APPENDIX - A.1

CLASS X : LESSON PLAN : Inquiry Training Model

TIME DURATION : 30 Minutes
SUBJECT : BIOLOGY
TOPIC : PRINCIPLE OF INHERITANCE

OBJECTIVES

The students should be able to:

1. Understand the meaning of heredity
2. Understand the relationship between the successive generations
3. Acquire facts, concepts and generalizations related to heredity and variations
4. Recognize the relationship between heredity and variations
5. Apply concepts and principles about heredity and variations to new situations
6. Analyse, synthesize and generalize data with different experiments.

DEFINING THE PROBLEM

The teacher will diagramatically represent on the black board that mendel crossed pure-breed Tall and Dwarf Pea-plants, sowed the seeds obtained and found that these produced all Tall plants in (F-1) first filial generation.

produced all Tall plants in (F-1) first filial generation.
However, a cross between two hybrids from (F-1) generation produced seeds which developed into tall and dwarf plants in the ratio 3:1 in the (F-2) second filial generation. Now the question is "why the plants were tall in F-1 generation and why plants were tall and dwarf in 3:1 in the F-2 generation"?

In the lesson there are two important hypothesis and different types of questions will be asked as follows:

**HYPOTHESIS NO 1**

How do the hybrid plants appear in (F-1) first filial generation?

The data will be gathered by asking following questions from the teacher and then the teacher must answer them in 'yes' or 'No'.

1. When a tall plant is crossed with a dwarf plant a hybrid is formed?
2. Is a pure tall or dwarf a condition in which both factors are identical and homozygous?
3. Is a hybrid a condition in which both factors are dissimilar and heterozygous?
4. Does a monohybrid cross involve one pair of characters?
5. Do the factors that express itself called dominant?
6. Do the factors that cannot express in a hybrid in (F-1) generation termed as recessive?
HYPOTHESIS NO 2

How do different types of plants appear in (F-2) second filial generation?
(a) Phenotypically 3 : 1; Tall : Dwarf
(b) Genotypically 1 : 2:1, Tall, Hybrid, Dwarf.

QUESTIONS
1. When a tall plant is crossed with a dwarf plant a hybrid is formed?
2. Is a hybrid a condition in which both factors are dissimilar and heterozygous?
3. Is a pure tall represented by 'TT'?
4. Is pure dwarf represented by 'tt'?
5. Is a hybrid represented by 'Tt'?
6. Do the factors that express in a hybrid are called dominant characters?
7. Do the factors that cannot express in hybrid in (F-1) are called recessives?
8. Do the visible expressions of heredity constitute phenotype?
9. Do the heredity constitution of an organism termed as genotype?
10. Are there twenty four pair of chromosomes in human being?
11. Are there twenty three pair of chromosomes in human being?
12. Is there a single pair of sex chromosomes?
13. When the hybrid are crossed four types of plants are formed?

14. Were they in ratio, tall: Dwarf, 3:1 phenotypically?

15. Were they in ratio tall, dwarf, 1:2:1 genotypically?

With these questions the hypothesis will be tested by themselves by asking from the teacher.
APPENDIX - A.2

CLASS X : LESSON PLAN : Inquiry Training Model

TIME DURATION : 30 Minutes
SUBJECT : BIOLOGY
TOPIC : SEX LINKED INHERITANCE

OBJECTIVES
The students should be able to:

1. Understand the meaning of sex linked inheritance.
2. Understand the relationship between the autosomes and sex chromosomes.
3. Understand the real nature of few diseases like haemophilia and colour-blindness.
4. Acquire facts, concepts and generalization related to sex linked inheritance.
5. Apply the concepts and principles of human genetics in new situations.
6. Analyse, synthesize and generalize data with different experiments.

DEFINING THE PROBLEMS
The students are made aware of the disease haemophilia which is sex-linked by telling them a story by the teacher.

Haemophilia is a sex linked inherited disease...
which is characterised by prolonged coagulation time and abnormal bleeding that is 30 minutes to 24 hours in comparison to normal (2 minutes to 8 minutes) Mr. Sham Singh is the patient of haemophilia. Neither his father nor his son are sufferers. His Maternal uncle died with the same disease but his sons are all right. In sex linked inheritance we come close the cases where males are the sufferer and females are the carriers (Haemophilia and colour blindness). Now the question is "How is this disease haemophilia transmitted (carried) from maternal uncle to Sham Singh?"

Now the students may hypothesize as follows:-

HYPOTHESIS
- How do you identify haemophilia?
- How does the genes located on x-chromosomes are responsible for production of factors necessary for blood coagulation?
- How does the male is sufferer and not the female?
- How does the female carry the factors?

Data are gathered by the students in the form of questions to teacher which can be answered in 'Yes' or 'No' by the teacher, contains factual information.

Students may ask questions of different types, but teacher must guide the students to ask right type of questions.
QUESTIONS

1. Are there twenty three pairs of chromosomes in every cell of human beings?

2. Do twenty two pairs of chromosomes autosomes?

3. Do autosomes responsible for development of all body characteristics?

4. Do sex chromosomes responsible for the development of sex of an individual?

5. Are there two pairs of sex chromosomes?

6. Is there a single pair of sex chromosomes?

7. Are sex chromosomes represented by XY in females?

8. Are sex chromosomes XY is female?

9. Do the both sex chromosomes dissimilar in female?

10. Are sex chromosomes XY in male?

11. Do the gametes possess half the number of chromosomes that is haploid?

12. Do the genes effect the sex chromosome?

13. Do the genes responsible for various sex linked diseases?

14. Do the haemophilia or colour blindness sex linked diseases?

15. Is haemophilia characterised by prolonged blood coagulation time?

16. Does the mutant recessive gene present on x-chromosome responsible for the production of blood coagulation?
17. Does the mutant recessive gene affect the males?
18. Does the mutant recessive gene affect the females present on x chromosomes that is heterozygous condition?
19. Do the females in heterozygous condition act as carrier but not suffer from it?

GENERALIZATION

In heterozygous condition the females act as a carrier of disease but do not suffer. In males the sex chromosomes are XY rather than XX. The recessive gene on X-chromosome shows its effect as there is no dominant gene to mask it on Y-chromosome.
CLASS X: LESSON PLAN: Inquiry Training Model

TIME DURATION: 30 Minutes
SUBJECT: BIOLOGY
TOPIC: DETERMINANTS OF FAMILY SIZE

OBJECTIVES

The students should be able to:

1. Understand the various motivations for having children.
2. Understand the parents' motivations for wanting children, which may affect the family size.
3. Differentiate between small and large families.
4. Learn how family size is influenced by beliefs, customs, sayings, values, and social practices.

DEFINING THE PROBLEM

The students are made aware of the problem "Determinants of family size" by telling them a story by the teacher.

Ram, a friend of mine, is married to Rani. After one year, Rani gave birth to a small baby girl. They were very happy although Ram hoped for a son. In this way, within five years, they have three daughters and Rani is expecting another baby. Having all this, Rani talks to Ram...
about family planning clinic but Ram stops her. After that Rani gave a birth to a female child. Now imagine Ram's disappointment (This can be shown with the help of diagrams also).

HYPOTHESES

1. What was the problem of Ram and Rani after 5 years of marriage?
2. Was it normal for Ram to wish for a son after having had three daughters in a row?
3. Do you know of couples in your locality who keeps of having children because they are after a son or a daughter?
4. Is the reason for wanting children common?
5. What others motivations do parents have for wanting children?

Students will gather data in the form of questions the answers of which will be given by the teacher in 'Yes' or 'No' and contains factual information.

Students may ask questions of different types but teacher must guide the students to ask right type of questions.

QUESTIONS

1. Would you say that motivations for having children affect family size?
2. Have our parents motivations for wanting children?
3. Do parents motivations for wanting children may
4. Do they make their family size large?
5. Do they make their family size small?
6. Do we have beliefs, customs, sayings or song as an example which reflects one's belief that a large family size is good?
7. Do some customs, beliefs and sayings favour large family size?
8. Do our family norms influenced by beliefs, customs of sayings?
9. Let us examine our Govt. policies and social practices?
   a) Do they favour large family size?
   b) Do they favour small family size?
10. Do large family size effect the population of our town, province and country?
11. Do some practices in our society promote the large family size?

GENERALIZATION
Children have roles to play in choosing a desirable family size. They should be critical about some beliefs, sayings and practices that affect family size and which also affect the population of a country.
CLASS : X  
LESSON PLAN : Inquiry Training Model

TIME DURATION : 30 Minutes
SUBJECT : BIOLOGY
TOPIC : POPULATION GROWTH AND ECONOMIC PROGRESS

OBJECTIVES

The students should be able to:

1. Realise that economic progress is affected by population growth;

2. Acquire facts, concepts and generalization related to population growth, economic growth and development;

3. Recognise the relationship between the population growth and economic development;

4. Apply concepts and principles about population growth and economic development to new situations;

5. Show concern about family size and the problem about population growth by advocating population control.

DEFINING THE PROBLEM

The students are made aware of the problem about increasing population growth and its effects on economic progress with the help of an essay which can be read by the
178 years ago Thomas Malthus, predicted that population always increases faster than food supply. As a result, mankind is always threatened with starvation. He warned that unless people learn to keep down the size of their families, poverty will remain and starvation will increase. Rapid population growth is the real cause of poverty among nations. At first thinkers and leaders just laughed at Malthus. They dismissed his theory saying that Man can conquer poverty and starvation through the use of technology. Recently, scholars begin to rethink what Malthus declared and now many Governments have begun to devise ways of preventing people from increasing their family size to slow rapid population growth. Some people think that more people means more poverty, more scarcity of food grains, but others think more people means more hands to work, more food production and less starvation. Now the question arises which group of people have right type of thinking.

Students hypothesize solutions to the problem as:
1. If births exceeds death, then population growth occurs.
2. If population grows faster, then a community tends to have a young population.
3. If a community has a young population then it tends not to progress faster.
4. If population grows faster, then the burden of
dependency ratio tends to be higher.

5. A community with a high dependency ratio tends to be a hindrance to economic progress.

6. If the population of a community increases rapidly, then per capita income tends to be low.

7. If per capita income is low, then standard of living tends to be low and economic progress slower.

Data are gathered by students in the form of questions to the teacher which can be answered 'Yes' or 'No'.

QUESTIONS

1. If birth in the country exceeds death then population growth occurs.

2. If deaths in the country exceeds birth, then population growth occurs.

3. If a community has a young population then it tends to progress faster.

4. If population grows faster, then the burden of dependency ratio tends to be higher.

5. If a community has a young population than it tends not to progress faster.

6. Is a community with high dependency ratio tends to be hindrance to economic progress?

7. Is a community with low dependency ratio tends to be hindrance to economic progress?
8. Is per capita income tends to be low, if the population of a community increases?

9. Is per capita income tends to be higher if the population of a community decreases?

10. Is the per capita income tends to be higher if the population of a community increases?

11. Is the standard of living tends to be low and economic progress slower, if per capita income is low?

12. Is the standard of living tends to be higher and economic progress higher if per capita income is higher?

13. Does the per capita income effects the standard of living in a community?

14. Does the standard of living in a community has its affect of economic progress?

GENERALIZATION

All these can be synthesized in one generalization, "The economic progress of a community is affected by population growth.".
CLASS : X  
LESSON PLAN : Inquiry Training Model

TIME DURATION :  30 Minutes  
SUBJECT : BIOLOGY  
TOPIC : PREY PREDATOR RELATIONSHIP

OBJECTIVES

The students should be able to:

1. Recognise the relationship between prey-predator.

2. Acquire facts, concepts and generalization related to population in a natural habitat.

3. Apply concepts and principles about prey predators to new situations.

4. Show concern about population size and problem brought about by population growth.

DEFINING THE PROBLEM

The teacher will began his activity by telling the students a story.

In the mountains of south west a number of years ago deer were quite numerous, although the population would fluctuate slightly. There were wolves in the mountains, some people from a small town witnessed a wolf pack pull down two of the smaller deer in the herd and were horrified. As a result, the people launched a campaign to eliminate the
wolves to the dismay of people, the year following the elimination of wolves showed a marked decrease in the population of the deer. Why, when the wolf is the deer's natural predator, should this occur?

Students hypothesize a solution to the problem and then gather data by asking questions from the teacher.

**Hypothesis**

- Does prey-predator balance have anything to do with the problem?
- Do other predators were able to prey more successfully on deer so their population went down, after the wolves were eliminated?
- After the deer's predator were eliminated, the population expanded so their habitat couldn't support them, and they become susceptible to starvation and population went down.

**Objections**

1. Have other animals been seen killing a deer?
2. When wolves were eliminated other predators such as bobcats, coyotes and large birds such as eagles, were able to prey more successfully on deer so their population went down?
3. Were more Bobcats seen in the deer's habitat after wolves were eliminated?
4. How about Coyotes?
5. Were numerous barkless dead trees found in the
region after the wolves were eliminated?
6. Were deer carcasses found in the region after the wolves were eliminated?
7. Before the wolves were eliminated?
8. More after?
9. Were the carcasses skinny?
10. Were the carcasses diseased?
11. Is hunting eagles against the law?
12. Do eagles kill mature deer for food?
13. Are the winters in the region quite cold?
14. Did the deer carcasses found before the wolves were eliminated tend to be young or old as opposed to the whole range of maturity?

GENERALIZATION

Other predators were the cause of the decline in population, but there was no increase in the population of Bobcats, and the increase in the eagle's population could be because hunting became illegal.

The deer must have starved because carcasses were found and the trees were stripped of their bark; but we also found that some of the carcasses were diseased, which suggested that disease may have caused some deaths.

After the deer's predator was eliminated their population expanded so their habitat could not support them and they became susceptible to starvation and disease.

The wolves taking the weaker members of the population.
CLASS X : LESSON PLAN : Inquiry Training Model

TIME DURATION : 30 Minutes
SUBJECT : BIOLOGY
TOPIC : BALANCED DIET AND NUTRITIONAL DISORDERS DUE TO DEFICIENCY OF VITAMINS:

OBJECTIVES

The students should be able to:

1. Recognise the importance of a balanced diet;
2. Acquire facts, concepts and generalization related to Balanced diet and Nutritional disorders due to deficiency of vitamins.
3. Recognise the relationship between the deficiency diseases and their sources.
4. Show concern about balanced diet and disease caused by the deficiency of vitamins.

DEFINING THE PROBLEM

The students are made aware of the balanced diet and diseases caused by the deficiency of vitamins by telling a story.

Rani and Sony are from the same family. Rani is a bright girl with lots of energy who is rarely ill and almost never misses school, on the otherhand Sony, who is also a bright girl, is often ill and misses a considerable amount
Students may hypothesize as follows:
- How do you identify balanced diet?
- How does a disease occur due to the deficiency of one nutrient?
- How do some people become obese as their age advances?
- How does the deficiency of vitamins cause diseases?

Data are gathered by students in the form of questions from the teacher which can be answered 'Yes' or 'No' and contains factual information.

QUESTIONS
1. Is adolescent, the period between childhood and puberty?
2. Does balanced diet include proteins, fats, carbohydrates, salt, water and vitamins?
3. Are proteins most significant constituent of the diet?
4. Are amino acids the building blocks for the body?
5. Are fats the major source of energy?
6. Are carbohydrates needed for providing energy for daily use?
7. Are a variety of salts essential for the metabolic activities of the body?
8. Do the salts needed to build bones, teeth, in blood coagulation, functioning of muscles and formation of R.B.C.'s?

9. Do vitamins simple organic compounds?

10. Do the vitamins contain calories?

11. Do some vitamins fat soluble?

12. Do some vitamins water soluble?

13. Do yellow fruits and vegetables contain vitamin A?

14. Is night-blindness caused due to deficiency of vitamin A?

15. Do polished rice contain vitamin B?

16. Does the disease beri-beri caused by the deficiency of vitamin B?

17. Do oranges, lemons, tomatoes, mangoes, amles and uncooked green vegetables contain vitamin C?

18. Is scurvy caused by the deficiency of vitamin C?

19. Is sunlight rich with vitamin D?

20. Do rickets occur due to loss of bone calcium?

21. Do some persons become obese in the old age?

22. Do the food taken by old persons mainly remain unconsumed and thyroid gland show under activity hence fatness is developed?
CLASS X : LESSON PLAN : Inquiry Training Model

TIME DURATION : 30 Minutes
SUBJECT : BIOLOGY
TOPIC : CONSERVATION OF NATURAL RESOURCES

OBJECTIVES
The students should be able to:

1. Recognise the relationship between deforestation and soil erosion.
2. Recognise relationship between deforestation and wildlife.
3. Acquire facts, concepts and generalization related to conservation of natural resources.
4. Apply concepts and principles about conservation of natural resources into new situations.
5. Show concern about conservation of natural resources and problem brought about by deforestation, soil erosion and wildlife management.

DEFINING THE PROBLEM
The teacher will began his activity by telling the students.

Sukhna Lake is a beautiful spot, pride or city
beautiful Chandigarh. In recent years people done deforestation in Shivalik foot-hills, so the soil erosion was done and silt has collected in the bed of Lake with rain water. Save Sukhna Lake is a campaign in which desilting is done through Sharamdan. Now the question is "How has the silt collected into the bed of Sukhna Lake"?

HYPOTHESISING

- Has deforestation to do with the silt formation in lake?
- How soil erosion was done?
- Has deforestation some relation with wild life?

Now data gathering will be done by students by asking questions from the teacher the answers of which will be given in 'Yes' or 'No' by teacher.

QUESTIONS

1. Is Sukhna Lake a natural resource?
2. Is protection of Sukhna Lake essential?
3. Is the main cause of silting deforestation?
4. Has deforestation some link with soil erosion?
5. Has deforestation started soil erosion?
6. Is the soil erosion done only through deforestation?
7. Was the soil erosion done through grazing animals on green bare land?
8. Do the trees or plants give the soil cover to prevent the effect of water and wind carrying
erosion?

9. Do the trees act as wind break and prevent soil erosion?

10. Do the roots of shallow rooted trees near the surface of soil bind the soil particles?

11. Do forest fires responsible for soil erosion?

12. Is Van-Mahotsava concerned with tree planting?

13. Do the trees felled (deforestation) from Shivalik foothills made the soil erosion?

14. Have the rains done soil erosion?

15. Is the silt in bed of Sukhna Lake eroded by rain from Shivalik foot-hills?

GENERALISATION

The generalisation will be done by students, as the result of deforestation that barren land has eroded and this brought a lot of silt with rain water into the bed of Sukhna Lake.
CLASS X :   LESSON PLAN : Inquiry Training Model

TIME DURATION : 30 Minutes
SUBJECT : BIOLOGY
TOPIC : WATER POLLUTION

OBJECTIVES

The students should be able to:

1. Recognise relationship between water pollution and diseases caused through it.
2. Acquire facts, concepts and generalizations related to water pollution.
3. Apply concepts and principles about water pollution into other natural resources and new situations.
4. Shows concern about conservation of water resources and problems brought about by water pollution.

DEFINING THE PROBLEM

The teacher will began his activity by telling students as:

There is a city naming X and a canal is situated on the outer boundary of the city. Two factories have been installed on its bank, so the waste materials can be easily
thrown into it. One third population of the city receive the water from the canal for domestic purposes. The drainage and waste products are also thrown into the canal. One can see dead bodies of animals floating on the surface of the water of canal. The population which uses this water frequently suffers with water born diseases. Now the question is "Why this 1/3 population of city is suffering with water born diseases?"

HYPOTHESISING

The students may hypothesize as:

1. Do the waste products from factories pollute the water?
2. Does polluted water exercises unhappy effect on plants and animals?
3. Does the contamination of water with industrial waste is most dangerous?
4. Does the effluents produce physical, chemical and biological change in water?
5. Does the polluted water effect animals?
6. Will the septic conditions prevail if the sewage and other wastes are present in large quantities?
7. Does the polluted water produce foul odour and undesirable colour?
8. Does polluted water fit for drinking and recreation?
9. Do the infectious diseases like cholera and
typhoid carried through water pollution?

10. Does the polluted water leads to oxygen depletion which kills fishes?

11. Do the water from municipalities, tanning and slaughter houses when discharged in river lake and ponds may serve as rich source of micro-organisms?

12. Do the micro-organisms cause cholera, typhoid and skin diseases in man?

13. Do run off water from fields carry nitrogenous and phosphate compounds?

14. Do these compounds increase algal growth and troublesome for fishes etc.?

15. Have the detergents, pesticides and various industrial products some role in polluting water?

16. Has polluted water some bad effect on plants?

17. If a person with cholera or Jaundice pollute the water, since the water source is common to inhabitants of the city, the disease breaks out in severe form and takes a big toll of human life?

GENERALIZATION

The students will make generalization from the questions that the water is polluted by different ways which causes water born diseases.
CLASS X : LESSON PLAN : Inquiry Training Model

TIME DURATION : 30 Minutes

SUBJECT : BIOLOGY

TOPIC : CHEMICAL INDUSTRIES AND THEIR HEALTH HAZARDS

OBJECTIVES

The students should be able to:

1. Recognise the relationship between chemical industries and their effect on (environment) ecology.

2. Acquire facts, concepts and generalizations related to chemical industries and its health hazards.

3. Apply concepts and principles about setting up chemical industries in other situations.

4. Show concern about installing chemical industries and problem brought about in producing health hazards.

DEFINING THE PROBLEM

The teacher will began his activity by telling the students.

Bhopal gas tragedy of December, 1984 which accounted for about 3000 deaths and injuries to as many as
This accident invoked memories of past disasters at Hiroshima and Nagasaki (Japan). The killer gas Methyl-Isocyanate is very toxic. It is volatile, colourless and tear producing liquid highly irritating to skin, eyes and mucous membrane, phosgene another poisonous gas was used in first world war during 1915. Now the question is "How the Bhopal gas tragedy occurred"?

**HYPOTHESIS**

The students may hypothesize as:

1. Do chemical industries produce several useful substances, still some are considered hazardous?
2. What precautions would be suggested while setting up a chemical industry?

The students will gather data by asking questions from the teacher and the answer of which will be given by teacher in 'Yes' or 'No'.

**DATA GATHERING (QUESTIONS)**

1. Was Bhopal tragedy biggest of this decade?
2. Was Bhopal tragedy biggest of this century?
3. Was Bhopal gas tragedy related with chemical industry?
4. Was there leak of any gas?
5. Does this industry prepare some medicine?
6. Does this industry prepare some insecticide?
7. Does this industry belong to Govt.?
8. Does this industry belong to private sector?
9. Is MIC (methyl Isocyanate) a gas?
10. Is MIC a liquid?
11. Is MIC colourless?
12. Is MIC volatile?
13. Is MIC toxic?
14. Is phosgene toxic?
15. Does the regular and periodical testing of a chemical plant essential?
16. Does the fitness certification of a chemical plant before installation not given?
17. Is it not essential to set up chemical factories away from thick population of cities?

GENERALIZATIONS

The generalizations can be done as the chemical industries produce useful substances still some are hazardous and chemical industries would be set up away from cities and with proper fitness certification.
APPENDIX - A.10

CLASS X : LESSON PLAN : Inquiry Training Model

TIME DURATION : 30 Minutes
SUBJECT : BIOLOGY
TOPIC : ENERGY FLOW IN SIMPLE FOOD CHAIN AND CONSEQUENCES OF DISTURBANCE IN NATURAL FOOD CHAIN

OBJECTIVES
The students should be able to:
1. Recognise the relationship between animals on the basis of their food habits;
2. Recognise the relationship between food chain and food web;
3. Acquire facts, concepts and generalisations related to disturbance in natural food chain;
4. Apply concepts and principles of disturbance in natural food chain in different situations;
5. Show concern about population size of problem brought about by increase or decrease of any species.

DEFINING THE PROBLEM
The teacher will began his activity by telling students, "All animals are attached with one another from the food point of view form a food chain. The starting point
of the chain is a plant and terminal point is carnivorous animals. Each link in a food chain is known as trophic level. There are primary producers (green plants) primary, secondary and tertiary consumers (all animals). All these organisms depend upon one another in order to survive and control the number of one another. If any one trophic level is removed the ecological balance will be disturbed, will create imbalance in the ecosystem. Now the question is, "Why presence and preservation of all trophic level is significant which acts as a biological control and maintains ecological equilibrium in nature?".

**HYPOTHESIS**

The students may hypothesize as:

1. Does the wild life an important link in food chain?
2. Does the wild life act as biological control?
3. How all these trophic levels create balance in nature?

To test these hypothesize the students will ask questions, the answers of which will be given by the teacher in 'Yes' or 'No'.

**DATA GATHERING (QUESTIONS)**

1. Do all the organisms attached with one another from food point of view form a food chain?
2. Is the starting point of food chain green plants?
3. Do plants prepare food by converting light energy
of Sun?

4. Is the terminal point of food chain carnivorous animals?

5. Are plants called primary producers?

6. Are primary producers consumed by primary consumers?

7. Are primary consumers consumed by secondary consumers?

8. Are secondary consumers consumed by tertiary consumers?

9. Was there drought and plants were not in excess than primary consumers may decrease in number?

10. Do the decrease in number of primary consumers have some effect on the number of secondary consumers?

11. Do the increase or decrease in number of secondary consumers have some effect on the number of tertiary consumers?

12. If we remove first trophic level from food chain than there will be an imbalance?

13. If we remove second or third trophic level than there will be balance?

14. If we remove any trophic level than there will be imbalance?
GENERALIZATION

The generalization will be done by students. Food chain links animals and wild life (Tertiary consumers) is important and imbalance of any trophic level may disturb ecosystem.
APPENDIX A-11

ACQUISITION OF PROCESS SKILLS TEST

Name __________________________________________ Age ______ Sex _______
School __________________________________________

DIRECTIONS

This test consists of many items. Each item has multiple choice but you have to tick (/) the right one. Some items contain the material which is insufficient to guide you to respond the questions raised at the end of each item. There is no time limit. Most of you can finish it within one and half an hour. If you do not know answer to any particular item, you can pass on to the next one.

PROCESS SKILLS TEST

Q.No.1 Rodents are;
   a) Molluscs
   b) Mammals
   c) Birds
   d) Non-insects arthropods

Q.No.2 Ahmedabad has many textiles mills, its important pollutant is:
   a) Steam
   b) Carbon-dioxide
   c) Cotton dust
   d) Sulphur-dioxide
Q.No. 3  The important organ damaged by alcohol;
   a) Heart
   b) Brain
   c) Lung
   d) Liver

Robert Johnson, a rancher organizes a wolf hunt to kill wolves preying on his sheep. He also has several acres of alfalfa, sometimes later, he notices an increasing amount of damage to his alfalfa field upon investigation he discovers large numbers of rabbits and dear eating his alfalfa.

Read the Paragraph and Answer.

Q.No. 4  Which of the following best describes the wolf in the above situation?
   a) Producer
   b) First order consumer
   c) Second order consumer
   d) Key industry animal

Q.No. 5  Which of the following best describes the sheep in the above situation?
   a) Producers
   b) First order consumers
   c) Second order consumers
   d) Key animal industry
Q.No. 6 Strengthening of concept of environmental monitoring is due to our concern.
   a) For the quality of environment
   b) For the quantity of environment
   c) For quality of monitor
   d) For pure air

Q.No. 7 Which of the following nitrogen base is not present in RNA?
   a) Uracil
   b) Adenine
   c) Thyamine
   d) Cytosine

Q.No. 8 Which of the following is the characteristic sugar of DNA?
   a) Glucose
   b) Ribose
   c) Deoxyribose
   d) Deoxy-glucose

Q.No. 9 Forests play a major role in;
   a) Checking erosion and controlling the climate of the area
   b) Providing timber, plywood and medicinal plants.
   c) Conserving the fertility of the soil
   d) Rearing of live stock
Q.No.10  Which of the following is the process in which ova are matured?
   a) Morphogenesis
   b) Organogenesis
   c) Oogenesis
   d) Spermato genesis

Q.No.11  The difference of RNA and DNA is mainly in their nature of:
   a) Sugar and base
   b) Sugar and phosphate
   c) Phosphate and base
   d) Sugar only

Q.No.12  Which process destroys or removes all microbial life including spores?
   a) Dis-in-festation
   b) Dis-in-fection
   c) Sterilisation
   d) Isolation

Q.No.13  Which of the following blood group is a universal recipient?
   a) A
   b) B
   c) AB
   d) O

The discharge of high amount of municipal and household wastes into rivers and canals is one of the major
sources of pollution of our water bodies. Most of the epidemics in big cities are caused through water born diseases such as typhoid, cholera, dysentry and Jaundice. Enhancement of bacterial viral and other parasitic populations in polluted waters endanger human health.

Read the Paragraph & Answer

Q.No.14 Cholera disease spreads due to:
   a) Polluted air
   b) Adultrated food
   c) Polluted water
   d) Anger of God

Q.No.15 Genes are located on
   a) Ribosomes
   b) Chromosomes
   c) Centrosomes
   d) Centromere

Q.No.16 When pollution is more in the Lakes there cannot be self purification because
   a) There is no Oxygen to sustain microbial activity.
   b) No sunlight is present
   c) Microbes die
   d) Pollutants settle down automatically.

Q.No.17 Which piece of equipment would be used for measuring volume?
   a) Graduated cylinder
b) Thermometer
c) Ruler
d) Spring scale

Q.No.18 Which piece of equipment would be used for measuring mass?
   a) Graduated cylinder
   b) Thermometer
c) Spring scale
d) Equal arm balance

Q.No.19 Which piece of equipment would be used for seeing microslides?
   a) Hand lens
   b) Compound microscope
c) Dissecting microscope
d) Naked eye.

Q.No.20 Which piece of equipment would be used to measure blood pressure?
   a) Thermometer
   b) Barometer
c) Sphygmomanometer
d) Stethoscope

Population problem has caused malnutrition which leads to many physical and mental disorders in case of human beings, over population has resulted in large scale unemployment. More space is required for habitation of human beings. This has created accommodation problem. In order to
build houses, man has cut forest or agricultural land is used. It has lead to serious problem of soil erosion, floods and climate changes. A large sized family cannot afford proper education. Over population has lead to rapid pollution of environment.

Read the Passage & Answer

Q.No.20 The population explosion has caused;
   a) Unemployment
   b) Soil erosion
   c) Pollution
   d) All the above

Q.No.22 The quality of environment can be improved through
   a) Erosion
   b) Conservation
   c) Over use of natural environment
   d) Deforestation

The density of population in a country, village or district is obtained by dividing total number of individuals present in an area or region by unit area. A country may have a large part of its land area not worth habitation because of forests, mountains or deserts. Naturally, then its entire population would get concentrated on small fertile land areas. Its population density would be lower than the country where its entire land area is worth habitation. The Nether lands is much smaller than India yet its population density is higher 319 persons Sq.Km. than
that of India 168 person Sq.Km. The reason is that all parts of Netherlands are habitable it is not so in India.

Read the Passage & Answer.

Q.No.23 Density of population in a given country is obtained by

a) Dividing the total number of persons living in the country by the total land area.
b) Dividing the total number of persons living in the country.
c) Dividing the total number of persons living in the country by total forest area.
d) Dividing the number of persons living in the country by the amount of production of natural resources.

Q.No.24 The population density of Netherlands is higher than that of India because of :

a) More land is there in Netherlands as compared to India.
b) Greater proportion of inhabitable area is there in Netherlands than that of India.
c) Greater economic advancement of Netherlands.
d) More natural resources in Netherlands.

Sex ratio in India in 1981 was 1071 males per 1000 females. In Punjab there were 1138 males for 1000 females. On the contrary the number of males to females in Kerala was 969:1000
Q.No.25 Which state has the highest sex ratio?

a) Uttar Pradesh
b) Madhya Pradesh
c) Chandigarh
d) Kerala

A number of problems arise due to disturbance in food chain for example the deer and pigs of Andhra Pradesh were killed. These were the natural food of tigers and lions. Now lions and Tigers have started killing other animals and men. Similarly in M.P. Lion hunting was done on large scale thus there were excess of pigs and deer which started eating crops. This resulted in deficiency of cereal crops and hence famine broke out.

All organisms in a biome depend upon one another in order to survive and control the number of one another. The result of this complete process is perfect balance in nature this balance is called ecological balance. If there is any disturbance at any level an imbalance is established.

Read the paragraph and then State Working Hypothesis

Q.No.26 Working Hypothesis;
Q.No.27 The population of pigs and deer declined because
a) of food scarcity
b) of game lovers
c) of excessive killing of pigs and deer for food
d) Very few dead animals were found in fields

Robert Johnson, a rancher, organizes a wolf hunt to kill wolves preying on his sheep. He also has several acres of alfalfa, sometimes later he notices an increasing amount of damage to his alfalfa field upon investigation he discovers large numbers of rabbits and deer eating his alfalfa.

Q.No.28 Read the passage and hypothesise for this;

Q.No.29 High in the mountains a dam suddenly breaks, what possible hypothesis could you give for such an occurrence?

Q.No.30 Indiscriminate hunting of wild animals has disturbed the food chains and food web of the forest and grasslands. As a result some of the animals have become extinct and some are on the verge of extinction. How does wild life disturb the balance of nature?
Hypothesis

Q.No31 Assume that mendel raised several hundred red flowered plants for 5 generations, crossing some and allowing others to self pollinate. If only red flowered plants appeared, it can be correctly inferred that the
   a) Plants were homozygous for flower colour
   b) Plants were heterozygous for flower colour
   c) Gene for red flowers was dominant
   d) Gene for red flowers was recessive

Q.No.32 Suppose that crossed pure breed red flowered plants with pure breed white flowered plants obtained all red flowered off springs (F-1 generation). The gene for red flowers must have been;
   a) Assorted
   b) Sex linked
   c) Dominant
   d) Probable

Q.No.33 Assume that mendel crossed more of the red flowered off spring of (F-1 generation) and obtained 4000 plants (2980 with red flowers and 1020 with white flowers) It is reasonable to conclude from these data that:
a) Mutation occurred in the F-2 generation.
b) The laws of chance were not operating
c) The genes for white flower and red flowers were carried in the same chromosome
d) The gene for the white flower is incompletely dominant.

Q.No.34 Man is entirely dependent on plants mainly because the plants have:
a) The capacity to use solar energy for the synthesis of various organic compounds which form the sources of energy
b) The capacity to synthesize starch which can be utilized for the production of energy
c) Many inorganic salts which may be useful in osmoregulation
d) The capacity to synthesize proteins which is the only important component necessary for the animal growth.

Q.No.35 Automobiles discharge hydrocarbons and nitrous oxide in atmosphere which is further converted to:-
a) Carbon monoxide
b) Ozone and other pollutants
c) Radio active substance
d) Hydrochloric acid and nitrogen dioxide
Table showing height and weight of six boys

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Q.No.36 Which of the following is the best reason for presenting the above data in a table?
- a) It requires no interpretation
- b) It is an effective way of showing relationships
- c) It has fewer mistakes than a descriptive paragraph
- d) It points up the reason tall boys weigh more.

Q.No.37 On the basis of the data given, it could be reasonably predicted that the weight of a boy 160 cm tall would be most nearly:
- a) 45 kg
- b) 55 kg
- c) 65 kg
- d) 75 kg

Q.No.38 Which one of the graphs (a), (b), (c) and (d) correctly expresses the data in table in graph (1)
Q.No. 38 Which of the graph (a), (b), (c) and (d) correctly expresses the data in the table?

Q.No. 40 Which of the graph (a), (b), (c) and (d) correctly expresses the data in the table?
Table showing annual income of seven families

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Study the Table and answer Q.No. 39 and 40

Q.No. 39 Which of the following is the best reason for presenting the above data in a table?
   a) It requires no interpretation
   b) It is an effective way of showing relationships
   c) It has fewer mistakes than a descriptive paragraph
   d) It points up the reason that with the increase of number of family members there is decrease in annual income.

Q.No. 40 Which one of the graphs (a), (b), (c) and (d) correctly expresses the data in the table? (in Graph II)

Q.No. 41 The increased number of pigs and deer was because of
   a) There was excess of cereal crop
   b) Lion hunting was done on large scale.
Q.No.42 Which one of the following is most effective in controlling floods;
   a) Deforestation
   b) Reforestation
   c) Constructing dams
   d) Digging deep canals.

Q.No.43 The clotting of blood is partially dependent upon:
   a) Vitamin K
   b) Vitamin E
   c) Vitamin A
   d) Vitamin B

Q.No.44 The nucleus in a cell is:
   a) The store house of all hereditary material
   b) A dense part of the cell
   c) The controller of the metabolism of cell
   d) All of the above

Q.No.45 Increasing urbanisation causes:
   a) Over crowding
   b) Health and pollution hazards
   c) Socio-economic problems
   d) All the above

Q.No.46 Do you know how to adjust compound microscope?
Q.No.47 Adjust the microslide in a compound microscope.
## Table showing Pre-test, Post-test and Gain Scores of Acquisition of Process Skills Test Group I

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APPENDIX-A.11.2

Table showing Pre-test, Post-test and Gain Scores of Acquisition of Process Skills Test Group II

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APPENDIX - A.11.3

SCORES OF TEST AND RE-TEST

SCHOOL : Govt. Sr. Sec. School, Sector 37-B, Chandigarh

CLASS : X

DATE OF RE-TEST : August 27, 1989

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Total  762  801  24628  26829  25638
\[ r = \frac{N \sum xy - \sum x \sum y}{\sqrt{[N (\sum x^2 - (\sum x)^2)][N (\sum y^2 - (\sum y)^2)]}} \]

\[ = \frac{25 \times 25638 - 762 \times 801}{\sqrt{[25 \times 24628 - (762)^2][25 \times 26829 - (801)^2]}} \]

\[ = \frac{640950 - 610362}{\sqrt{(615700 - 580644)(670725 - 641601)}} \]

\[ = \frac{30588}{\sqrt{30556 \times 29124}} \]

\[ = \frac{30588}{187.23 \times 170.65} \]

\[ = 31950.79 \]

\[ = .957 \]