

**International Green Warrior Olympiad (IGWO)****Sample Paper****Pattern and Marking Scheme**

| <b>Grade</b>       | <b>Topic/Section</b> | <b>No. of Questions</b> | <b>Marks per Question</b> | <b>Total Marks</b> |
|--------------------|----------------------|-------------------------|---------------------------|--------------------|
| <b>Grade 9</b>     | Green Champ          | 40                      | 3                         | 120                |
|                    | Green Challenger     | 10                      | 6                         | 60                 |
| <b>Grand Total</b> |                      | <b>50</b>               |                           | <b>180</b>         |

The total duration of the exam is 60 minutes. There's a negative marking of  $1/3^{\text{rd}}$  marks for every wrong answer.

**Syllabus**

Clean Water and Sanitation, Affordable and Clean Energy, Sustainable Cities and Communities, Responsible Consumption and Production, Climate Action, Life Below Water, Life on Land, Zero Hunger

For more details, visit <https://www.crestolympiads.com/green-olympiad-gwo>.

## Green Champ (Each Question is 3 Marks)

- Over-extraction of groundwater can lead to various negative consequences. Which of the following is NOT a potential consequence of excessive groundwater extraction?
  - Increased soil fertility
  - Land subsidence
  - Saltwater Intrusion
  - Decreased baseflows in rivers
- A community initiated a campaign to clean a polluted river. After a year, water quality improved, and fish species returned. What is the most likely reason for the return of aquatic life?
  - Increased water temperature providing a suitable habitat.
  - Natural migration of fish from other water bodies.
  - Introduction of genetically modified fish species.
  - Community clean-up efforts reducing pollution levels.
- A group of students conducted an experiment comparing the effectiveness of different water filtration methods. They used boiling, activated carbon filter, UV light purifier and ceramic water filter. Which method is most likely to remove both bacteria and chemicals from water?
  - Boiling
  - Ceramic water filter
  - UV light purifier
  - Activated carbon filter
- In an experiment, water samples were collected from two sources: a river and a lake. The samples were tested for pH, dissolved oxygen levels, and bacterial content. Which parameter is essential to determine water quality and safety for consumption?
  - pH level
  - Dissolved oxygen levels
  - Bacterial content
  - A only
  - A and B only
  - B and C only
  - A, B and C
- A city is facing water scarcity due to changing rainfall patterns caused by climate change. As an environmental scientist, you are tasked with devising a sustainable water management plan. Which of the following approaches would be the most effective in ensuring a stable water supply for the city?
  - Building more reservoirs and dams to capture rainwater during heavy rainfall.
  - Importing water from neighbouring cities to meet the immediate demand.
  - Drilling deeper wells to access groundwater, irrespective of environmental consequences.
  - Encouraging water conservation practices, implementing rainwater harvesting systems, and promoting the use of recycled water for non-potable purposes.
- A factory is discharging wastewater containing heavy metals into a nearby river. The heavy metals are contaminating the drinking water supply for a downstream community. What type of water purification technology could be used to remove the heavy metals from the wastewater before it is discharged into the river?

- a. Solar water purifier
  - b. Ultraviolet light filter
  - c. Activated carbon filter
  - d. Reverse osmosis filter
7. An off-grid cabin in a remote area needs a reliable source of electricity. The cabin owner has to choose between a diesel generator and a small solar power system. Which system would be the most cost-effective in the long run, considering environmental impact?
- a. Diesel generator
  - b. Solar power system
  - c. Both options are equally cost-effective
  - d. It depends on the local climate.
8. A homeowner is considering investing in a tidal energy system for their coastal property. What are the key factors they should consider before making this decision, and how can they maximise the system's efficiency and environmental impact?
- a. Factors to consider: Tidal patterns, environmental impact on marine life, and system maintenance.  
Maximising efficiency: Positioning the turbines in areas with strong tidal currents and conducting regular maintenance to ensure optimal performance and minimise environmental impact.
  - b. Factors to consider: Availability of sunlight and wind speed.  
Maximising efficiency: Installing solar panels alongside tidal turbines to capture energy during sunlight hours and using noise barriers to reduce sound pollution.
  - c. Factors to consider: Rainfall patterns, groundwater levels, and seismic activity.  
Maximising efficiency: Implementing rainwater harvesting systems to utilise freshwater efficiently and monitoring seismic activity to ensure the system's stability.
  - d. Factors to consider: Soil quality, slope of the land, and proximity to urban centres.  
Maximising efficiency: Utilising geothermal heat pumps to enhance soil quality and using natural landscaping techniques to promote biodiversity.
9. A city heavily relies on coal-fired power plants for electricity. Despite its economic benefits, residents are experiencing increased respiratory issues due to air pollution. Local authorities are considering a shift to renewable energy sources. Which of the following would be the most effective long-term solution to address both environmental concerns and energy needs?
- a. Building more coal-fired power plants with advanced pollution control technology.
  - b. Encouraging residents to use energy-efficient appliances.
  - c. Implementing stricter emission standards for existing coal plants.
  - d. Transitioning to a mix of solar, wind, and hydroelectric power sources.
10. A rural community plans to transition from traditional biomass stoves to cleaner, more efficient cookstoves. Considering all of the environmental factors, which statement best summarises the overall impact of adopting cleaner cookstoves?
- a. Cleaner cookstoves improve indoor air quality, reduce fuel consumption, and enhance community health and well-being.
  - b. Cleaner cookstoves have minimal impact on indoor air quality and community health.
  - c. Cleaner cookstoves are less affordable and practical compared to traditional biomass stoves.
  - d. Cleaner cookstoves have a negative impact on the environment due to increased energy consumption.

11. Rank the following energy sources from highest to lowest in terms of their carbon emissions per unit of energy produced.
- Natural gas, Coal, Biomass
  - Biomass, Natural gas, Coal
  - Coal, Biomass, Natural gas
  - Natural gas, Biomass, Coal
12. A company is considering investing in a large hydropower project that could displace several local communities. What ethical considerations should the company take into account before proceeding with the project?
- Economic benefits for the company
  - Environmental impact assessment
  - Well-being and rights of the affected communities
  - Government regulations and permits
13. In an experiment, researchers planted native tree species in two different locations: one in a preserved forest and another in an urban area with limited green spaces. What would be a potential hypothesis for this experiment?
- Native tree species grow better in urban areas due to higher pollution levels
  - Tree growth is similar in both locations due to controlled environmental conditions
  - Native tree species thrive better in preserved forests due to suitable habitats and reduced disturbances
  - Urban areas with limited green spaces promote biodiversity among native tree species
14. Imagine you are a city planner. How would you design a new urban development project to ensure the preservation of green spaces and natural habitats while meeting the housing needs of the growing population?
- By clearing all existing green spaces for housing projects
  - By constructing shopping malls and entertainment complexes in green spaces
  - By completely banning urban development to preserve natural habitats
  - By incorporating green roofs and vertical gardens in buildings to compensate for the loss of ground-level green spaces
15. You are in the market to purchase a new laptop. You have the choice between a non-certified laptop that costs \$800 and a certified eco-friendly laptop that costs \$950. The certified laptop is 30% more energy-efficient. Based on the initial cost and energy efficiency, which laptop is more financially responsible over its expected lifespan of 5 years?
- The non-certified laptop
  - The certified eco-friendly laptop
  - The decision depends on personal preference
  - Both laptops have the same total cost over 5 years.
16. In a survey, two refrigerators of different efficiency ratings are compared. Which parameter should be measured to evaluate their overall performance, efficiency, and stability?
- Energy star rating
  - Temperature fluctuation range
  - Colour and design

- a. A only
- b. A and B only
- c. B only
- d. A, B and C

**17.** Coastal City X is experiencing an increase in the frequency and intensity of hurricanes due to climate change. The city is considering building seawalls to protect its coastline. Which of the following long-term strategies, in addition to seawalls, could be implemented to mitigate the impacts of climate change on the city?

- a. Increasing deforestation in nearby areas to absorb excess water.
- b. Implementing green infrastructure such as mangrove restoration and creating natural buffers.
- c. Relocating the entire city to a safer location.
- d. Encouraging residents to use more air conditioning to adapt to rising temperatures.

**18.** Consider the following statements and choose the correct

Statement 1: The greenhouse effect is solely caused by human activities, primarily the burning of fossil fuels.

Statement 2: CH<sub>4</sub> is a greenhouse gas that is more effective at trapping heat than carbon dioxide.

- a. Statement 1 is correct but statement 2 is incorrect.
- b. Statement 1 is incorrect but statement 2 is correct.
- c. Both the statements are correct.
- d. Both the statements are incorrect.

**19.** A city government is planning to invest in public transportation to reduce carbon emissions. Based on the environmental and economic impacts of this initiative, which of the following statements is most accurate?

- a. Investing in public transportation primarily benefits the environment with minimal economic impact.
- b. Investing in public transportation has environmental and economic benefits, including reduced congestion and improved air quality.
- c. Public transportation initiatives have negligible effects on both the environment and the economy.
- d. Public transportation investments have significant economic benefits but do not impact the environment positively.

**20.** A community is experiencing increased forest fires due to prolonged droughts caused by climate change. As a disaster management expert, which of the following strategies would you recommend to reduce the impact of forest fires on the community?

- a. Clearing all trees and vegetation near residential areas to create firebreaks.
- b. Implementing controlled burns during periods of low fire risk to remove excess vegetation and prevent large-scale wildfires.
- c. Installing sprinkler systems on rooftops and encouraging residents to water their lawns frequently.
- d. Ignoring the issue as forest fires are a natural part of the ecosystem.

21. Based on the data in the table below, which city is likely to face the most severe water scarcity issues due to climate change?

| City   | Average Annual Precipitation (mm) | Population Density (people/sq. km) |
|--------|-----------------------------------|------------------------------------|
| City A | 800                               | 1500                               |
| City B | 1200                              | 2000                               |
| City C | 600                               | 3000                               |
| City D | 1000                              | 2500                               |

- a. City A  
b. City B  
c. City C  
d. City D
22. A coastal region heavily relies on seafood for its economy and nutrition. Due to climate change, fish populations are shifting to cooler waters. What practical steps can the community take to address the issue and ensure a sustainable seafood supply?
- a. Increase imports from regions where fish populations remain stable.  
b. Implement stricter fishing regulations and quotas without scientific monitoring.  
c. Collaborate with scientists to monitor shifting fish populations and adjust fishing practices accordingly.  
d. Ignore the situation and hope for the best without taking any actions.
23. In a study of marine dead zones, researchers found that an area in the Gulf of Mexico had extremely low oxygen levels. Which of the following is a likely consequence of such dead zones on marine organisms?
- a. Enhanced growth of phytoplankton  
b. Increased populations of oxygen-dependent species  
c. A decrease in ocean temperature  
d. Mass mortality of fish and other marine species
24. Climate change, characterised by rising global temperatures and changing weather patterns, profoundly influences marine ecosystems. Based on these changes, which of the following statements accurately describes the impact of climate change on marine life?
- a. Marine species migrate to colder regions, disrupting local ecosystems as they seek cooler environments due to rising sea temperatures.  
b. Marine species adapt quickly to changing temperatures, minimising any impact on their distribution and ecosystem interactions.  
c. Rising sea temperatures can force species to move to different habitats, affecting food chains, biodiversity, and the delicate balance of marine ecosystems.  
d. Most marine animals are cold-blooded so they remain unaffected by climate change, as they can adjust to any environmental changes without significant consequences on their distribution.

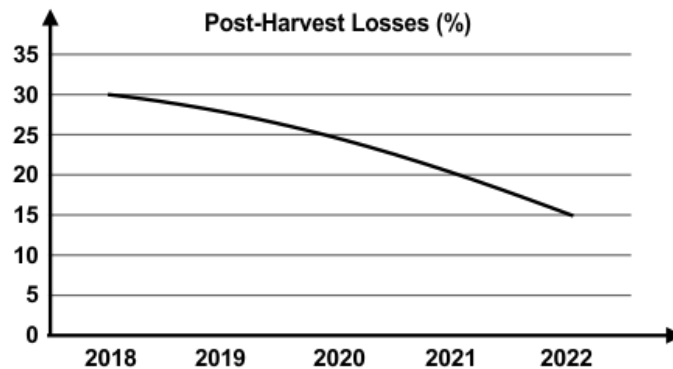
25. Consider two marine species: one with a high reproductive rate and rapid growth, and another with a low reproductive rate and slow growth. Which species is more vulnerable to overfishing and why?
- The species with a high reproductive rate, because it produces more offspring.
  - The species with low reproductive rate, because it produces fewer offspring and matures slowly.
  - Both species are equally vulnerable to overfishing.
  - Neither species is vulnerable to overfishing.
26. In an experiment studying the effectiveness of marine protected areas, researchers compared fish populations inside and outside the protected zones. What result would indicate the success of marine protected areas in promoting fish populations?
- Increased fish populations only outside the protected areas
  - Decreased fish populations inside the protected areas
  - Higher fish populations inside the protected areas compared to outside
  - Uniform fish populations inside and outside the protected areas
27. In an experiment, two plots of land were treated differently to study the impact on soil quality. Plot A received organic compost, while Plot B received chemical fertilisers. After a year, soil samples were analysed. What would be the expected observation?
- Plot A's soil has higher organic matter content and microbial activity than Plot B.
  - Plot B's soil has higher organic matter content and microbial activity than Plot A.
  - Both plots show similar soil quality due to the treatments.
  - Both plots show severe soil degradation due to external factors.
28. Researchers conducted an experiment to assess the effectiveness of different soil erosion control methods. They implemented terracing, cover cropping, and mulching on three separate plots of land. After one year, the researchers measured soil erosion rates in each plot. Which method would they likely find most effective based on sustainable erosion control?
- Terracing
  - Mulching
  - Cover cropping
  - No method, as erosion is a natural process
29. In a conservation project, a wetland ecosystem was successfully restored, leading to an increase in the population of migratory birds. What is this an example of?
- Ecological succession
  - Biodiversity hotspot
  - Habitat fragmentation
  - Ecological restoration
30. An individual is trying to reduce their carbon footprint through their diet. Which action would have the most significant impact on reducing carbon emissions?
- Choosing locally sourced fruits and vegetables over imported ones.
  - Consuming organic meats instead of conventionally raised meats.

- c. Opting for packaged vegetarian convenience foods.
- d. Eating seafood exclusively sourced from sustainable fisheries.

**31.** A research team conducted an experiment to evaluate the effectiveness of cover crops in reducing soil erosion and enhancing soil fertility. They planted different cover crop varieties and analysed soil erosion rates and nutrient levels. What findings would support the use of cover crops as a climate-smart technique?

- a. Higher soil erosion rates and reduced nutrient levels in plots with cover crops.
- b. Lower soil erosion rates and improved nutrient levels in plots with cover crops.
- c. Similar soil erosion rates and nutrient levels in plots with and without cover crops.
- d. Lower soil erosion rates and nutrient levels in plots without cover crops.

**32.** The graph below demonstrates a 50% reduction in post-harvest food losses achieved by a cooperative of farmers through enhanced packaging and transportation practices. What specific strategies in packaging and transportation could account for this significant success?



- a. Using biodegradable packaging materials and increasing the number of intermediaries in the supply chain.
- b. Utilising airtight packaging to preserve freshness and optimising transportation routes to minimise travel time and handling.
- c. Employing large packaging to fit more produce and reduce the number of trips.
- d. Using basic packaging materials and increasing the frequency of deliveries to retailers.

**33.** Agricultural extension officers are advising a community on incorporating crop rotation and Integrated Pest Management (IPM) into their farming systems. Which of the following statements is true regarding these practices?

- a. Crop rotation and IPM are outdated methods with no impact on modern farming practices.
- b. Crop rotation depletes soil nutrients, and IPM is only effective for specific pests.
- c. Crop rotation is limited to specific crop varieties, and IPM is only suitable for large-scale agricultural operations.
- d. Crop rotation and IPM collectively improve soil health, minimise pest infestations, and enhance productivity and sustainability.

**34.** Researchers conducted an experiment comparing the carbon sequestration rates of conventional farming and agroforestry systems over five years. The data showed significantly higher carbon sequestration in agroforestry plots. What factors might contribute to this difference?





- 37.** According to the scenario, what role does governmental policy and regulation play in shaping FreshHarvest's sustainable packaging strategies?
- No impact, as governmental policies are irrelevant to private businesses
  - Discourages businesses from adopting sustainable packaging due to restrictions
  - Encourages compliance with eco-friendly practices and sets standards for the industry
  - Promotes the use of non-recyclable materials through subsidies and incentives

**Direction for questions 38 to 40:**

Consider the case study given below and answer the following question:

Case Study: Conservation of Endangered Sea Turtles in Coastal Regions

Background:

In a coastal region, sea turtles, including species such as loggerheads, green turtles, and leatherbacks, are facing significant threats due to habitat destruction, pollution, and illegal poaching. To address this issue, a conservation program was initiated, involving local communities, marine biologists, and environmental organisations. The program aimed to protect nesting sites, raise awareness, and implement measures to safeguard these endangered sea turtles.

Objectives:

- Nesting Site Protection: Secure nesting sites to ensure safe hatching and protect eggs from poaching and predation.
- Public Awareness: Raise awareness among local communities and tourists about the importance of sea turtle conservation and the role of each individual in protecting these species.
- Research and Monitoring: Conduct research to study the nesting behaviours, migration patterns, and threats faced by sea turtles. Implement monitoring systems to track population trends.

Conclusion:

The collaborative efforts of the conservation program, combining community engagement, public awareness, and scientific research, resulted in a significant positive impact on sea turtle populations. By addressing the core issues of habitat protection, awareness, and research, the coastal regions managed to secure a future for these endangered sea turtles, ensuring their survival for generations to come.

- 38.** In an experiment studying the effect of pollution on sea turtle nesting, researchers discovered a correlation between pollution levels and nesting success. How can they establish a cause-and-effect relationship between pollution and nesting success?
- Collect more data over a longer period
  - Conduct a controlled experiment in a pollution-free environment
  - Isolate and control all variables except pollution levels
  - Observe the nesting behaviour in a different location unaffected by pollution.
- 39.** How can the preservation of sea turtle habitats indirectly benefit other marine species?
- By reducing beach erosion
  - By promoting coral reef growth
  - By minimising ocean acidification.
  - By maintaining biodiversity and ecosystem balance

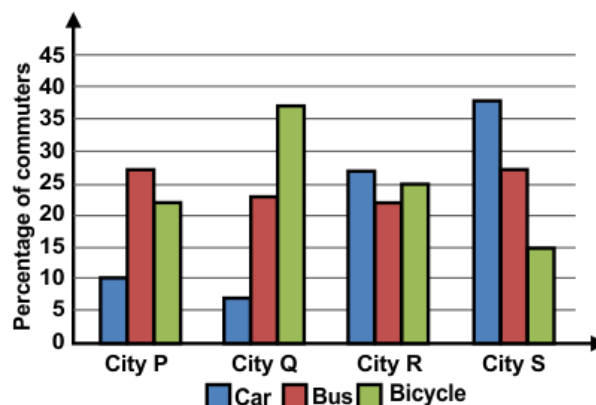
40. Researchers conducted an experiment to compare the hatching success rates between protected nests and natural nests. The data showed a 15% higher hatching success rate in protected nests. What could be the reasons behind this difference?
- Protected nests are less prone to predation and disturbances.
  - Natural nests have a higher temperature, leading to lower hatching success.
  - Protected nests receive more sunlight, aiding in the incubation process.
  - Natural nests are unaffected by pollution, reducing hatching success rates.

## Green Challenger (Each Question is 6 Marks)

41. A company wants to reduce its carbon footprint by transitioning its vehicle fleet from gasoline to electric. They have gathered data on the mileage, charging times, and energy consumption of electric vehicles (EVs) over a year. Based on the provided data, which EV model is the most energy-efficient for the company's needs?

| EV Model | Mileage(miles) | Charging Time (hours) | Energy Consumption (kWh) |
|----------|----------------|-----------------------|--------------------------|
| EV-1     | 250            | 4                     | 20                       |
| EV-2     | 300            | 2                     | 22                       |
| EV-3     | 220            | 3                     | 18                       |
| EV-4     | 200            | 6                     | 25                       |

- EV-1
  - EV-2
  - EV-3
  - EV-4
42. Country A and Country B have similar populations and energy consumption patterns. Country A generates 70% of its electricity from coal, while Country B generates 70% from renewable sources. If both countries aim to reduce their carbon emissions by 50%, which country would need to make a more significant change in its energy infrastructure to achieve this goal?
- Country A
  - Country B
  - Both countries need to make equal changes.
  - Neither country needs to make changes.
43. Refer to the bar graph below, which represents the mode of transportation in four different cities. Analysing the provided graph, which cities can be considered the most sustainable in terms of transportation, environmental impact, and commuting efficiency?



- a. Cities P and Q
- b. Cities Q and R
- c. Cities R and S
- d. Cities S and P

44. Refer to the table below.

If a household aims to minimise its carbon footprint while using laptops, which laptop model should they choose based on the given data?

| Laptop  | Energy Consumption (kWh) | Energy Star | Environmental Impact Score |
|---------|--------------------------|-------------|----------------------------|
| Model W | 100                      | 4.8         | 7.5                        |
| Model X | 350                      | 2.5         | 5.8                        |
| Model Y | 50                       | 5.2         | 2.3                        |
| Model Z | 200                      | 3.9         | 6.7                        |

- a. Model W
- b. Model X
- c. Model Y
- d. Model Z

45. In a study comparing two carbon offset projects, Project X focuses on reforestation, while Project Y invests in renewable energy projects. The amount of carbon dioxide equivalent (CO<sub>2</sub>e) sequestered over a ten-year period of both projects is given below. Based on the data provided, which of the following statements is true?

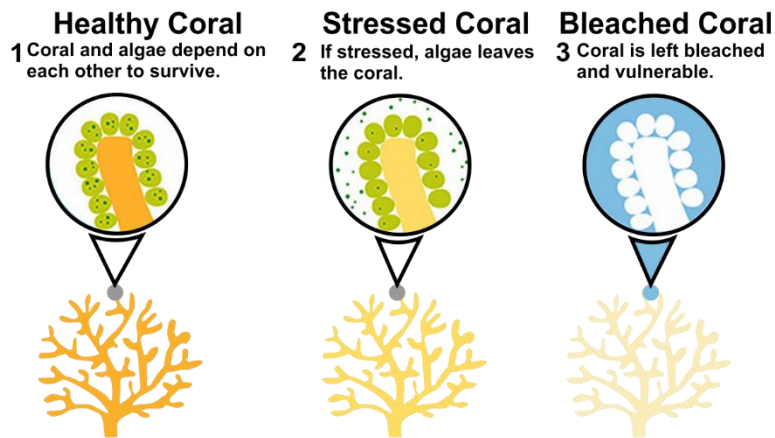
- A. Project X contributes more to mitigating climate change by reducing atmospheric CO<sub>2</sub> levels, thus aiding in global efforts to combat global warming.
- B. Project Y contributes more by enhancing local biodiversity and ecosystem health, promoting a sustainable environment for flora and fauna.
- C. Both Project X and Project Y improve air quality in their respective regions.
- D. Both Project X and Project Y reduce the resilience of ecosystem to the impacts of climate

| Project   | CO <sub>2</sub> e Sequestered per Year (metric tons) |
|-----------|--|
| Project X | 2,500  |
| Project Y | 1,800  |

- a. A, B, and C only
- b. A and C only
- c. C only
- d. D only

46. Examine the diagram below representing the symbiotic relationship between algae and coral. Considering the information provided, which of the following environmental factors could lead to the expulsion of algae and consequently result in coral bleaching?

- A. Higher fish population
- B. Decreased water acidity
- C. Elevated water temperatures and stress
- D. Elevated levels of CO<sub>2</sub>



- a. A and B  
 b. B and C  
 c. C and D  
 d. D and A

47. A group of scientists studying the human impact on terrestrial ecosystems made the following statements:

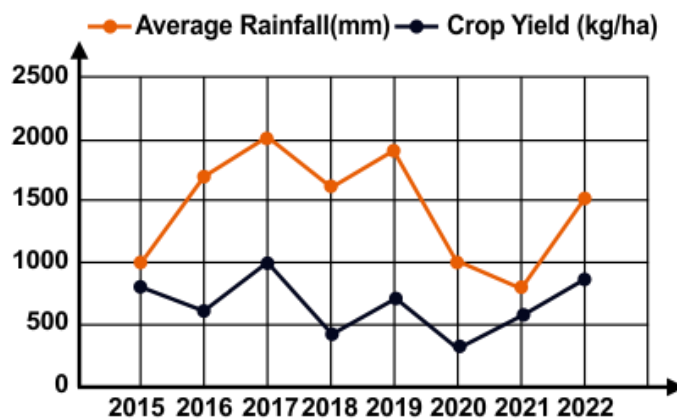
- I. Deforestation contributes to a loss of biodiversity and disrupts the natural habitat of various species.
- II. Urbanisation often leads to soil pollution and alters the natural drainage patterns, affecting nearby ecosystems.
- III. Introducing non-native species can enhance biodiversity and strengthen ecosystems.
- IV. Increased agricultural practices always result in improved soil quality and long-term ecosystem stability.

Which scientist among them is correct?

- a. Scientist A, who agrees with Statements I and II  
 b. Scientist B, who agrees with Statements II and III  
 c. Scientist C, who agrees with Statements I and IV  
 d. Scientist D, who agrees with Statements III and IV

48. Examine the graph below illustrating the correlation between crop yield and average rainfall for the specified year. Based on your analysis, address the following questions:

- A. What factors might contribute to the unpredictability observed in the data?
- B. What technique would you recommend to mitigate these outcomes and enhance agricultural resilience?



- a. A: Climate change  
B: Relocating the farms to regions with more predictable rainfall
- b. A: Soil erosion  
B: Implementing agroforestry practices
- c. A: Climate change  
B: Promoting crop diversity through polyculture and intercropping
- d. A: Soil erosion  
B: Increasing the use of chemical fertilisers to boost crop growth

**Direction for questions 49 and 50:**

Consider the case study given below and answer the following question:

Case study: Cape Town's Water Security Challenges

The city of Cape Town, South Africa, faced a severe water shortage in 2018. The city's dams were running low, and the city was on the verge of running out of water. The city implemented a number of water conservation measures, including:

- Restricting water usage to 50 litres per person per day.
- Banning watering lawns and gardens.
- Closing public swimming pools.
- Collecting rainwater.
- Desalinating seawater.

As a result of these measures, the city was able to avoid running out of water. The water shortage also raised awareness of the importance of water conservation, and the city has continued to implement water conservation measures even after the drought ended.

**49.** Identify the significant challenge(s) faced by Cape Town in achieving clean water and sanitation during the water crisis.

- A. Climate change
- B. Population growth
- C. Social inequality

- a. A only
- b. A and B only
- c. A and C only
- d. A, B and C

**50.** In the context of water conservation, what is the significance of desalination, and how did it contribute to Cape Town's water security during the crisis?

- a. Desalination is a method of wastewater treatment, conserving significant amounts of water.
- b. Desalination helped in collecting rainwater, ensuring a sustainable source of freshwater.
- c. Desalination involved converting seawater into freshwater, helping to supplement water resources.
- d. Desalination played no role in Cape Town's water security during the crisis.

## Answer Key

|     |   |     |   |     |   |     |   |     |   |     |   |     |   |
|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|
| 1.  | a | 2.  | d | 3.  | d | 4.  | d | 5.  | d | 6.  | d | 7.  | b |
| 8.  | a | 9.  | d | 10. | a | 11. | c | 12. | c | 13. | c | 14. | d |
| 15. | b | 16. | b | 17. | b | 18. | b | 19. | b | 20. | b | 21. | c |
| 22. | c | 23. | d | 24. | c | 25. | b | 26. | c | 27. | a | 28. | c |
| 29. | d | 30. | a | 31. | b | 32. | b | 33. | d | 34. | a | 35. | b |
| 36. | d | 37. | c | 38. | c | 39. | d | 40. | a | 41. | b | 42. | a |
| 43. | a | 44. | c | 45. | b | 46. | c | 47. | a | 48. | c | 49. | d |
| 50. | c |     |   |     |   |     |   |     |   |     |   |     |   |