Grade 11

International Green Warrior Olympiad (IGWO)

Sample Paper

Pattern and Marking Scheme				
Grade	**Topic/Section**	**No. of Questions**	**Marks per Question**	**Total Marks**
Grade 11	Green Champ	40	3	120
	Green Challenger	10	6	60
Grand Total		**50**		**180**

The total duration of the exam is 60 minutes. There's a negative marking of 1/3rd 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)

1. 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?

   a. Increased water temperature providing a suitable habitat.
   b. Natural migration of fish from other water bodies.
   c. Introduction of genetically modified fish species.
   d. Community clean-up efforts reducing pollution levels.

2. 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

3. 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?

   a. Increased fish populations only outside the protected areas
   b. Decreased fish populations inside the protected areas
   c. Higher fish populations inside the protected areas compared to outside
   d. Uniform fish populations inside and outside the protected areas

4. In a scenario where a factory discharges untreated industrial wastewater containing high levels of heavy metals into a nearby river, what long-term impact would this have on the aquatic ecosystem?

   a. Decreased biodiversity due to increased nutrient levels
   b. Bioaccumulation of heavy metals leading to toxicity in aquatic organisms
   c. Growth of indigenous species due to enrichment of the ecosystem
   d. Eutrophication due to sedimentation of metals

5. A region known for its dense forests undergoes significant deforestation due to increased logging activities and expansion of agricultural land. As a consequence, the landscape transforms from a lush forested area to large expanses of cleared land.

   How does the process of deforestation impact the water cycle in this scenario?

   a. Increases transpiration leading to higher rainfall and soil erosion.
   b. Reduces transpiration, potentially leading to decreased rainfall and soil erosion.
   c. Enhances groundwater recharge due to lack of vegetation covering the ground.
   d. Accelerates the water cycle, reducing the risk of floods

6. An experiment is conducted to compare the efficiency of different rainwater harvesting systems in a specific location. System A uses rooftop collection, while System B utilises surface runoff collection. Which system is likely to yield more water in an area with infrequent but heavy rainfall?

   a. System A
   b. System B
   c. Both systems will yield similar amounts of water
   d. None of the systems will be effective in heavy rainfall conditions

7. Your community is contemplating the implementation of an electronics recycling program to address the growing e-waste issue. As a member of the planning committee, you're tasked with identifying key considerations for successful planning and execution of this program. What are some critical factors that should be considered when planning and implementing an electronics recycling program for the community?

   1. Public education and outreach to promote program awareness
   2. Establishment of convenient drop-off locations for e-waste
   3. Categorise e-waste based on type for targeted recycling

   a. Only 1
   b. Only 1 and 2
   c. Only 2 and 3
   d. 1, 2, and 3

8. A city is experiencing water scarcity due to changing precipitation patterns caused by climate change. What practical strategies could the city adopt to address this issue and ensure water availability for its residents?

   a. Investing in water conservation and harvesting technologies
   b. Implement a stringent water rationing system to limit household water consumption.
   c. Increasing water tariffs for residents
   d. Relocating residents to areas with better water sources

9. A city planner is tasked with designing a new neighbourhood that is projected to face more frequent and severe heat waves due to climate change. The planner aims to incorporate design features that will effectively mitigate the impacts of these heat waves.
   Which of the following design features would be most effective in mitigating the impacts of heatwaves in this neighbourhood in the context of climate change?

   1. Incorporating green spaces, parks, and tree-lined streets to provide shade and cooling.
   2. Installing more air conditioners to combat the heat waves.
   3. Extensive use of glass facades to reflect sunlight away from buildings.

   a. Only 1
   b. Only 1 and 2
   c. Only 2 and 3
   d. 1, 2, and 3

10. In a study comparing the environmental impact of various diets, researchers found that a vegan diet had the lowest ecological footprint. What factors might contribute to this finding?

    a. Vegans typically consume less food than meat-eaters.
    b. Vegans typically avoid processed foods, which often have a high environmental impact.
    c. Vegans consume plant-based foods, which require less land, water, and energy to produce than animal-based foods.
    d. Vegans typically avoid animal products, which are associated with greenhouse gas emissions.

11. Your school has accumulated a large amount of outdated computers. You propose to the administration to donate the computers to a local school in need. This action demonstrates:

1. Disregarding the impact of outdated computers on environmental sustainability
2. The application of the concept of e-waste reuse.
3. The reduction of e-waste generation through extending the lifespan of electronic devices.

a. Only 1
b. Only 1 and 2
c. Only 2 and 3
d. 1, 2, and 3

12. As a responsible homeowner, you are considering installing a smart thermostat to control your home's heating and cooling system. You are aware of the potential benefits of smart thermostats, such as energy savings and improved comfort. However, you are also hesitant to make the switch due to concerns about cost and complexity.
Which of the following benefits would NOT incentivise you to install a smart thermostat?

a. Reduced energy consumption and lower utility bills
b. Ability to receive real-time energy usage data
c. Increased complexity in operating the heating and cooling system
d. Remote access and control from anywhere using a smartphone or tablet

13. You've been tasked with organising a community waste management initiative. While researching the potential hazards of various types of waste, you discover the significant threat posed by e-waste to the environment. Based on this information, what is the primary reason why e-waste poses such a significant threat?

a. Its rapid generation rate exceeds our ability to recycle it efficiently.
b. It contains toxic materials that leach into the environment when improperly disposed of.
c. It takes up valuable landfill space, hindering other waste management strategies.
d. It contributes to the formation of ozone layer depletion, intensifying climate change.

14. You are an environmental consultant hired by a local community to assess the potential environmental impacts of a proposed aquaculture farm. The farm plans to raise salmon in open-net cages in a bay adjacent to a sensitive coral reef ecosystem.
Based on your knowledge of aquaculture and the local environment, which of the following potential environmental concerns should you prioritise in your assessment?

1. The farm's operations could increase the risk of eutrophication
2. The farm's waste products could pollute the water and harm the coral reef
3. The farm will alleviate pressure on overfished wild populations

a. Only 1
b. Only 1 and 2
c. Only 2 and 3
d. 1, 2, and 3

15. Emma, a university student, is researching the relationship between food choices and climate change for her environmental science project. She has collected various data and conducted interviews with experts. Which statement best describes the relationship between food choices and climate change based on Emma's findings?

a. Meat-intensive diets contribute significantly to greenhouse gas emissions.
b. Consumption of locally sourced foods has no impact on climate change.
c. Eating organic foods exclusively reduces global warming effects.
d. Frozen foods have a higher carbon footprint compared to canned foods.

16. A small community in a remote, arid region is facing water scarcity. Their traditional farming practices are no longer sufficient to sustain the community's needs. To ensure long-term food security and water conservation, the community is considering adopting a new farming approach.

Which farming practice would be the most sustainable option for the community to adopt in the long term, considering both water conservation and food production?

a. Conventional irrigation using sprinklers
b. Organic farming with flood irrigation techniques
c. Agroecological practices incorporating drip irrigation systems
d. Intensive farming with open furrow irrigation methods

17. A coastal town is experiencing increased flooding due to rising sea levels caused by climate change. The town's economy is heavily reliant on tourism, and the flooding is threatening to damage its beaches and infrastructure. Local authorities are considering various options to mitigate the impact of flooding.

Which of the following would be the effective long-term solution(s) to address both environmental concerns and economic needs?

1. Construct a seawall
2. Invest in renewable energy sources
3. Develop eco-tourism initiatives
4. Relocate the town's infrastructure to higher ground

a. Only 1
b. Only 1 and 2
c. Only 1, 2 and 3
d. 1, 2, 3 and 4

18. In a bid to minimise electronic waste, a tech company developed a device that allows consumers to upgrade their devices' internal components rather than replacing the entire unit. This initiative primarily addresses which principle of sustainable waste management?

a. Recovery
b. Recycling
c. Upcycling
d. Downcycling

19. A large oil spill from a tanker accident devastates a coastal ecosystem. Oil slicks coat beaches and contaminate the water, impacting birds, fish, and other wildlife.
In addition to immediate cleanup efforts, what long-term environmental impacts should be monitored and addressed following this disaster?

1. The potential for oil residue to persist and enter the food chain
2. The disruption of coastal habitats and sensitive ecosystems
3. The economic and social impacts on fishing communities and tourism industries

a. Only 1
b. Only 1 and 2
c. Only 2 and 3
d. 1, 2 and 3

20. Researchers conducted an experiment to evaluate the impact of controlled burning on grassland ecosystems. The results indicate an increase in plant diversity post-burn.
What is the likely reason for this observation?

a. Controlled burns reduce soil fertility, promoting diverse plant species.
b. Controlled burns remove invasive species, encouraging native plant diversity.
c. Controlled burns eliminate all vegetation, allowing invasive species to dominate.
d. Controlled burns clear space for monoculture growth.

21. Helen wakes up one frosty winter morning to see tiny water droplets on her bedroom windows. She knows this condensation signifies heat loss. Determined to save energy and stay warm, Helen considers several solutions.
Which one of the following would be the most effective in reducing energy loss from the windows?

a. Invest in heavy curtains and blinds for all her windows.
b. Increase the temperature setting on her thermostat by a few degrees.
c. Use a dehumidifier to remove moisture from the air.
d. Replace her single-pane windows with double-pane, insulated windows.

22. In a bustling metro city, a community aims to implement an effective waste management plan focusing on waste segregation, composting organic waste, and recycling. A company is assigned to execute this plan. However, the company proposes an incineration facility instead of the proposed methods, citing efficiency.

What is the most probable reason the new proposal of an incineration facility may not be suitable for the waste management plan?

a. Incineration facilities are costlier to construct and maintain.
b. Incineration contributes to air pollution and the emission of harmful gases.
c. Incineration does not effectively reduce the volume of waste.
d. Incineration requires more manual labour compared to recycling methods.

23. Some scientists propose using geoengineering techniques like injecting aerosols into the atmosphere to reflect sunlight and temporarily cool the planet. However, there are concerns about the potential unintended consequences of such interventions.
Which of the following is/are concern(s) regarding geoengineering with aerosols?

1. Disruption of weather patterns
2. Enhancement of ozone depletion
3. Positive impact on climate change awareness

a. Only 1
b. Only 1 and 2
c. Only 2 and 3
d. 1, 2 and 3

24. You're a local community leader in a coastal village known for its thriving fish farms. While these farms provide valuable food and income for the community, you've noticed concerns about water quality, with algae blooms and fish kills in nearby rivers. Scientists attribute this to nutrient runoff from the farms.
To promote responsible aquaculture and address these environmental concerns, which principle should be prioritised?

a. Maximising fish production by increasing stocking density in existing ponds.
b. Expanding the aquaculture area by clearing mangroves.
c. Investing in systems that recycle water and minimise waste discharge
d. Providing subsidies to farmers who use traditional aquaculture methods.

25. Two islands in the Pacific Ocean experience similar climates but have different levels of deforestation. Island A has lost 80% of its original forest cover, while Island B has maintained 90% of its forest. Over the past decade, Island A has experienced more frequent and intense heat waves compared to Island B. Which of the following is the most likely explanation for this difference?

a. Island B benefits from cooler ocean currents that moderate its climate, while Island A does not.
b. Island A's proximity to volcanic activity contributes to increased heatwaves.
c. Island A has a higher concentration of greenhouse gases in its atmosphere due to reduced carbon sequestration by forests.
d. Island B's higher elevation reduces the likelihood of extreme heatwaves.

26. Mini's family washes clothes three times a week, often running half-empty loads in their washing machine. Her environmentally conscious brother suggests combining smaller loads into fewer, full washes and opting for cold water whenever possible.

Compared to Mini's current washing habits, her brother's suggestions would most likely result in:

a. A significant increase in water consumption due to longer wash cycles.
b. A slight decrease in energy consumption due to fewer wash cycles.
c. A moderate decrease in both water and energy consumption.
d. A dramatic decrease in water consumption but no change in energy use.

27. You've decided to upgrade your home's insulation to improve energy efficiency. Which material is often used as an effective insulator in walls due to its low thermal conductivity?

a. Plastic cling wrap
b. Plywood sheets
c. Aluminium foil
d. Fiberglass

28. Maria, an aspiring environmentalist, conducted an experiment to showcase the impact of deforestation on the local climate. She observed a significant rise in local temperatures in areas where extensive deforestation had occurred.
What could be the primary reason behind this observed rise in temperatures?

a. Increased cloud cover due to deforestation
b. Reduction in carbon dioxide levels in the atmosphere
c. Loss of tree cover leading to decreased evapotranspiration
d. Enhanced soil fertility in deforested areas

29. Emma works at a fish farm that practices responsible aquaculture. She ensures the farm's operations prioritise environmental sustainability. What might be a typical aspect of responsible aquaculture that Emma would advocate for?

a. Increasing the use of antibiotics to prevent fish diseases
b. Discharging excess fish feed directly into natural water bodies
c. Implementing bioremediation techniques to naturally filter and clean the farm's water
d. Harvesting fish without considering breeding cycles

30. In a biodiversity conservation project, two strategies were implemented to protect endangered species: Strategy A focused on captive breeding programs, while Strategy B emphasised habitat restoration and protection. Which strategy is more likely to result in the long-term conservation of endangered species?

a. Strategy A
b. Strategy B
c. Both strategies will equally contribute to endangered species conservation.
d. It depends on the specific species and their reproductive behaviour.

31. Climate-Smart Agriculture aims to achieve three main goals simultaneously: increased productivity and food security, enhanced resilience to climate change, and reduced greenhouse gas emissions. Which of the following practices most effectively addresses all three goals?

a. Crop rotation
b. Monoculture
c. Agroforestry
d. Irrigation management

32. In urban areas, stormwater runoff often carries pollutants into local water bodies, affecting nearby ecosystems.

Which statement accurately describes the impact of this runoff on aquatic life?

a. Elevated toxicity levels, endangering aquatic species
b. Increase in oxygen levels, aiding aquatic organisms
c. Minimal disruption to the natural habitat
d. Increased resilience of biodiversity through varied pollutants

33. A school in an urban slum lacks proper sanitation facilities and clean water access. Students often skip school due to frequent stomach illnesses and infections.
Some effective interventions to improve the health and attendance of these students would be:

1. Providing free medical treatment for illnesses
2. Building clean and accessible toilets within the school premises
3. Distributing educational pamphlets on hygiene practices

a. Only 1
b. Only 1 and 2
c. Only 2 and 3
d. 1, 2 and 3

34. You want to reduce your household food waste, a major contributor to greenhouse gas emissions.
Which practical approach is most effective?

1. Compost all food scraps, even meat and dairy, reducing landfill waste.
2. Plan meals meticulously and buy only what you need to avoid buying and discarding excess food.
3. Store food properly to extend shelf life and prevent spoilage.

a. Only 1
b. Only 1 and 2
c. Only 2 and 3
d. 1, 2 and 3

Direction for questions (35 to 37): Consider the case study given below and answer the following question:

Case Study: The Green Guardians of Greenhill High

Greenhill High, a bustling school with over 1,000 students, faced a rising energy bill and growing concerns about its environmental impact. The principal and teachers knew they needed a change, and thus, the "Green Guardians" were born! This student-led initiative focused on three key areas: energy-efficient appliances, LED lighting, and well-insulation.

Appliance Upgrade: The Green Guardians convinced the school board to replace ageing appliances with ENERGY STAR certified models. New washing machines used cold water effectively, while newer dishwashers boasted shorter cycles and automatic shut-offs. These changes resulted in a

20% reduction in kitchen and laundry energy consumption.

Lighting the Way: Replacing traditional incandescent bulbs with LED lights was a game-changer. These LED bulbs lasted 25 times longer, used 80% less energy, and provided brighter, cooler light. Not only did the classrooms become more comfortable, but the school also saved 15% on its lighting costs.

Insulating for Impact: The Green Guardians knew that keeping the school warm in winter and cool in summer would significantly reduce energy use. They proposed adding insulation to the attic and walls, sealing air leaks, and upgrading windows. The results showed a 10% drop in heating and cooling energy needs, creating a more comfortable and sustainable learning environment.

The Green Guardians' efforts didn't stop there. They launched awareness campaigns, organised energy-saving competitions, and even convinced the cafeteria to source local, organic food. Their success story inspired other schools to join the green movement, proving that even small changes can make a big difference.

35. Why is insulation in buildings crucial for reducing energy consumption?

a. It directly generates electricity, lowering overall consumption.
b. It helps in regulating temperature, reducing the need for heating and cooling.
c. It eliminates the need for appliances, thereby reducing energy usage.
d. It minimises lighting costs by reflecting natural light efficiently.

36. Imagine Greenhill High expands its sustainability efforts to include electric school buses. How might this decision impact the school's environmental footprint and local air quality?

a. The school's carbon footprint would decrease while local air quality worsens.
b. Only local air quality would improve, with no change in the school's carbon footprint.
c. Both the school's carbon footprint and local air quality would improve.
d. Only the school's carbon footprint would decrease, with no change in air quality.

37. The case study mentions the Green Guardians' focus on local, organic food. How does this relate to the concept of clean and affordable energy?

1. Reducing transportation emissions associated with food distribution.
2. Supporting agricultural practices that maximise energy use.
3. Encouraging healthy eating habits, leading to increased energy levels.

a. Only 1
b. Only 2
c. Only 3
d. 1, 2, and 3

Direction for questions (38 to 40): Consider the case study given below and answer the following question:

Case Study: Rejuvenating the Red Desert

The once fertile plains of the Red Desert now lie barren and parched. Decades of unsustainable agricultural practices, deforestation, and overgrazing have stripped the land of its topsoil, leaving behind a landscape of eroded gullies and windblown sand. The local community, dependent on the land for their livelihood, faces diminishing harvests and increasing dust storms.

The Challenge: Restoring the Red Desert requires a multi-faceted approach that addresses both the physical and social dimensions of land degradation. The key challenges include:

-Soil erosion and nutrient depletion: Restoring soil fertility is crucial for supporting plant growth.
-Water scarcity: The arid climate presents a significant challenge for plant growth. Implementing water harvesting systems like rainwater cisterns and promoting drought-resistant crops can optimise water use.
-Loss of biodiversity: Restoring native plant and animal populations is essential for creating a healthy and resilient ecosystem. This can involve assisted regeneration, seed dispersal, and creating wildlife corridors.
- Community engagement: Sustainable land management requires the active participation of the local community. Building trust, providing training, and ensuring equitable access to resources are crucial for long-term success.

The Outcome: Over time, the Red Desert undergoes a remarkable transformation. Eroded gullies are filled with fertile soil, native plants flourish, and animal populations return. The community experiences increased food security and improved livelihoods, thanks to sustainable farming practices and diversified income sources. The success of the program serves as a model for other communities facing land degradation, demonstrating the power of collaboration and knowledge-based solutions in restoring lost ecosystems and building a sustainable future.

38. Which of the following statement(s) describes the relationship between deforestation and soil erosion in the Red Desert?

1. Deforestation disrupts the water cycle, reducing rainfall and increasing soil dryness, indirectly leading to erosion.
2. Deforestation directly causes soil erosion by exposing soil to wind and rain.
3. Deforestation increases rainfall, leading to flash floods and soil washout.

a. Only 1
b. Only 1 and 2
c. Only 2 and 3
d. 1, 2, and 3

39. In an experiment analysing soil quality in the Red Desert, which factor would likely exhibit the most substantial improvement after implementing cover cropping techniques compared to conventional farming methods?

a. Soil pH levels
b. Soil compaction
c. Soil moisture retention
d. Organic matter content

40. Based on the case study, which of the following crops would be most suitable for cultivation in the Red Desert environment to promote biodiversity and ensure food security?

1. Wheat (moderate water demand, monoculture, requires fertile soil)
2. Millet (low water demand, can be intercropped, drought-resistant)
3. Sorghum (moderately drought-resistant, can be intercropped)

a. Only 1
b. Only 1 and 2
c. Only 2 and 3
d. 1, 2 and 3

Green Challenger (Each Question is 6 Marks)

41. 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_2e) sequestered over a ten-year period of both projects is given below. Based on the data provided, which of the following statements is true?

1. Project X contributes more to mitigating climate change by reducing atmospheric CO_2 levels, thus aiding in global efforts to combat global warming.
2. Project Y contributes more by enhancing local biodiversity and ecosystem health, promoting a sustainable environment for flora and fauna.
3. Both Project X and Project Y improve air quality in their respective regions.
4. Both Project X and Project Y reduces the resilience of ecosystem to the impacts of climate change, such as droughts, floods, and wildfires.

Project	CO_2e Sequestered per Year (metric tons)
Project X	2,500
Project Y	1,800

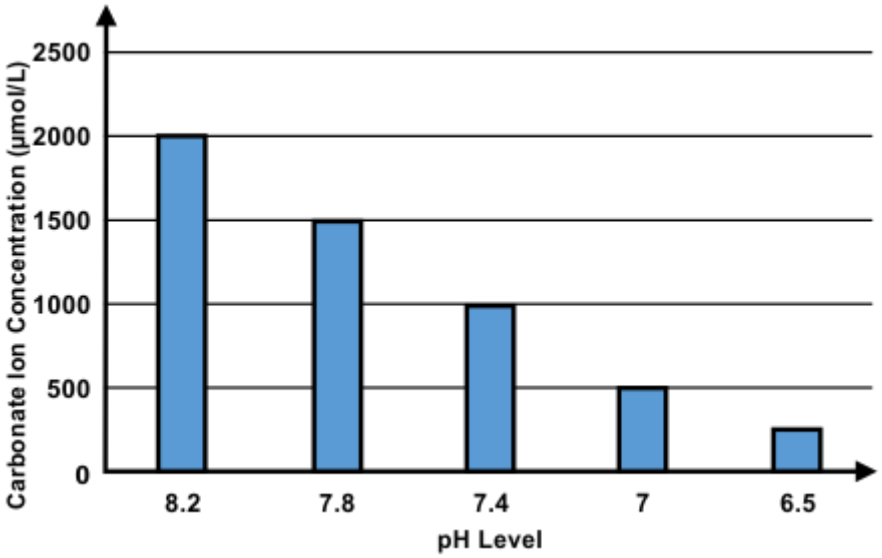
a. Only 1, 2 and 3
b. Only 1 and 3
c. Only 3
d. Only 4

42. You are an environmental consultant advising a company on the selection of laptops for their office. They prioritise sustainability and want devices that will last longer with responsible usage practices.
The table below outlines key factors important for responsible device usage across four different laptops. Considering the scenario provided, which laptop would you recommend to the company for longer-term use.

Laptop Model	Energy Efficiency	Repairability	Material Sustainability	Ventilation
Laptop A	High	Moderate	Recyclable components	Good
Laptop B	Moderate	High	Repair-friendly design	Average
Laptop C	High	Low	Sustainable sourcing	Poor
Laptop D	Very High	Moderate	Recycled materials	Excellent

a. Laptop A
b. Laptop B
c. Laptop C
d. Laptop D

43. Researchers conducted an experiment to assess the impact of ocean acidification on marine snail populations. They exposed snails to different pH levels in controlled environments and measured their growth rates over time. The graph below illustrates the relationship between pH levels, carbonate ion concentration. Based on this data, what is the probable outcome for marine snail populations as the H^+ increases in the seawater?



a. Snails will exhibit accelerated shell growth due to higher calcium carbonate availability.
b. Snails will exhibit reduced shell growth and vulnerability to shell dissolution.
c. Snails will show no change in growth rates regardless of pH variations.
d. Snails will develop stronger, thicker shells to withstand changing pH conditions.

44. Analyse the data provided in the table below, which represents the Biological Oxygen Demand (BOD) levels (mg/L) of influent and effluent wastewater samples before and after treatment.
Identify the accurate statements regarding the effectiveness of the wastewater treatment process.

1. Higher BOD in Sample B after treatment indicates higher dissolved oxygen levels, ensuring healthier aquatic ecosystems.
2. Reduction in BOD levels in Samples A and C signifies a decrease in the amount of organic pollutants present in the water.
3. The reduction in BOD in Samples A and C, the risk of eutrophication decreases, preserving the balance of nutrients and oxygen.
4. The treatment process for Sample B was ineffective as BOD levels increased after treatment.

Sample	Influent BOD	Effluent BOD
A	250	90
B	150	200
C	300	45

a. Only 1 and 2
b. Only 1, 2 and 3
c. Only 2 and 3
d. Only 2, 3 and 4

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

Case Study: The Müller Family's Journey to Renewable Energy

The Müller family, residing in a charming village in the German countryside, had always been conscious about their environmental impact. In 2022, they decided to take an active step towards a greener lifestyle by installing a rooftop solar panel system. Their primary motivation was to reduce their reliance on fossil fuels and contribute to mitigating climate change. However, as they embarked on this journey, they discovered a plethora of other benefits:

Environmental Benefits:
-Reduced Carbon Footprint: The solar panels generated clean energy, leading to a significant reduction in their carbon emissions. This translated to a cleaner environment for their family, their community, and the planet.
-Improved Air Quality: By relying less on fossil fuels, the Müllers contributed to cleaner air in their region, which improved their overall health and well-being.

Financial Benefits:
-Reduced Electricity Bills: The solar panels generate enough electricity to cover a significant portion of their household energy needs, resulting in substantial savings on their monthly electricity bills. This provided them with financial stability and freed up resources for other expenses.
-Government Incentives: The German government offers various financial incentives for individuals and families adopting renewable energy solutions. The Müllers took advantage of these incentives, further reducing the cost of their solar panel system and accelerating their return on investment.

Lifestyle Benefits:
-Energy Independence: The Müllers achieved a sense of energy independence by generating their own clean energy. This gave them greater control over their energy consumption and reduced their dependence on the national grid, especially during peak hours.
-Enhanced Home Value: Homes with renewable energy systems are becoming increasingly sought-after, leading to a potential increase in the value of the Müller's property.

Overall Impact:
The Müller family's experience showcases the numerous benefits of adopting renewable energy in a domestic setting. Their commitment to environmental sustainability not only helped them create a cleaner future but also resulted in financial savings and enhanced their quality of life. Their story serves as an inspiration for others to consider switching to renewable energy and contribute to a more sustainable future.

The Müller family experienced a change in their lifestyle that resulted in increased energy consumption. Which of the following strategies could they implement to maintain their energy independence?

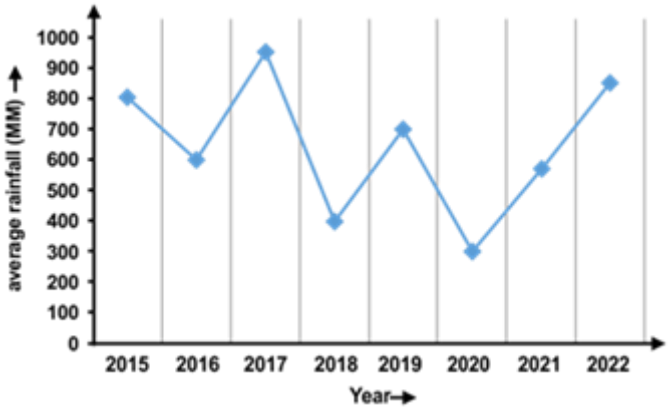
1. Install additional solar panels to increase energy generation.
2. Utilise a battery storage system more efficiently.
3. Increase their reliance on the national grid.
4. Install additional solar panels to increase energy generation.

a. Only 1, 2 and 3
b. Only 1, 2 and 4
c. Only 2, 3 and 4
d. 1, 2, 3 and 4

46. A community in an arid region has implemented a rainwater harvesting system to collect and store rainwater for various uses. The community relies heavily on this system as their primary source of water. However, due to climate change, the rainfall patterns have become unpredictable. The graph below shows the rainfall pattern over the past 8 years.

Which factor is most likely to limit the effectiveness of the rainwater harvesting system in this scenario?

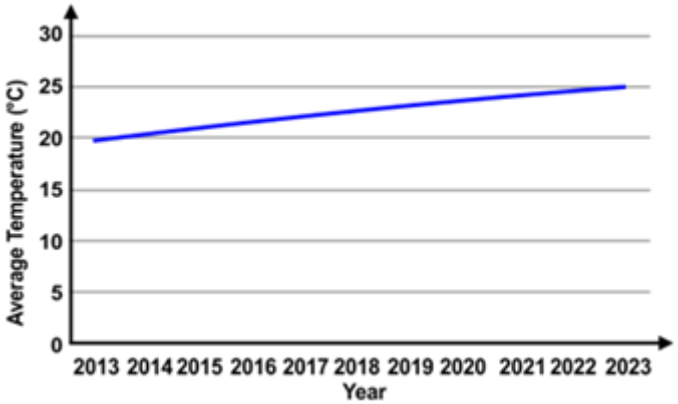
1. Inadequate storage capacity hindering collection during periods of heavy rainfall
2. Minimising the environmental impact of excessive runoff during heavy rainfall periods.
3. Unpredictable collection amounts resulting in insufficient water supply during dry spells.
4. Contamination risks associated with pollutants present in the collected rainwater.



a. Only 1, 2 and 3
b. Only 1, 3 and 4
c. Only 2, 3 and 4
d. Only 1, 2 and 4

47. You are a farmer in a region with a temperate climate. You have been farming for over 20 years and have a good understanding of the growing cycles of your crops that have a narrow range of temperature tolerance. You have been keeping detailed records of your annual average temperature for the past decade. The graph below shows a clear trend in temperature change.
Based on your knowledge of agriculture and environmental science, which of the following is

1. Increased crop resilience and improved harvests.
2. Reduced yield and delayed harvest
3. Increased susceptibility to pests and diseases
4. Optimal conditions for crop pollination and seed germination.



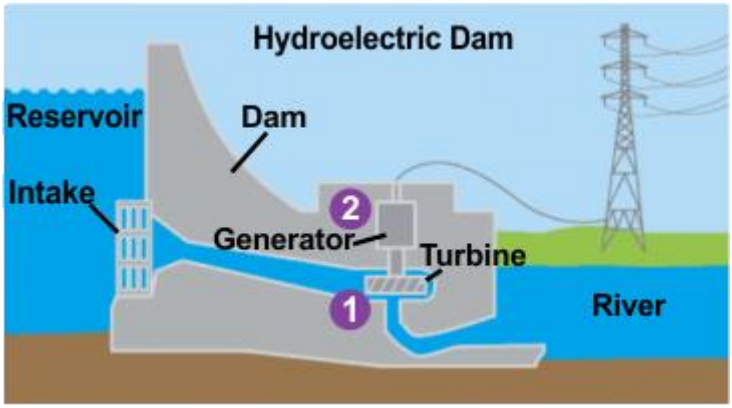
a. Only 2
b. Only 1 and 2
c. Only 2 and 3
d. Only 2, 3 and 4

48. A community living in a desert region relies on a shallow aquifer for their water supply. However, the water level in the aquifer has been steadily declining due to over-extraction. The community is concerned about the potential consequences of this trend.
A. What are the two most likely consequences of the declining water table in the community's aquifer?
B. What steps could they take to address this issue?

a. A: Increased soil salinity and decreased crop yields
   B: Implement water conservation measures and explore alternative water sources.
b. A: Land subsidence and decreased evaporation rates
   B: Enforce strict regulations on water use and promote public awareness campaigns.
c. A: Loss of biodiversity and increased groundwater recharge
   B: Invest in desalination plants and build new dams for water storage.
d. A: Waterborne diseases and reduced desertification
   B: Develop rainwater harvesting systems and distribute water resources equitably.

49. A small rural community plans to enhance its energy generation capacity by installing a hydroelectric dam to utilise the potential energy of water from a nearby river. Initially, the dam has a reservoir depth of 20 meters.

If the community decides to double the reservoir depth to 40 meters by expanding the dam, what effect does this have on energy production?



a. The energy output decreases as the water volume increases.
b. The energy output remains constant regardless of the reservoir depth.
c. The energy output increases proportionally with the increased reservoir depth.
d. The energy output decreases due to excessive water pressure.

50. A city's wastewater treatment plant utilises a multi-stage process involving coagulation, sedimentation, filtration, and disinfection. The table below shows the average contaminant levels at different stages of the treatment process.
Analyse the data and answer the following questions:

A. Which stage of the treatment process removes the most turbidity?
B. Why the bacterial count drops significantly after disinfection.

Stage	Turbidity (NTU)	Chemical Oxygen Demand (COD)	Total Coliform Bacteria (CFU/mL)
Raw Wastewater	100	500	10,000
After Coagulation & Sedimentation	20	300	1,000
After Filtration	5	100	10
After Disinfection	1	50	0

a. A. Disinfection
   B: Bacteria settle to the bottom of the tank during disinfection
b. A: Filtration
   B: Disinfection kills or inactivates bacteria, preventing their reproduction
c. A: Coagulation & Sedimentation
   B: Disinfection kills bacterial count by disrupting cellular structures
d. A: Filtration
   B: Disinfectant, like chlorine, kills bacteria through oxidation

Answer Key

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