to) habitat for ocelots/other species, which increases biodiversity - Increases access to mates/reproduction opportunities, which increases genetic diversity for ocelots/other species - Reduces chances of collisions with vehicles for other species, which impacts biodiversity or food webs
Create or restore protected/preserved areas away from vehicle traffic.	- Increases available food sources/access to food for ocelots/other species to maintain/increase populations - Provides habitat for ocelots/other species, which increases biodiversity - Increases access to mates/reproduction opportunities, which increases genetic diversity for ocelots/other species - Creates recreation areas for humans which can - improve quality of life/opportunities for aesthetic enjoyment - provide economic advantages such as increased tourism
Install warning signs on roadsides in areas of ocelot habitat/Use speed limit reductions/enforcement.	- Reduces chances of collisions with vehicles, which reduces harm to humans/damage to property - Reduces chances of collisions with vehicles for other species, which impacts biodiversity or food webs - Reduces speed of vehicles, which reduces emissions of air pollutants (CO₂, NO_x, SO_x)
Install wildlife barriers/fences/Route new roads/construction around ocelot habitat.	- Reduces chances of vehicle collisions with other species, which reduces harm to humans/damage to property/impacts to biodiversity/food webs - Walls reduce road sounds, reducing noise pollution impacts on species

Provide public transportation to reduce (the number of) vehicles on roads.	• Reduces chances of collisions with vehicles, which reduces harm to humans/damage to property • Reduces chances of collisions with vehicles for other species, which impacts biodiversity or food webs • Reduces amount of vehicle emissions ($\text{CO}_2/\text{NO}_x/\text{SO}_x$), which reduces climate change/acid rain/smog/respiratory issues	
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