

ECOLOGY

1. 1989 Q4 P1

State how excessive use of pesticides may affect soil fertility

2. 1989 Q8 P1

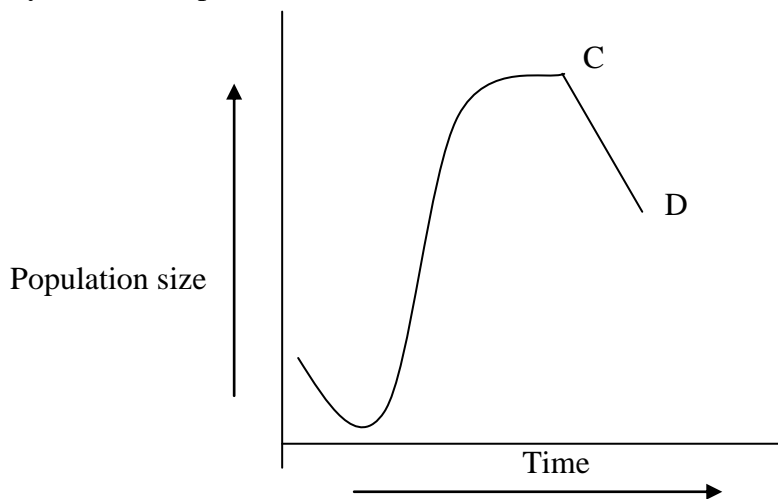
The table below shows a list of five human diseases. Complete the table by naming the causative agent of each.

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. The data was as shown in the table below.

Lakes	Mean body length of two year old fish	Type of water	Amount of plant life (g/m ³ of water)	Insects	Snails	Crabs	worms

	(cm)						
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 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

An investigation was carried out between 1964 and 1973 to study the changes of fish population in a certain small lake. Four species of fish A, B, C and D were found to live in this lake. In 1965, a factory was built near the lake and was found to discharge hot water into the lake raising the average temperature from 25°C to 30°C.

In 1969, discharge of hot water, sewage and industrial waste into the lake was stopped.

The fish populations during the period of investigation are shown in the table below.

FISH SPECIES	1964	1966	1968	1970	1971	1972	1973
A	6102	223	20	106	660	4071	7512
B	208	30	11	22	63	311	405
C	36	100	0	0	0	0	0
D	4521	272	23	27	79	400	617

- (a) (i) In which year were the fish population lowest?
- (ii) State the factors that might have caused the lowest fish population during

the year you have stated in (a) (i) above.

(iii) Explain how each factor you have state in (a) (ii) above could have brought about the changes in fish populations.

(b) (i) What is the difference in the rate of population recovery of species A and D?

(ii) Suggest two biological factors that could have led to this difference.

(c) (i) State a method that might have been used in estimating fish populations in the lake.

(ii) State one disadvantage of the method that you have stated in (c) (i) above.

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

Name a water-borne disease and state a control measure for it.

11. 1993 Q3 P1

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

12. 1993 Q8 P1

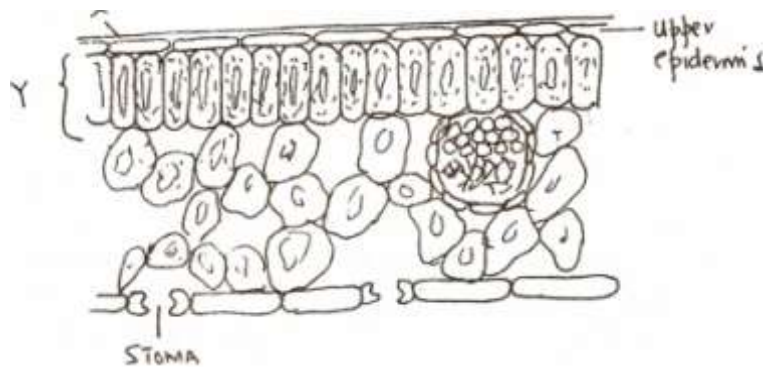
Name the disease caused by each of the following organisms.

(a) *Wuchereria bancrofti* (Filarial worm)

(b) *Phytophthora infestans*

13. 1993 Q15 P1

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



(a) Explain two ways in which structures labeled 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.

(b) Describe the flow of energy from the sun through the different tropic levels in an ecosystem

15. 1994 Q5 P1

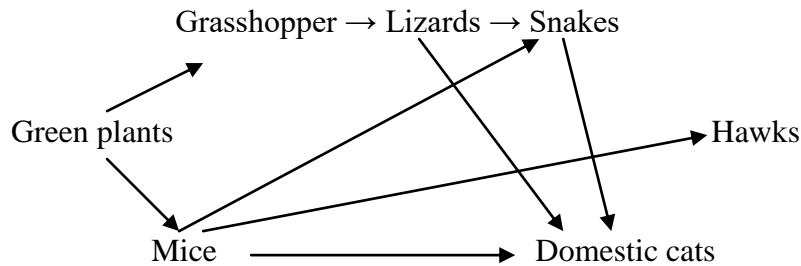
Explain why the biomass of primary producers is greater than that of primary consumers in a balanced ecosystem.

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.

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, 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

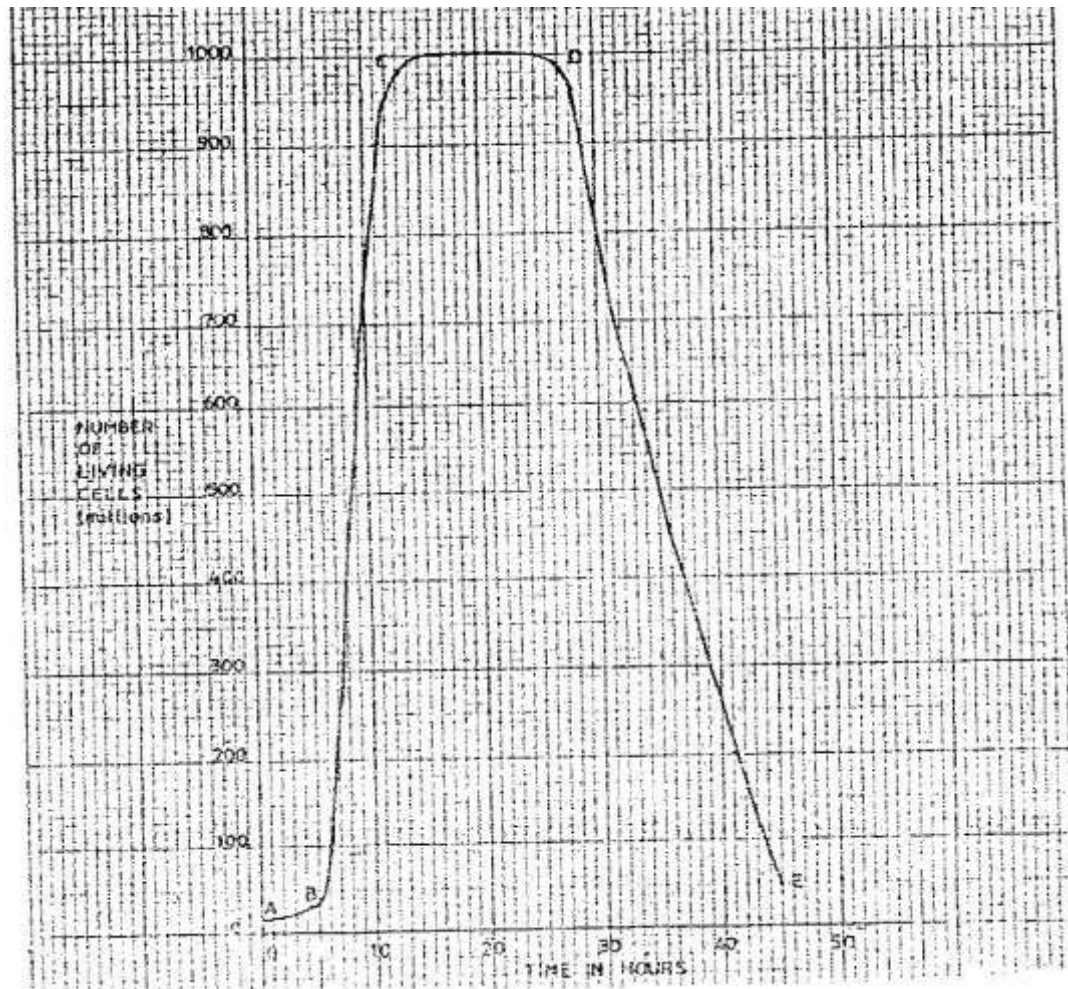
m = Number of marked crabs in the second catch

(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. 1996 Q20 P1

A culture of bacteria was incubated in nutrient agar at 35°C. Samples were taken at intervals in order to estimate the number of bacteria in the population. The data obtained is shown in the graph below.



- (a) When was the population of bacteria 350 million
- (b) Account for the shape of the graph between
 - (i) A and B
 - (ii) B and C
 - (iii) C and D
- (c) Give three reasons for the shape of the curve between D and E
- (d) (i) Suggest what would happen to the population of the bacteria if the temperature was lowered to 0°C after incubating for 12 hours.
(ii) Give a reason for your answer in (d) (i) above
- (e) Give three reasons why it is important to control human population growth rate in Kenya?

20. 1997 Q6 P1

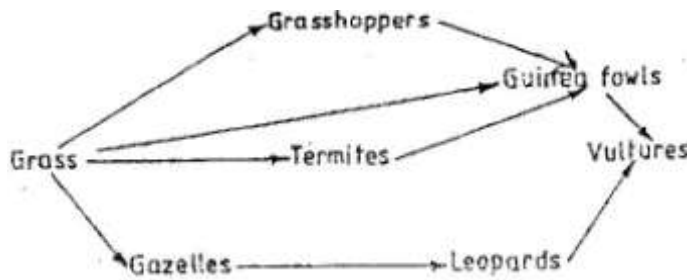
Oil can be applied on the stagnant water to control the spread of malaria.

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

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

21. 1997 Q11 P1

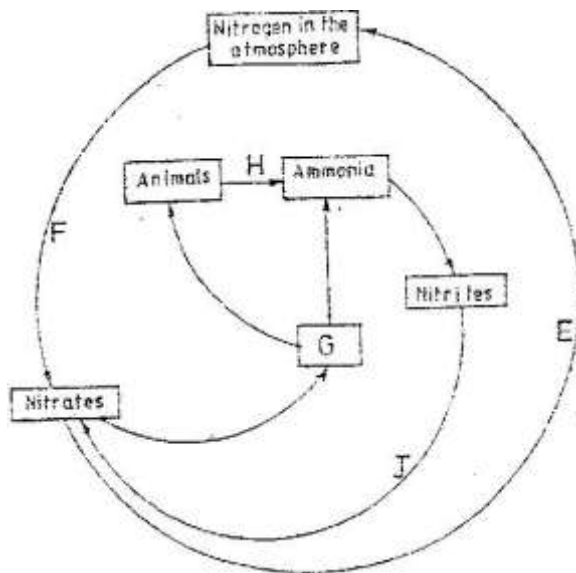
The following below represents a feeding relationship in an ecosystem



- (a) Write down the food chains in which the guinea fowls are secondary consumers
- (b) What would be the short term effects on the ecosystem if lions invaded the area?
- (c) Name the organism through which energy from the sun enters the food web.

22. 1997 Q14 P1

The diagram below represents a simplified nitrogen cycle.



- (a) Name the organisms that cause process E and J
 E.....
 J.....
- (b) Name the process represented by F and H.
 F.....
 H.....
- (c) Name the group of organism represented by G

23. 1997 Q19 P1

- (a) What is parasitism?
- (b) Describe how the tapeworm is adapted to a parasitic mode of life

24. 1998 Q5 P1

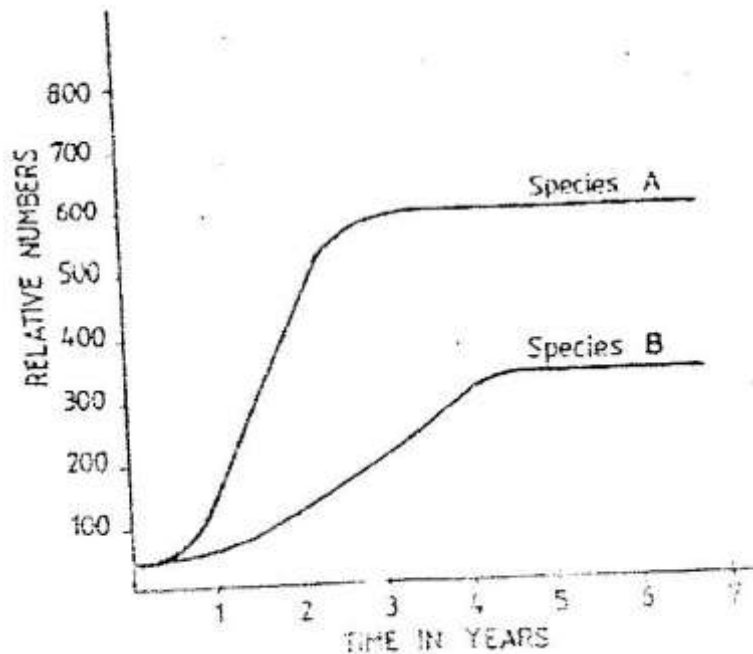
What is the relationship between leguminous plants and bacteria found in their root modules?

25. 1998 Q10 P1

Give two reasons why primary productivity in an aquatic ecosystem decreases with depth.

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?
(ii) Give reason for your answer
- (b) Account for the shape of the curve species A between
(i) One year and three years
(ii) Three years and seven years
- (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.

27. 1999 Q13 P1

- a) Distinguish between a community and population.
b) Describe how population of grasshoppers in a given area can be estimated.

28. 1999 Q17 P1

Explain how the various activities of man have caused pollution of air.

29. 2000 Q2 P1

Give a reason why two species in ecosystems cannot occupy the same niche.

30. 2000 Q10 P1

Explain how birds of prey are adapted to obtaining their food.

31. 2000 Q14 P1

- (a) Name the crop infested by *phytophthora infestans* and the disease it causes
(b) State four control measures against the disease

32. 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
Bush land	Wild games	
	Thomsons's gazelles	450
	Eland	20
	Wildebeest	60
	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?
(ii) Give a reason why the animal named in (a) (i) above is better adapted to the two ecosystems.
- (b) Why are cattle and sheep fewer in the bush land than in the savannah?
- (c) (i) Name suitable methods that were used to estimate the population of:
Domestic animals
Wild animals
(ii) Give a reason why the method named for wild animals in (c) (i) above is suitable
- (d) State three methods which could be used to determine the diet of wild animals in an ecosystem
- (e) Name four biotic factors that could have regulated the animal population in both ecosystems
- (f) State four human activities that affect population of animals in game parks
- (g) What is the importance of national park to a nation?

33. 2000 Q19 P1

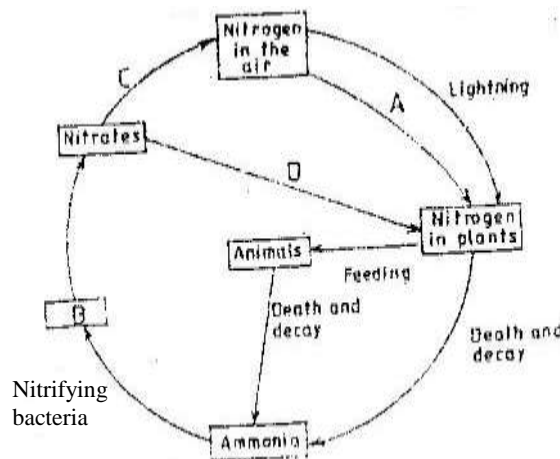
How are leaves of mesophytes suited to their functions?

34. 2001 Q2 P1

Why are green plants referred to as primary producers in an ecosystem?

35. 2001 Q13 P1

The diagram below represents the nitrogen cycle



(a) State the process labeled

A.....

D.....

(b) Name the compound represented by B

(c) Name the group of organisms labeled C

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

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

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

36. 2002 Q2 P1

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

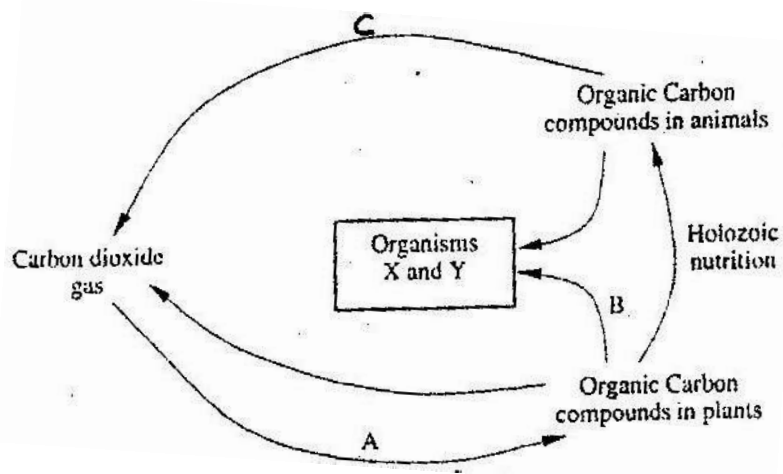
b) State the association of the bacteria named in (a) above with the leguminous plants.

37. 2002 Q7 P1

Explain why the carrying of wild animals is higher than that for cattle in a given piece of land.

38. 2002 Q12 P1

The chart below represents a simplified carbon cycle.



(a) Name the process labeled A, B, and C

- A.....
- B.....
- C.....

(b) Name the organisms X and Y

- X.....
- Y.....

(c) State the importance of carbon cycle in nature

39. 2002 Q15 P1

Ascaris lumbricoides in an example for an endo – parasite

- a) The name Ascaris refers to
- b) State the habitat of the organism

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

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40. 2003 Q4 P1

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

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

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41. 2003 Q10 P1

How are leaves of submerged adapted plants for photosynthesis?

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42. 2003 Q11 P1

Name the causative agent of typhoid.

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43. 2003 Q16 P1

a) What is meant by:

i) Autecology

.....

ii) Synecology?

.....

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	
B	150	
C	02	

Suggest the possible habitat of the plants from which the leaves were obtained

Leaf

Habitat

A

B

C

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

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

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

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

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

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

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

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

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

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

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

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48. 2006 Q16 P1

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

a) Decomposers

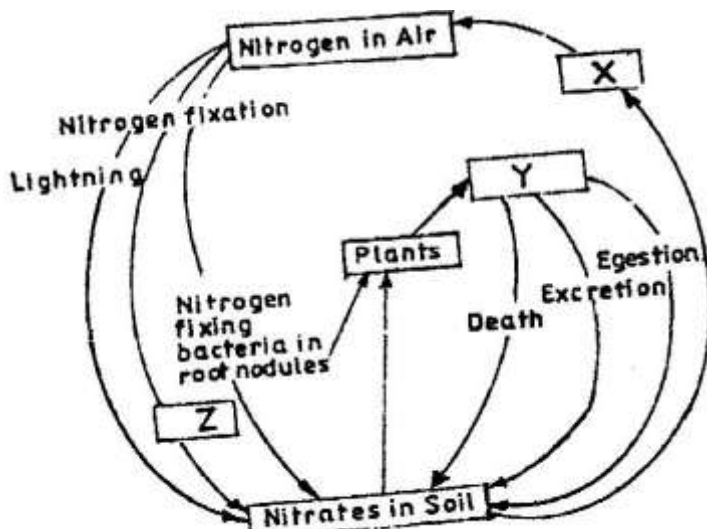
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b) Predation

.....

49. 2006 Q26 P1

The chart below represents a simplified nitrogen cycle.



What is represented by X, Y, and Z?

X.....

Y.....

Z.....

50. 2006 Q3 P2

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

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

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51. 2007 Q15 P1

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

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(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 schistosoma species is adapted to parasitic mode of life (2 marks)

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.....
57. 2009 Q2 P1

Name two benefits that a parasite derives from the host (2 marks)

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58. 2009 Q9 P1

(a) Name the causative agents of the following diseases in humans (2 marks)

(i) Typhoid

.....

(ii) Amoebic dysentery

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(b) Name the disease in humans caused by plasmodium falciparum (1 mark)

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59. 2009 Q19 P1

(a) State three effects of dumping untreated sewage into a river (3 marks)

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(b) Name one process that is responsible for loss of energy from one trophic level to the next (1 mark)

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60. 2009 Q20 P1

Other than using the quadratic, give two methods of estimating population of grass (2 marks)

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61. 2009 Q3 P2

(a) What is meant by the term biological control (1 mark)

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(i) Give an example of biological control (1 mark)

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(b) (i) What is eutrophication? (3 marks)

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(ii) What are the effects of eutrophication (3 marks)

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.....

(c) Name a substance that is responsible for acid rain (1 mark)

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62. 2010 Q13 P1

What is meant by the following term?

a) Habitat; (1 mark)

.....

b) Ecosystem (1 mark)

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.....

63. 2010 Q25 P1

State **three** factors that contribute to the deceleration phase in the population curve of an organism (1 mark)

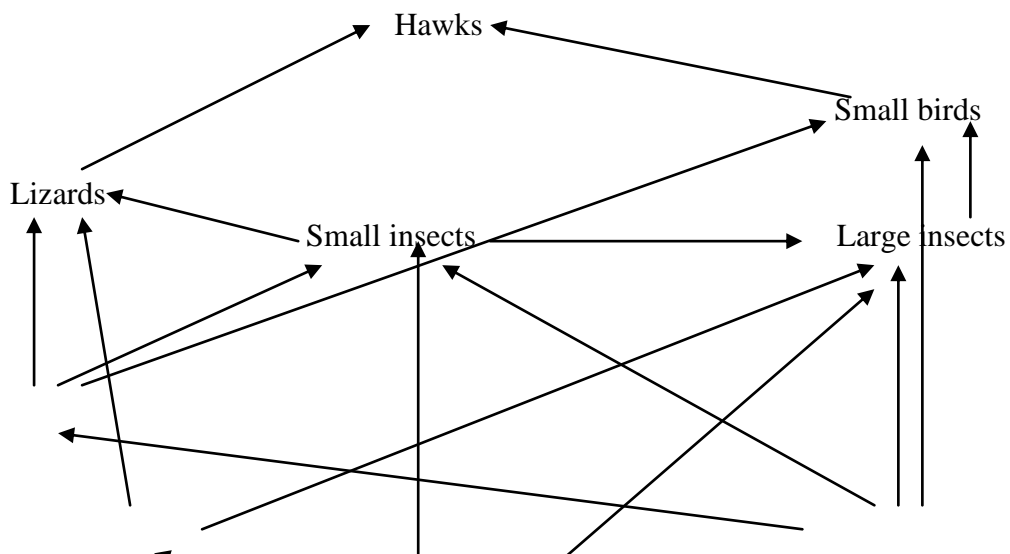
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64. 2010 Q3 P2

The diagram below represents a food web in certain ecosystem



Caterpillars

Earthworms

Green plants

Decaying leaves

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)

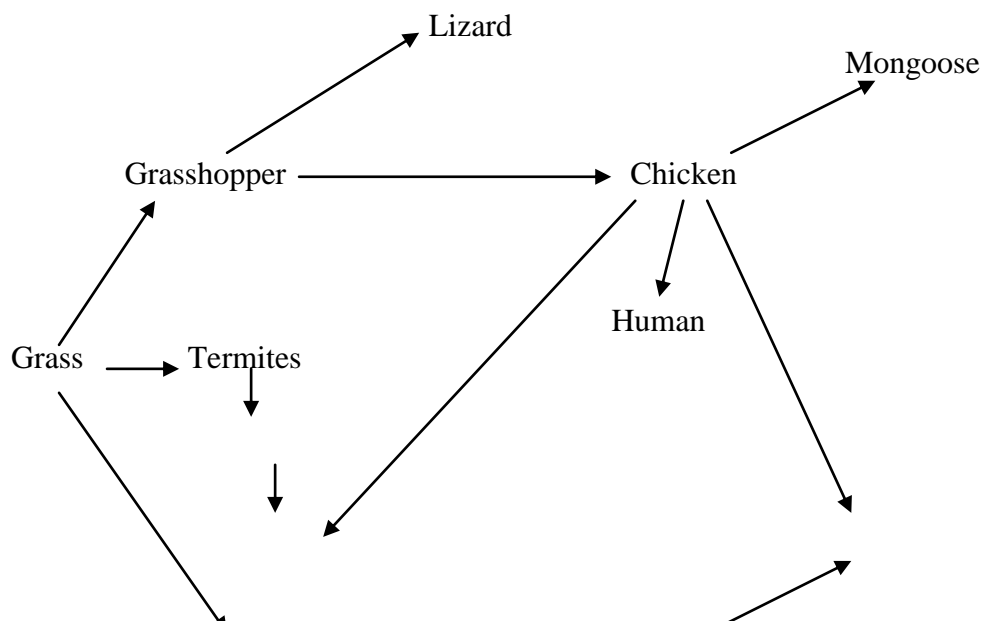
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ii) Explain the answer in (c)(i) above.

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65. 2011 Q5 P1

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



Weaver bird

Hawk

Vulture

Sheep

Hyena

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)

.....

66. 2011 Q6 P1

What is meant by the following terms?

a) Ecology (1 mark)

.....

.....

b) Carrying capacity (1 mark)

.....

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67. 2011 Q3c P2

How are the pneumatophores adapted to their function? (2 marks)

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68. 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 cuticle	0.4	0.1	0.2
Surface area of roots	2000	1000	1200

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

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

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69. 2012 Q21 P1

Name the process through which free atmospheric nitrogen is converted into nitrates.

(1 mark)

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70. 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)

