ECOLOGY

1. 1989 Q4 P1

State how excessive use of pesticides may affect soil fertility

2. 1989 Q8 P1

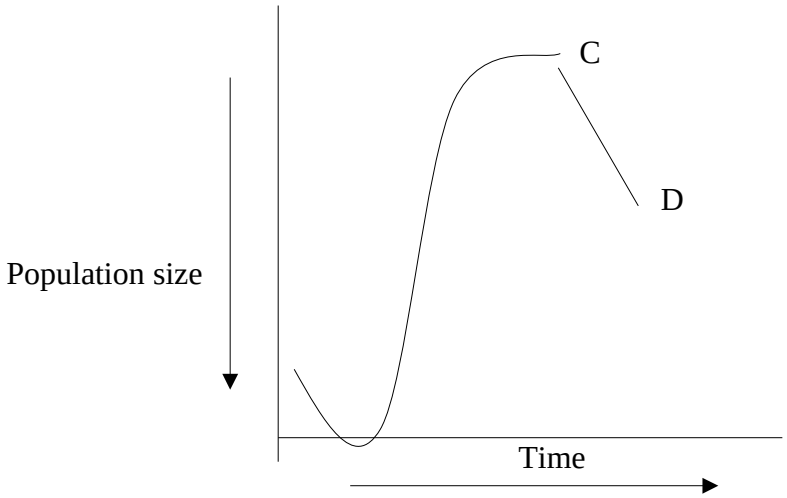
The table below shows a list of five human diseases. Complete the table by naming the causative agent of each.

The first one has been completed for you.

Disease	**Causative agent**
Ringworm	Fungus
Tuberculosis	
Yellow fever	
Bilharzia	
Trypanosomiasis (sleeping sickness)	

3. 1989 Q15 P1

The graph below represents a population growth of a certain herbivore in grassland ecosystem over a period of time



Suggest three factors that could have caused the population change between C and D.

4. 1989 Q17 P1

A biologist carried out a study to investigate the growth of a certain species of herbivorous bony fish and the factors influencing plant and animal life in four small lakes A, B, C, and D. The lakes were located in the same Geographical areas. Two of the lakes A and B were found to contain hard water due to presence of high contents of calcium salts. The mean bodies lengths of 2 year old fish, amount of plant life and investigate biomass in each lake were determined.

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The data was as shown in the table below.

Lakes	Mean body length of two year old fish (cm)	Type of water	Amount of plant life (g/m^3 of water)	Insects	Snails	Crabs	worms
A	31.2	Hard	1050	11	300	10	180
B	28.6	Hard	950	72	100	9	90
C	18.4	Soft	1.2	97	0	2	20
D	16.3	Soft	0.5	99	0	1	10

(a) Describe the procedure that may have been used to determine the mean body length of the fish.
(b) What were the likely reasons for the difference in the mean body length of the fish living in lakes A and D?
(c) Suggest one reason for the absence of snails in lake C and D.
(d) (i) Name any six abiotic (physical) factors that are likely to influence the plant and animal in life in Lake A.
(ii) Explain how each of the factors named in (d) (i) above may influence the plant and animal life in Lake A.

5. 1990 Q6 P1

Which of the following diseases that affect man are caused by viruses

- Typhoid
- Measles
- Pneumonia
- Dysentery
- Chickenpox
- Cholera
- Herpes simplex
- Poliomyelitis
- Trichomoniasis

6. 1990 Q14 P1

7. 1991 Q7 P1

State two roles of green plants in a fish aquarium other than providing food for fish.

8. 1991 Q8 P1

State two precautionary measures which should be taken in preventing an outbreak of cholera.

9. 1991 Q10 P1

With reference to leaf structure only. Explain **FIVE** ways by which plants are adapted to living in arid areas.

10. 1992 Q3 P1

11. 1993 Q3 P1

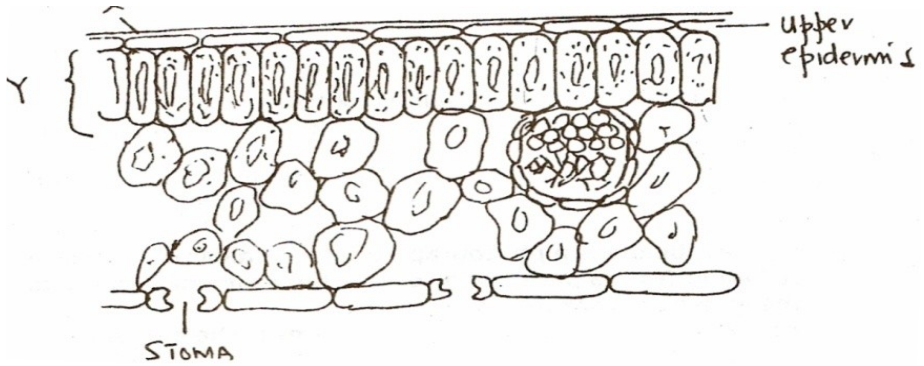
What is the biological reason for spreading oil on stagnant water in the control of malaria?

12. 1993 Q8 P1

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13. 1993 Q15 P1

The diagram below represents a section through a leaf of a terrestrial plant.



(a) Explain two ways in which structures labelled X and Y are adapted to their function

(b) State the difference that would be observed between the above section and one obtained from the plant growing in fresh water habitat

14. 1993 Q19 P1

(a) Explain how food as a factor regulates the population of animals in an ecosystem.

15. 1994 Q5 P1

Explain why the biomass of primary producers is greater than that of primary consumers in a balanced ecosystem.

16. 1994 Q19 P1

(a) What is pollution?

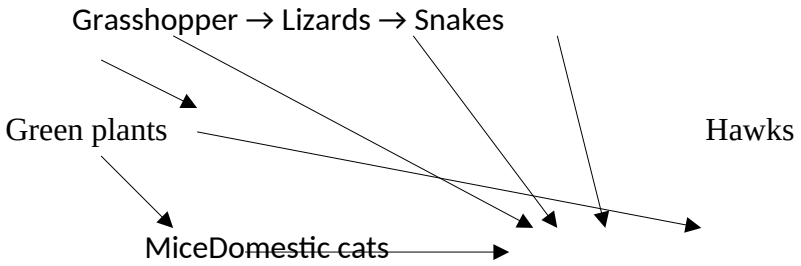
(b) State the cause and the methods of controlling pollution of;-

i. Air

ii. Water

17. 1995 Q13 P1

The chart below shows a feeding relationship in a certain ecosystem



(a) Construct two food chains ending with a tertiary consumer in each case (2 marks)

(b) Which organism has the largest variety of predators in the food web? (1 mark)

(c) Name secondary consumers in food web (2 marks)

(d) Suggest three ways in which the ecosystem would be affected in there was a prolonged drought. (3 marks)

18. 1996 Q15 P1

To estimate the population size of crabs in a certain lagoon, traps were laid at random. 400 crabs were caught, marked and released back into the lagoon. Four days later,

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traps were laid again and crabs were caught. Out of the 374 crabs, 80 were found to be marked.

(a) Calculate the population size of the crabs in the lagoon using the formula below

$$N = \frac{n \times M}{m}$$

Where N = Total population of crabs in the lagoon
n = Total number of crabs in the second catch
M = Number of marked crabs during the first
m= Number of marked crabs in the second catch (2 marks)

(b) State two assumptions that were made during the investigation (2 marks)

(c) What is the name given to this method of estimating the population size (1 mark)

19. 1997 Q6 P1

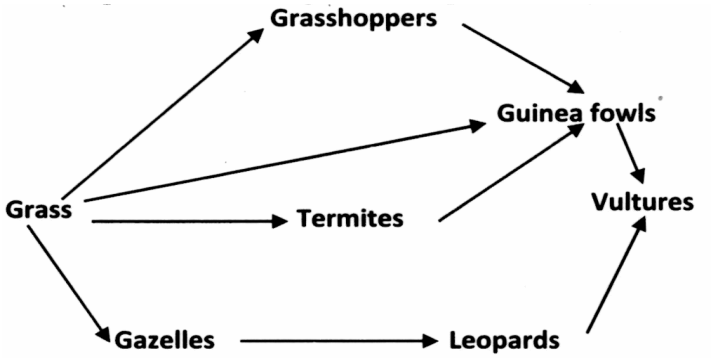
Oil can be applied on the stagnant water to control the spread of malaria.

(a) How does this practice control the spread of malaria? (2 marks)

(b) Give a reason why this practice should be discouraged

20. 1997 Q11 P1

The following below represents a feeding relationship in an ecosystem



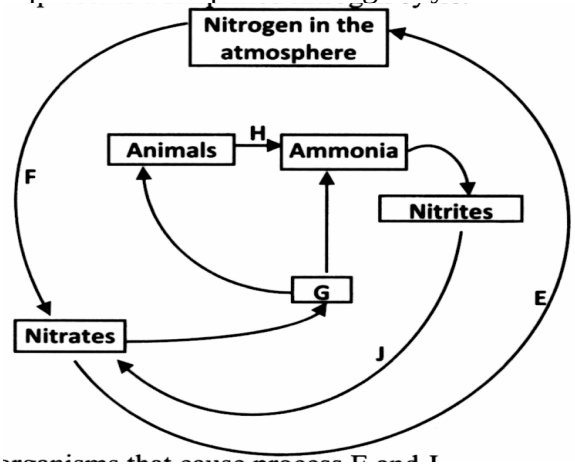
(a) Write down the food chains in which the guinea fowls are secondary consumers (2 marks)

(b) What would be the short term effects on the ecosystem if lions invaded the area? (3 marks)

(c) Name the organism through which energy from the sun enters the food web. (1 mark)

21. 1997 Q14 P1

The diagram below represents a simplified nitrogen cycle.



(a) Name the organisms that cause process E and J (3 marks)

(b) Name the process represented by F and H. (2 marks)

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(c) Name the group of organism represented by G (1 mark)

22. 1997 Q19 P1

(a) What is parasitism? (2 marks)

(b) Describe how the tapeworm is adapted to a parasitic mode of life (18 marks)

23. 1998 Q5 P1

What is the relationship between leguminous plants and bacteria found in their root modules? (1 mark)

24. 1998 Q10 P1

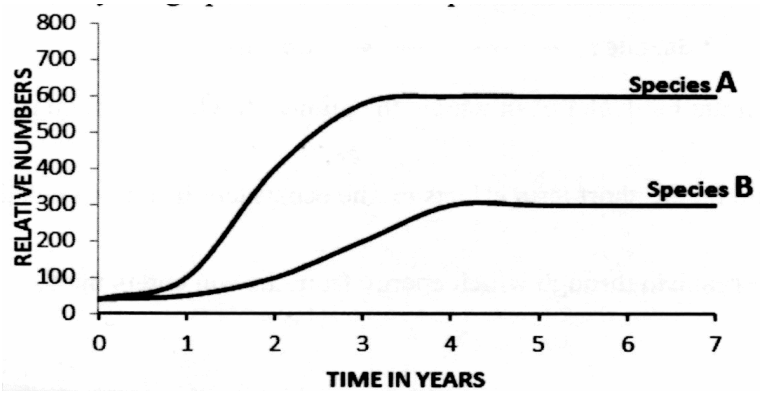
Give two reasons why primary productivity in an aquatic ecosystem decreases with depth. (2 marks)

25. 1998 Q11 P1

State two ways by which the human immuno deficiency (H.I.V) is transmitted other than through sexual intercourse? (2 marks)

26. 1998 Q15 P1

The herbivorous mammalian species were introduced into an ecosystem at the same time and in equal numbers. The graph below represents their populations during the first seven years. Study the graph and answer the questions that follow.



(a) (i) Which species has a better competitive ability? (1 mark)

(ii) Give reason for your answer (1 mark)

(b) Account for the shape of the curve species A between

(i) One year and three years (2 marks)

(ii) Three years and seven years (2 marks)

(c) A natural predator for species A was introduced into the ecosystem. With a reason state how the population of each species would be affected. (2 marks)

27. 1999 Q5 P1

28. 1999 Q13 P1

a) Distinguish between a community and population. (2 marks)

29. 1999 Q17 P1

Explain how the various activities of man have caused pollution of air. (20 marks)

30. 2000 Q2 P1

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Give a reason why two species in ecosystems cannot occupy the same niche. (1 marks)

31. 2000 Q3 P1

State two ways in which some fungi are beneficial to humans (1 mark)

32. 2000 Q10 P1

Explain how birds of prey are adapted to obtaining their food. (2 marks)

33. 2000 Q17 P1

The numbers of different types of animals supported by a square kilometer in two terrestrial ecosystems are shown in the table below

Type of ecosystem	**Type of animal**	**Number of animals supported per sq. km**
Acacia savannah	**Domestic animals**	
	Cattle	7
	Goat	30
	Sheep	10
	Wild games	
	Thomsons's gazelles	450
	Eland	20
	Wildebeest	60
Bush land	**Domestic animals**	
	Cattle	2
	Goats	15
	Sheep	5
	Wild game	
	Thomson's gazelles	200
	Eland	12
	Wildebeest	10

(a) (i) Which domestic animal is better adapted to both ecosystems? (1 mark)

(ii) Give a reason why the animal named in (a) (i) above is better adapted to the two ecosystems. (1 mark)

(b) Why are cattle and sheep fewer in the bush land than in the savannah? (1 mark)

(c) (i) Name suitable methods that were used to estimate the population of: (2 marks)

- Domestic animals
- Wild animals

(ii) Give a reason why the method named for wild animals in (c) (i) above is Suitable (2 marks)

(d) State three methods which could be used to determine the diet of wild animals

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in an ecosystem (3 marks)

(e) Name four biotic factors that could have regulated the animal population in both ecosystems (4 marks)

(f) State four human activities that affect population of animals in game Parks (4 marks)

(g) What is the importance of national park to a nation? (2 marks)

34. 2000 Q19 P1

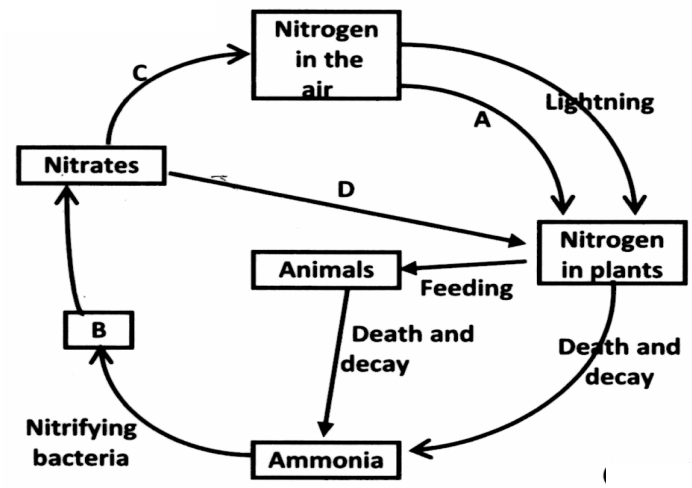
Explain how leaves of mesophytes suited to their functions? (2 marks)

35. 2001 Q2 P1

Why are green plants referred to as primary producers in an ecosystem? (2 marks)

36. 2001 Q13 P1

The diagram below represents the nitrogen cycle



(a) State the process labelled (2 marks)

A……..

D…….

(b) Name the compound represented by B (1 mark)

(c) Name the group of organisms labeled C (1 mark)

(d) (i) name the group of plants which promote process A (1 mark)

(ii) State the part of the plant where process A takes place (1 mark)

(e) How would excess pesticides in the soil interfere with process A (2 marks)

37. 2002 Q2 P1

a) Name the bacteria found in the root nodules of leguminous plant (1 mark)

b) State the association of the bacteria named in (a) above with the leguminous plants. (1 mark)

38. 2002 Q7 P1

Explain why the carrying capacity of wild animals is higher than that for cattle in a given piece of land. (1 mark)

39. 2002 Q15 P1

Ascaris lumbricoides in an example for an endo – parasite

a) The name Ascaris refers to …… (1 mark)

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b) State the habitat of the organism (1 mark)

c) State three ways in which the organism is adapted to living in its habitat. (3 marks)

40. 2003 Q4 P1

a) Name the bacteria found in root nodules of leguminous plants. (1 mark)

b) What is the role of the bacteria named in (a) above? (1 mark)

41. 2003 Q10 P1

How are leaves of submerged adapted plants for photosynthesis? (3 marks)

42. 2003 Q11 P1

Name the causative agent of typhoid. (1 mark)

43. 2003 Q16 P1

a) What is meant by:

i) Autecology (1 mark)

ii) Synecology? (1 mark)

b) The number and distribution of stomata on three different leaves are shown in the table below:

Leaf	**Number of stomata**	
	Upper epidermis	**Lower epidermis**
A	300	0
B	150	200
C	02	13

Suggest the possible habitat of the plants from which the leaves were obtained (3 marks)

(c) State the modifications found in the stomata of leaf C. (3 marks)

44. 2004 Q3 P1

45. 2004 Q19 P1

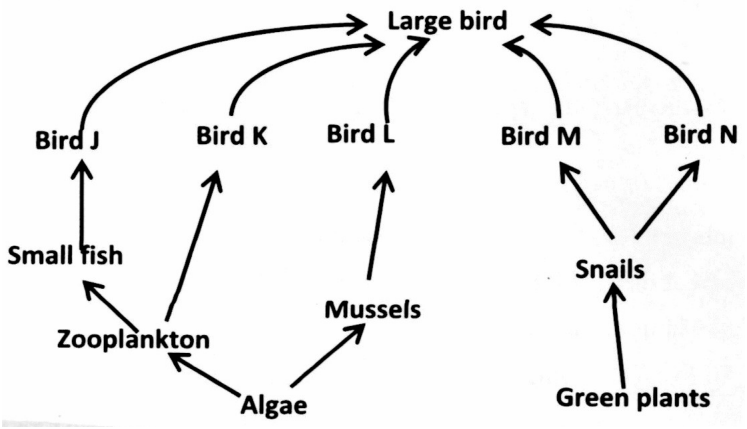
46. 2005 Q10 P1

Name the organism that causes amoebic dysentery. (1mark)

47. 2005 Q17 P1

After an ecological study of feeding relationships students constructed the food web below.

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a)Name the process through which energy from the sun is incorporated into the food web. (1mark)

b) State the mode of feeding of the birds in the food web (1mark)

c)Name two ecosystems in which the organisms in the food web live (1mark)

d) From the information in the food web, construct a food chain with the large bird as a quaternary consumer. (1mark)

e) What would happen to the organisms in the food web if bird N migrated? (3 marks)

f) Not all the energy from one trophic level is available to the next level. Explain (3 marks)

g)(i) Two organisms which play a role in the ecosystems are not included in the food web. Name them. (2 marks)

(ii)State the role played by the organisms named in g(i) above. (1 mark)

h)i) State three human activities that would affect the ecosystems. (3 marks)

ii) Explain how the activities stated in h(i) above would affect the ecosystems. (3 marks)

48. 2006 Q16 P1

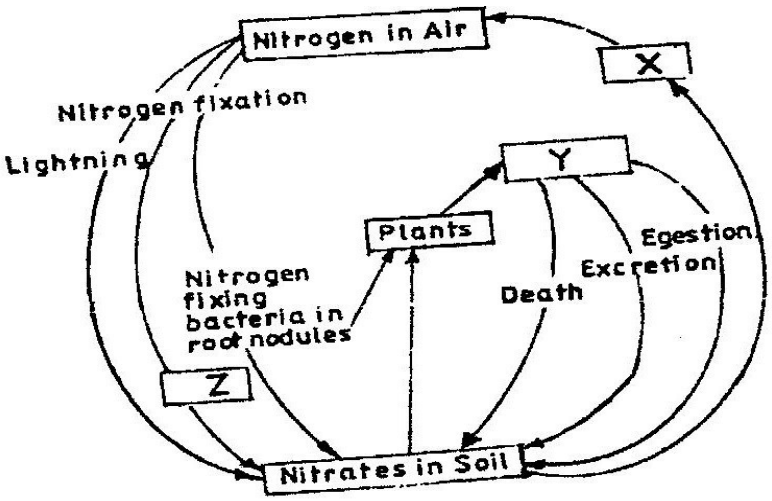
What is the importance of the following in an ecosystem? (2 marks)

a) Decomposers

b) Predation

49. 2006 Q26 P1

The chart below represents a simplified nitrogen cycle.



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What is represented by X, Y, and Z? (3 marks)

50. 2006 Q3 P2

a) Distinguish between pyramid of numbers and pyramid of biomass. (2 marks)

b) Give three reasons for loss of energy from one trophic level to another in the food chain. (3 marks)

51. 2007 Q15 P1

(a) Distinguish between population and community (2 marks)

(b) Name a method that could be used to estimate the population size of the following organisms

(i) Fish in a pond (1 mark)

(ii) Black jack in a garden (1mark)

52. 2007 Q16 P1

State two ways in which schritosoma species is adapted to parasitic mode of life (2 marks)

53. 2007 Q26 P1

State one way by which HIV/AIDS is transmitted from mother to child (1 mark)

54. 2007 Q8 P2

Describe causes and methods of controlling water pollution (20 marks)

55. 2008 Q3 P1

(a) Name a disease of the liver whose symptom is jaundice (1 mark)

(b) State the causative agent of:

(i) Cholera (1 mark)

(ii) Candidiasis (1 mark)

56. 2008 Q14 P1

Describe the three characteristics of a population (3 marks)

57. 2008 Q22 P1

State two characteristics of aerenchyma tissue (1 mark)

58. 2008 Q7 P2

59. 2009 Q2 P1

60. 2009 Q9 P1

61. 2009 Q19 P1

62. 2009 Q20 P1

63. 2009 Q25 P1

64. 2009 Q3 P2

65. 2010 Q13 P1

What is meant by the following term?

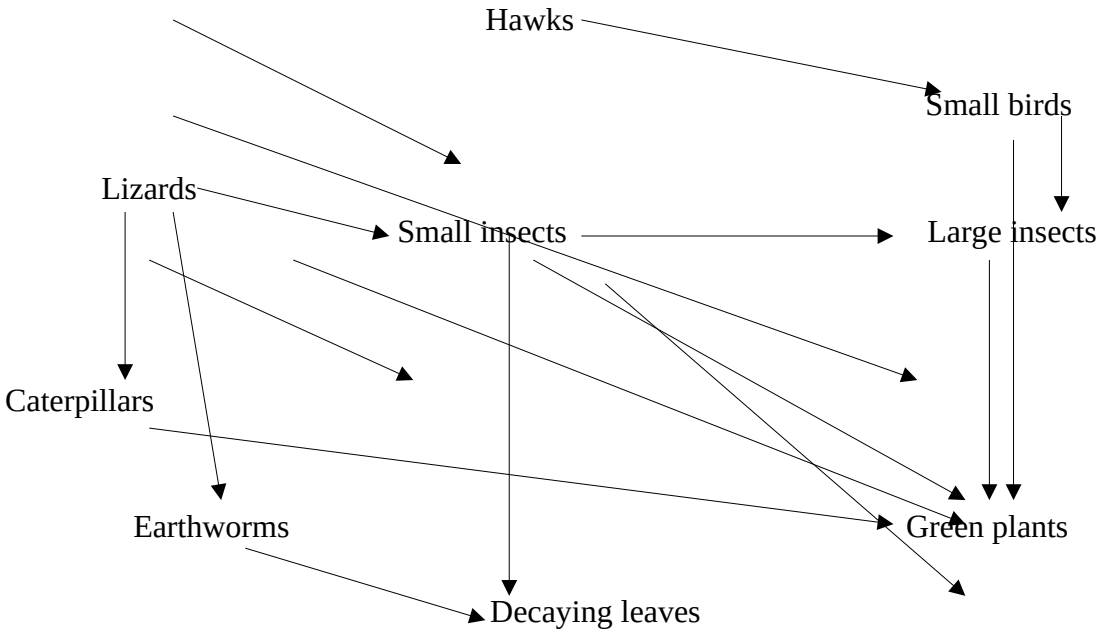
a) Habitat; (1 mark)

b) Ecosystem (1 mark)

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66. 2010 Q3 P2

The diagram below represents a food web in certain ecosystem



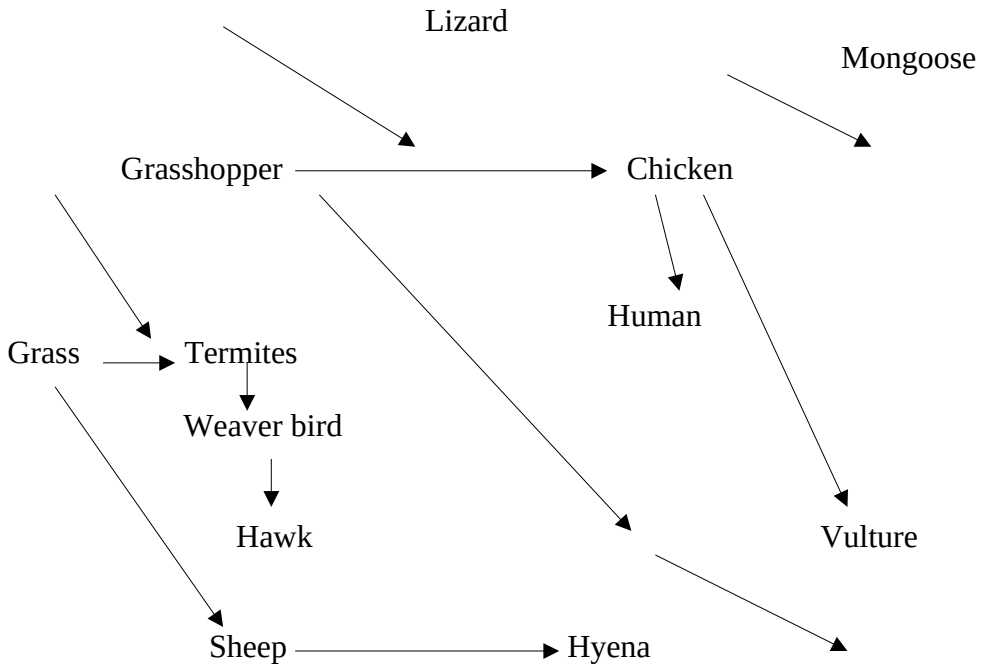
a) Name the trophic level occupied by each of the following:
   i) Caterpillars (1 mark)
   ii) Small insect. (1 mark)

b) From the food web, construct **two** food chains which end with lizards as a tertiary consumer. (2 marks)

c) i) Which organisms have the least biomass in this ecosystem? (1 mark)
   ii) Explain the answer in (c)(i) above.

67. 2011 Q5 P1

The figure below illustrates a food web in a certain ecosystem.



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From the food web:

a) Draw the shortest food chain; (1 mark)

b) Identify the organisms with the highest

i) number of predators; (1 mark)

ii) biomass (1 mark)

68. 2011 Q6 P1

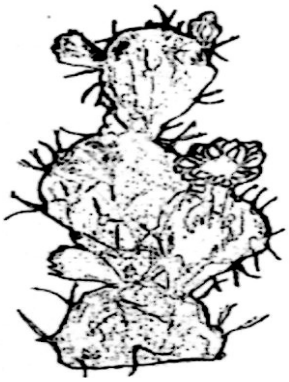
What is meant by the following terms?

a) Ecology (1 mark)

b) Carrying capacity (1 mark)

69. 2011 Q14 P1

The diagram below represents a certain plant.



(a) What is the likely habitat for the plant (1mark)

(b) Give two reasons for your answer in (a) above (2marks)

70. 2012 Q5 P1

The table below shows results of a study of three plants C, D and E growing in different habitats

feature	**Plant C**	**Plant D**	**Plant E**
number of stomata on upper surface of leaf per square area	4	20	6
number of stomata on lower surface of leaf per square area	6	0	8
Thickness of leaf cuticle (mm)	0.4	0.1	0.2
Surface area of roots (cm^2)	2000	1000	1200

a) Which one of the plants C, D and E grows in an area of relatively low water availability? (1mark)

b) Explain your answer in (i) above (1mark)

71. 2012 Q21 P1

Name the process through which free atmospheric nitrogen is converted into nitrates. (1mark)

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72. 2012 Q6 P2

The data provided below represent populations of a predator and its prey over a fifty years period.

TIME IN YEARS	POPULATION IN RELATIVE NUMBERS	
	POPULATION OF P	POPULATION OF Q
5	24500	17000
10	30000	20500
15	33500	26000
20	33500	30000
25	31000	33000
30	27000	32000
35	25000	30000
40	29000	27500
45	32500	28000
50	34000	28500

(a) (i) Using the same axes, draw graphs of the relative populations of **P** and **Q** against time. (7 marks)

(ii) With a reason, identify the curve that represents the prey. (2 marks)

(iii) Account for the two populations between 25 and 32 years. (2 marks)

(iv) Which years were the two populations equal? (2 marks)

(v) Apart from predation, state **three** biotic factors that may have led to the decline of the prey population. (3 marks)

(b) Describe the hazards of air pollution by Sulphur(IV)Oxide. (9 marks)

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73 . 2014 Q6 P2

An experiment was done to determine the uptake of nitrogen from the soil by broad bean seedlings. The experiment was done with one set of seedlings M grown in the atmosphere enriched with carbon (IV) oxide and another, set up of seedlings N grown in the normal atmosphere.

The amount of nitrogen in each seedling was measured in milligrams at intervals of ten days. The table below shows the results obtained.

	Amount of nitrogen in milligrams									
SET M	0	25	70	125	160	395	635	860	895	915
SET N	0	15	35	50	65	105	120	125	135	140
TIME (DAYS)	15	25	35	45	55	65	75	85	95	105

(a) Using the same axis draw line graphs of nitrogen uptake by the two (**M** and **N**) sets of broad bean seedlings against time. (8 marks)

(b) Determine the rate of uptake of nitrogen in Set **M** between 65 and 85 days. (2 marks)

(c) i) What is the relationship between carbon (IV) oxide concentration in the air and nitrogen uptake?

(ii) Account for the relationship in (c) (i) above (3 marks)

(d) i) What would happen to the concentration of nitrogen in the seedlings in set **M,** if after 75 days the seedlings are transferred to a normal atmosphere (1mark)

ii) Explain your answer in (d) (i) above (2 marks)

(e) State **three** ways in which nitrogen fixation occurs (3 marks)

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ECOLOGY

MARKING SCHEME

1. 1989 Q4 P1

May kill soil micro-organisms that decompose humus to release mineral salts. In this way they interfere with nutrient cycling

2. 1989 Q8 P1

Disease	**Causative agent**
Ringworm	Fungus
Tuberculosis	Bacteria
Yellow fever	Virus
Bilharzia	Schistosoma/fluke/platyhelmintes
Trypanosomiasis(sleeping sickness)	Trypanosoma

3. 1989 Q15 P1

- Drought or fire
- Emigration
- Food shortage/overgrazing

4. 1989 Q17 P1

(a) - The fish were caught, their age determined and the two year old were obtained and their lengths measured and recorded.
- This was done repeatedly until a large enough number (more than thirty) were measured. Calculation was done by dividing the total length of all fish by the total number of fish.

(b) - Lake A has hard water/ more calcium while Lake D has soft water/ less calcium.
Calcium is needed for bone formation. Thus the fish in Lake A will grow faster and have greater bone length and body length than fish in Lake D.

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(c) Lakes C and D have very little / no calcium which is necessary for the formation of shell in snails.

(d) i) Light, temperature, carbon dioxide concentration, oxygen concentration, PH, and salinity.

ii) - Light: Determine the rate of photosynthesis hence the primary production of the lake

-Temperature: rate of enzyme action in photosynthesis and other Metabolic reactions in plants and animals

- Carbon dioxide: determine the rate of photosynthesis / productivity (since it is a raw material).it also determines the ph of water.

- Oxygen: affects respiration in plants and animals
- Salinity: some ions are needed for plants and animal nutrion. Osmoregulation in plants and animals is affected by salinity.

- Ph: Affects enzyme reactions in metabolism.

5. 1990 Q6 P1

Measles, chickenpox, herpes simplex, poliomyelitis

6. 1990 Q14 P1

(a) (i) 1968

(i) Hot water/ temperature, sewage and industrial waste

(ii) **Temperature:**

High temperature reduces the amount of dissolved oxygen in water. This cause the suffocation of fish.

Sewage:

- Decomposition of organic matter in sewage reduces oxygen concentration in the lake. Sewage provide food for bacteria (aerobic) increasing their population and demand for oxygen; leading to depriving fish for oxygen.
- The carbon dioxide and ammonia produced by decomposition of sewage changes PH of water in lake and hence interferes with photosynthesis.
- Pathogenic bacteria in sewage may kill fish.
- Sewage blocks light penetration into the the lake. This interferes with producers / photosynthesis thus decreasing available.

Industrial waste:

Toxic substances in industrial waste kill producers and fish substance in wastes may clog fish gills and may change PH of water and oxygen solubility is reduced; oil in surface may reduced oxygen availability to fish.

(b) (i) population of species A recovers at a faster rate than species D

(ii) - Reproductive rate/ fecundity higher in A and B
- Less competition for food in A in absence of C.
- C feeds on A: therefore A increased faster in absence of C.
- More predation of D than A
- Waste contained toxic substances with longer terms effect in D than A

(c) (i) Capture/ Recapture method

(ii) Marks may have disappear/death may interefere

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7. 1991 Q7 P1

- Generate oxygen
- Remove carbon dioxide

8. 1991 Q8 P1

- Vaccination/ Immunization;
- Proper hygiene

  Acc. Any example of proper hygiene.

9. 1991 Q10 P1

(a) - Reduced leaf surface/ needle like / spine / scales; thickened / waxy / shiny cuticles; Sunken stomata; reduced number of stomata; hairy leaves.
- Succulent / fleshy leaves to store water.

(b) – Wave length / colour / quality of light.
- Duration / period of light
- Light intensity

10. 1992 Q3 P1

Cholera/ dysentery/ typhoid/ hepatitis; clean sanitary conditions/ personal hygiene/ drinking boiled water / cook food well.

11. 1993 Q3 P1

Oil cuts the supply of air / suffocates / kills mosquito larvae: Thus breaking the life cycle / reducing population of mosquito

12. 1993 Q8 P1

(a) Elephantiasis / Filariasis

(b) Potato/ tomato blight

13. 1993 Q15 P1

(a) X

(i) Thick / waxy (and impervious) to prevent water loss.

(ii) Transparent to allow light; tough for protection against mechanical injury / infection; shiny to reflect heat / light preventing leaf from heating up.

Y

(i) Cell closely packed/ vertically elongates to trap light

(ii) Positioned on upper side trap light; has chloroplast for photosynthesis

(c) Large air space/ closely packed mesophyll tissue/ aerenchyme stomata on upper epidermis/ no stomata on lower epidermis; reduced muscular bundles; presence of scheroids; reduced/ thin cuticle; chloroplast on epidermis

Acc. Stomata on top/upper side or surface but Rej. Upper part

Acc. poorly developed vascular bundles

Rej. Reduced number of vascular bundles

14. 1993 Q19 P1

(a) A lot of food cause population to increase due high rate of reproduction an immigration hence competition for food, death, emigration thus reducing the population, little food leads to stiff competition, hence emigration, death reducing population.

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(b) Energy from the sun is trapped by green plants, in the process of photosynthesis when chemical energy/ starch/ food is produced; the green plants are the producer/ are the 1st trophic level ; the plants are eaten by herbivore, which are primary consumers/ occupy the 2nd trophic level; the herbivores are then eaten by carnivores which are the secondary consumers/ the 3rd trophic level when the plants and animqls / organism die; saprophytic organisms/fungi/bacteria feds them into simple substance/ mineral, the fungi/ bacteria are the decomposers / dentritivores/ dentritors as the energy flows to various trophic levels some energy is lost through respiration.

15. 1994 Q5 P1

Energy to sustain primary consumers is obtained from primary producers(who must also sustain themselves).Energy lost from one trophic level to the next

16. 1994 Q19 P1

(a) Pollution in any process which leads to adverse/ harmful spoiling changes in the environment

(b) (i) Air

Air pollution is caused by pollutants such as dust, smoke, and fumes of engines, harmful gases / aerosols / sulphur dioxide / oxides of nitrogen / CO_2 / CO noise / loud explosion / bomb explosion

Sources

Factories/industries heavy traffic/ motor vehicles/ plains/ fire/ burning charcoal. Volcanoes bomb explosion.

Control of air pollution

- Use of lead free petrol in motor vehicles
- Smokeless fuel/ electricity / solar energy
- Filtration of waste gases to remove harmful gases
- Factories to be elected away from residential area
- Reduced volume/ intensity of sound/ use ear miffs

(ii)Water

- Causes of water water pollution
- Agrochemical/silting/ dust/excessive fertilizers/ pesticides/ herbicides
- Industrial/ domestic waste/ efficient
- Untreated sewage/human feaces
- Sillage of oils/ chemicals

Control of water pollution

- Treatment of industrial wastes before discharge in water
- Educating farmers on use of controlled amounts of insects/ pesticides/ herbicides/ weed killers/ fertilizerts / orgarnic farming controlled soil erosion
- Avoid spillage of oils/ chemicals

17. 1995 Q13 P1

(a) - Green plants – Grasshoppers – Lizards – snakes
- Green plants – Grasshoppers – Lizards – Cats
- Green plants – Mice – Snakes – Hawkers
- Green plants – Mice – Snakes – cats

(b) – Mice

(c) Lizards eat Hawk snakes, Rej. If any primary, tertiary consumer is given

(d) (i) Most plants will die / dry
(ii) (same) organisms may starve to death

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(iii) (same) organisms may migrate

18. 1996 Q15 P1

(a) $\frac{374 \times 400}{80} = 1870$

(b) - There was even distribution of crabs
- No movement in and out of regions; no migration
- There was random distribution of errors after the first capture.

(c) – Capture/ recapture; capture release recapture.

19. 1997 Q6 P1

(a) Mosquito larvae/ Pupae are killed; Accept suffocation/ Breaking life cycle of mosquitoes

(b) Pollution of environment/ oil expensive, other aquatic are killed; accept Contamination.

20. 1997 Q11 P1

(a) Grass → Grasshoppers → Guinea fowls
Grass → Termites → Guinea fowls

(b) Lions would compete with leopards
Gazelle numbers would reduce
Grass would increase

(c) Grass; rej. Plants

21. 1997 Q14 P1

(a) E- Denitrifying bacteria; e.g. pseudomonas denitrifications
J- Nitrifying bacteria; Nitrobacteria reject nitrosamines

(b) H- Death decay/ decomposition; excretion/ Aminonification putrefaction egestion.
F- Nitrogen fixation

(c) Plants

22. 1997 Q19 P1

(a) An association between two organisms; where one benefits; and the other is adversely affected. Or an association where an organism lives in or on another living or organism: obtaining from it and causing harm without necessary killing it.

(b) Has hooks/suckers: for attachment to wall of intestines: long; to increase surface area for absorption of food: award increase in S.A for absorption once. Secretes enzymes/to neutralize digestive enzymes; (mucus inhibitor substance/anti enzymes)

Hermaphroditic: to ensure reproductive/ self fertilization.
Production of many eggs: to ensure survival
Segment for egg dispersal:

More than one host; for transmission: e.g T solium – pig (Intermediate host) T. Saginata. Long to fit in the intestine/ increase surface area for (flatten) Absorption of food;
Anaerobic survive in the gut with low O_2.

23. 1998 Q5 P1

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Symbiotic/ both benefit/ mutual benefit; correct description of mutual benefit

24. 1998 Q10 P1

–Light intensity decreases with depth light limiting
- Temperature decreases with depth

25. 1998 Q11 P1

– Use of unsterilized instrument;
- Temperature decreases depth
- blood transfusion
- Mother to the foetus/ mother to baby infant/ breast milk/ sharing of instruments e.g needles syringes, razor blade e.t.c
- Mixing of infected blood through cuts

26. 1998 Q15 P1

(a) (i) Species A;
(ii) The rate of multiplication/ growth in A is faster than of species B

(b) (i) One year and three years
1-3 years shortage of resources more suitable environmental Conditions/ such as food space e.t.c resource were not limiting hence the population increased exponentially rapidly; acc correctly named resource e.g food space.

(ii) Three years and seven years
3-7 years shortage of resources/ limiting/ birth rate equals death rate; hence the population had become stagnant/ constant; acc; Environmental resistance has set in rej. Incorrect resources e.g PT and T.

(c) Species A would decrease (because of there is less competition with species A/ more resources available.

27. 1999 Q5 P1

Shelter Food, Oxygen Removal of CO_2 breeding sites.

28. 1999 Q13 P1

a) A community consists of all members of a given spaces ina particular habitat at a particular time.
b) Use the capture and recapture methods; Catch the grasshoppers count and mark using permanent ink; record and release; and allow time 1 to 2 hours; recapture and count the marked and the unmarked; total population is equal to the number of marked and unmarked grasshoppers in the second sample multiplied by number marked grasshoppers in the first sample; divided by the number of grasshoppers marked in the second sample that were recaptured.

29. 1999 Q17 P1

Sulphur based chemicals e.g. sulphure dioxide gas H_2S Cl_2 HCl_2 produced by (food preventing) industries /sewages matter, Affect gaseous exchange/makes acid rain /damages plants leaves.
Acc. Pesticides, Herbicides, Insecticides, Acaricides, paint sprays, Aerosols

CFCs sprayed to control (plant) disease and pests, also affect respiratory organs of animals; the chemicals are residuals and persistent (not easily) broken down deplete.

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Ozone layers; smoke/fumes produced in areas with (heavy) industries and (high density of motor vehicles / fire which burn fuel/oils wood coal; These visibility; fumes also settle on leaves and stop photosynthesis (excessive) production of carbon dioxide causes the green house effect/Temp. inversion as a result of heating in lower layers of atmosphere; sound /noise produced incessantly b machines/ heavy vehicles/aircraft; affects hearing in animals; Dust, industrial production of (cement) generates dust; which finally settles on plants leaves limiting photosynthesis; removal of vegetation/cutting of trees; interferes with.

The carbon cycle; radioactive emissions; from nuclear reactors/mines/ x-rays machines bombs cause mutation/cancer/death.

30. 2000 Q2 P1

Due to stiff competition of resources leading to elimination/ exclusion of one species; acc. currently named example food

31. 2000 Q3 P1

– Brewing industries; baking
- Manufacture of medicine/ antibiotics
- Food e.g. mushrooms yeast also provides vitamin B, and B2

32. 2000 Q10 P1

- Curved/ sharp/ hooked strong beaks for killing / tearing/ ripping off flesh from bones
- Curved/ strong/ sharp claws for grabbing/ holding prey

33. 2000 Q17 P1

(a) (i) Goat
(ii) It is a grazer and a browser

(b) Insufficient grass in bush/ aren't adapted to eating twigs/ not browsers/ are grazers

(c) (i) Domestic animals - total counts
Wild animals – total counts; aerial counts/ quadrant/ Belt transect/ capture/ recapture
(ii) Analyzing gut counts, studying dentition/ breaks/ claws/ parts

(d) Observation
Examine droppings
Dissecting a sample of animals/ study structure/ nature of digestive System/ size of caecum/ length of intestine/ chamber

(e) Irrigation
Competition; diseases
Predation; human activity/ man accept any correct
Parasitism

(f) Poaching, cropping/ culling/ licensed spot hunting

(g) Pollution; translocation
Burning trees, charcoal- deforestation

34. 2000 Q19 P1

Broad/ wide/ flat lamina provides large surface area for absorption of (O) and sunlight, thin to ensure short distance of CO_2 reach photosynthesis/ palisade cells; presence of stomata guard cells for efficient diffusion of O_2 gaseous exchange / H_2O vapour transpiration/ CO_2 into the leaf transparent

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cuticle epidermal cells; for light penetration into palisade cell which contains chloroplast next to upper epidermis; these receives maximum light for photosynthesis. Chloroplasts have chlorophyll, which traps light energy.
Leaves have vein, xylem and phloem to transport products of photosynthesis to other part of the plant.

Air spaces on spongy mesopyll, easily circulates gases/ CO_2 diffuse into palisade cells.

Mosaic arrangements of leaves; enable leaves to trap sunlight.

35. 2001 Q2 P1

Utilize energy from the sun to manufacture food/ photosynthesis; for subsequent tropic level/ consumers/ other organisms

36. 2001 Q13 P1

(a) A – Nitrogen fixation
D – Absorption
(b) Nitrate/ nitrates/ NO_2
(c) Denitrifying bacteria/ Denitrifiers
(d) (i) Leguminous plants, (acc. Legume/ acc examples e.g beans peas)
(ii) Roots nodules; rej root or nodules alone; acc; root
(e) – Killing / reducing of composers
- Killing/reduction of nitrogen fixing bacteria/ nitrogen fixing microorganisms
- Destruction of leguminous plants

37. 2002 Q2 P1

a) Rhizobium Nitrogen fixing bacteria
b) Symbiosis / mutualism

38. 2002 Q7 P1

Cattle are mainly grazers while others are browser.

39. 2002 Q15 P1

(a) Genus
(b) Ileum/ colon/ duodenum/ intestines/ of humans or intestines of pig

(c) Lack of elaborate elementary canal (simple guts) can tolerate raw corn
Thick cuticle pellicle, reject the outer covering lays many eggs
Mouthparts for sucking partly digested food
By pollen tube that grows through style

40. 2003 Q4 P1

(a) Rhizobium
(b) Convert nitrogen into nitrates / convert nitrogen into proteins / convert N_2 into nitrogenous Compounds / foxed N_2 into nitrates.

41. 2003 Q10 P1

- Numerous chloroplasts to absorb light / epidermis have chloroplasts to absorb light.
- Deeply divided / truncated leaves / branched leaves to increase surface area.
- Large air spaces for storage of air / buoyancy; acc parenchyma tissue for storage of air

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- Have no cuticle to facilitate exchange of gases

42. 2003 Q11 P1

Salmonella typhi; Acc.Bacteria / salmonella alone

43. 2003 Q16 P1

a) i) study of a single species within a community / ecosystem / habitat / environment.

ii) Synecology?

Study of natural communities within an ecosystem

b)

Leaf	**Habitat**
A	aquatic / fresh water
B	Forest; Terrestrial
C	Arid / semi arid; desert.

c) Sunken
Hairy
Reserved rhythm
Small stomatal pore

44. 2003 Q3 P1

Has air spaces; which store gases for gaseous exchange buoyancy;
Acc. Floating.

45. 2004 Q19 P1

Wind.

In windy conditions the rate of transpiration increases; wind disperses fruits/ seeds; is an agent of pollination; acc. Spores for seed.

Temperature

Changes in temperatures affects the rate of photosynthesis and other biochemical reactions/ metabolic reactions/ enzymatic reactions/ enzymatic reactions, temperature increases rate of transpiration;

Lights

Plants need light for photosynthesis, some plants need light for flowering/ photoperiodism/ seeds like lettuce require light for germination.

Humidity

When humidity is low, the rate of transpiration increases;

PH

Each plant requires a specific pH to grow well/ acidic/ alkalinity/ neutral;

Salinity

Plants with salt tolerant tissues grow in saline area, plants in estuaries adjust to salt fluctuations;
Topography
North facing slopes in temperature lands have more plants than south facing slope
Plants on windward side have stunted/ distorted growth;
Acc. Comparisons of mountains and valleys

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Acc. Description of other areas with other topographies e.g. River valley rainfall/ water
- Fewer plants in areas/ semi arid and
- Water is needed for germination/ is a raw material for photosynthesis/ dissolves/ minerals salts/ provides turgidity for support/ fruits/ seeds

Pressure;
Variation in atmospheric pressure affect availability of CO+2+ which affects photosynthesis and low pressure increase rate of transpiration; and affect amount of oxygen; for respiration

Mineral salts/ trace elements
- Affects distribution of plants in the soils
- Plants thrive well where there are mineral salts in the soil
Plants living in the soil deficient in particular mineral element have special methods obtaining it; for example legumes obtaining from nitrogen by fixation

46. 2005 Q10 P1
Entamoeba hystolystica

47. 2005 Q17 P1
a)Photosynthesis
b)Heterotrophic – holozoic

c) Small fish pond / dam, rain forests.
d) Algae ⟶ Zoo plankton ⟶ smallfish ⟶ bird ⟶ large bird.

e)-Snails would increase in number
-Bird M would increase in number.
-Green plants would decrease in number

f) The energy to be passed on from one trophic level to the next is contained in food materials. Most of the food taken in by consumers passed on from one trophic level to the next is consumers passes through the digestive track as undigested matter that is removed as faeces. The digested materials are absorbed in to the bloodstream and conveyed to various tissues of the body. Most of the absorbed food materials are used in respiration, to Produce is lost as heat during sweating, evaporation and transpiration in plants.

g) i) Scavengers e.g. vultures
Decomposers e.g. bacteria

ii) Scavengers feed on dead bodies of herbivores and carnivore // the consumers.
-Decomposers act upon the remains of the producers, consumers, & Scavengers causing decay, to release inorganic materials, which are later re-used by producers to make new organic compounds.

h) i) -Deforestation
-Overgrazing
-Soil erosion
-Hunting, poaching
-Over fishing

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-Poor waste disposal // Environmental pollution

ii) **Deforestation**

Lack of trees leads to reduced number producers in an ecosystem.

Overgrazing

Many animals eat away and trample the vegetation hence reducing / depleting the number of producers.

-Lead to gully erosion hence carrying away some of the underground and crawling animals (Consumers)

48. 2006 Q16 P1

a) Decomposer – breakdown of large component to simpler nutrient hence recycling of nutrients in an ecosystem

b) Predation – regulation of numbers / population of prey

49. 2006 Q26 P1

X- Denitrifying bacteria/ denitrification

Y- Animals/ Herbivores; accept primary consumers

Z- Nitrogen fixing bacteria (in soil) accept Azotobacter.

50. 2006 Q3 P2

(a) Pyramid of numbers is a diagrammatic representation of the number of organism, at each trophic level in a food chain; While biomass is a diagrammatic representation of dry weight organism at each trophic level in a food chain.

(b) Insufficient utilization of food resource/ wastage

Through respiration

Though excretion

51. 2007 Q15 P1

(a) Population – It is all members of a given species in particular habitat at a particular time.

Community- all organisms belonging to different species interact in the same habitat.

(b)(i) Capture and recapture method

(ii) Line transect

52. 2007 Q16 P1

- - Produce large number of eggs for increased survival
- Produce enzymes to digest human skin when penetrating
- Can withstand low oxygen concentration
- Have hooks – like structures to attach to the intestinal walls

53. 2007 Q26 P1

During birth, breast feeding

54. 2007 Q8 P2

It is addition of substance into water that may cause harm to organisms and are disruptive to ecosystem.

The causes of water pollution include:

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- Industrial effluents that may be toxic chemicals which may kill the aquatic organisms. It can be controlled by treating the effluents before discharging them.
- Hot water that reduces concentration of oxygen killing the animals. It is controlled by placing high penalties on factories discharging hot water.
- Oil spillage from oil tankers that reduces oxygen in water, penetration of light intensity and clog feathers of marine birds. It can be controlled by regular servicing of oil tankers.

Domestic effluents that include:

- Untreated sewerage that causes water borne diseases. It can be controlled by treating sewerage before being discharged.
- Detergents that cause eutrophication causing reduced oxygen concentration. It is controlled by banning phosphate based detergents.
-

Agricultural effluents that include:

- Pesticides and herbicides that have heavy metals that they may cumulates along the food chain killing the higher animals. It is controlled by use of biological control of pests.
- Inorganic fertilizers that have nitrates and sulphates that cause eutrophication is controlled by use of organic fertilizers.

Silting due to soil erosion reduces penetration of light to the plants and clog respiratory surfaces of animals. It is controlled by proper methods of soil erosion and proper farming methods.

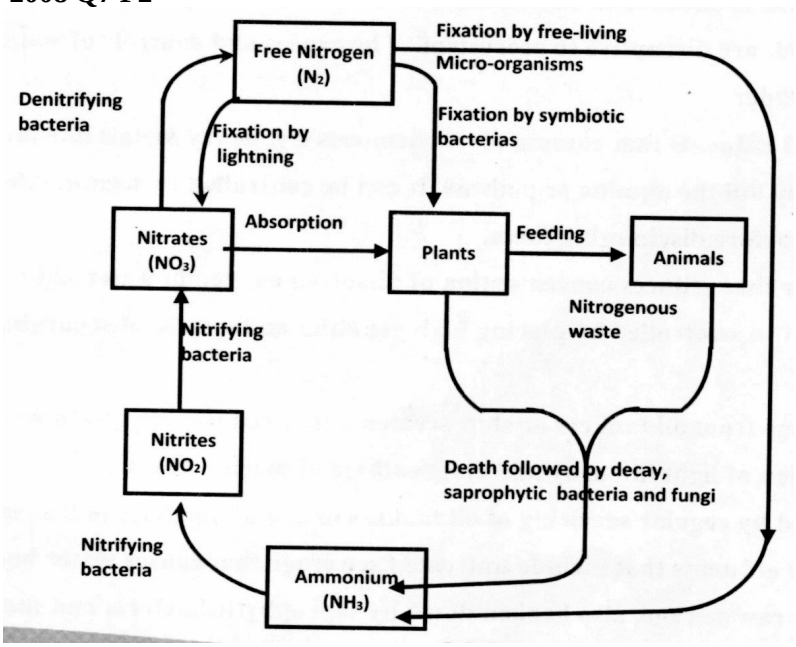
55. 2008 Q14 P1

Growth – increase/ decrease in numbers/ change in numbers
Dispersion – Spread/ distribution of organisms in a habitat
Density – Number of individual per unit area

56. 2008 Q22 P1

Large airspace
Thin cell walls

57. 2008 Q7 P2



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During thunderstorm/ lightning; nitrogen gas combines with O_2 to form nitrogen oxides; nitrogen oxides dissolve in water to for nitric acid; acid is deposited in the soil by rain, nitric acid combines with chemical substance to form nitrates/ nitric acids dissolves to form nitrates which are absorbed by plants symbiotic bacteria/ such as rhizobium; which are found in root nodules of leguminous plants, fix free nitrogen to nitrates.
Free living bacteria/ clatridium/ azotobacteria fix nitrogen to all rates
Nostoc algae/ chlorella/ anaemia/ ix nitrogen to nitrates.

Plants use Nitrates to form plant proteins
Animals feed on plants and convert plant proteins into animal proteins
Plants/ animals die and decomposed by bacteria/ saprophytes/ fungi decomposing plants/ animals/ release ammonia which is covered to nitrates/ by nitrosomomes nitrococcus bacteria
Nitrates are converted to nitrates; by nitrobacteria
Nitrates in the soil can be converted to free nitrogen/ denitrification by some fungi; pseudomonas/ hulobacillus denitrifying bacteria.

58. 2009 Q2 P1

- Obtains food/nutrients
- Shelter *Acc. Habitat* *Ref: Protection*

59. 2009 Q9 P1

(a) (i) Salmonella typhi; *Ignore underlining but must be written correct*.
(ii) Entamoeba hystolystica
(b) Malaria

60. 2009 Q19 P1

(a) – Leads to eutrophication; causes water borne disease
- Kills organisms in water; / reduce amount of oxygen in the water; / reduce the quality of water for consuming change water PH; / interferes with food charus / trophic levels

(b) Respiration / defecation / excretion;

61. 2009 Q20 P1

– Belt transect;/
- Line transect

62. 2009 Q3 P2

(a) (i) Using a living organism to regulate / control / reduce / check the population of another organism
(ii) - Lady bird (Beetles) used to control Aphids in coffee
- Cats used to control rats in the store / snakes
- Wasps used to control coffee mealy bugs

(b) (i) Enrichment of water bodies with nitrates / phosphates / sulphate *accept* NO_3 $_{(aq)}NHT^+$ due to discharge of sewage / domestic effluent kitchen water containing water detergents / runoff water fertilizer; leading to rapid growth of aquatia plants / phytoplankton's ;
Accept: nutrients for nitrates phosphates
(ii) (Proliferation of plants) block light from reaching plants underneath which will not photosynthesize; the plants die and decompose leading to lack / depletaion of O_2; animals also die/suffocate

(c) nitrogen iv oxide /sulphur iv oxide; *accept nitrogen dioxide sulphur dioxide*

63. 2010 Q10 P1

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(a) Aquatic / fresh water
(b) Large air space/aerenchyma
Sclereids
Stomata on upper epidermis/absence of stomata in lower epidermis
Absence of cuticles
Poorly developed vascular bundles

64. 2010 Q13 P1

(a) Place / environment in which specified organisms live
(b) A natural unit with abiotic and biotic factors

65. 2010 Q3 P2

a) i) Primary consumer
ii) Primary consumer / Secondary consumers;

b) Green plants → Caterpillars → Small insects → lizard
Decaying leaves → Caterpillars → Small insects → lizard

c) i) Hawks;
ii) At each trophic level energy is lost as heat / respiration; and during decomposition; or lost in defecation/ feces/ waste products of metabolism/ excretion; some parts of the organism are not eaten; (hence less biomass as one moves up the tropic levels.

66. 2011 Q5 P1

(a) Grass → Grasshopper → Lizards; (1 mark)
(b)(i)Chicken;
(ii)Grass

67. 2011 Q6 P1

(a) This is the study of the inter-relationship between organisms and their environment;
(b) The maximum population of a species that a particular habitat can support.

68. 2011 Q6 P1

(a) Dry / Arid / Semi – arid/ Desert

(b) Succulent / fleshy stem; reduced leaves/ leaves reduced into thorns.

69. 2011 Q3c P2

Grow into the air above mud / water; have lenticels for gaseous exchange;

70. 2012 Q5 P1

(a) plant C
(b)This cuticle reduces water loss;
Low number on upper surface reduces water loss;
Large root surface area enhances water absorption;
NB; (b) tied to (a)

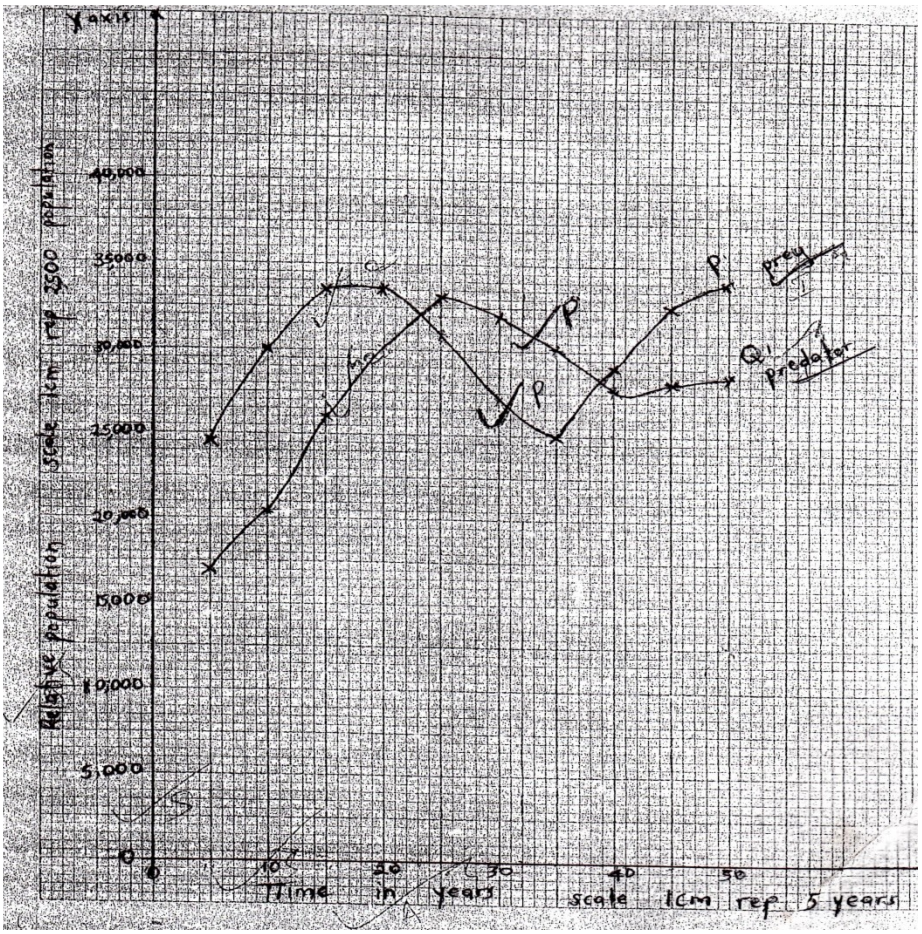
71. 2012 Q21 P1

Nitrogen fixation

72. 2012 Q6 P2

(a) (i) Scale = Y axis no scale X axis no origin = deny

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(ii) Curve P; Prey population is initially higher/prey population usually starts falling earlier.

(iii) Both populations decrease,because prey is not enough to sustain predator Population/environmental stress limit population of

(iv) At 23 $\pm$0.5; 22.5,23.5
39±0.5; 38.5,39.5

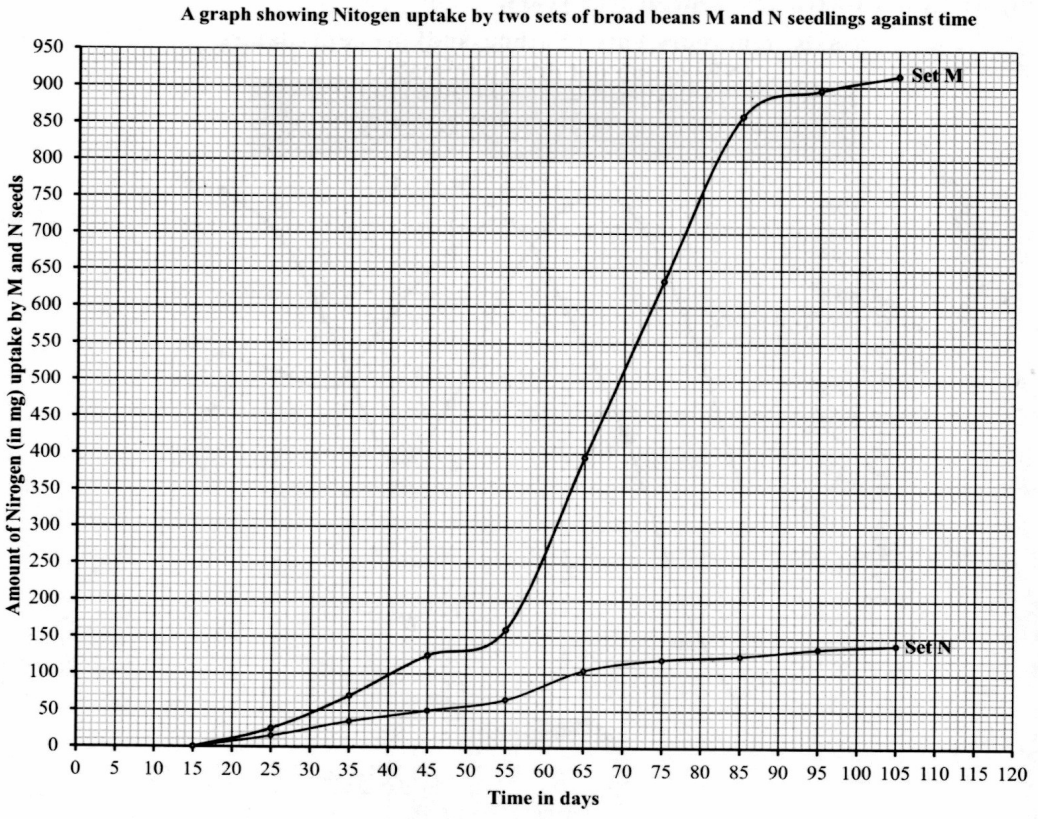
(v) Human activities; Acc pollution/deforestation/translocation /culling/hunting/Poaching/afforestation.
Competition; for mates/space/water
Less food for prey/competition for food;
Diseases causing death of prey
Emigration of prey Acc migration out of habitat.
Parasitism Acc parasite,pathogens

b) Sulphur IV oxide in the air causes respiratory diseases;in high concentration it can kill humans/damage plants. Acc aggravates asthma, causes bronchitis/pneumonia/emphyserna
Forms acid rain; which decreases soil PH;corrodes metals/buildings/machines/stones/sculptures
acid rain poisons/damages/kills plants/kills animals;
acid rain causes leaching of magnesium mg^{2+}/calcium ca^{2+}/aluminum Al^{3+}

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73. 2014 Q6 P2

(a)



(b)

At 65= 395	**860 -395**	**465 =23.25mg/day**
At 85=860	**20**	**20**

(c) i)

The higher the carbon (iv) oxide content in the air; the higher the nitrogen uptake

(ii)

More carbon (iv) oxide in the air makes the seedlings to photosynthesize more hence more amino acids / proteins are formatin in the dark stage; formation of amino acids/ proteins requires nitrogen rej if proteins are formed in the dark

(d) (i) The concentration of nitrogen would remain constant

ii) Despite decline in CO_2; the nitrogen already absorbed / taken up by the plant will remain;

(e)

- Nitrogen fixation by symbiosis bacteria
- Nitrogen fixation by lightning
- Nitrogen fixation by free-living- micro-organism

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