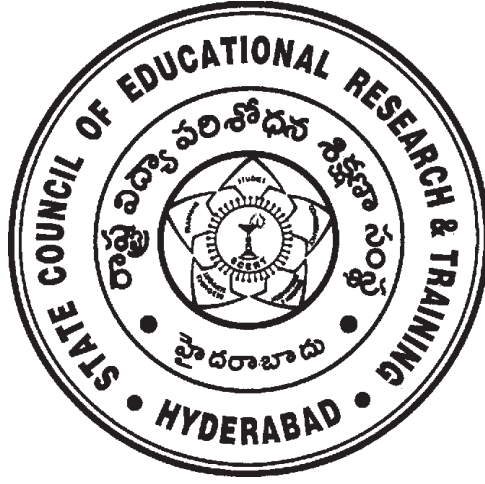


# **Biological Science**

## **10th Class**

### **Teachers' Handbook**



**State Council of Educational  
Research & Training  
Telangana State Hyderabad.**

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## ముందుమాట

పాఠశాల విద్యలో చేపట్టిన సంస్కరణల్లో భాగంగా ఈ విద్యా సంవత్సరంలో పదో తరగతికి నూతనంగా రూపొందించిన పాఠ్యపుస్తకాలు ప్రవేశపెట్టారు. 6 నుండి 9 తరగతులలో చర్చించిన వివిధ భావనలను పునశ్చరణచేస్తూ ఇంటర్మీడియట్ కు కావలసిన పునాది కల్పిస్తూ, దానికి అనుసంధానంచేస్తూ పదో తరగతి పాఠ్యప్రణాళిక రూపొందింది. జాతీయ విద్యాప్రణాళికా చట్టం 2005, రాష్ట్ర ప్రణాళికాపరిధిపత్రం 2011, విద్యాహక్కు చట్టం 2009 ఆశించిన లక్ష్యాలను సాధించేందుకు వీలుగా ఈ పాఠ్యపుస్తకాలు రూరపదిద్దుకున్నాయి. పాఠ్యాంశలలోని భావనలను అర్థంచేసుకోడానికి వీలుగా అనేక కృత్యాలు, ప్రయోగాలు, క్షేత్రపరిశీలనలు, చారిత్రక నేపథ్యాలు, విభిన్న ఉదాహరణలు జోడించారు. కాబట్టి భౌతికశాస్త్ర ఉపాధ్యాయుడు ఇంతకు ముందులా పాఠం మొత్తం తానే వివరించాలని ప్రయత్నించకుండా పిల్లలు వివిధ అభ్యసన సన్నివేశాలలో పాల్గొంటూ నేర్చుకోవడానికి అవకాశం కల్పించాలి. చర్చించడం, అన్వేషించడం, ప్రయోగాలు చేయడం ద్వారా పిల్లలు సొంతంగా నేర్చుకునేలా ప్రోత్సహించాం.

పదవ తరగతిని పాఠశాల విద్యలో అత్యంత కీలకమైనదిగా మన మందరం భావిస్తుంటాం. ఉన్నత ఫలితాల సాధనకోసం అవిశ్రాంతంగా కృషిచేస్తుంటాం. అయితే మనం పాటించే విధానాలు పిల్లలు అర్థరహితంగా బట్టిపట్టే విధంగా మార్చేవిగా ఉండకూడదు. పరిక్షలు, మార్కుల ఒత్తిడికి ఆందోళనకు గురిచేసేవిగా ఉండకూడదు. పిల్లలు స్వేచ్ఛగా అభ్యసన ప్రక్రియల్లో పాల్గొంటూ స్వతంత్ర అభ్యాసకులుగా ఎదగడానికి దోహదపడేవిగా ఉండాలి. కాబట్టి వారు పాఠ్యపుస్తకాలలోనుండి, గైడులు, కృష్ణన్ బ్యాంక్ నుండి గుడ్డిగా చూసి రాయడం, కంఠతాపట్టడం వంటి అలవాట్లను అవకాశం లేకుండా చూడాలి. పాఠంలో ఉన్న ప్రశ్నలపై చర్చించడం, ప్రయోగాలు, ప్రాజెక్టులు చేయించడం అనుబంధ అంశాలు పై చర్చించడం ద్వారా పిల్లలు వివిధ భావనను సులభంగా అర్థంచేసుకో గలుగుతారు. ఒక భావన నేర్చుకోవడానికి కావలసిన పూర్వజ్ఞానం ఏమేరకు అవసరమో గుర్తించి వాటిపై అవగాహన కలిగించాలి. భౌతికశాస్త్ర అంశాలు నేర్చుకోవడానికి కావలసిన గణితపరిజ్ఞానం కలిగించడం ఉపాధ్యాయుని కర్తవ్యం. పాఠ్య ప్రణాళిక మార్పులలో భాగంగా నూతన భావనలు పాఠ్యపుస్తకాలలో పొందుపరచిన వాటిని అర్థం చేసుకోవడానికి ఉపాధ్యాయులు సంప్రదింపు గ్రంథాలు పరిశీలించాలి. అదనపు సమాచారం సేకరించి మరింత అర్థవంతంగా విషయాలపట్ల పిల్లలకు అవగాహన కలిగించేందుకు కృషిచేయాలి.

నిరంతర సమగ్ర మూల్యాంకనంలో భాగంగా నిర్వహించే నిర్మాణాత్మక మూల్యాంకనంలో పిల్లలతో తప్పని సరిగా ప్రయోగాలు చేయించి ప్రయోగశాల రికార్డును నిర్వహింపజేయడం. నోటుపుస్తకాలు సరిగా, సొంతంగా రాసేలా చూడడం అవసరం. పిల్లల ప్రగతిని నిరంతరం పరిశీలిస్తూ స్వయంగా నేర్చుకొనేందుకు తోడ్పడాలి. శాస్త్రీయ అభిరుచిని పెంపొందించేందుకు వివిధ సైన్సు మ్యూజిన్లు పుస్తకాలు పాఠశాల గ్రంథాలయంలో ఉండేలా చూడాలి. సైన్సు తరగతి గదికి ప్రయోగశాల, గ్రంథాలయం రెండు కళ్ళలాంటివి. వాటిని సమర్థంగా నిర్వహించడం లోనే ఉపాధ్యాయుని వృత్తి పరమైన వికాసం దాగిఉంటుంది.

పాఠ్యవిషయాలను పుస్తకం నుండి విద్యార్థికి చేరవేయడంగా కాకుండా పిల్లల్ని ఆలోచింపజేస్తూ, అన్వేషింపజేస్తూ ప్రశ్నలద్వారా చర్చలలో పాల్గొనజేస్తూ తరగతి గది బోధనలో నూతనత్వాన్ని నింపాలి. సైన్సు నేర్చుకోవడం అంటే పుస్తకాలకు పరిమితంకావడం కాదనీ విభిన్న భావనలను నిత్యజీవితంలోని వివిధ సందర్భాలలో పరిశీలిస్తూ, అన్వయిస్తూ కొత్త కోణంలో సృజించడం అని గుర్తించాలి. కేవలం పదవతరగతిలోనే ఫలితాల సాధనకు ప్రయత్నించడం కాకుండా 6వ తరగతి నుండే పిల్లలు చేస్తూ చర్చిస్తూ, పాల్గొంటూ స్వంతంగా నేర్చుకోవడం అలవడేలా ఉపాధ్యాయనిపుణులు కృషిచేస్తారని, బట్టిచదువుల బంధనాలనుండి పిల్లల్ని విముక్తంచేసి నైపుణ్యాల సాధనలో స్వీయ అభ్యాసకులుగా మారేలా తీర్చిదిద్దుతారనీ ఆశిస్తూ.....

విజ్ఞానాభివందనాలతో

సంచాలకులు  
రాష్ట్రవిద్యాపరిశోధన శిక్షణాసంస్థ,  
హైదరాబాద్.



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## I. New Text books - Importance



We all know that in our state new text books are formed according to the instructions of NCF - 2005, RTI- 2009 and aims of STCF - 2011. As a part of it new text books for class X for the academic year 2014-15 are introduced. Tenth class is crucial in school education. We treat that this is the last step in school education. Hence tenth class syllabus should help the students in their intermediate course or other competitive exams. All the same time it should make them new concepts. Accordingly New text books are formed.

Text books reflect the below topics which are mentioned in State Curriculum Frame work. Position paper.

### 1. To get rid of rote memory :

There is no information of any topic in the text book which one can rote. For example, in a text book, it is questioned that is there any relation among a candle, rat and mint plant? If so, what is it ? The answer for this question will not be in any lesson. After doing experiments, children can come to a conclusion and can establish relationship between the experiment and the result. To understand the topics and concepts in the text books different activities are framed.

### Examples :

- Flow charts should be used to know the complex topics.
- Instead of filling with the information about Human digestive system children should pose questions, discuss, observe and can understand on their own.
- They can analyse the graphs and tables and can write the answers on their own and can recognise the contrasts and comparisons in the topics.
- To make them understand the functioning of kidneys by introducing the medical topics like dialysis and artificial kidneys.

The activities children can understand different topics.



## 2. Learning should not be limited to the text books :

Children can gain more knowledge through the activities and project works of text books. Hence group works, discussions and project works are included in every lesson. children can learn new things when we can take them out from the class room. In order to understand the concepts deeply and meaningfully many projects, group works and field trips are there in the text book.

## 3. To make use of the concepts learnt in day to day life :

The topics in the lessons of the text book are based on our daily life activities. Activities and experiments which included in the text books are arranged in such a way that they can make use of daily life incidents.

eg : Why does vomits come?

How will be the movements in the elementary canal at the time of vomiting?

Why do legs pain when we run or walk long distances?

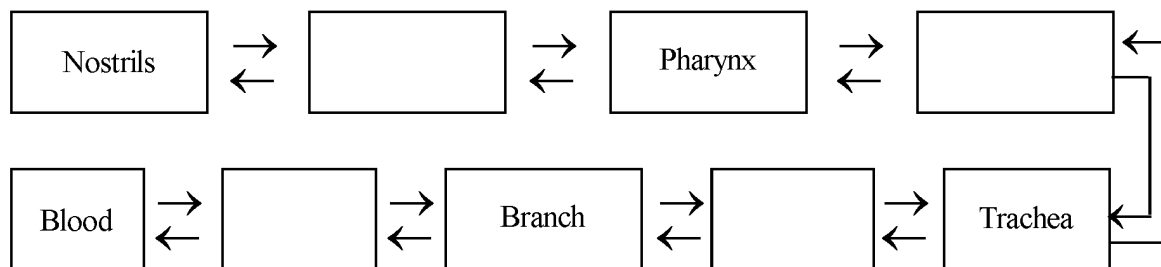
What for dialysis when the kidneys are not function.

In this way so many experiences which we face in our daily life are included in the lessons. Children can make else of this knowledge and can solve their daily life problems.

## 4. Evaluation methods should bring out the abilities in children :

Topics in the text books are arranged in such a way that instead of mugging them up, students can add their opinions and experiences to the knowledge they gained and can acquire analysing skills, experimental skills can draw the pictures, diagrams, can understand the flow charts and express them on their own, can put the information in flowcharts and tables.

Eg : Complete the way how the air enters into the body.



Flow charts like this will enhance student's knowledge. Activities in the text book cater student's background, their culture, their interest and provide them the opportunities to utilise their doing capacities.



New text books help the children to study the science in a scientific way. As part of qualitative education it is necessary for all the children to attain determined educational standards.

To achieve the academic standards through the lessons of this text book teachers should follow the teaching learning strategies like making the children to think, to question, to discuss and make them participate in activities and experiments.

### **New Text book - Characteristics :**

- Topics are based on the topics of earlier classes, in a new angle.
- The interesting topics like the different findings in science and the experiments by scientists to find these are included in the lessons. Through these topics their interest towards science will increase. They show interest to learn new things and to do experiments. Children will recognize that the scientific findings are not happened all of a sudden but are the results of the scientist's experiments for years together.
- Space for continuous comprehension evaluation is provided through asking them thought providing questions to test their understanding in the middle of the lesson.
- Science should be studied in a scientific way through the activities like field trips, experiments, group works, discussions and project works. Hence to study the different concepts in the lessons these activities are included in each lesson.
- Besides satisfying the children with the classroom experiments, motivate them to know the result in an experiment by changing different factors. Children can make the experiments with locally available things. With this not only the concepts strengthens but they can learn new topics also. Given activities not only make them understand the textbook topics, but also make them learn new things by doing experiments.
- To understand the concepts in the text book, diagrams help them a lot. And these diagrams in this text book are of different colours and hence it is easy for the children to understand them. Most of them are 3D, Microscopic and real pictures.
- In order to make them understand different organ systems flow charts and tables are given.
- At the time of introducing complex concepts in the lessons, daily life incidents are added for their understanding. Most of the topics of these lesson can be utilised in their daily life.
- Discussion topics and the activities in the text book should not give them specific answers all the time. By giving open-ended questions there will be scope for the children to think and write individually. Hence, topics like 'think-discuss' like activities are given.



- The activities in the text book help the children to compare and decide their hypothesis.
- The activities are arranged in such a way that, in most of the situation, children themselves can search and find out the answers.
- Children can do the experiments, observations on their own or with the help of the teachers.
- In order to assess children's progress there are many types of questions in the middle of the lesson and at the end as well. There are meant to think and write individually on their own.
- In order to give them additional information besides the content in the lesson, the topics like 'Do you Know', Annexure, etc. are included.
- To improve analytical thinking among the children, information is given in table form wherever necessary.

New text books are made to learn mainly the concrete concepts through experiments and observations. Observations and experiments make the children to have specific opinions towards scientific concepts and give them the skills to utilise the learnt concepts to solve their daily life problems in an efficient way. These new textbooks help the children to understand the nature, environment and make them grow the person with scientific attitude through science.

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## II. Syllabus - Themes



In selecting the themes NCF - 2005 suggested to include the children's abilities, society, needs, human resources, future needs, changes in the nature and environment and the experiments and efforts in the areas of science and technology. It is not so easy to provide widely improving day by day information only through textbooks. Hence we have to develop the habit of collecting the information whenever necessary through different channels. This help them to build the knowledge on their own. In continuation with syllabus VIII and IX, topics and syllabus in the tenth class text book are developed. The lessons in this text books are based mainly on the following themes.

1. Food
2. World of living organisms
3. What are living beings made of ?
4. Natural Resources

### **1. Food :**

In the theme of food students had an understanding of food we eat in 6 and 7th classes, the food from plants and animals in class 8th and the agricultural products and the challenges in class 8th. In continuation to these in the tenth class preparation of food through photosyntheses in plants (autotrophy), Nutrition in parasites (parasitic nutrition, heterophy), passage of food through alimentary canal, process of digestion, diseases due to mal nutrition etc. are included.

### **2. World of Living Organisms :**

Under this theme in 6th class living and non-living organisms, in 7th class soil - our life, forget - our life, in class 8th and 9th bio-diversities are given. In continuation heredity is included in tenth class.

### **3. What are living beings made of :**

Under this theme, in class 9th plant cell, structure of animal cell, tissues, passage of substances in the cells are given in continuation to this different organ systems like respiration, transportation, excretion, coordination and reproduction like topics are introduced in class 10th.



#### **4. Natural Resources :**

Under this theme in classes 8th and 9th can't drink can't breathe, soil pollution, Bio, Physical and Chemicals rings are the topics. In continuation to these in class length our environment, our responsibility, natural resources like lessons are introduced. Through these we can make the students aware of conserving agriculture, watershed methods, community based interventions, farmer based interventions, wasteland development and tree plantation and the natural resources like forests, soil, fossil fuels etc.

In studying the science the role of textbooks is very limited. Science is very vast, mere textbooks are not enough to gain the knowledge. To know these concepts effectively and analytically, and to gain knowledge on one's own it is important to discuss with the teachers, and to get information from the library books and from different information systems like, internet. It means that text books learn how to seek this knowledge.

To develop among children processing skills, like interacting with the material and with the nature, discussing, searching, and collecting to clarify their doubts, conducting field trips and come to a conclusion are provided in the lessons.

### **Class X Syllabus 2014-15 Biological Science**

#### **1. Nutrition**

- 1.1 Life process- Introduction, Basis of theme making
  - 1.1.1 Recalling the related issues from previous work
- 1.2 Nutrition in plants
  - 1.2.1 Understand the concept of photosynthesis in general terms
  - 1.2.2 Raw materials required
  - 1.2.3 Process involved in photosynthesis- light reaction, dark reaction
  - 1.2.4 Products- With reference to carbohydrates, energy
  - 1.2.5 A brief account of fate of carbohydrates which is the end products (accumulation and conversion)
  - 1.2.6 Suggested Activities- T.S of leaf to observe chloroplast, Hydrilla experiment, KOH.
  - 1.2.7 Variegated leaf.



- 1.2.8 Do you know? - Insectivorous plants are autotrophic.
- 1.3 Nutrition in human beings
  - 1.3.1 Parts of the alimentary canal,
  - 1.3.2 Digestive glands
  - 1.3.3 Enzymatic reactions and assimilation (Brief account)
  - 1.3.4 Do you know?-(Vitamins & minerals), deficiency diseases

## 2. Respiration

- 2.1 Introduction- Recall- Respiration as a characteristics of living beings, how the process takes place, organs or organs systems involved in the product
- 2.2 Respiratory system in human being- Respiratory organs, mechanism of gaseous exchanges (Flow chart/diagram etc)
  - 2.2.1 Pathways of respiration – Substrate breakdown, release of energy, product
- 2.3 Types of respiration- aerobic, anaerobic
- 2.4 Respiration in plants

## 3. Transportation

- 3.1 Introduction- Need of the transport system in all living being, material that are transported, medium of the transport (blood- human being, water- plants)
- 3.2 Transportation system in human being- Heart (the pumping organ) Structure and function, circulation of blood, channels for blood circulation- artery, vein, capillaries, double circulation, and lymphatic system.
- 3.3 Transportation in plants- (a) Mechanism of water transportation in plants (Brief account), transpiration, ascent of sap, cohesive and adhesive forces, root pressure. Detailing of ascent of sap with activity/ experiment. (B) Translocation of food.

## 4. Excretion

- 4.1 Introduction- Need of excretion by posing question/by summarizing the earlier chapter.
- 4.2 **Excretion in human being** - excretory system, parts and function, Kidney as a excretory/ osmoregulatory organ (L.S. of kidney to show location of nephron, its structure and function as a unit of excretion)



- 4.3 Artificial kidney, hemolysis.
- 4.3.1 Other pathways of excretion in human being.
- 4.4 **Excretion in plants**- Process, important secretory/excretory products useful for human being.

## 5. Control & coordination

- 5.1 Introduction- Need for control and coordination.
- 5.2(a) Nervous system in humans being- Recall of the structure of nerve(Response to stimuli), reflex arch(Types of nerves, Different nervous system)
- 5.3 Human brain and its functions
- 5.4 Role of hormone- general account of hormone in human being and their function
- 5.5 Control and coordination in plants- response to stimuli, movement & growth, plants hormones and their function.
- 5.6 Tropic movements in plants - Photo, geo, hydro, chemo tropism.

## 6. Reproduction

- 6.1 Introduction- Recall of reproduction work which has done so far, importance of reproduction (continuation of genetic material from generation to generation, as a basis of variation)
- 6.2 Observable phenomena related to process
- 6.2.1 Growth and development of human embryo
- 6.3 Sexual reproduction in plants
- 6.4 Cell division (Brief account of the basis of the above observable phenomena )
- 6.4.1 Mitosis, Meiosis
- 6.5 Reproductive health- Family planning, safe sex, HIV/ Aids

## 7. Coordination of Life Processes

- 7.1 Introduction- Recall life processes, how they work together
- 7.2 Sensation of hunger and system involved- Nervous, muscular
- 7.2.1 Outcome of sensation- watering of mouth, looking for food, panic of stomach
- 7.3 Consumption of food- process involved in breakdown of substances in mouth
- 7.3.1 Travel food through food pipe-Role of nervous system, muscular system





- 7.3.2 Reaching the stomach- stimulus, response, enzyme reaction, acidic, action of sphincter
- 7.3.3 Intestinal process involved- Intestine to blood and all parts of body, blood to expulsion of waste, intestine to expulsion of waste
- 7.3.4 Relationship between different life processes related to digestion- source of energy for all these processes.

## **8. Heredity and Evolution**

- 8.1 Heredity; Introduction- Recalling (Variation in organisms, selection of characters based on variation, based on variation forming classification)
- 8.2 Variation- accumulation of variation, inheritance- heredity, similarity and difference, Mendel's contribution of heredity, rules of inheritance, sex determination in human being.
- 8.3 Evolution
  - 8.3.1 Variation in population with an illustration- Natural, Artificial selection
  - 8.3.2 Acquired characters (traits) vs inherited traits, Darwin and Lamarck,
  - 8.4 Evidence of evolution- fossils, homologous and analogous organs
    - 8.4.1 Evolution by stages
    - 8.4.2 Speciation
    - 8.4.3 Human Evolution

## **9. Our Environment**

- 9.1 Introduction- recall the work done- food chain, food web, Interdependence between living things
- 9.2 Detail of interdependence between biotic and abiotic components taking case study as an example
- 9.3 Concept of quantification of biotic and abiotic factors in the forms of pyramids.
- 9.4 Brief account about type of pyramids- biomass, number
  - 9.4.1 Taking one ecosystem as a base detailing both the pyramids.
  - 9.4.2 Some case studies (Kolleru, Edulabad water reservoir)

## **10. Natural resources**

- 10.1 Introduction- By probing questions related to natural resources from specific situation from daily life



- 10.1.1 Resource used by human beings
- 10.1.2 Types of resources, classification
- 10.2 Consumption of natural resources- statistical data for eliciting the abuses (Comparison within two areas, Based on case studies)
- 10.3 Elements of abuse- Nature's fundamental principal, a letter of mother nature to people, greediness of human being, deforestation and desertification
- 10.4 Management and conservation- why conservation, How- World conservation strategies, Localized strategies, Case study of loss of agricultural resources in a particular district and it's conservation.

### 10th Class Biology - Themes - Lessons :

Sl.No.	Theme	Lesson
1.	Food	Nutrition - Food Supplying system
2.	World of Living Organisms	Heredity
3.	What are living beings made of	<ul style="list-style-type: none"><li>1. Respiration - the energy releasing system</li><li>2. Transportation - the circulatory system.</li><li>3. Excretion - the wastage disposing system.</li><li>4. Coordination - The linking system.</li><li>5. Reproduction - The generating system.</li><li>6. Coordination in life processes.</li></ul>
4.	Natural Resources	<ul style="list-style-type: none"><li>1. Our environment - our concern</li><li>2. Natural Resources</li></ul>



### III. Unit Structure

Tenth class new science text book is based on the philosophy of knowledge construction in which students participating in the incidents and gaining knowledge themselves. Let's observe how the lessons are formed.

- Lessons start with the incidents children face in their daily life or with the revision of earlier classes concepts.
- Question and discuss about the concrete concepts of earlier classes.
- Prepare the students to study science through thought provoking, researchable questions.
- Conducting activities and experiments to make aware of the topics of new concepts.
- Analytical exercise through activities, experiments, projects, information gathering tables, asking thoughtful questions to analyse the information, conducting discussions and make them aware of the concepts.
- Explaining the diagrams and the structure of different cells and organs and explaining how the activities happens in the organs. Exhibiting the processes in the form of flow charts.
- In order to create curiosity, scientific thinking and scientific attitude, keeping additional information available.
- Teaching learning methods should mix with the learner's mutual interactive activities.
- Self responses should be in such a way that children should add their own thoughts and opinions and findout the things in their own way.
- Lessons in the text books are arranged in such a way that they will achieve academic standards.
- Text books help to improve the learning through individual and self-evaluation.

The lessons in the text book which are based on different themes are arranged in the order of conceptual importance. It is necessary to observe many topics starting from introductory scene to



improve the learning in a philosophical angle. Let's kindly observe different parts of the science text books which are based on theoretical strategy to build the knowledge.

- Introducing scene / introduction with thoughtful questions.
- Activities / experiments
- Think / Discuss
- Do you know?
- Laboratory activities
- Filling the labels / analysis
- Observing the maps
- Drawing the graphs, diagrams, flow charts and annexures.
- Making and exhibiting the models.
- Reading stories and biographics
- Key words
- What we have learnt?
- Improve our learning (questions).

Every lesson in the text book is based on the above topics. In addition to analyse these things deeply, let's observe how to conduct these steps in the class room.

## **1. Introduction :**

The lesson starts with the introductory scene. In order to understand the lesson, this introductory scene is based on children's earlier experiences. Some lessons start with thoughtful questions too.

**Eg :** The lesson excretion - the wastage disposing system starts with the following thoughtful questions.

- Where are the wastes produced?
- How are they produced?
- What are the substances present in them?
- Does the composition vary in the same organism in different situations?

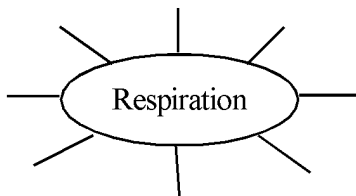
By questioning and discussing thoughtful questions like these we can know their earlier experiences and can create interest to learn the lessons.



## How to introduce ?

To understand the concepts in a science text book, it is necessary to observe children's earlier experiences. For this the teacher should discuss topics in the beginning of the lesson with the children. Mind mapping based on the key concepts of the lesson should be concluded.

**Eg :** At the time of teaching respiration - the energy releasing system, teacher should pose questions regarding what they know about respiration and should make a mind map.



While making mind mapping teacher should discuss and question the children the topics what they have learnt in the earlier class and should write them on the black board.

## 2. Activities / experiments :

By analysing the results of the activities and experiments makes understanding towards different concepts. The activities and the experiments can be done with locally available things. These can be performed individually or under teacher's supervision. After completion of the activity/experiment thoughtful questions are given for the understanding of the concepts.

**Eg :** In the lesson respiration under the topic of breathing two test tubes, water, lime water, straws are enough to conduct the experiment. These are all available for the children. After completion of the experiment results can be analysed through following questions.

1. What does this experiment indicate?
2. Which gas turns lime water milky?
3. Which gas do you think might be present in greater quantities in the air are breathe out as compared to air around us?

If children can imagine answers for the above three questions children can understand that the gas that changes lime water milky is carbondioxide and hence the presence of carbon dioxide will be in layer amounts in exhaled air.

## How to conduct ?

- Why the activity/experiment is going to be done should be discussed with the children.
- The aim of the activity / experiment should be written on the blackboard.



- Make the children guess the result, and write the answers on the blackboard.
- Make the children read the text book thoroughly to know the method and apparatus to conduct the activity / experiment.
- Teacher should provide the necessary tables to enroll the observed items of the activity / experiment.
- Activities should be done individually, with in the group or with the help of the teacher.
- The results should be enrolled individually or in groups.
- Compare the experiment results with hypothesis.
- Children's report should be exhibited and discussed in the class room by asking thoughtful questions.
- Explanations and conclusions in the textbook should be discussed individually to test student's understanding.
- New thoughts / problems are based due to the experiments should be discussed.
- Experiments can be done by using alternative methods and instruments and discuss their thought and experiments.

### **3. Think - Discuss :**

To understand the lesson thoroughly thoughtful questions are given under the topic. These will make the children to think in different angles.

**Eg :** In the lesson transportation - the circulatory system after making understanding about the blood capillaries, there are questions about William Harvey's experiment.

1. In which blood vessels valves are found? What do you think is the function of the valves in them?
2. Why do sub-cutaneous vessels bulge on the side away from the heart when the hand is tied?
3. The deep seated blood vessels (arteries) bulge on the side towards the heart when tied. What do you understand from it?
4. There are valves in the heart between arteria and ventricles. Is the purpose of valves in the veins and arteries same?



The above questions give complete understanding about the functioning of the valves and which the blood flows in arteries and veins.

#### **How to conduct ?**

- After reading a question make the children think and speak.
- For the sake of understanding give them direction and if possible ask follow up questions.
- No need to ask the students to copy down the answers in the note books. These help to strengthen the concepts.
- Provide chance to the students to observe or to do follow up experiments whenever necessary.

#### **4. Do you know ?**

In every lesson to understand the concepts deeply and to observe them some additional activities are given under the topic "Do you Know?" For example, in transportation - the circulatory system lesson there are explanations about blue whale, elephant, human being, coalitit bird, weight of the heart and number of heart beats. In the same way in the lesson coordination - the linking system, the reasons for the nastic movements in Mimosa pudica are explained. By reading these the curiosity to know how things develop among the children.

#### **How to conduct ?**

- As a part of teaching the lesson pase thoughtful question and encourage the students to read the items in the box.
- Make them read individually and discuss.
- Encourage the students to gather the related information from library books, internet etc.
- Keep the information gathered by the children (diagrams, questions, books, information) in school bulletin/wall calender.
- These are not meant for testing. Hence, there will not be questions on these either in summative or in formative exams.

#### **5. Laboratory activities :**

In new textbooks conducting experiments in laboratory are given much priority. For this weekly one lab period (two 45 mts periods) is allotted. Laboratory activities are given in every lesson. Though there are many activities in the text book, the laboratory activities are special. To conduct



these specific operates and specified situations are needed. To conduct an experiment in the laboratory necessary equipment and chemicals should be arranged in advance.

**Eg :** Oxygen is produced during photosynthesis.

- Experiments in yeast - the process of photosynthesis.
- Observing the hearts of goat / sheep through dissection.
- Observing the internal organs of the kidneys of sheep/goat through dissection.

#### **How to conduct ?**

- Laboratory activity can be conducted either in the class room or in the lab.
- Make ready of the necessary equipments chemicals and observation tables to conduct an experiment.
- By keeping the equipments ready, teacher should give suggestions to the students wherever they needed and make them to do the activities in the lab.
- Discuss and analyse the recorded results with the whole class.
- Experiments can be done in such a way that the students should.
- Experiments can be done by making the students guess the result by changing the factors and the situations. Encourage the students to learn new things and to come to a conclusion.
- Ask the students to write the experiment in their lab record.

#### **6. Filling the tables - and their Analysis:**

Learning activities in the new textbooks make the children develop the processing skills among the students. Gathering the information on their own, classifying it, and come to conclusions by observing it should be implemented as a major learning process. In the textbooks, tables filled with information, information gathering and the tables which develop the analysing skills are given. These help the students to understand the lesson effectively. For example in the lesson Heredity in the table of Mendel's peas plant traits minute pictures are included. By this students can easily understand the observations of the scientists. On the same way in the lesson transportation - the circulatory system the table of Harvey's experiment is given and asked to fill the blanks for arteries and veins. With this students can easily understand the functioning of the veins.

#### **How to conduct ?**

- Instruct the students how to gather the information for the tables given in the lessons.





- Ask the students to gather the information individually / in groups from the library books, field trips and internet. Give them ample time for this.
- Ask follow up questions from the text book for the discussion save to develop their understanding.
- If the space provided in text book is not sufficient ask the students to prepare information cards and to conduct the activity.
- With the help of gathered information prepare graphs, flow charts and exhibit.
- Discuss the topics to be filled in the tables.
- Give necessary instructions while filling the tables.
- Teacher should give examples.
- Ask the children to give examples.
- Make the students to fill the tables individually.
- As part of teaching tables should be conducted in the class room only.
- Ask the students to fill the tables at their home, school or wherever they get information. It takes much time to fill some tables.

## **7. Observing maps and diagrams and preparing flow charts :**

Much information can be provided in brief through maps and diagrams. A picture gives much information. Most of the diagrams in biology and physical science are given in the form of quality photos and microscopic pictures. Pictures which show internal construction and instrumental arrangement are given. There is much importance of maps and pictures in science.

Eg : Paramecium, Mitochondria, Blood cells like minutes are shown in the form of 3D microscopic pictures.

### **How to conduct ?**

- Utilise maps, diagrams, and flow charts for understanding whenever necessary.
- Make them practice to draw the pictures which are given in 2D form.
- Ask the students to read the lesson and recognise the parts of the diagram.
- Ask the students to read the information and put it in the form of flow chart.
- Ask the students to exhibit the gathered information in graph form.



- Make the students draw the arrangement of apparatus in the lab and internal parts of the body.
- Make the students draw different stages in the life cycles of creatures.
- Ask them to complete the incomplete diagram.
- The diagrams in tenth class text book are useful to some extent only to inculcate the academic standard of information transfer among the students. Hence ask the students to take the diagrams of different biosystems and organic constructions from other books. Earlier text books, intermediate and degree text books are useful for this. But tenth class stage should be kept in mind while selecting the diagrams.

## 8. Stories, Personal history and Annexures :

Reading the backgrounds of different findings develop interest among students towards science. By regarding different experiments, results help them to know whether their ideas towards them are right or wrong. eg : In the lesson of coordination the linking system researches done by Leonardo Davinci gives the knowledge that spinal cord not only sends the information from the brain to the body parts but also works as a controlling unit.

By regarding the personal histories children can understand the scientist efforts, dedication, their thinking behind their findings and think to find out new things.

Annexures will help the students to understand the concepts deeply. The annexure in the lesson Heredity - from parent to the progeny children will know the importance of Heel a cell and by the researches of Potti Narasimha Rao they'll know how other scientist went forward.

### How to utilise?

- Stories personal histories, annexural issues in the annexures of the lesson must be read by the students only. And should ask them what have grasped from it.

**Eg:** In the lesson excretion. The wastage disposing system the importance of organ donation is given. 18 years old yashwanth kumar, who was in coma with brain dead donated his kidneys, heart valves, liver and gave life for some more people is a miracle. Learning issues like this in the childhood helps the children a lot.

- Collect the lesson related issues from newspapers and internet and exhibit them in the wall magazine.
- By reading the stories, personal histories, and annexures develop the quality of praising among the students.



- Make the students appreciate the scientists and get inspiration from them by reading their biographies.
- Ulmost recognisable thing is that stories, personal histories and annexures are not meant for testing. They are intended to create interest among the students.

## **9. Making Models - Exhibition :**

Though there are 2D pictures, maps and graphs to explain the concepts of bio and physical sciences, it is better to introduce 3D pictures of Heart structure, electric motor, shapes of different atoms, kidney structure etc. For this models are required. By making alternative models children can understand the concepts.

### **How to utilise ?**

Besides collecting the information and understanding it, it should be expressed to others meaningfully by using technical terms. There should be provision to exhibit the models prepared by the children.

- Ask the children to prepare models individually or in a group.
- Prepare the write ups that explain about the models and exhibit in the classroom.
- Ask the children to exhibit their models and to talk about them.
- When the students prepared working models they should talk about its functioning.
- Take care of preserving the collected and prepared models in the classroom.

## **10. Key Words :**

The important concepts of the topics in the lesson are included as key words at the end of the lesson. With the help of these key words children will for psychological pictures related to those concepts and can analyse. eg : By learning the key word peristaltic movement children can remember the waves movement when the food passes through alimentary canal.

### **How to discuss ?**

- Key words are the brief concepts of the lesson.
- While learning the key words and concepts make aware of them through experiments and activities.
- Understanding the lesson is explaining the key words fluently and hence make the students to talk on them.



- The key words of the earlier units should be utilised in learning the later units.
- Teachers should not define the key words.
- Students should make mindmap based on the key words.

## **11. What we have learnt :**

It's a revision topic. Important concepts discussed in the lesson are given briefly in this. With the help of this we can know what are topics we discussed in the lesson. This helps for self assessment like what we have learnt and what should we learn through this lesson.

### **How to conduct ?**

- Discuss with the children about each item / sentence. Ask the children to say what have understood about that.
- Ask the children to explain the concepts and write it down in their notes.
- The items under the topic what we have learnt are meant not only for revision but for use as an exercise to discuss and analyse the lesson once again.
- Make them help these to collect additional information and to conduct annexural activities.
- These should not be made rote learning.

### **Improve your learning :**

Achieving specified academic standards is the main objective of teaching - learning activities. Though the teacher achievement of the academic standards while teaching the lesson, the items in improve our learning help him / her to observe how the children understand and how they are analysing the lesson. This is one angle and on other side they help the students to assess themselves.

### **How to conduct ?**

- The items in the topic will be like another effort to learn individually the contents in the lesson.
- Though it is an evaluation, it is not meant to test now for the students have learnt.
- As a part of continuous comprehensive learning, the items in improve our learning help to learn the lesson more comprehensively.
- There will not be direct answers in the text book for the questions in this topic.
- Encourage the students to understand the content and write answers on their own.



- Utilise this to know how far the students achieved the specified academic standards.
- The activities which should be done individually/group work/whole class will be conducted as they are intended.
- There are games and puzzles and these are part of evaluation and help to understand the content. Hence these should be conducted without learning.
- Annexural experiments should also be conducted and reports should be written in the notebooks.
- Make the students to write the answers to the questions related to the academic standards like interests, appreciations, bio diversity and applying to real life. Much priority should be given to these.
- Teacher should prepare some more questions, wherever necessary to achieve the academic standards.
- Give ample time to the questions related to the field trips like collect and enroll.
- Ask the students to write answers to the questions in the middle of the lesson then and there only (individually/groups).

By understanding the construction order of the lesson in the text book teacher will have annexures on how to prepare the teaching learning processes. They will have an awareness on how to teach about an item in a lesson. They will have an understanding on how to teach different topics in teaching learning processes by mixing with the content.

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## IV. Academic Standards

APSCF - 2011 Educational Act specified that if the children activities class specific academic standards, then it is considered as qualitative education. That is why for each class and each subject academic standards are specified. The important objective of teaching learning process is to achieve academic standards based the information they got from the text books than the information in the books.

The main aim of the science is to create a new society having concern towards animals and the nature, patience and equality. Solutions to the problems like droughts, and disease is also the responsibility of the science. To prepare our children as future Indian scientists it is necessary to make changes in our text books, teaching learning processes and examination system.

### I. Conceptual Understanding :

It indicates comprehensive understanding of a concept student has to explain a concept if s/he understands that s/he has to classify, it analyse, give examples, tells the reasons and make psychological pictures. Hence under the academic standard understanding comes explaining, classifying, analysing, giving examples, telling the reasons and forming psychological pictures.

#### 1. Explaining

It indicates student's comprehensive understanding of a concept understanding means explaining, classifying, analysing, giving examples, telling the reasons and forming psychological pictures.

Student can explain the following concepts.

**Example :** The process of photosyntheses.

- Lungs - Gaseous exchange between the blood capillaries.
- Functioning of peripheral nervous system.
- Coagulation of blood.
- Structure of Kidney - Functioning.
- Alkaloids in plants.



- A sexual reproduction in plants like fusion, budding, fragmentation, parthenogenesis and vegetative propagation.
- Digestion of food in alimentary canal.
- Phenotypic genes.
- Pyramid of numbers.

## **2. Classifying :**

- Recognizing differences between the things in a group.
- Recognising comparisons between the things in a group.
- Grouping the things according to their special traits.
- Telling the sources and methods that are followed for classification.

**Student can classify the following concepts according to their comparisons and contrasts :**

- On the basis of nutrition
  - ◆ Autotrophic - Heterotrophic
  - ◆ Heterotrophic - paracytic
- On the basis of Respiration
  - ◆ Anaerobic respiration - aerobic respiration
  - ◆ Combustion - Respiration
- Depending on the blood flowing method in the vessels arteries and veins.
- Classifying the nerves according to the functioning.
  - ◆ Sensory nerves - motor nerves.
- Bio chemical substances
  - ◆ Auxins - Absciscic Acid
  - ◆ Auxins - Gibberellins.

## **3. Analysing :**

- Explaining an incident or a situation in their own words.
- Telling the reasonable causes about the concepts.



- Analysing the formulae, equation and experiments results, recognizing the relation and forming intra and new relations.

The following items can be classified by analysing.

- Observe various experiments of photosynthesis.
- The graph that shows the pH of reactive acid in blood.
- The diagram that shows plasma and concentration of urine.
- Water harvesting methods.
- Food pyramids.

#### **4. Giving Examples :**

- Instead of saying what the teacher has said, student has to tell similar example by using classroom knowledge is said to be 'giving examples'.
- Giving examples on the basis of common and different traits.

Students can give examples of the concepts which they have learnt in the classroom.

- Diseases due to malnutrition.
- The process of fermentation in real life.
- Opposite physical reactions of different situations.
- Seedless fruits.
- Different types of diversities.
- Food chain, Food web.
- Different types of natural resources.
- Creatures of single circulation.
- Creatures of double circulation.
- Endocrine glands.
- Energy losing situation in creatures.
- Non-renewable resources.
- Plants of asexual reproduction through spores.
- Analogous organs.





## **5. Saying the causes :**

- Explaining the results of the experiments and concepts with reasons.
- Recognizing the relations connecting the reasons for action and reaction.
- Explaining the observations on the basis of reasons.
- Children affecting to Marasmus disease.
- Blood flowing speedily in arteries.
- The changes in the pupil when light falls on it.
- The number of chromosomes are constant in creatures of every generation.
- Womtings.
- The pain in legs when we play or run.
- Not showing the traits of the parents in progeny.
- Diversities in creatures.
- Joining of healthy metals metals in the bodies of water animals in pollutant water.
- Decreasing of natural resources.

## **6. Formation of Mental Images :**

- The abstract concepts which can not be understand through direct experiences can be understand by mathematical forms and logical thoughts and those concepts can be psychologically.
- Reusing those already formed psychological pictures whenever necessary.
- Light and dark reactions of photosynthesis.
- Respiratory systems - Transportation of gases.
- Blood circulation in hearts.
- The method of filtration of blood in kidneys.
- Feedback Mechanism.
- Life cycle of flowering plant.



## II. Asking questions, making Hypothesis :

- Children have inquestive nature science they have the curiosity and questioning capacity. Asking thoughtful questions on different concepts.
- Asking thoughtful questions to deeply analyse the selected issue.
- All the times of gathering the information, observing the situations prepare questions for interview.
- Questioning is the natural trait of the children. These are keys for research. Hence continue their nature of questioning and develop the capacity of making research.
- Guessing the results through prior thoughts that help problem solving.
- While doing experiments, observations, guessing the results and making hypothesis.

### Eg : Hypotheses :

- If there is no diaphragm in respiration.
- If there are no volves in veins.
- If waste materials are not filtered in blood.
- If by products not released in plants.
- If all the activities in the body are done by the brain only.
- Why are the food materials spoil?
- Conrequences of child marriages.
- The reasons for mandal selecting the peas plant.
- Damages if Lamark theory becomes real.
- Consequences of decreasing salwa in mouth.
- How will be the food materials if information does not happen?
- If stomata are closed in leaves.
- If excretory materials remain in the body.
- If there is no relation between the neurons.
- Reasons for the turns birth.
- If there is no coordination among the different life process.
- Consequences of acquired traits passed through heridy.



### **Questioning :**

- questioning the doctor about AIDS disease.
- Stimuli, responses.
- Passage of energy in ecosystem.
- Evaluation.
- Movements of the food in alimentary canal.
- questionnaire to question the doctors on contraceptures.
- questionnaire to question the gardener on grafting.

### **III. Experiments - Field Trips :**

This include the skills of selecting the instruments, arranging, observing, enrolling, analysing, determining and generalization etc.

#### **Observing :**

- Collecting the information through the experience of sensory organs.
- Observing a thing, a situation, a happening.
- Recognising the happened/completed incidents in a order.

**Enroll :** Enrolling the collected information in a table or in a notebook.

#### **Analysing :**

- Explaining an incident, a situation, a method with reasons in their own words.
- Anedite reasonable causes for any incident.
- Recognising which of the collected is right with evidences.
- Preparing concepts by keenly observing the graphs and reports.

#### **Determining :**

Saying a result by practically observing, analysing a correct guessed hypothesis is determining.

Conduct the following experiments.

- Experiment that prove that carbondioxide is necessary for photosynthesis.
- Oxygen is produced during photosynthesis.



- Light is necessary for photosynthesis.
- Releasing heat in respiration.
- Releasing CO<sub>2</sub> in respiration.
- Releasing CO<sub>2</sub> in combustion.
- Fermentation.
- Experiment of root pressure.
- Phototropism of plant.
- Observation of spores on bread (Rhizopus).
- Preparing food web by observing ecosystem.

By conducting the above experiments and field trips children can achieve the skills like selecting the suitable equipments in an experiment, arranging them, observing, enrolling, analysing, determining and generalisation etc.

#### **IV. Information skills - project works :**

**Information skills :** Collecting the information, exhibiting the collected information in data form, analysing the data, coming to conclusion are the important informative skills.

- In the process of learning is necessary for the students to collect the information in many ways. They have to classify the collected information, prepare the tables, and by analysing the reports they have to write the report.
- Through the skill of information collection children learn different life styles, cultures and honour other's opinions.
- They will be sympathetic towards the environments and will be ready to take the responsibilities.
- Ready to accept their strengths and weaknesses, participates.
- Work with others, share and help others.

Eg: Recognising the children with mal nutrition, knows the reasons.

- Observing the pulse during rest and at jogging time.
- Collecting the information of weights of different annuals and their heart weights.
- Collecting the information of the damage by offids on plants.



- Collecting and analysing different blood and urine reports.
- Collecting the details of organs donations from the newspapers.
- Collecting the details of grafting at a garden.
- Collecting the information about contraceptives from a hospital.
- Collecting different types of diversified seeds.
- Collecting the details of the creatures of an ecosystem and making food chain, food pyramid.
- Observing the tank, recognising the pollutants.

### **Project Works :**

- The process of selecting a problem and by following different steps to solve that problem is project work.
- These will help the children to utilise their innate and creative abilities.
- Wait patiently until the results come.
- Behaving leader as well as follower in the group.
- Writing the reports and exhibiting them.
- Explaining analytically.
- It's group work, hence develop mutual cooperation, patience.

The following can be given under project works.

- Eg:**
1. Malnourished diseases - prevention.
  2. Selection of different types of products secreted by plants and their advantages.
  3. Study on the pollution of nearby wells, tanks, springs.
  4. The changes in the village due to too much digging of the borewells.
  5. Grafting in plants of school garden.
  6. Making report on different stages of a flowering plant.
  7. Tank, river, irrigation methods.
  8. Water harvesting methods.
  9. Watershed works.
  10. A study on the irrigation through well, tube wells.



## V. Transfer of information through Diagrams, pictures, graphs and models.

- This includes expression through diagrams, recognising the parts of the picture.
- Drawing the pictures by observing them through microscope.
- Preparing black diagrams, flow charts, classifying tables.
- Expressing opinions through creative pictures, models and alternative equipments.
- Expressing collected information, results through bar graphs, pie graphs.

### Draw the following pictures by the children :

- Arranging different lab equipments.
- Construction of Mitochondria.
- Structure of chloroplast.
- Structure of nephron.
- Parts of brain.
- Reproductive systems of male, female.
- Fertilization.
- Make them draw the diagrams of the pictures they saw under microscope.
- Fission.
- Fragmentation.
- Stages of Mitosis, Meiosis.
- Transection of leaf.
- Internal structure of the heart.
- Excretory systems.
- Nerve cell.
- Vericle section of flower.
- Structure of ovule.
- Budding in yeast.
- Structure of pollen grain.

### Flow Charts :

- Digestive system - digestive path.
- Blood circulation.
- Food Chain.
- Pyramids.
- Mitosis, Miosis.
- Asexual reproduction.
- The cardioc cycle (stages in heart beat).
- Respiration path.
- Filtration of blood in Nefron.
- Food web.
- Method of recognising the taste.
- Life cycle of flowering plant.



### **Graphs :**

- The graph that shows the concentration of lactic acid.
- Pulse rate, heart beat.
- Relation between age-pulse rate.

### **Making Models :**

- Chloroplast.
- Excretory system
- Digestive system
- Respiratory system
- Food pyramid number pyramid
- Human reproductive systems - male, female
- Reflex arc
- Mitochondria.
- Nephron
- Internal structure of the heart.
- Structure of brain
- Cell division - stages
- nerve cell.

### **VI. Aesthetic sense - appreciation - Values :**

- Developing the nature of competitive spirit, accepting the win and lose equally.
- Developing the characters of accepting the real, appreciation.
- Observing the different issues in the nature and recognising their importance through their hidden relations.
- Enjoying by seeing the specialities of bio, physical and chemical issues.
- Appreciating the efforts of the scientists.
- Participating in science clubs, seminars.
- Writing quotations, pamphlets, poems etc.

Children will respond and appreciate the following issues.

- Photosynthesis provides food for the total creatures.
- Peristaltic movement of food in alimentary canal.
- Absorption of food in small intestine.
- Exchange of gases in air sacs.



- Respiration.
- Functioning of valves in heart.
- Roots absorbing water from the soils and transporting to the end of the branches.
- Filtration of blood in nefron.
- The way plant wastages useful to humans.
- Nerve pathways - reflex are.
- Functions the brain.
- Foetus development of human.
- Method of cross pollination and fertilization in plants.
- Division of chromosomes in Mitosis, Miosis.

### **Seminars**

Students to participate different seminars in school can collect and explain regarding the following issues.

- Importance of science day.
- Role of Vitamins in our health.
- Consequences of mal nutrition.
- Adversities of population growth, family planning situations.
- Bad effects of HIV/AIDS on society.
- Kin marriages - evolutions - consequences.
- Conservation of natural resources - our responsibility.

### **Writing Slogans - Making Pamphlets**

Children can write slogans on the following issues.

- Nutritious food - importance.
- Blood donation - importance.
- Organ donation - importance.
- Child marriages - adversities.





- Water resources - conservation.
- Bio - diversity.
- Conservation of fossil fuels.

## **VII. Concern towards biodiversity/application to real life :**

- Children recognising the importance of bio diversity in their surroundings.
- Making efforts for saving.
- Recognising that every creature has right to live.
- Knowing that how human behaviour is damaging the nature.
- Understanding and behaving responsibly towards nature and environment.
- Applying the knowledge that they gained in real life situations.
- Understanding that the nature is not man's own, he is the only part of it.

Children can utilise the knowledge that they gained in the class room in real life in the following situations.

- Save the plants.
- With the understanding of nutrition take nutritious food, avoid junk food.
- Develop healthy food habits.
- Do Pranayama, yoga for respiration.
- To care not to have high blood pressure.
- follows grafting methods in plants, growing of school garden.
- Saving the food from the fungi.
- Fighting against sex determination tests.
- Achieving high food production.
- Following irrigation methods.
- Conserving the resources, taking actions to increase the ground water.



# 10<sup>th</sup> Class - Academic Standards to be achieved

## Nutrition

### CHAPTER-1

#### I. Conceptual Understanding

- Explain the Difference between autotrophy and heterotrophy
- Explain the reasons for photosynthesis happening in plants and for not happening in animals.
- Explain differences between light dependent and light undependent reactions.
- Tell the contrasts and comparisons between photosynthesis and resperation.
- Recognise the commanalties of food collecting methods in human and different animals.
- Explain the nutrition in parasites and plants with examples.
- Explain actirlies happens in different parts of human elementary canal.
- Explang the igesting system of dfferent food materials.
- Tell the difficulties and reasons related to indigestion.
- Explain the deseases due to mal nutrition with examples.
- Explain the reasons and difference between kwashorkar and marasmus deseases.
- Explain vitamin deficiency deseases and the resources of vitamins with examples.

#### II. Questioning - Making hypotheses :

- Questions the method of collecting the required materials for photosynthesis.
- Questions the food preparatory methods in plant parts which are not green.
- Hypathesise the expermental results of green plant light obsorption.
- Questions the need of reutlising the food materials prepared in plants.
- Try to know the reasons for some materials not digested in the stomach.
- Guess the consequences of mal nutritions food.

#### III. Experiments - Field trips :

- Conduct the experiment that determines the presence of carbohydrates.
- Observe Prestlay's experiment and comment on the results.
- Conduct the experiment that determines the necessity of sun light for photosynthesis. Test to determine oxyzen.
- Conduct the experiment that ozygen is produced during photasynthesis.
- Know the acidic and basic reactions in the alimentary canal through litmus test.



#### **IV. Collecting the information :**

- Visit the health centre and collect the information on the diseases due to mal nutrition.
- Visit the families in the habitat and collect the information of the people suffering from the diseases due to vitamin deficiency and digestion related ailments and reasons for them.
- Collect the information on low cost nutritious food materials, the children of different ages through internet.

#### **V. Drawing the diagrams - Making Models :**

- Draw the diagrams of the structure of the chloroplast and internal structure of leaf. Explain the importance.
- Draw and label the diagram of human digestive system. Explain its functioning.
- Draw the diagram of food collecting method of Amoeba. Tell the relation of excretion and collection.
- Make the flow chart of food movement in alimentary canal. Explain about peristalsis.
- Make the model of human digestive system. Explain the role of enzymes in digestion.

#### **VI. Appreciating, having aesthetic sense :**

- Appreciate the process of making food by the green plants for the survival of the whole living organisms.
- Appreciate the efforts of these tests in photosynthesis.
- Observe in their locality the dependence of some plants on other plants.
- Appreciate the food collecting methods of the organisms.
- Appreciate the structure of the alimentary canal and the role of enzymes.

#### **VII. Sympathy towards biodiversity :**

- Campaign on the importance of nutritious food. Put efforts that everyone should take nutritious food.
- Follow good habits in order to be healthy and make others to follow it.
- Recognize that different types of plants and animals depend one on another for their survival and identify their maintenance in balancing the diversity. Prepare cartoons and essays reflecting that.



# Respiration

## CHAPTER - 2

### I. Understanding the concept

- Explain the properties of the gases that release and absorb in respiration.
- Compare respiration with photosynthesis.
- Explain the contrasts between respiration and photosynthesis.
- Explain the differences between respiration and combustion.
- Explain the differences between aerobic and anaerobic respirations.
- Explain the differences between the respiration in plants and animals.
- Explain the differences between exhale and inhale.
- Explain the passage of air in respiration in different parts of the human body.
- Explain the functioning of epiglottis while breathing and swallowing.
- Explain the relation between respiration and energy release.
- Explain the process of respiration.

### II. Questioning and making hypotheses :

- Question the release of energy in anaerobic respiration.
- Question the release of energy in plants.
- Hypothesise what happens in the organisms at non-availability of respiratory materials.
- Hypothesise how the heat released from the body affects life processes.

### III. Experiments - Field Trips

- Conducts the experiment of release and absorption of gases in respiration.
- Conducts the experiment the release of heat and carbon dioxide in anaerobic respiration.
- Conducts the experiment of  $\text{CO}_2$  by product in energy release.
- Conducts the experiment of the release of heat energy and  $\text{CO}_2$  in respiration.

### IV. Collecting the information :

- Collect the information on the processes and composition percentages of releases in respiration through internet.
- Collects the information and pictures on the evaluation of respiratory organs in different animals.



#### **V. Drawing the diagrams - Making Models :**

- Draw and label the diagram of mitochondria. Explain how they are functioning as energy storages.
- Draw the diagram that shows the air spaces in leaf. Explains the gases exchanging system.
- Draw the diagram that shows the structure of alveoli of lungs and tells their functioning.
- Make the flow chart of the path of the air passage in respiration and explains it.

#### **VI. Appreciation and aesthetic sense :**

- Appreciate the process of respiration in human.
- Appreciate the speciality of respiration and photosynthesis in plants are being opposite to each other mutually.
- Appreciate the energy releasing system in respiration. follows correct respiratory methods and pranayama.
- Appreciate the role of fermentation in materials becoming.

#### **VII. Concern towards Biodiversity :**

- Observe in real life processes the method of respiration in different organisms.
- Recognise the importance of inhale, exhale in respiration.
- Knows how respiration helps for the survival of the organisms.

## **Transportation**

### **CHAPTER - 3**

#### **I. Conceptual Understanding :**

- Explain the relations between the pulse rate and heart beat.
- Explain different parts and their functioning of heart.
- Explain the differences between arteries and veins.
- Recognizes the differences between single circulation, double circulation. And explain the reasons for it.
- Tells the differences between circulation and transportation of materials in plant.
- Explain the differences between xylem and phloem.
- Explain the method of root hairs absorbing water.
- Explain with examples how root pressure, transpiration for the transportation of materials.



## **II. Questioning - making hypothesis :**

- Questions the place of heart valves in circulation.
- Questions the relation between heart beat and circulation.
- Hypothesise the physical actions that happens in plant when transportation of materials.
- Hypothesise the consequences in plants in xylem is removed.

## **III. Experiments - Field Trips :**

- Observes the internal structure of goat's heart by doing dissection.
- Observe the blood pressure by using stethoscope and sphygmomanometer.
- Observe root pressure through rubber tube experiment.
- Conducts the experiment of transpiration by using polythene sac.

## **IV. Collecting the Information :**

- Collect the information on relation among body weight, heart weight and heart beat of different animals.
- Collect the pictures, information on evolutionary order of the heart of different animals and make reports.

## **V. Drawing the diagrams - making models :**

- Draw and label the internal structure of the heart, make model.
- Draw the chart of single, double circulation.
- Make the flow chart of the cardiac cycle.
- Draw the diagrams of different cells of xylem and phloem.
- Make the model of stethoscope. And hear the heart beat with this.

## **VI. Appreciation and aesthetic sense :**

- Appreciates the function of circulatory system and heart in humans.
- Appreciates the mechanism of food and mineral salts transportation in tall trees.
- Praises the system of circulation affecting heart beat.

## **VII. Concern towards biodiversity :**

- Knows the importance of circulatory system in humans.
- Knows the adversities of high blood pressure. Follows good health habits.
- Observes the diversities of circulatory systems in different animals.



## Excretion - Academic Standards

### CHAPTER - 4

#### I. Concept Understanding :

- Explains with examples different excretory materials in human.
- Explain the differences between the excretory material of animals and that of humans.
- Explain the functioning and structure of different excretory organs in human.
- Explains with examples the excretory materials that formed in plants and explain their economic importance.
- Recognizes the differences between excretion and secretion.
- Compares the method of blood purification with the method of filtration.

#### II. Questioning - making hypotheses :

- Questions the system of urine formation in human.
- Questions the system of blood purification done by kidney.
- Hypothesise what happens if the kidney do not purify the blood. Hypothesise the situation when excretion is needed in plants.

#### III. Experiments - Field Trips :

- Observes the kidney of goat / sheep or its model by dissecting it.
- Observes the internal structure of the kidney and explains it.
- Knows the method testing of urine sample / blood sample.

#### IV. Collecting the Information :

- Collects the information of endocrine glands in human, the hormones they secrete and their effect on the body through internet.
- Collects the details of phytohormones that restricts the growth of different plants.

#### V. Drawing the diagram - making models :

- Draw and label the diagrams of human brain, neuron and spinal cord.
- Draw and label the diagram of reflex arc.

#### VI. Appreciation and aesthetic sense :

- Appreciates the coordination of different parts of the body are under the control of nervous system.
- Appreciates the impact of hormones on plant's growth.



## **VII. Concern towards Biodiversity :**

- Knows the importance of growth hormone.
- Apply the coordination of different parts of the body with real life situations.

# **Reproduction - Generating System**

## **CHAPTER - 6**

### **I. Understanding the concept :**

- Explains the method of sexual reproduction.
- Explains different types of asexual reproductive systems of human.
- Explain the male and female reproductive systems of human.
- Explains the relation between child birth and child marriages.
- Explains the method of sexual reproduction in plants.
- Tells the types of cell division and the differences between them.
- Suggests different methods of population control.

### **II. Questioning - Making Hypotheses :**

- Questions about the diseases in human that come through sexual reproduction.
- Hypothesise the products that are formed by cell division.
- Imagines the consequences that occur if the sex chromosomes are not formed in organisms and if there are deficiencies in reproductive system.

### **III. Experiments - Field Trips :**

- Explains the structure of Rhizopus, Fungi by observing them through microscope.
- Explain the functioning of the sexual parts of the flower by directly observing it.
- Observes the permanent slide of pollen grain and knows its developmental stages.

### **IV. Collecting Information :**

- Collects the information through internet about the methods of asexual reproduction that are given in the text book.
- Collects the information and make a report about HIV/AIDS, its treatment and prevention through school library, internet.

### **V. Drawing the diagrams - making models :**

- Draw and label the diagrams that show the methods of asexual reproduction in different plants.





- Draw the LS of the flower. Explain the method of reproduction.
- Draw and label the diagrams that explain sexual reproduction in plants.

**VI. Appreciating, having aesthetic sense :**

- Appreciates the formation of adult organism in plants and animals from very tiny cells through fertilization.
- Knows sexual health and follows the values.

**VII. Sympathy towards biodiversity :**

- Recognizes the diversity in the method of vegetative propagation in different plants.
- Discuss on sexual health, participates in awareness programmes.

## **Coordination in life processes**

### **CHAPTER - 7**

**I. Understanding the content :**

- Knows what's hungry ?
- Knows the changes in our body that occurs due to hunger.
- Knows the relation between hunger and smell.
- Recognizes that the mouth is the food chewing machine.
- Knows the differences among the different teeth in our mouth.
- Knows that the food passes in the alimentary canal through peristaltic movements.
- Knows that the stomach is mixing and digesting machine.

**II. Questioning - making hypotheses :**

- Knows how the food digests in the stomach through questions.

**III. Experiments - Field Trips :**

- Knows the taste of jeera, saunf, apple, tomato just by chewing without seeing them.
- Knows the smell of asafoetida, garlic by smelling them with closed eyes.
- Knows how the food breaks down by using the model of chalk pieces kept in vinegar.
- Knows what happens if the flour is kept in the mouth for sometime.
- Knows the pH of mouth at intervals of one hour.
- Knows how bolus moves in the alimentary canal by keeping potato in a cycle tube.



#### **IV. Collecting Information :**

- Collects the information on the types of teeth in the mouth, their structure and the method of cleaning them through library books.

#### **V. Drawing the diagrams - making models :**

- Draw and label the diagram of taste buds on the tongue.
- Draw and label the teeth in the mouth

#### **VI. Appreciation and aesthetic sense :**

- Knows, how different types of teeth are useful in real life.
- Appreciates different life processes being related to one another.

#### **VII. Concern towards Biodiversity :**

- Comments on the diversity and coordination among different life processes in the human body.
- Prepares cartoons and poems about the diversities in life processes.
- Recognizes that every life process is an important one and behaves carefully at them.

## **Heredity**

### **CHAPTER - 8**

#### **I. Understanding the content :**

- Understands the diversity and its importance.
- Explains with examples the researches of Mendel and his Biography.
- Explain the law of dominance, Law of segregation.
- Explains the importance of diversity in the population.
- Explains acquired, inherited characters.
- Understands and comments on the experiments of Lamarck, Darwin and their biographies.

#### **II. Questioning - making hypotheses :**

- Questions the trails of heredity, formation of new species and evolution of organisms.
- Hypothesise the later stages of evolution in beetle.
- Hypothesise on the future issues in the evolution order of human.



### **III. Experiments - Field Trips :**

- Proves Mendal's principles expermentally.
- Explains the diversity in population, through beetle experiment.

### **IV. Collecting the information :**

- Fill the table with the information of five friends. Analyses semlarites and their characters.
- By seeing the physical features like nose, forehead in the mirror, fill the table whether they resemble their mother/father/father-in-la2/mother-in-law.
- Prepares the scrap book with the picutres and information related to fossils.

### **V. Drawing the diagrams - making models :**

- Make the flow chart showing the ratios of monohybrid cross and disybrid cross.
- Make the flow chart showing sex determination in humans.

### **VI. Appreciation and aesthetic sense :**

- Appreciate the efforts of Mendal, Lamark, Darwin.
- Appreciates determining the age of fossil by using carbon dating method.
- Recognizes the relations among organisms in the evolution.

### **VII. Concern towards biodiversity :**

- Recognizes diversity in evidences from embryology.
- Comments on Darwin's theory by applying it ot organisms.
- Makes cartoons, characters on human evolution.

## **Our Environment**

### **CHAPTER - 9**

#### **I. Understanding the concept :**

- Describes food relations, different types of pyramids in ecosystem.
- Explains the impact of human activities on environment.

#### **II. Questioning - making hypotheses :**

- Questions the food relations among the organisms in ecosystems.
- Questions the disasters related to ecosystem.
- Make hypothesis on the situations due to the change in the number of organisms in ecosystem.
- Make hypotheses on human activites and their impact on environment.



### **III. Experiments - Field Trips :**

- Observes different food chains and the food relations among them in his/her environment.
- Observes the number of organisms and their relations in different ecosystems.
- Observes and make reports on human activities and their impact on ecosystems.

### **IV. Collecting the information :**

- Collects the information on the pollutants that join in the ecosystems of their environments.
- Collects the information of environmental disasters that happened in different countries of the world.
- Makes the reports on human activities and their impacts on environment.

### **V. Drawing the diagrams - Making Models :**

- Make different food chains through pictures.
- Makes the model of ecosystem's number pyramid and comments on that.

### **VI. Appreciation and aesthetic sense :**

- Appreciates the food relationships among the organisms in the ecosystem.
- Shows respect towards nature/envitornment for having living and non-living organisms and helps the human survival.
- Shows individual responsibility and social consciousness towards environment.
- Feels happy by observing different ecosystems.

### **VII. Concern towards biodiversity :**

- Takes the decision to save the organisms and resources as he/she feels that for the survival of the organisms the food relations among them are necessary.
- Encourages and creates the human activities that helps the ecosystems.
- Student, prevents joining of toxins / pollutants in the ecosystem.

## **Natural Resources**

### **CHAPTER - 10**

#### **I. Understanding the concept :**

- Explains the conservative methods of natural resources.
- Gives examples for water conservative methods.
- Tells reasons for the reduction of natural resources.



- Explains about persons and organizations that follow different methods in utilising different types of natural resources.

## **II. Questioning - making hypotheses :**

- Questions on conservation and misuse of natural resources.
- Makes hypotheses on the impact of human activities on natural resources.
- Questions about renewable resources.

## **III. Experiments - Field Trips :**

- Observes keenly the issues like water resources, insects in his/her environment.
- Observes the biodiversity in villages and other places.
- Observes the methods of garbage throwing in their houses.

## **IV. Collecting the information :**

- Collects the information on the preventing methods of water misuse which is the main aspect of natural resources and its implementing methods.
- Acquires the information analysing skill from the given graph.
- Can take the project work in survey form.
- Make the tables with the names of persons, organisations that work for the conservation of natural resources.

## **V. Drawing the diagrams, making models :**

- Prepares flow chart on the methods natural resources conservation.
- Draw the graph on the collected information.

## **VI. Appreciation and aesthetic sense :**

- Appreciates the role of natural resources in human survival.
- Have the conscious to conserve the natural resources. Prepares essays, pamphlets explaining it.
- Appreciates the persons, organizations that participate in conservation of natural resources.

## **VII. Concern towards biodiversity :**

- Follows, encourages the methods of natural resources conservation.
- Recognizes biodiversity and save them with honour.
- Recognizes the importance of 3R's and follow it in daily life.



## V. Annual Plan

**Class :** 10

**Required Periods :**

**Subject :** Biology

### Academic Standards

#### 1. Conceptual Understanding :

Understanding the content means understanding different bioscience concepts through explaining, classifying, analysing, giving examples, say the causes, forming the psychological pictures.

- **Explaining :** Student can explain the process of photosynthesis, gaseous exchange between lungs and blood capillaries, peripheral nervous system coagulation of blood, structure of kidney, alkaloids in plants, buddings, cell cycle, peristaltic movement in alimentary canal, number pyramid.
- **Classifying :** Classifies the creatures on the basis of nutrition, methods of respiration on the basis of factors that participate in respiration, blood vessels according to their structure and function, nerves according to their functions, bio chemical substances in plants according to usage, vegetative propagation on the basis of human interference, sex determination according to chromosomes, pyramids in the ecosystem.
- **Analysing :** Student can analyse experiment result, graphs, maps, pictures, tables, line graphs, flow charts, incidents, study reports, and arrangement of the instruments.
- Experimental results of photosynthesis.
- Graph that shows the concentration of lactic acid in blood.
- Map that shows internal structure of the heart.
- Line graph of alimentary canal.
- Flow chart of human digestive system.
- An effort towards water management in Kothapalli village.
- Arrangement of equipments in anaerobic respiration experiment.



### **Giving Examples :**

- Student can give examples utilising his/her own knowledge or on the grounds of other examples. Can give examples on his/her own for the diseases due to malnutrition, fermentation, seedless fruits, diversified traits of persons in a family, food web, natural resources etc.
- Can give examples for heterotrophs, the creatures that makes respiration through body wall creatures that have single circulation, creatures that have kidney systems, edocrinal glands, plants that forms spores, hormones, analogous organs, homologous organs, the situations that the creatures lose their energy, non-renewable resources.

### **Saying the causes :**

Students can say the causes for the result of the experiments, different concepts, action - reaction, etc.

- Student can explain the causes for result of Iodine test in mole's half-leaf experiment, Marasmus disease, strength of arteries, expansion and contraction of lungs, dialysis, changes in the size of pupil, occurring meiosis, construction of small intestine, not showing the parental characters in the progeny, joining heavy elements in the fishes of edulabad reservoir, and for decreasing natural resources.

### **Forming of mental images :**

Understanding abstract concepts that are not able to understand through direct experiences with logical thinking, and forming / creating psychological pictures about them, and reusing these psychological pictures in needy situations.

## **2. Asking questions, making hypothesis :**

Asking thoughtful questions on different concepts/gathering the information, observation, preparing necessary questions for the interview sake, experiments, guessing the results while observation, making hypothesis students can ask thoughtful questions relation between light - photosynthesis, heart beat, blood pressure, composition of urine, stimulus - response in plants, insulin levels in blood, budding, AIDS, bacteria, evolution, sex determination, food web, food pyramid etc.

Student, can guess the hypothesis on the changes at the time of decreasing the salivary, consequences of not happening fermentation in preparation idli, dosa, bread, the situations of closing stomata in leaf, consequences of storing waste materials in our body like plants, the change when there is no relation among the body cells, fertilization of more ovules in human female reproductive system, dividing the fertilized into two, the changes in life processes with lack of coordination, if there is no diversity in the characters of the creatures the consequences of acquired characters that passes through heredity.



### 3. Experiments and Field trips :

Student can do the experiments of light and  $\text{CO}_2$  are necessary for photosynthesis, experiment of releasing oxygen, releasing of heat and  $\text{CO}_2$  in anaerobic respiration, releasing of heat and  $\text{CO}_2$  in aerobic respiration, releasing heat in combustion, root pressure, plant growth towards light, observing rhizopus on bread through microscope, observing the hearts of sheep or goat, visiting of any surrounding eco system while observing the kidney of a goat/sheep.

By doing the above experiments and field trips student can arrange suitable equipment. S/he can analyse, enroll the observed issues of the experiments, and field trips. By determining the results can draw the generalization.

### 4. Information Skills :

- Classifying the collected information, preparing the tables, analysing, reporting.
- Reporting and analysing the given information through tables, maps, flowcharts, graphs etc.
- Gather the information on unhealthy food habits, obesity, awareness on blood donation, sex determination, diabetes, students can classify and can prepare tables, and by analysing the information can prepare the reports.
- Digestive enzymes, vitamins, characteristics of diseases, blood vessels, construction, functions - plasma - composition, urine - composition, Alkaloids - uses, brain - various parts functions, endocrine glands, hormones in plants - uses, Kolluru lake - results of the studies, survey results of Vanaparthy - Vaddicherla villages etc. given information can be analysed and they can prepare the reports.

Students can analyse and write about the pictures of gaseous exchange between lungs and blood vessels, internal structure of human heart, peripheral nervous system, life cycle of flowering plant, develop mental stages of human focus, sex determination in humans, number pyramid etc.

### 5. Transfer of information through pictures, graphs, models :

Student can draw and label the diagrams of the experiments of  $\text{CO}_2$  is essential for photosynthesis, experiment of releasing oxygen, vertical sections of leaf, chloroplast, internal construction of mitochondria, release of heat and  $\text{CO}_2$  in aerobic and anaerobic respirations, internal structure of human heart, internal structure of kidney, excretory system, structure of nephron, neuron, human reproductive systems of male, female, internal structure of flower, structure of ovule, fertilization etc.

- Student can observe permanent slides of Rhizopus on bread, division of mitosis, meiosis under microscope and can draw the pictures.





- S/he can draw the pictures of light and dark actions, different stages in human digestive system, circulatory system in humans, filtration of urine in nephron, food chains, can make the flow charts related to food web, types of asexual reproduction, 3R's vitamins diseases etc.
- Student can draw the graphs of Age-pulse rate, cell cycle - time, creature - mass (energy) s/he can prepare the tables of characteristics of quashiorkar, marasmus diseases, comparison between sexual and asexual reproductive systems, s/he can make models of chloroplast, mitochondria excretory system in human, kidney, respiratory system, digestive system, stages of cell division, structure of heart, brain, fertilization in plants, blood pyramids etc.
- **Aesthetic sense, appreciation, values :** Student can conduct and participate in the activities of science club, wall magazine in biology, specific issues of animals and plants, special days like earth day, science day, quiz, elocution etc.
- S/he can participate in the seminars of vitamins, food resources, high blood pressure - reason, emotions - control, respiration - health, HIV/AIDS, kin marriages - consequences, conservation of environment, natural resources etc.
- S/he can prepare slogans/pamphlets on alimentary canal - health principles, resources - sensitization, kindness towards animals, organ donation necessity. S/he can write the conversations/dialogues between different life processes, heredity etc.

## **6. Aesthetic Sense, Appreciation, Values :**

**Student can appreciate the following bio science issues :** Leaves preparing the food in photosynthesis and providing food for all the creatures directly or indirectly.

- The complex process of the swallowed food reaching the stomach through alimentary canal through peristaltic movements, joining different enzymes, releasing of specific enzymes to digest specific nutritious food in suitable quantity, absorption of digested food.
- Gaseous exchange through to capillaries, capillaries the passage and back, the capacity of epiglottis that not obstructing the passage of air, food.
- Cardiac fluid protecting the heart, oxygenated, deoxygenated blood flowing in separate vessels without mixing, opening of the valves in the heart etc.
- Very tiny root hairs absorbing water for the huge trees, and with the pressure they release opposite to the gravity of the earth to the end of the tall trees is really a miracle.



- Arrangement of millions of nephrons in a kidney, each nephron separating the wastages, and retaining the useful material is a complicated process.
- Reusing alkaloids which are the wastages in plants and those material are useful to human beings is a wonderful process.
- Axons carrying the signals in the form of electric signals, through these transferring the information speedily and clearly, brain doing the functions like thinking, memory, analysis makes us wonder.
- Development of human embryo - complex evolution.
- Parts of the flower - develop at specific place for specific function.
- Formation of seed from ovule in fertilization.
- The number of chromosomes reducing to half : This retaining that species speciality.
- Nature's judicious selection of the organism with useful traits.
- Very tiny organism and very huge animal takes an important role in the nutritious level of food web. The necessity of being the organisms in a systematic, serial in numberwise in the eco system.
- Proving the importance of ground water, crop loss with decreasing water levels in wells, etc.

## **7. Concern towards bio diversity/application to real life :**

- Growing and conserving plants in the school premises by knowing the importance of photosynthesis.
- Understanding nutrition takes nutritious food, avoiding junk food, developing healthy food habits.
- With the knowledge of respiration doing pranayama, recognising that with fermentation idli, dosa like substances will be soft.
- By understanding of high blood pressure takes preventive measures and tells others.
- By understanding the transportation in plants grow plants and recognizes the relation between production of water and growth of root and soil construction.
- Knowing the need of water to plant and tending out the wastages, make habit of taking sufficient water.
- Follows the methods of grafting, cutting in planting the plants.



- Take care of food like bread, vegetables, fruits from fungi.
- Prevents social crimes like child marriages, infant foeticide.
- Recognizes that ladies are not responsible for sex determination and behaves accordingly.
- Tells the farmers the importance of bio control for high yielding of crops, exchange of crops, using hybrid seeds.
- Take his/her role in the conservation of water resources. Use the water cautiously.
- Utilise the other natural resources judiciously.

### Academic Standards

Month	Name of the Unit	Number of Periods	Resources	Activities to conduct CCE
1	2	3	4	5
June	Nutrition - Food supplying system	10		<ul style="list-style-type: none"><li>* The experiment that shows light, CO<sub>2</sub>, chlorophyll are necessary for photosynthesis.</li><li>* Presence of starch experiment,</li></ul>
June/ July	Respiration the energy releasing system	10		<ul style="list-style-type: none"><li>* Researches of Levoixes, presently discussion.</li><li>* Conducting the activities - inhale, exhale lime water.</li><li>* Yeast, anaerobic respiration, burning the sugar, proving experimentally that heat, and CO<sub>2</sub> release in respiration training in Pranayama.</li></ul>
July	Transportation- the circulatory system	10		<ul style="list-style-type: none"><li>* Conducting the activities - Pulse rate, heart beat, utilising stethoscope.</li><li>* Observing internal structure of goat's heart.</li><li>* Blood pressure, root pressure, conducting the experiments.</li><li>* Seminar - Discussion on Thalassemia</li></ul>



Month	Name of the Unit	Number of Periods	Resources	Activities to conduct CCE
1	2	3	4	5
August	Excretion - the wastage disposing system	10		<ul style="list-style-type: none"><li>* Observing the transsection of goat's kidney by dissecting.</li><li>* Observing blood, urine tests report.</li><li>* Dialysis and discussion on kidney transplantation.</li><li>* Making herbarium with plants of Alkaloids.</li><li>* Conducting symposium on organ donation.</li></ul>
Sep-tember	Coordination- The linking system	10		<ul style="list-style-type: none"><li>* Slide observation of nerve cell.</li><li>* Conducting activities : Knee Jerk reflex action reaction, phototropism.</li><li>* Galen's research, discussion on insulin story.</li><li>* Control mechanism in plants.</li><li>* Hormones that are used in plants - uses - collecting the information.</li><li>* Discuss with the local doctor on the role of hormones in control co-ordination.</li></ul>
Octo-ber	Reproduction- The generating system	15		<ul style="list-style-type: none"><li>* Collecting plants of different types of vegetative propagation and planting them in school garden.</li><li>* Making models of cell division stages.</li><li>* World AIDS day - seminar.</li><li>* Visiting nearby college/hospital and observing different stages of human embryo.</li><li>* Collecting different stages in the life cycle of flowering plant and making herbarium.</li></ul>



Month	Name of the Unit	Number of Periods	Resources	Activities to conduct CCE
1	2	3	4	5
No- vember	Coordination in life processes	10		<ul style="list-style-type: none"> <li>* Action of Salva on Carbohydrates, relation between taste and smell, activities of perustalic movements, experimental activity : effect of acid on leaf.</li> <li>* Testing the pH of different liquid in humans.</li> <li>* Conduct quize on the coordination of life process.</li> </ul>
Decem- ber	Heredity From Parent to progeny	10		<ul style="list-style-type: none"> <li>* Collecting information on the researches of Gregar John Mendal, Watson, Kauck, Darwin, Laamark, Russel Wallace.</li> <li>* Preparing flow chart on Mendal experiments.</li> <li>* Project on evolution of the organisms, fossil fuels..</li> </ul>
Janurary	Our environment our concern	10		<ul style="list-style-type: none"> <li>* Making models of food webs, food chains in different ecosystems.</li> <li>* Writing autographics of your local water boards / rivers and exhibiting them in bulletin boards.</li> <li>* Collecting information on water conservating methods, new agriculture methods, conducting rallies.</li> </ul>
Febru- ary	Natural resources	10		<ul style="list-style-type: none"> <li>* Collecting information on the actions for water conservation taken by state govt, local bodies and gram panchayats.</li> <li>* Collecting information on ground water with different places in summer.</li> <li>* Seminar on measurements to improve ground water.</li> <li>* Essay writing on careful usage of ground water.</li> </ul>



## Lesson Plan

Class : 10

No. of Periods : 10

Lesson : Excretion - The wastage disposing system

Academic Standards to be achieved : should be written by the teacher

Period	Teaching	Teaching	TLM/ Resources	Evaluation
1	2	3	4	5
1.	Introduction of excretion - excretion in humans	Discussion - Reports	Charts of excretory systems, charts, charts showing excretory organs.	1. What are the excretory organs in humans? 2. How does wastage form in the body of organisms.
2.	Lab Activity - excretory system	Model dissection observation discussion	Goat/Sheep Kidney 3D pictures, charts	1. Draw and label the diagram of 4s of kidney.
3.	Structure of Kidney	Discussion - Observation	1. Chart showing the structure of kidney. 2. Model of Kidney.	1. Write about glomerulus? 2. Which you feel amazing of filtration in nephron? why?
4.	Mechanism of urine formation	Discussion, Observation	Chart showing nephron construction	1. Which component of urine is highest in percentage? 2. What percentage in nephron? why? 3. Why do some people have high urination problem?
	Composition of urine	Collecting the reports, observing. Exhibition - Discussion - analysis.	pH paper Clinical lab report	1. What is the reason for amber colour of human urine? 2. What are the characteristics of diabetes insipides. 3. What happens if urination does not occur from the human body?



Period	Teaching	Teaching	TLM/Re-sources	Evaluation
1	2	3	4	5
6.	Dialysis artificial kidney.  Kidney transplantaion, other pathways, of excretion, excretion in other organisms.	Conducting Sympasum importance of dialysis - discussion - analysis. Collection - Observation - Discussion.	The chat showing dialysis machine  Vedio of Dialysis.  Charts showing lungs, skin.	1. How does the artificial kidney in the human body conduct life functions? 2. When does the process of dialysis is needed. 3. What is the use of artificial kidney? 4. Do you think that organ donation is good? why? 5. Can we say that kidneys and the skin in the human body places same functions?
7.	Excretion in plants - alkalioids	Collection observation discussion	Hy-Products in plants. eg : gums, latex	1. What are the advantages of alkaloids to the plants?
	Other secondary hy-products in plants. Do you know?	Discussion  Discussion	The chart that shows the differ-ences between excretion, secre-tion of neem and Jatrophia Plants.	1. What are the soceondary hy-production ? 2. Give examples of the plants with alkaloids of taninsresins.
	Excretion, secretion, keywords.		Chart	
8.	What we have learnt	Discussion, individual activity	Textbook, black-board, notebooks	12 questions from the text book.
9.	Improve learning. Let's improve learning Annexure organ donation a boon for life.	Whole school activitys individual, wholeclass activity.  Collection - Discussion	Clippings from newspapers, information from internet.	Text book, blackboard. Collect the information of NGO's that work on organ donation. What shall we do to donate our organs to 'Jeevandan'?



### **Teachers Notes (additional resources, programmes)**

1. Collection of blood and urine reports (Patient's aswell as healthy persons.)
2. Celebration of Kidney day (march 13th)
3. Organizing symposium on 'organ donation', collecting information of Jeevandan organization.
4. Collecting information on cretory, kidney related medical units (Nephrologist, urologist).
5. Information on biodiesel, medicinal plants.
6. Information on impact of by-products like coffee, niktoen on nervous system.

### **Responses of teacher :**

Teacher has to notedown self-evaluation, students responses after teaching the lesson.

### **Period Plan - Steps in teaching the lesson**

While teaching science (Physical Science, Biological Science), teachers should keep in mind the academic standards of that particular class and accordingly prepare teaching learning strategies in order to achieve science teaching objectives.

- Teaching should not be same for all the lessons and according to the content of the lesson the teacher should prepare and implement the strategies like experiment, observation, collecting the information, field trip, interview, project etc.
- Teacher should not read the lesson insted give the choice to read the content and analyse it through descussions, questions.
- Create amicable situations for the children to question and to express their views freely.
- While conducting the experiments try to develop the processing skills like arranging the equipments, observing, noting, analysing and coming to conclusion in order to understand the content.
- The teacher should not expect only correct answers at the time of class room discussion instead accept their views when they express freely.
- The teacher should make the children to think by asking the questions of multiple answers.
- Teacher should try to make the children to guess the results by asking, questioning them different variables/alternatives while doing the experiments.
- Invite the professions, subject experts to teach the children whenever the teaching demands.





- Try to develop the qualities like mutual cooperation and mutual exchange by creating group activities.
- Prepare prior the needed equipments, materials in order to teach the lesson. The teacher should go through the library books and make notes on the content related issues, so that she/he can teach the lesson more thoroughly, analytically.
- Teacher should recognise the achieved academic standards among the children and assess them how far they have achieved as a part of teaching.
- Teacher should analyse the results of assessment and give feed back to the children and help the children to achieve their standards.

## **How to teach Science ?**

Science Class room should be a dias to questions and learning by doing researches. It means that organization of teaching learning processes should keep in mind the nature of science and educational objectives, reading the information for the text books, explaining them, learning the answers to the questions etc., are opposite process to the nature of teaching science. Hence discussions through motivating questions to make the children think, organising the activities in order to understand the process by adding teacher's experiences is necessary.

Science learning starts with questions. Hence teacher should encourage the children to question and express their doubts at Science freely. Discussions should give scope to express their views. Discussion should not be limited to the concepts of the text book only, but there should be related items that help to know those concepts perfectly. Scientific findings did not happen suddenly, those are not permanent truths also. Teacher should explain the students that we are all able to know these things by the continuous and consistent researches and the teacher should also develop scientific thinking among the children in such a way that these findings are not permanent and there may be new findings in the future and should discuss on these topics.

The science concepts should be such a way that the children will be able to understand them through observing their environments and by doing researches. For this they have to conduct the experiments instructed in the text book. If the teacher explains the results of an experiment without doing it the children may misunderstand it. If the student does not know the basic issues learning science in higher classes becomes complex. Hence conducting experiment should not become mere exhibition instead it should be learning by doing and should be feasible to discuss on the results and come to a conclusion. In a science class room teaching strategies like questioning, discussion, individual-group,



whole class activities, project works, conducting interviews, seminars, symposiums, collecting the information, reports, analysing it, drawing diagrams, making models, conducting quiz, writing letters, essays, slogans, making alternative instruments, conducting experiments by using them field trips etc., should be used according to the needs.

Let's observe what steps teacher should follow in a period teaching :

- I. Introduction** :
  1. Greeting
  2. Mind Mapping
  3. Inquisitive Questions
  4. Saying the lesson name
- II. Reading the Lesson** :
  1. Reading the lessons, recognising the words and concepts that they do not understand.
  2. Discussion in Groups.
  3. Teacher explaining by writing on the black board.
- III. Organising the Activities understanding the concept** :
  1. Doing the activities in group.
  2. Writing the reports, drawing the diagrams, making models and graphs.
- IV. Exhibition - Discussion** :
  1. Exhibiting reports, diagrams, models that the students prepared.
  2. Write the thoughtful questions on the black board and based on children's exhibitions explaining and discussing the lesson.
- V. Conclusion - Evaluation** :
  1. Giving a brief conclusion on the discussed concepts of the lesson.
  2. Ask the children to write answers to the questions on their own reading the lesson for the next period, collecting the necessary material and information.

The importance of the lesson, academic standards or objectives of the lesson that are going to be achieved through the unit should be discussed in the first period only.



- **Academic standards to be achieved :** Try to achieve the seven academic stands of the science upto the completion of the lesson. Hence teacher should notice that which concepts are there in a period and determine the academic concepts accordingly.
- **Importance of the Lesson :** Teacher should explain the importance of the lesson in such a way that why should they learn it and what profits are they are going to get through it.
- **Mind Mapping :**

**Creating :** Besides greetings like 'good moring', 'how are you' teacher should greet them with rythemic claping, small games, puzzles, by giving half of the picture ask them to think of the second half like different styles.
- **Mind Mapping :** Mind mapping should be in the first period of the lesson only. Teacher should write correct key word on the black board ask the children to say in their own words their concepts towards that word, examples, characters, properties and write them on the black board. It's not a trail to make them the little of the lesson. Some times lesson name will be the key word. But it's not always possible. Key word should be close / near concept to the lesson.
- **Asking inquisitive questions :** Discuss and ask the students probing questions make them think the related concepts based on the key word and write the key issues on the block board. Motivate the children to learn the lesson with interest. Make the students ready to larn the concepts of the lesson. Mind mapping should be done in the first period of the lesson only. Later periods should start with the probing questions and thoughtful questions on the learnt issues of the earlier periods.
- **Reading : Recognising key words :** Ask the children to read individually the lesson which the teacher decided to teach in the period of that day. While reading the lesson, make them recognise the concepts they do not understand, nwly introduced words. Teacher should write them on the black board. Make the students discuss them in groups. Teacher should explain them and ask them to question on which issues they wanted to learn in the lesson.
- **Conducting the Activities - understanding the concepts :** Ask questions in order to understand the concepts of the lesson and to clear their doubts. Make assumptions to solve the problems. Make them do the experiments to determine the assumptions. Ask the students to prepare equipments for this, conduct the experiment enrolling it, collecting and analysing the information as part of problem solution individually, in groups through different processing skills. Ask them to organise the projects and analyse the results.



They should express the learnt concepts through drawing the diagrams and labelling them. Make them prepare gradual process, draw the pictures that show observatory works and preparation of models, alternative equipments. Make them talk to develop the quality of appreciation in recognizing the greatness of the findings and scientific findings in the lesson. Develop the sense of saving the environments by recognising the biodiversity. The activities should be in such a way that they should apply the class room knowledge in their real life.

For the understanding of the above concepts the following activities should be done in the class room teaching learning process :

1. Preparing experiments, projects, field trips, collecting the information and tables.
2. Analysing the information from the tables, determining the results.
3. Organising interview, quiz, seminar, symposium.
4. Write reports and methods for the conducted experiments and observations.
5. Drawing maps, graphs for the observations, experiments, drawing the diagrams labelling explaining and making models.
6. Make them read historical issues of the science, stories and thesis.
7. Make them prepare essays, posters, logos, songs, stories and cartoons.
8. Collecting the information for conducting / organising wall magazine, children's diary, school magazine, theatre day.

**Note :** This step in the period plan changes according to the topic. See in the new text book 'explanation of the topics' chapter to know how to conduct a selected topic in a period. Prepare this step in your plan according to these instructions. Teacher should collect and make ready of the necessary materials, equipments and things. Teacher should write thoughtful questions on the black board and discuss with the students if there is only information and no activity).

**Demonstration - Discussion :** In order to understand the concepts students participate in many activities. Make different items. Ask them to demonstrate all those. Discuss on them write the main items on the black board. Based on this analyse the items that the children have prepared write the thoughtful questions on the board which help to analyse, discuss the lesson.

**Conclusion - Evaluation :** At the end of teaching, learning provide chance to the children to revise what they have learnt. Teacher should follow many methods in this. Asking each student to tell each item and making a conclusion, making conclusion with only one student or teacher himself/ herself giving conclusion.



Evaluation should be done in two ways. It should be an internal part while teaching and the second one after teaching.

- Give chance for diverse responses in evaluation.
- The topics in the text book like discuss in groups, write what you have noticed, complete the tables etc., should be taught as part of the teaching. That means that teaching the lesson and evaluation occurs at a time.
- Evaluation should not be at a specified time but it should be situationally.
- Ask them to discuss in groups and write responses on their own regarding the items in the topic what we have learnt in a period.
- Make them do individually the items in the topic. Let's improve our learning.
- Either teacher or fellow student should observe the students' note books and their activity papers.
- Create activities for home work. Like this the teacher should implement the teaching learning strategies according to the above steps. Instead of rote learning, mugging up, writing as it is from the text books, guides, question banks, mechanical reading, mechanised systems, teaching learning strategies should help the students to learn meaningfully.
- Interactions, self expression, questioning should become key in teaching learning processes.
- Experiments, searchings, activities, project works, games etc., should become key and internal part in teaching strategies and teaching learning processes.
- Teaching learning strategies are not that teacher explain or read them. Teachers should motivate the students to learn and participate. Use necessary material, make them available and provide learning atmosphere.
- Teaching learning strategies, process should be in such a way that the students learn individually or with the fellow students through teachers, materials. Learning time of the students should be completely utilised.
- The arrangements/ atmosphere should help the students to learn in their own language. Teachers should use student's language.
- Organisation of the teaching learning strategies should start with the children's experiences, their earlier knowledge.
- Local arts, productive items, experiences of the hard working people should be used as resources in teaching learning strategies, processes.



Students learning is an important issue in efficient organisation of the school. It depends on the teaching learning strategies that the teacher follows. To make the students construct the knowledge in the class room teacher should impliment different teaching strategies.

- **Discussing - Mutual interactions :** Teacher, students should discuss every item in the class room. Mutual interactions must be done effectively. Every discussion should help to understand the concepts.
- **Making them to read the lesson :** Make every student read the lesson. It leads to understand the concepts.
- **Questioning :** Usually children have questioning nature. Hence develop among them the capacity of asking thoughtful questions on different concepts.
- **Doing research - experiments :** Organise the experiments to determine experimentally what the students have learnt. Make them understand the content by discussion while doing the experiment. Make them decide the results, and follow the cautions.
- **Observations - Searchings - Problem Solution :** Develop problem solution abilities among the students. Help the students to select a problem and find solutions for it.
- **Project Works :** Project is a process of selecting a problem and to solve it they will follow many steps in order to come to conclusion. Hence it should be helpful to utilise children's innate and creative abilities.
- **Field Trip :** As a part of it try to develop the skills like observing, analysing and determining.
- **Collecting information - Analysis - making tables :** Students follow so many methods in order to learn the things. Help the students to classify the collected information and note it down in the lables by analysing on their own.
- **Writing Reports :** Develop the abilities to write comprehensively in a report of the collected information, its method and style of collecting. Ask them to exhibit the information in the forms of graphs, picutres.
- **Quize :** Make the students organise and participate in quize competitions to develop curiosity, zeal among them on the key related issues of science.
- **Seminar - symposium :** Encourage the students to select subject oriented items, collect the related information and express their views. Seminars should help the students to express their views and comprehensive understanding of that topic.
- **Filling and making puzzles :** Students fill the puzzles with much curiosity. Through these we can make them understand the content and can evaluate it also. Hence we should encourage the students to fill the puzzles and to create them.



- **Making models, graphs, pictures :** Encourage the students to draw the pictures in order to understand the concepts and their methods. Encourage them to use graphs to analyse the information to know the results and to determine. Encourage the students to develop aesthetic sense besides the subject awareness in making the models.
- **Preparing Scientific stories, poems, songs :** Encourage the students to prepare and collect scientific stories, poems, songs and make them discuss on them. Encourage the students to form scientific concepts, to recognize the importance of biodiversity and appreciate them through reading the stories, poems and songs.
- **Making cartoons and comments :** Students show curiosity towards cartoons. Teacher himself/herself should prepare scientific, curiosity, creating cartoons. Encourage them to prepare cartoons on and captions on health, habits, life skills etc.
- **Organising speeches with local professionals :** Arrange a special programme in school and organise vocational speeches with the local professionals. So that encourage the students to honour the professions, inspire and understand.
- **Conducting Interviews :** Conduct oral interviews to know student's thoughts, opinions and views. Encourage the students to say the answers, to express their views without any stress. Interview should help the students to encourage them to clarify their doubts.
- **Making Alternative Equipments :** Teacher should discuss the topic before conducting the experiment and encourage the students to develop concepts and make assumptions. Encourage the students to conduct alternative experiment for every experiment. Help them to understand the content by discussing while doing the experiment.
- **Using Libraries, internet :** Besides the information from the text books teachers should collect it from the newspapers, magazines and internet. Make them available to the student and encourage them to collect more. Encourage the students to recognise the importance of biodiversity, to think deeply about the content and to appreciate contents and findings of the science.
- **Reading Science histories :** The results of science now we are seeing are not found suddenly. These are the continuous efforts of the scientists for centuries together. After one scientist finding out a new thing another scientist make it base and finds out some more new findings. For example so many experiments had done to know our breathing air is oxygen. By reading the histories regarding the findings of the science create interest and appropriate attitude towards science.



## VI. 10<sup>th</sup> Class Examinations - Reforms

### A. Need of the Reforms

- The aspect that is to be worried about is mainly the role played by 'school'. The role of school is reduced to prepare the children mechanically for their exams limiting their knowledge to textbooks. Learning by rote memory and mechanical completion of syllabus do not prove to be beneficial for achieving the objectives of education. A school must enable the children to explore, search, discuss, read the reference books, discriminate and analyze. When these are kept in view, the present system of examination has to be changed.
- The class X is treated as an important class and more focus on examination outcomes. Therefore, the syllabus of class X is being completed much earlier than decided months. The teaching is mostly aimed at examinations and school encouraging memorizing the answers with the help of guides, study materials etc. Most of the time the children are confined to reading and re-reading the texts and memorizing the answers. There is no opportunity and space for children to think on their own and construct answers applying their knowledge and experience. There is stress and anxiety in the entire preparation for class X on the part of the children and teachers. The schools are confined as coaching centres without much focus on developing analytical and logical thinking on the part of the children and develop knowledge and wisdom.
- The examination pattern and system is not focusing on testing the children's logical, analytical and communication abilities. Though the children are getting good marks, it do not reveal their abilities and competencies. There is high expectation on the part of the children at class X in terms of marks which leads to pressure on the children and they resort to various types of incidences. Therefore, it is required to take up appropriate reforms at class IX and X, which actually reveals the original potentialities and abilities of children. The entire process of education should aim at developing, thinking, analytical and communication skills among the children in a democratic climate.
- School should function for the all-round development of children. For their all-round development, children should participate in various activities and programmes to develop





physically, mentally, socially, emotionally and morally. Presently, teaching is limited to languages, Science, Mathematics, Social Studies. Only these are being evaluated. Teaching must take place considering Health & Physical Education, Arts & Cultural Education, Work & Computer Education and Value Education & Life Skills as curricular areas. They should not be treated as co-curricular activities. Even these areas also be evaluated periodically.

- The most important person in school education is teacher. Development of the students depends on the activities and programmes conducted by the teacher. Unfortunately all these activities are kept a side and giving utmost importance to only information oriented examinations. As a result of these teachers are not being trusted. If teachers are believed and given responsibilities fixing the targets we can achieve better results than now. Hence, the evaluation methods need to be reformed in this angle. Instead of allotting the complete weightage to the public exams, we should consider teacher at school level and some weightage must be given to internal assessment or Formative Assessment.
- In this present situation, children are under stress as evaluating them is just limited to exams. Alternate aspects must be included to avoid pressure among children. Project works, experiments, assignments, children's notebooks and children's participation must be made use of while evaluating their performance.

## **B. Reforms in class IX and X – Background**

- APSCF-2011 was framed in accordance with RTE-2009 and NCF-2005. The textbooks from classes I to X are revised (modernized) on the basis of APSCF-2011.
- The new textbooks aim at achieving the class wise, subject wise, targeted competencies and developing multifaceted personality and competencies such as thinking, self expression, analysis, logical representation etc.
- Developed Position Papers and approaches to teaching in all the subjects focusing on the changes that are to brought in the Department of Education in the State. Similarly a Position Paper has also been developed on the reforms in examination and make examinations away from rote memory.
- CCE for classes I to VIII is being implemented in the State since April, 2010 with a focus on projects, self expression, change in the nature of questions etc.
- A shift in the nature of teaching learning processes and engagement of the children in learning process with activities, dialogue and discussions, projects, experiments etc. The very process of experiencing and knowledge construction have been changed.



In view of changes as above in the school curriculum, textbooks, teaching learning process, it is necessary to change the way we assess the children i.e. what to be assessed, how to be assessed and feedback procedures etc. it become necessary to bring reforms in class IX and X examination.

### **C. Guidelines**

Series of actions contemplated by SCERT for developing proposals on SSC Examination reforms

- Conducted a meeting with textbook writers and experts on the proposed SSC examination reforms during September, 2013 and discussed the issue.
- Based on the above discussions and the existing CBSE pattern, draft proposals have been formulated.
- A meeting was conducted with subject specific teachers, headmasters, Mandal Education Officers, academic officers of AP residential institutions, representatives from private school managements during March, 2014 and discussed the draft proposals and formulated the second draft.
- The draft proposals have been sent to all the RJD SEs and DEOs in the State and requested them to discuss on the draft proposals and submit a report with suggestions and proposed changes. Accordingly, the DEOs conducted meetings with teachers and submitted their opinions and suggestion to the Director, SCERT.
- A request was made to all the teacher organizations in the State duly furnishing the draft proposals with a request to discuss the same and attend a meeting to submit their opinions and suggestions. A meeting was convened with teacher organizations on 26<sup>th</sup> April, 2014 at SCERT where in the teacher organizations presented their opinions and suggestions.
- A meeting was conducted by the Principal Secretary, School Education (PE & SSA) with Director SCERT, Addl. Directors of School Education, selective DEOs, Principal and staff members of CBSE schools, Professors of SCERT on 3<sup>rd</sup> May, 2014 at Conference Hall, J-Block, Secretariat, Hyderabad and discussed on the proposed class IX and X examination reforms. The members interacted presented their opinions and suggestions.

Based on the above meeting and discussions a penultimate draft on SSC examination reforms have been developed as given here under.



## PROPOSALS

### a) Quantitative aspects :

#### 1) Number of papers for each subject

- Two papers for each language subjects i.e. Telugu, English, Hindi, Urdu etc., except second language (Telugu/Hindi).
- Two papers for non language subjects i.e. Science, Social Studies and Mathematics viz., **Science**– Paper 1 Biological Science, Paper 2 Physical Science; **Social Studies**– Paper 1 Geography and Economics, Paper 2 History and Civics; **Mathematics**– Paper 1 numbers, sets, algebra, progressions, coordinate geometry and Paper 2 geometry, trigonometry, mensuration, statistics, probability etc.

### b) Papers and Marks :

Subject	Total Marks	Paper I Marks	Paper II Marks	Formative Assessment Marks
First Language (Telugu/ Hindi/ Urdu etc.)	100	40	40	20
Second Language (Telugu/ Hindi)	100	80	-	20
Third Language (English)	100	40	40	20
Mathematics	100	40	40	20
Science	100	40	40	20
Social Studies	100	40	40	20
<b>Total</b>	<b>600</b>	<b>280</b>	<b>200</b>	<b>120</b>



### **c) Marks weightage and duration of examination**

- **For all subjects**– Telugu, Hindi, English, Mathematics, Science and Social Studies – Every subject will have two papers and each paper is for 40 marks and the examination duration is 2 hours and 30 minutes in addition to 15 minutes for reading the question paper, but for second language (Tel/Hindi) time duration is 3 hrs in addition to 15 minutes for reading the question paper.
- The summative examinations which is school based for class IX and the final summative is of public exams at class X conducted by Director, Govt. Examinations. Each subject will be conducted for 80% of marks. The remaining 20% of marks are through internal assessment i.e. Formative Assessment [FA].
- The average of four formative assessments conducted in an academic year will be accounted for 20% of marks i.e. the average of four formative assessments will be taken and accounted for 20% of marks in class X public examinations.
- Conduct one paper on each day except on general holidays.

### **Summative Assessment :**

- Three summative tests must be conducted in each academic year for classes IX and X. In case of class X, public examination will be in place of third summative test to be conducted by the Board of Secondary Education.
- First and second Summative Assessments shall be conducted by schools itself through preparing question papers for 80% of marks. This ensures that the children are trained to write public exams. The remaining 20% of marks shall be awarded on the basis of the Formative Assessment.
- The summative assessment for class IX and 1<sup>st</sup> and 2<sup>nd</sup> Summative Assessment in class X must be on the lines of public exams.

The questions must be developed based on the blue print reflecting the academic standards.

### **d) Internal and external weightages – Formative and Summative:**

80% of marks in each subject for the summative/ external public examinations and. the 20% of marks for the proposed internals under formative assessment. The areas and marks for the formative assessment is given here under.



Sl. No.	Item for Formative Assessment	Marks
1	<b>Language subjects</b> – Reading storybooks, children literature, newspapers etc. and reflecting in terms of writing and presentation in the classroom. <b>Science</b> – Doing the experiments and writing in the record. <b>Mathematics</b> – Generating Mathematical problems under various concepts – Writing and presentation in the classroom. <b>Social Studies</b> – Reading the text and interpretation and reflections on contemporary social issues through writing and class room presentation	5
2	Children’s written work in their notebooks – Self expression/ writing to the questions/ tasks given in the exercise part under each unit/ lesson. The children shall not copy the answers from guides/ study materials etc. but they should think and write on their own.	5
3	Project works	5
4	Slip test	5
	<b>Total</b>	<b>20</b>

- A separate notebook for each subject for the formative assessment pertaining to three items of serial numbers 1, 3 and 4 of the above table shall be maintained by each student. However, in case of serial number 2 i.e. a separate notebook may be maintained by each child. These notebooks reflecting children works must be preserved which will be the basis for awarding marks by the teacher and for the verification of officials whenever required.
- The average of four FAs will be accounted for 20% of marks in public examinations under each subject.

### **Verification of internal marks and submitting to O/o Director, Govt. Exams:**

- After completion of the 4<sup>th</sup> Formative Assessment, the headmaster should verify all the records for the above internal tests and keep ready for external moderation committee and submit the details of the marks to the SSC board after committee verification and approval, in a fixed



format through on-line. The programming part of this for submission of internal marks from schools will be done by Director, Govt. Examinations.

- 10 to 15 schools in two or three Mandals shall be considered as a unit for monitoring and moderating. The moderation committee formulated by the DEO, shall observe all the schools assigned in the given Mandals both government and private and verify the marks, grades awarded for internals and as well as co-curricular activities.

#### **e) Pass marks and minimum marks for passing**

- 35% is the pass marks for all the language and non language subjects.
- In case of formative assessment (internals), 20 marks each for all the subjects except Science i.e. 10 marks for Biological Science and 10 marks for Physical Science.
- Student must score a minimum of 35% of marks in each subject which includes both internals and externals. Students must secure 28 marks in external public exam.

#### **Pass marks in Second Languages:**

- The pass marks for second languages i.e. Hindi, Telugu etc. will be 35% on par with other language subjects.

#### **f) Grading**

- The marks based grading for classes IX and X with the range is given here under.

<b>Grade (100 M)</b>	<b>Marks in Languages</b>	<b>Grade points</b>
A1	91 to 100 marks	10
A2	81 to 90 marks	9
B1	71 to 80 marks	8
B2	61 to 70 marks	7
C1	51 to 60 marks	6
C2	41 to 50 marks	5
D	35 to 40 marks	4
E	0 to 34 marks	3



Cumulative Grade Point Average (CGPA) will be calculated by taking the arithmetic average of grade points.

### **g) Other curricular subjects (Co-curricular areas) – Evaluation**

- Co-curricular activities i.e. Physical & Health Education, Arts & Cultural Education, Work & Computer Education, Value Education & Life Skills are the part of the school curriculum. Periods have been allocated in the school timetable for transaction of these areas. These areas are now included for assessment in classes IX and X. Each area has 50 marks.
- Grade details of these subjects are to be recorded in the memorandum of marks of class IX and X. The 5-point grade scale is applied to these areas i.e. A+, A, B, C and D.
- No public exam shall be conducted in these subjects. However, these areas will be evaluated for three times in an academic year i.e. quarterly, half yearly and annually. Teachers shall observe and award marks. The average will be taken into account and the details of grade must be submitted on-line by HM to Director, Govt. Exams after verification by the moderation committee.
- HM should allot the responsibility of conducting these co-curricular activities followed by assessment to the teachers. Initially, choice may be given to the teachers to select the areas based on their interest. If it is not possible, the HM should allot co-curricular activities to the working teachers as suggested here under.

Ex:

- Value Education & Life Skills to language teachers/ Social Studies teachers.
- Art & Cultural Education to Social Studies teacher/ language teacher
- Work & Computer Education to Physical Science/ Biological Science teacher.
- Physical & Health Education will be conducted by Physical Director/ Physical Education Teacher. In case PD/ PET is not available other teachers like Biological sciences etc. may be considered.

However, the co-curricular areas shall be shown separately and will not be counted for grading the students in curricular areas.



## **QUALITATIVE ASPECTS**

### **h) Nature of the question papers and questions**

- The nature of questions are to be open ending, descriptive, analytic which tests children abilities of thinking, critical analysis, judgments and leads to self expression and away from rote memory. Children must be trained to think critically and construct the answers on their own. Ensuing that learning is shifted away from rote methods and memory oriented, focus on self expression and do away with using of guides and study material and memorizing of answers.
- The questions should make the children think and write. The questions should be analytical, application oriented and open ended.
- The questions once appeared in public exams should not be repeated.
- The questions given in the exercises of the textbook under each unit and lesson must not be given as such. The questions must reflect the academic standards.

### **i) Academic standards/ competencies to be achieved**

- The questions in the public exam should be in relevance to the laid down academic standards/ competencies to be achieved in the subjects concerned.
- Weightage for the competencies of the subjects shall be developed and blue print/ weightage table prepared and accordingly question papers shall be developed.

#### **Types of test items:**

- Following are the nature of test items.

#### ***A) Non language subjects (Science, Mathematics and Social Studies)***

- Essay type questions.      ○ Short answer questions.
- Very short questions
- Objective type questions – Multiple choice questions.

#### ***B) Languages subjects – Telugu and other Indian languages***

- Reading comprehension      ○ Writing





- Creative expression
- Grammar
- Vocabulary

### ***C) Language – English***

- Reading comprehension
- Creative writing
- Vocabulary
- Grammar

- Objective type questions which are multiple choice in nature.

### **j) Questions – Choice**

- Each question paper may contain internal choice for essay types of questions only.

### **k) Questions – Weightage**

- Blue print will be developed reflecting weightage to the nature of questions and academic standards. No specific weightage to the lessons/ units. Questions may be given from any lesson/ any part of the textbook.
- The weightage tables must be kept in view while preparing question papers. Type of questions (essay, short answer, very short answer and objective questions) and academic standard-wise questions (how many marks and questions to each academic standard etc.).

### **l) Single answer booklet and no additional papers**

- It is proposed to give one answer booklet to the students to write the answers since suggestion given for the extent of answer in the form of paras/ sentences/ words. No additional answer papers will be entertained.

### **m) Correcting the answer scripts and the facility of revaluation**

- As the questions are thought provoking and open ended, correction must be done carefully. Appropriate guidelines will be given from SCERT to the teachers along with key for undertaking proper correction of answer scripts.
- Transparency in paper correction must be made by way of facilitating for re-counting of the answer scripts if students represent.
- Guidelines on examination reforms and for correcting the papers will be framed from SCERT.



The children self expression, power of analysis, self writing, application and explanation, argument and representation of their perspective etc. will also form the basis for the correction in addition to subject matter.

#### **n) SSC Memorandum of Marks**

- Following are the items represented in the class X public examination memorandum of marks:

**Part I:-** General information about the student.

**Part II:-** Grades for the curricular areas i.e. languages and non languages - both internals and externals and over-all grade.

**Part III:-** Grades for co-curricular activities with qualitative description.

Information on the grades and grade point average may also be given on the other side of the memorandum of marks.

#### **o) Training Programme**

- The SCERT shall design the training programme for the teachers teaching classes IX and X along with supervisory staff. SCERT develop teacher handbooks on entire process of examination reforms and new textbooks and train the District Level Resource Persons in every subject area for the teachers teaching classes IX and X including supervisory staff in collaboration with RMSA. The RMSA shall meet the expenditure towards developing teacher handbook, conducting training to District Resource Persons and actual conduct of training to the teachers in the field.
- Trainings may also be through teleconferences at regular intervals and sharing of good practices, doubts etc.

#### **p) Responsibilities of D.C.E.B**

- D.C.E.B. shall take up the responsibility of preparing question papers for classes IX and X (except public exam paper) and also sending them to schools.
- One Headmaster with sound academic background and commitment must be made as in-charge of D.C.E.B. subject-wise district teams with 10 to 15 expert teachers must be



formed to prepare the question papers under D.C.E.B. The team members should include the textbooks writers from the district, SRG members, subject experts, teacher educators, experienced teachers etc.

- The subject groups of DCEB shall develop question papers and also examine the good questions furnished from schools and teachers. These teams must conduct subject-wise trainings in the district and also monitor the practice of assessment in the schools. They may be considered as members in the moderation committee.
- SCERT shall conduct orientations and trainings to the DCEB Secretaries and subject groups at regular intervals and build their capacity and also monitor the functional aspects of DCEBs. The DIETs, CTEs and IASEs shall support and supervise the work of DCEBs.
- DCEB should conduct seminars and training programmes to the teachers to develop awareness on the examination processes and correcting the answer scripts.

#### **g) ROLES AND RESPONSIBILITIES**

##### **SCERT :**

- The Director SCERT develops and submit the proposals to government in consultation with Director, Government Exams.
- Develops guidelines on all aspects of examination reforms in the form of handbooks to the teachers and supervisory staff along with additional booklet on subject-wise model papers.
- Develops guidelines for the valuation of answer scripts as a part of teacher handbooks.
- Proposals to the government on the required facilities to the schools to implement the curriculum so as to meet the examination standards.
- Guidelines on the moderation for internals.
- Monitoring and studies on the implementation of SSC examination reforms at various levels and take up follow up action.

##### **Director, Government Exams:**

- Collaboration with SCERT in finalizing the proposals based on the feasibility and for submission to government for orders.



- Development of programme for the on-line submission of internals and co-curricular activities to the Director, Govt. Exams and designing the memorandum of marks/ certificate.
- Monitoring the submission of internal marks and other nominal roles.
- Correction of answer scripts and declaring the results.
- Pre and post examination work, recounting etc.

### **RJD, SEs and District Educational Officer:**

- Conducting orientation to the teachers and supervisory staff on the new evaluation procedures. This also includes training to teachers and headmaster of private schools.
- Restructuring and strengthening the DCEB with one in-charge i.e. Secretary and constitution of subject specific groups with expert teachers @10 to 15 teachers per subject.
- Constitution of two member moderation committee for @1 for two or three Mandals. Steps for the capacity building of these moderation committee members with the help of SCERT and DIETs/ CTEs/ IASEs.
- Developing question papers printing and monitoring for the implementation for class IX and X except class X public examination.
- Focus on thinking and self expression of answers from the children and do away the practice of memorizing answers from the guides and textbooks.
- Gradual nurturing of self expression from class I onwards and focus on quality curriculum transaction and children learning outcomes rather than focus on class X alone.

### **Dy. Educational Officers:**

- The Dy.EOs are responsible for 100% implementation of examination reforms of in their division and monitoring the internals. This is for both government and private schools.
- Identification of expert teachers in all the subjects and communicating list of such teachers to the DEO to consider for DCEB.
- Monitor the work of headmasters in monitoring the correct work of internals and implementation of curriculum and co-curricular activities.



- Record the nature of curriculum implementation and examination practices in the Academic Guidance Register (AGR) of every government and private school.
- The Dy.EO shall supervise the implementation of new textbooks, teaching learning process and implementation of formative and summative assessment procedures before moderation committee visits the schools.
- The Dy.EO is responsible for arranging training programmes and create awareness on curriculum transaction and examination reforms.
- Develop the knowledge on the basic aspects of curriculum, pedagogy, assessment duly reading and referring teacher handbooks, source books from SCERT and from other sources/ internet.

### **Headmaster:**

- Headmaster is the first level supervisory officer to ensure proper implementation of curricular and co-curricular activities, teacher preparation, lesson plans, teaching learning process and conduct of exams properly by all the teachers.
- Identify and encourage teachers and children for their best efforts and talent and take it to the notice of higher officials and SCERT.
- Using of guides and study material by the children and memorizing the finished answers will damage the children's thinking capacities and self expression. Therefore, guides and study material shall not be used. HM should ensure this.
- Allotment curricular and co-curricular subjects to the teachers available and see that all these areas must be transacted.
- Headmaster must check the evidences for internal exams i.e. proper conduct of formative and summative assessments at school level and offer suggestions on the records and registers prepared by teachers and children. He should verify all the children and teacher records on FA and SA and satisfy himself before placing it to the moderation committee.
- HM to furnish internal (FA) marks and grades on co-curricular activities to the Director, Government Examinations through on-line as per the schedule from Director, Govt. Exams.



- The HM should follow the schedule for the conduct of internals and other exams and maintenance children cumulative records and communicating the progress to the parents at regular intervals.
- The HM must ensure for quality classroom transaction by utilizing available TLM, equipment and library books in the schools.
- The HM should conduct monthly review on the performance of the teachers and children and record in the minutes book along with suggestions for each teacher and review follow up action on the minutes of the earlier meeting.
- Arrangements for proper feedback to the children and their parents on children performance and school activities.
- The HM is the first teacher and must be sound in academic knowledge by way of reading teacher handbooks, new textbooks and other source books and conduct frequent sharing workshops within the school on teacher readings and other academic issues and concepts.
- The HM should observe the classroom transactions of each teacher and offer further suggestions and guidance for improvement.

### **Teachers:**

- The teachers are responsible for the proper implementation of new textbooks i.e. activities, projects, experiments, field investigations, information tasks etc.
- The exercises given under each unit/ lesson are analytical and thought provoking in nature and children should think and write on their own. There shall not copying of answers from the guides, study materials, copying from other children notebooks etc. This is one of the items under formative assessment with appropriate interest and care. Teachers should not encourage purchasing and using of guides, study materials etc.
- The questions in the box items are meant for discussions in the classrooms where children express and share their thinking and ideas. The box items are on the contemporary issues and situations where children are expected to reflect their experiences and prior ideas. This is helpful for application of textbook knowledge in their daily life situations.



- Prepare and implement curricular and co-curricular subjects assigned to them and transact in a qualitative way with a focus on interactive teaching, discussions with active participation of children. Read resource books and additional reference material to get more clarity on concepts and develop teaching notes on each lesson. Thus, add value to the textbooks.
- Teachers conduct formative assessments (internals) and summative assessments and value the children notebooks and other records on regular basis. Give marks and grades based on children performance and maintain evidences of children performances in the form of children notebooks, records and keep ready for the observations of headmaster and moderation committee. The teachers shall take up remedial teaching and support children based on the gaps identified through formative and summative assessments.
- Keep and read the teacher handbook, modules provided during training programmes and take up follow up action. Teaching is a profession and teacher is a professional and constant updation of knowledge and skills is a must for any profession. Therefore, the teachers efforts for self development through reading resource books, magazines, journals, attending seminars/ trainings, visiting subject specific websites, sharing in teacher meetings etc.
- Develop and use annual and lesson/unit plans and improve over time.
- Furnish children and teacher records pertaining to FA and SA to HM for his verification and for further guidance and suggestions.
- Encourage children for their initiatives and attempts to improve and support them.
- After careful examination of the matter, government here by agreed the proposal of the Director SCERT, A.P, Hyderabad as mentioned at Para 2 above, and accord permission to the Commissioner & Director of School Education, A.P., and the Director, SCERT for the implementation of the examination reforms as mentioned above for classes IX and X in all schools in the State i.e. government, local bodies, aided and private recognized schools.
- The Commissioner & Director of School Education, Director, SCERT, Director Government Examinations are requested to take further necessary action accordingly.





## VII. Formative Evaluation

From RTE Act - 2009, we know that children should achieve all-round development, and that schools should take responsibility for this. Children should develop physically, mentally, morally and emotionally. For this, children's interests, attitudes and values should be developed along with school subjects.

The curriculum gives equal importance to teaching learning experiences and the evaluation of the achievement of children. If the evaluation conducted in schools evaluate not only the children's ability to construct knowledge, but also their personality development, and is done on a continuous basis throughout the year, it can be called Continuous Comprehensive Evaluation.

Here,

**CONTINUOUS means:** not limited to any particular teaching learning process or any event or any situation, but to observe all components of learning on continuous basis. This is to say that observing/evaluating children's physical and cognitive development in an orderly manner on a continuous basis in the school and outside the school without letting them know that they are being evaluated. By identifying the gaps in learning and by taking up remedial measures, the teacher as well as the student should be able to do self-assessment.

**COMPREHENSIVE means:**

'All-round development'- development in the children's physical, mental, ethical and cognitive domains. For this, equal importance should be given to scholastic and co-scholastic areas in the curriculum without looking at them as two separate areas. This means treating arts, work, values, health and life skills on par with language, mathematics, science and social studies. This way, it looks at the children's development not just from the standpoint of scholastic achievement but also from the view point of their interests, competencies and attitudes too. This is to say that comprehensive evaluation gives equal importance to creativity, analytical skills and rational thinking in addition to knowledge, understanding and application.





## **The Need for Evaluation**

For us evaluation means conducting examinations. Teachers, parents and the society as a whole used to look at evaluation from the examination point of view. Forcing the children to memorize the information given in the textbooks, making them write it in the examinations and finally awarding marks for that has become the main aim of education. These examinations, conducted in the name of evaluation, instead of forming positive attitude towards learning and school, subject children to fear, anxiety and stress.

The marks and ranks that are used to measure the progress of children are putting children continuously under pressure, so their physical and cognitive development is hampered. The teaching learning processes have changed targeting the achievement of marks. Evaluation has become a big examination programme that is conducted ignoring the children's interests, attitudes and competencies. In this mad race for marks, undesirable happenings are taking place giving way to meaningless competition leaving no scope for the children's emotional development and the achievement of life skills. The unit and terminal examinations conducted in the name of evaluation are only good for stamping children 'pass' or 'fail' but not to identify the learning gaps and to remediate them.

The present evaluation system is teacher centered. The information given in the name of 'progress cards' contain evaluation done on scholastic areas only. On many occasions, though we claim to conduct Continuous Comprehensive Evaluation, in fact, only scholastic areas are given importance.

The co scholastic areas like art education, work experience, value education, life skills, etc., are not given due importance. Moreover, we misunderstand that Continuous Comprehensive Evaluation means conducting more examinations. Therefore, there is an urgent need for the policy makers, experts in the field of education and teachers to have a closer look at Continuous Comprehensive Evaluation and try to understand its true meaning.

## **Aims of Continuous Comprehensive Evaluation**

Evaluation is not meant for memorizing information and reproducing it in examinations. It should assess the behavioural changes in children's cognitive, psycho-motor and affective domains which have been brought out by the learning experiences provided in the classroom, and help children to improve. The information given to children in the form of various lessons is not enough for them. NCF - 2005 indicated that it is the responsibility of the school to develop in children the skills and competencies necessary for their future life, like analytical skills, creative thinking, logical reasoning; and life skills, like self-discipline, patience, tolerance, social adjustment and facing and



solving problems with tact. So far these have been treated as extra-curricular activities or co-curricular activities, and little or no importance has been given to them. This is detrimental to the all-round development of children. Hence, the state curriculum framework - 2011 has indicated that all these components should be treated as curricular activities, erasing the divide between them. Therefore, it is decided to evaluate the children's physical, cognitive, emotional and social development giving equal importance to each of them. Let us have a look at the objectives of Continuous Comprehensive Evaluation from this angle.

- To help develop cognitive, psychomotor and affective domains
- To lay emphasis on thought processes and de-emphasize memorization
- To make evaluation an integral part of teaching-learning process
- To use evaluation for improvement of students' achievement and teaching-learning strategies, on the basis of regular diagnosis followed by remedial instructions
- To use evaluation as a quality control device to maintain desired standards of performance
- To determine social utility, desirability or effectiveness of a programme and take appropriate decisions about the learner, the process of learning and the learning environment
- To make the process of teaching and learning a learner-centered activity

Continuous Comprehensive Evaluation should be organized as a part of teaching learning processes. This helps us to know how efficient are the learning experiences provided in the school in developing the children. In Continuous Comprehensive Evaluation, all components are evaluated equally without maintaining the distinction between curricular and co-curricular areas.

The evaluation procedures followed in school as a part of Continuous Comprehensive Evaluation should be such that they observe children completely in all aspects and record them. It is also necessary to assess children through examinations conducted periodically along with the evaluation done through observation of children inside and outside the classroom in tandem with the teaching learning processes. However, whatever may be the evaluation procedure, its results should not be used to compare two children.

Evaluation should not only observe how children learnt, and what was learnt but should also help them retain what was learnt. Interests, attitudes, emotions, special interests, physical growth and health related components should also be assessed along with knowledge, understanding, application, analysis and adjustment to new situations. This evaluation is of two types:

1. Formative Evaluation
2. Summative Evaluation



## 1. Formative Evaluation

Working towards improving the children's learning through observing and recording their performance while they are participating in teaching learning processes is called Formative Evaluation (assessment). It is used by the teacher to continuously monitor children's progress in a non-threatening, supportive environment. It involves regular descriptive feedback, rather than marks and grades, which gives a chance for the students to reflect on their performance, take advice and improve upon it.

The teacher can estimate what the children have learnt; and how they are learning based on the discussions in the classroom, their answers to questions in the middle and at the end of the lessons, their notebooks, class work and homework, group activities and project work, etc. This is called formative evaluation.

Formative evaluation gives continuous feedback to the teacher as well as the children all along the teaching learning processes, so it helps them make necessary changes in their teaching/learning strategies. If used effectively, it can improve children's performance tremendously while raising their self-esteem and reducing the work load of the teacher. Let us have a look at the features of this formative evaluation.

### Formative Evaluation

- Is a process to observe the progress of the child and how s/he is learning
- Is diagnostic and remedial
- Makes the provision for effective feedback on how children are learning
- Provides the platform for the active involvement of children in their own learning.
- Enables teachers to adjust teaching by taking into account the results of evaluation
- Recognizes the profound influence evaluation has on the motivation and self-esteem of students, both of which are crucial influences on learning
- Recognizes the need for students to be able to assess themselves and understand how to improve
- Builds on children's prior knowledge and experience in designing what is taught.
- Incorporates varied learning styles based on how and what to teach.
- Encourages children to understand the criteria that will be used to judge their work
- Offers an opportunity to children to improve their work after feedback,
- Helps children to support their peers, and expect to be supported by them.



- This is conducted in a natural environment free from stress and fear and without making the children aware of being tested
- The teacher can have an understanding of the children's progress while they participate in teaching learning processes

Students will learn by participating in different learning activities provided in the school. Teacher has evaluate the concepts the students learnt, the learning system, and the way how they are participating is learning processes the formative evaluation. In class 9, 10 formative evaluation has to evaluated through four measures.

- 1) Lab Activities (5 marks)
- 2) Project works (5 marks)
- 3) Written works - Note Books (5 marks)
- 4) Slip test. (5 marks)

Teacher should conduct the above four tools for every formative assessment. For example in Formative-1 Lab Activity for 10 marks, Project work for 10 marks, Note book for 10 marks, Slip test for 20 marks. After the end of academic year reduce four formative marks for each tool into 5 marks. A student scored 30 marks out of 40 for lab activity calculate these marks for 5.

Let's observe to conduct these measures.

### **Lab Activity**

In the process of formative assessment lab activity is an important tool. Student should participate in lab activity to perform activities which are mentioned in the text book under the title of Lab Activity. Teacher should access student in the following areas.

- Participation in Lab Activities - Experiment
- Lab Record

Teacher should absorb students when they are working individually, in groups, how they select and arrange appratous, observations and recordings. Based on their observations student should write their lab record

- Lab record is also a part of 200 pages formative notebook.
- Lab record is also helpful for the student to obsurb how they did the experiment.
- 5 marks is awarded for this lab record.



## Items in Lab Record

- **Aim** : It explains why we perform the experiment.
- **Apparatus** : Here we should mention required apparatus and materials, chemicals.
- **Precautions** : We should mention the precautions that must follow while performing experiment.
- **Procedures** : Here we should write the process.
- **Reporting** : We should report our observations in the form of table, flowchart etc.
- **Result analysis** : Analyse the above data.
- **Generalisation** : We come to certain conclusion based on the experiments.

## Model Report of an experiment

Pratap, Divya, Johnson and me were formed into a group. Myself and Pratap brought the apparatus and chemicals required for the experiment and kept them on the table. Johnson and Divya arranged the apparatus with the help of the teacher. We made a report after observing the results of the experiment. We conducted this lab activity on 18-8-2014.

**Aim** : To observe the reaction of acids and bases with metals.

**Apparatus required** : Stand, test tubes, delivery tube, rubber stopper, glass trough, candle, burner.

**Chemicals** : Zinc granules, dil hydrochloric acid, sodium hydroxide solution.

### Experimental Method - 1

We took a strong glass test tube. We filled with dil HCl. Fixed it to the stand. Took same zinc granules and put them in dil HCl. Fixed one holed rubber stopper to the test tube. Fixed one end of the delivery tube through the hole. Poured soap water in a glass trough. Kept the second end of delivery tube dipped in the soap water.

**Observations** : Observed that dil HCl and zinc granules reacted and gas bubbles are formed. The gas thus formed reached soap water and soap bubbles were formed.

**Confirmation** : When a burning candle was brought near the bubbles they went off with a pop sound. We identified that the gas released is hydrogen.

**Result** : Zinc reacts with hydrochloric acid to release hydrogen gas and zinc chloride solution is formed.



## Experimental Method - 2

We took a strong glass test tube. Filled less than half of it with (10 ml) sodium hydroxide solution. Fixed it carefully to a stand. Put some zinc granules and fixed one holed rubber stopper. Fixed one end of the delivery tube through the hole kept the second end of the delivery tube dipped in the soap water.

**Observations :** Observed that zinc granules reacted with Na OH and released gas bubbles which reached the soap water through the delivery tube.

**Confirmation test :** When a burning candle was brought near the gas bubbles, they went off with a pop sound.

**Result :** Metals like zinc react with acids like HCl, bases like NaOH and release hydrogen gas.

**Precautions** → Test tubes must be fixed to a stand with the help of the clamps so that they do not break.

- HCl and NaOH must be taken first. Zinc granules should be added later.
- Fixing the stopper and delivery tube must be done quickly.
- Do not blow the soap water bubbles immediately one after the other. Take some time.

## Displacement reactions :

### Discussion points :

- Do metals like copper and iron release hydrogen ?
- What happens if soap water is not taken in the glass trough ?
- Does the amount of gas released depend on the amount of HCl and zinc granules taken?

## Lab Record Assessment

- Experimental process - 4 marks
- Lab Record - 6 marks

After completion of 4 formative assessment we should calculate 40 marks into 5 marks.

## Project works

In the Formative Assessment project work is another tool which contains 10 marks. There are different types of projects in every lesson under the academic standards information skills and



projects. So teachers select any type of project from improve your learning or from content. Based on the resources teachers has a choice to select any other topics which is related to content.

Projects are different types.

- Based on members
- Based on project nature
- Based on procedure (by interview, by collecting information, by observing nature)

### **Steps in writing Project Report :**

- Name of the project
- Objectives
- Tool
- Procedures
- Table
- Conclusion
- Resources
- Thanks giving

### **Project Report Assessment**

10 marks are allotted to project report.

- Preparation, conducting project - 3 marks
- Project report - 5 marks
- Discussion on project - 2 marks
- After completion of 4 formative assessment we should calculate 40 marks into 5 marks.

### **Written Works - Note books**

For every student writing skill is very important to express what have understand in their own words. In written form. For this notebooks helps a lot. In constructive evaluation we asses what the children write on their own. Hence, lets know its importance, how to conduct, how to evaluate.

### **Written Works - Importance :**

- Now a days though the children understand the theories in science, principles, concepts, they are not able to write in their note books on their own.





- Students of English medium as well as reading in mother tongue instructed schools are not writing properly because both of them lack writing skills.
- They are not able to construct a sentence, and there are language, grammatical errors. They are not able to write what they've wrote because of illegible writing.
- They are not able to write on their own and hence they are habitated to copy down from the guides, question banks and other's note books. Teachers too are encouraging and neglecting it.
- Because of these creativity, writing by thinking on their own are disappearing from the students.
- Keeping the above points in minds in constructive evaluation estimate the students writing there and there and instruct them accordingly. They have to work on writing with their own vocabulary, by using their experiences of what they have understood.

We think that students while writing on their own will write what they think at the moment, their answers will not be clear and straight, and they do not have language proficiency. We suspect them too. We think that their answers will not have standardization as each of them will write in different ways, and it takes much time in their correction and marks allocation. To rectify these doubts we should know what is writing on own? How to inculcate that among the students.

Writing on one's own means writing by understanding the concepts using words, sentences in his/her own style. It's not writing exactly as it is the sentences from the text book. For the explanation of the meaning sentences may increase or decrease. May use own examples. By writing on their own students will have clarity towards the concepts. They understand the content. Hence they can write answers for any type of question.

### **What should we do for this?**

All of sudden students can not write on their own in tenth class. Hence, make them practice to write answers, on their own fro at least five or six question in each lesson. For this teacher has to follow the following steps.

- Write the question or topic on the blackboard.
- Discuss the possible answer for that question.
- Write the key words from the discussion the blackboard.
- With the help of key words ask them to say the answers in sentences.
- Ask two or three students to repeat the answer.





- Finally, ask the students to note down the answers in their notebooks.
- After, all of them completed writing, write one's answer on the black board, discuss how they wrote, tell them corrections.
- On the basis of this discussion ask the students to correct their answers.

### **How to conduct the written work ?**

- Every student have note book.
- Ask them to write list of key words, new words in their notes books for every unit.
- After classroom discussions ask them to write explanation for those words according to their understanding. It helps to content understanding, and after that to write the answers on their own.
- Ask them to write answers on their own for the questions under let's improve learning for every unit.

### **How to Evaluate the written work?**

There are ten marks for written work in constructive evaluation. Teacher should keep the following items in mind while allocating the marks.

- Written work should not be the copy from the book but it should be on his/her own.
- Draw the diagrams wherever necessary.
- Words, sentences should be meaningful without mistakes.

### **Slip Test**

As a part of constructive evaluation teacher should estimate the student's understanding after teaching every lesson. Testing the student's understanding at anytime but not in a specified time and making the students that they are writing an exam is said to be a slip test. It is not like a unit test.

### **Importance of Slip Test :**

- To know how far the students have understood the learnt topic.
- To assess how the students applying the learnt items with the real life.
- To make them overcome the fear of exams and build confidence.
- To participate in continuous teaching learning processes.
- To express their concepts briefly.
- To put them away from rote learning.



### **How to conduct the slip test?**

- Conduct the test without prior declaration after teaching the lesson.
- 20 marks for slip test.
- As part of constructive evaluation at FA times slip should be conducted in any period of 45 minutes duration.
- Questions in the slip test should some of the academic standards and they should write answers on their own.
- Keep 200 page long notebook for slip tests. Four formative slip tests in an academic year should be written in this text book only.
- Basing on the answers, discuss with the children how they are in each academic standard. This is the key issue in constructive evaluation and compulsory one too. Just conducting the exams and allocating marks and grades is not enough. By analysing the answers and giving instructions for their improvement is also important.  
Eg : Do you think that there is relation between respiration and photosynthesis? Why?  
Questions like these will help them to think and write on their own.
- Enroll the slip tests grades in the register.

### **Bioscience experiments :**

1. What is the importance of experiments in bioscience?
2. What is the relation between textbook and laboratory?
3. How to conduct the laboratory?
4. What to do before, while and after the experiment?
5. What is the role of the teacher in conducting bioscience experiments?
6. What are the required equipment, chemicals to conduct experiments in the lessons of 10th class bio science?

Conducting experiments in science is an important skill process. In science and technological revolution there is an important place for experiments. Experimental results done by the scientists are key for many revolutionary changes in human life. Ronald Ross found the life history of malaria insect through his experiments. That is why bio science teacher should help the students to do experiments, understand the concepts, principles on their own to construct the bio science knowledge. Through this students build their knowledge. By doing experiments like these students can develop scientific attitude.



In studying bio science there is a specific place for experiments among skill process. To achieve the desired standards, doing the experiments and testing the results on their own with locally available experiments is an experiment. In bio science, it is necessary to observe many items under microscope. So, the teacher has to prepare the students in using the microscope and in making the slides. In bioscience experiments teacher has to train the students including experiments, direct observations (eg : parts of the plant, models of organisms), drawing the diagrams etc.

**Importance of experiments :**

1. Prove and understand bioscience truths, principles, rules.
  2. Develops the capacity to found solutions for everyday problems.
  3. Know the answers for the questions like why. What?
  4. Develop interest towards bio science.
  5. Prepare to conduct new experiments.
  6. Learn bio science in natural environment.
  7. Laboratory helps the students to understand the concepts by doing.
- Makes the chance to think of alternatives for the deficiency of resources in everyday life.

## Projects of X Class Bio Science

S. No.	Name of the lesson	Project Name	Tools	Explanation of the Project
1.	Nutrition	Mal nutrition diseases	<ul style="list-style-type: none"> <li>- Information Collecting tables</li> <li>- Questionnaire</li> </ul>	<ul style="list-style-type: none"> <li>- Visit the nearby PHC and collect the information health problems in children, adults due to mal nutrition. Write report on how to overcome malnutrition with the locally and seasonally available food materials</li> </ul>
2.	Respiration	Tobacco, Pollution diseases	<ul style="list-style-type: none"> <li>- Questionnaire</li> <li>- Internet</li> <li>- Photos</li> <li>- Tables</li> </ul>	<ul style="list-style-type: none"> <li>- Collect the information on respiratory diseases, other diseases due to utilisation of tobacco and respiratory disease due to pollution.</li> </ul>
3.	Circulation	Blood pressure - Health problems	<ul style="list-style-type: none"> <li>- Questionnaire</li> <li>- Patients discharge summary</li> <li>- Health reports</li> <li>- Tables, internet</li> </ul>	<ul style="list-style-type: none"> <li>- Collect the information on the blood pressure of your teachers, neighbours. Write report on the problem of hypertension and hypatense on persons. Write analysis in the relation between high blood pressure and health problems.</li> </ul>
4.	Excretion	DA / Kaloids effects on humans	<ul style="list-style-type: none"> <li>1. alkaloid plants</li> <li>- Herbaruim sheets</li> <li>- Tables of information collection</li> </ul>	<ul style="list-style-type: none"> <li>- Collect information on by products of secondary life processes (alkaloids, tanins, resins) that are harmful to humans. Write a report on how they are harmful to humans. Prepare herbaruim with alkaloid plants.</li> </ul>



S. No.	Name of the lesson	Project Name	Tools	Explanation of the Project
		2. Organ donation - brain dead	<ul style="list-style-type: none"><li>- Internet</li><li>- Daily News Clipping</li><li>- Acceptance form for organ donation</li><li>- Application for acceptance form.</li></ul>	<ul style="list-style-type: none"><li>- Collect information on organ donation of brain dead. Collect the information and write report on methods to be followed for organ donation, acceptance of government, persons and other related clinal information</li></ul>
6.	Reproduction	Cultivation methods of vegetables and flower plants. Growing of economical importance plants	<ul style="list-style-type: none"><li>- Questionnaire</li><li>- Tables to fill the information</li><li>- Internet</li><li>- Tables of information collection</li><li>- Photos</li></ul>	<ul style="list-style-type: none"><li>- Visit your nearest village and ask the farmers how they grow plants of vegetables and flowers like potato, ladies fingers, cysanthemum, mary gold etc. Write a report with the collected information and exhibit it in the class room.</li><li>- Collect the information from the library and internet on how your district and state people are growing plants of economical importance and write report on it.</li></ul>
7.	Heredity	1) Carbon dating period of fossils  2) Human evaluation	<ul style="list-style-type: none"><li>- Questionnaire</li><li>- Photographs</li><li>- Internet</li><li>- Photos</li><li>- Internet</li><li>- Table for filling the information</li></ul>	<ul style="list-style-type: none"><li>- Collect information on the method of carbon dating and radio activity. Collect comprehensive information on how these two methods are useful in counting the period of fossils and write a report on it.</li><li>- Prepare a chart on how the human evaluation occured in past eras with suitable examples and time.</li></ul>



S. No.	Name of the lesson	Project Name	Tools	Explanation of the Project
9.	Our environment	Organic forming	<ul style="list-style-type: none"><li>- Tables</li><li>- Questionnaire</li><li>- Photos</li><li>- News Papers</li></ul>	<ul style="list-style-type: none"><li>- Write comprehensive report on organic forming (without using pesticides, fertilizers). Prepare comprehensive report on organic forming, traditional agricultural methods, yeilding and analyse the result.</li></ul>
10.	Natural resooources	Ground Water methods of conservation	<ul style="list-style-type: none"><li>- Photos</li><li>- Tables</li><li>- Questionnaire</li></ul>	<ul style="list-style-type: none"><li>- The used and rain water in cities and towns is not sinking into the grounds. Write about the methods that are used to send this water into the ground.</li><li>- What are the measures that the farmers, local bodies, governments are taking to improve ground water in rural areals.</li></ul>

**Note :** Teacher should keep in mind local needs, availability of resources, abilities of the students and prepare new projects in addition to the above cited projects.



## VIII. Summative Evaluation

Evaluating the Total items that the student has learnt through teaching learning process is called comprehensive evaluation. This is the method of testing the students' achievements after completion of the course or after completion of the specified lesson plan. In this method the issues like what the student has learnt through the course and how far he has learnt are observed. This evaluation should be conducted in the form of written test only. If we observe the nature of the comprehensive evaluation,

- This is the method of evaluating the learning.
- Summative I, II, III tests should be conducted in a academic year.
- Teacher should observe the students' progress based on the academic standards with the question paper he / she has prepared on her / his own.
- Prepare weightage table before preparing the question paper.
- The total questions from the text book in summative - III should be based on academic standards.
- The questions in the question paper will be in such a way that by nature they can be written analytically on their own. Hence we should not expect that all students can write same answers.
- After correction of the paper write the achieved marks, total marks, grades in the allotted boxes according to the academic standard.

### Academic Standards - weightage table :

- 9th and 10th classes question paper should be prepared according to the academic standards. Observe the weightage table of academic standards.
- Weightage according to the academic standards.
- In every academic standard essay type questions, short answer questions very short answer questions, multiple choice question will be there.



S.No.	Academic Standards	Weightage	Marks
1.	Conceptual Understanding	40%	16
2.	Questioning, making hypothes	10%	4
3.	Experiments, Field Trips	15%	6
4.	Information Skills	15%	6
5.	Information transfer through pictures and models	10%	4
6.	Appreciation, biodiversity, values, application to real life	10%	4

- Question paper should be prepared in order to test how far the student has achieved the specified academic standards.
- In preparing the questions equal priority will be given to all the lessons. There should not be division of either essay question from a particular less or short questions from another lesson.

#### **Nature of Questions :**

- The questions are prepared according to the academic standards. Questions should be according to academic standards and instructed weightage in the table.
- Every question is arranged in such a way that students can think and write the answers on their own.
- The students can write the answers after reading and understanding the question.
- All are open ended questions.
- The questions under improve our learning in the text book are not taken as it is but are based on the concepts in the lesson. Hence make complete awareness to the students on the nature of the questions.
- The questions in a test will not be repeated in the same form in the next test. The nature of the question will be changed according to the concept. Completely avoiding the unhealthy habit of making them read important questions is its intention. Not that asked question near the repeated.
- According to the weightage of the academic standards there will be 4 types of questions.  
1. Essay type 2. Short Answers 3. Very short answer 4. Multiple Choice.
- Questions are prepared in order to assess the students' creativity, values, aesthetic sense, conservation of natural resources, humanity values, national integrity etc. Hence every student should think and write the answers on his / her own.





- Questions never be taken from guides, question banks. Hence teacher should make the students not to depend on them, make them procure on their own. Teacher should concentrate on children to read the concepts from the text book, analyse them and write on their own.
- Let's observe the weightage according to the nature of questions, marks.

**Weightage Table according to the nature of the Questions, Marks**

S.No.	Type of Question	No. of Questions	Marks	Total Marks
1.	Essay Type	4	4	16
2.	Short Answer	6	2	12
3.	Very Short Answer	7	1	07
4.	Multiple Choice	10	1/2	05

**Long answer / essay type questions :**

These questions will help the students to know how far they have understood the learnt content. Four marks are allotted for these. The answers for these questions should be written on their own in 8 to 10 sentences.

- Total essay type questions will be four and there is internal choice. Total marks sixteen.
- Answers should be analytical without linguistic mistakes and suitable examples should be given. Explanation should be through diagram or graph wherever it is necessary.

**Short answers questions :**

- 12 marks are allotted for these. Answers should be clear and specific and should be written in 4 to 5 sentences.
- 2 marks for each question and total questions are six. There will be no choice.

**Very Short answers questions :**

- Seven Marks are allotted for these. Answers should be clear and specific in 1 to 2 sentences.
- One mark for each question and total seven questions and there will be no choice.

**Multiple Choice Questions :**

- 5 marks are allotted. Answers should be written by thinking.
- 1/2 mark is allotted for each question. Total ten questions and there will be no choice.

There is possibility of these four type of questions in any academic standard.



**Test Items :** To evaluate the children's learnt items in school questions are important. Children will try in so many ways to pass the exams by writing answers to the questions in the exams. Copying the answers from the guide, mugging up, practising the answers by writing them many times. Hence the student's knowledge will be of same type. Students try to write as it is, word to word from the text book. For example many of us give marks only if they draw the diagrams of T.S of leaf as it is from the text book. Not only that, there are some teachers who demand for the size of the leaf same as to the text book. More over there were questions to the students' memory power only. For example, see the below questions.

- What is nutrition ?
- How many type of saliva glands are there? What are there ?
- What is Quasheorkar ?

To write answers for these questions students have to definitely memorise the answers. Because the students feel that the teachers will give marks only if they write as it is from the text book.

New text books will encourage the students to learn on their own. Instead of memorising they encourage the students to learn through experiences. The academic standards achieved by this can be assessed through the methods of continuous comprehensive learning. Hence, we have to prepare the questions in order to write the answers on their own. For this let's take the lesson 'our environment - our responsibility' as an example and observe the style of the questions.

**Our Environment - Our concern :** From the lesson 'our environment - our concern there is a possibility to ask the following questions.

**Concept : Food Chain :** For chain indicates the food relations among the animals with arrow marks. But the food relations among the animals will not be so easy or will not be without undergone the changes. Insectivorous birds eat beetles and other insects besides efids. Hence it should be reasonable to use the word 'food web' in this situation.

**Read the above information and answer the following questions :**

1. What differences did you recognise between the food chain and good web ?
2. Think that in a forest ecosystem there, a large number of foxes are being entered. What are the consequences of this ?
3. Draw in a picture form a food chain showing the eagle as primary consumer. Write what other primary consumers will there in it ?



4. In a food chain every nutrition level depends on the other. How can you tell that ?
5. In it a lossor profit if there the number of consumers is less than the number of producers in a food chain ? Write the reasons.
6. In a food chain producers play a key role. Do you support this ? Why ?

Observe the above question keenly. Think of the following items.

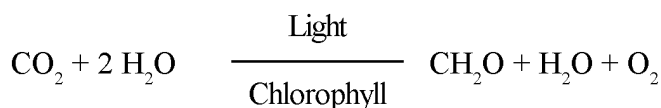
- Do all the questions based on the lesson ?
- Do all the questions can be written on one's own ?
- What are the items that were kept in mind in preparing the questions.
- How far the above gives information is sufficient to give answers for such questions.
- If the children write on their own what type of answers can they be write ?
- How to overcome the problem while correcting different, different answers ?

Now, let's observe the questions based on different academic standards in class 10.

1. **Conceptual understanding questions :** Under this academic standars questions life explaining, classifying, analysing, giving illustrations, say the causes and forming psychological questions can be given.

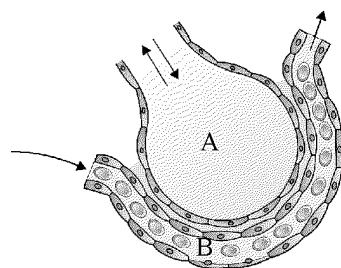
#### Model Questions :

1. Balance the following equation. Write what you have received through this equation




2. Nutrition is autotrops occurs when there is light and without light also what is the difference between these two situations ?
3. Doctors advise not to eat fried items at the time of fever. What are the reasons for this ?
4. If we chew the grains like wheat, jowar, rice we feel sweet. Why ?
5. Observe the below diagram

- a) This picture is related to which biosystem ?
- b) Write the names of the parts of a, b ?
- c) To which system they are linked with ?
- d) Which process is happening here? What happens as a result of it?





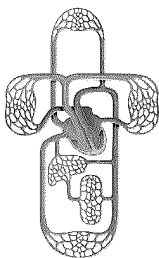
6. A person reached a specific distance once on foot and once by running. In which situation his legs pain ? Why ?
7. Which items do you take into consideration to explain the differences of arteries and veins?
8. Which cell is called energy currency cell ? What do you know about this construction?
9. Explain the formation of wine in a flow chart ?
10. In wine excretory system much water is reabsorbed. What happens if it doesn't occur?
11. Write contrasts and comparisons of the style of response in plants and animals to the stimuli?
12. The symbol  is there on the item you bought. What it instructs ?
13. Complete the table.

Name of the Gland	Enzyme it exerts	Function of the Enzyme
	Ptyalin	
Stomach		Breaking the Proteins
Liver		Emulsification of fats
	Pepsin	Digestion of proteins

14. Do the malnutrition reason for diseases ? Why ? Write any of such disease and its characters?
15. Give examples for the vitamin deficiency diseases ?
16. Pregnant ladies are advised to eat leafy vegetables and take folic acid pills. Why ?
17. What is the advantage of wet and warm then way from the nostrils to capillaries ?
18. What functions does hemoglobin in blood ? In the animals that do not have hemoglobin in blood. What is the role of blood in respiration ?
19. Why the exchange of gases happens only in alveoli, though the arteries are in pharynx, trachea and .....?
20. Can we say that combustion, respiration are almost same actions ? What evidences do you have for this ?



21. Observe the below diagram ? when type of cardiac cycle it indicates ? Explain the process that happens here ?



22. Nephron is called structural and functional unit of kidney. Why ?
23. Blood is filtered in Bowman's capsule of nephron. For the filtration of blood some pressure is needed. How this pressure happens to blood ?
24. Excreting wastes from the human body not only the kidney but other organs also help. How do support it ?
25. Not only the plants but also their wastes are useful to us. What evidences do you give for it?
26. Read the below paragraph and write Answers

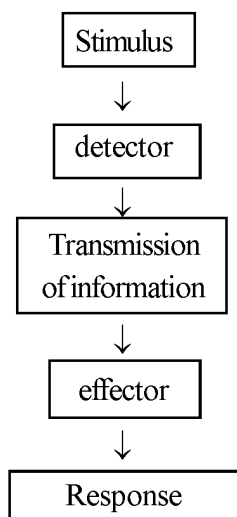
There is systematic method in showing response to a stimulus. There are different stages in it. First stage starts with the response recognising the changes in outside or inside of the body atmosphere or with recognising the stimuli. Transmitting the received information is second stage, analysing that information is third stage and showing correct response to that stimuli is the last stage.

- a) What does this information show ?
- b) Convert the above information into flow chart ?
- c) Write about the mechanism that conducts this action ?
27. What is number pyramid ? What does it indicate ?

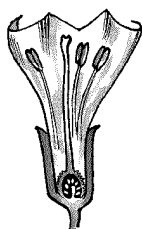
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**Read the flow chart given below:**

28. What does it indicate ? Explain with an example.



29. Explain the different parts of the brain and their function in a table form.
30. Among the following organisms can we see asexual reproduction. Write about the method of asexual reproduction in any of the two organisms.
31. What are the differences between grafting and
32. See the below picture. Which type of pollination will occur in this ? Why do you think so?



33. Keep in mind Mendal's experiments and write what you know about the folloing concepts.  
a) Pure breed    b) Phenotype    c) Genotype    d) Allels
34. What is Mitosis ? In organisms in whcih type of cells it occurse. Write about the defferent stages of it ?

## **2. Questioning, making hypotheses :**

To asses s the academic standard of questioning, making assumptions keep the following items in the mind, while preparing the questions.



- Ask thoughtful questions on different concepts.
- For the sake of information collection.
- While observing
- Questionnaire for conducting the interview
- Context of doing experiment
- To get Advice
- Guessing the results.
- Guessing the issues what have impact.
- Assuming causes for the problem.
- Assumptions about future.

Let's see model questions :

1. You want to know about intestinal juice from your nearby doctor. Which questions do you ask him.
2. The wells and the tanks in your village become dry. Ground water levels decreased. Assume the causes for this ? Will there be no water scarcity if all the farmers of your village work collectively ?
3. Ramaiah made broad bed furrow around his field under employment guarantee scheme. Guess the reasons for it ? If all the farmers of your village work together will their water scarcity meet ?
4. If you meet a historian to clarify your doubt on 'Man has first born in African continent'. What type of questions will be ask him / her ?
5. What questions do you ask your teacher to know about the coagulation of the blood ?
6. What are the consequences if meiosis not happens in the body cells of the organisms ?

### **3. Experiments - Field Trips :**

Questions regarding experiments - field trips will be in below question forms.

- Doing experiments
- Observing Experiments
- Determining



- Selecting the apparatus
- Enrolling
- Generalising
- Awareness of equipment
- Analysing
- Give them the result and doing experiment
- Doing experiments for the results.
- Doing the experiments by doing the elements.
- Recognising the faults.

#### **Model Questions :**

1. We have conducted experiment that prove the release of oxygen when photosynthesis happens ?
  - i) What are the plants that used for this experiment ? Where do they grow ?
  - ii) How did you conduct the above experiment ? In which context large number of air bubbles released. You noticed ?
2. In the experiment of anaerobic respiration with yeast
  - i) Why was liquid paraffin is poured on glucose ?
  - ii) How did you conduct the above experiment ?
  - iii) What did you understood about anaerobic respiration ?
3. What is peristaltic movement ? Explain the food movement in alimentary canal comparing with the experiment of moving potatoes in cycle tube ?
4. Write the following items about the experiment you have done to show that plants move to light.
  - a) Used equipments    b) Method of the experiments    c) Observed results.

#### **4. Information Skills :**

There are two main issues in the academic standard collecting the information - projects.

##### **1. Collecting the information :**

- i) Collecting the information, analysing.
- ii) Filling the tables, writing the reports





## 2. Analysing the information :

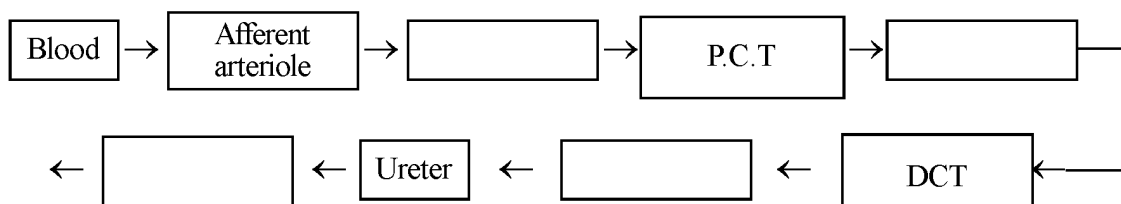
- Analysing the tables on own.
- Preparing the table, information classification

### Model Questions :

- See the below table. Write what you know from it.

Gas	Percentage of gases in inhaled air	Percentage of gases in exhaled air
Oxygen	21	16
CO <sub>2</sub>	0.04	04
Nitrogen	79	79

- Whom do you meet to collect the information of the methods of farmer based, community based water management ? Prepare information table to note down your observation ?
- Observe the below flow Chart. Fill the boxes. Explain to which system this belongs to ?



- Ragaiah is not feeling well. The following results have come in the tests. Analyse the table. Write answers for the following questions ?

Tests	Present Status	Normal Range
<b>Blood Test</b>		
1. Blood Pressure	160/90	120/80
2. Glucose (fasting	120	60-100
3. Glucose (Post Lunch)	220	160-180
4. Bilerubin	1.0	01.-0.8
<b>Urine Test</b>		
1. 24 hours protiens	150 mg	100 mg
2. Sodium	140	125-250



- 1) How can you state that Rangaiah is diabetic ?
- 2) What are the tests to know about Bilerubin ?
- 3) What do you understand from the above report ?
- 4) What questions do you ask the doctor on the above report ?
- 5) Write the list of questions to ask the manager of the garden of your village to know which plants are grown the frafting ?

## **5. Pictures - Drawing graphs, making models :**

To assess this academic standard keep the following items in the mind to prepare questions.

- Drawing the diagrams.
- Labeling the parts in the diagrams.
- Drawing the pictures that show the arrangement of equipments.
- Black Diagram
- Flow Chart
- Pigraphs.
- Drawing creative pictures / diagrams.
- Making attentive equipments.

### **Model Questions :**

1. Draw the diagram of equipments arragements in Hydrilla experiment. You did to prove that ozygen releases in photosynthesis ? Write reasons why test tube is placed upside down on funnel ?
2. Draw line diagram of number pyramid keeping foxes as third consumers ? What are the consequences if their number increases.
3. Observe the below diagram (on pg. 137). Write the process of fertilization ?
4. Draw and lable mitochondria ? Why should we call it cell of power ?
5. Draw the life histroy of flowering plant in the form of black diagram.
6. Draw the diagram of nephron and recognize the parts of glomerulus and tubular re-absorption? Write how those actions take place ?



## **6. Aesthetic sense / Appreciation / Values :**

To assess this standard some key issues are recognized. We can assess this standard easily through these issues. We should not ask the children for every question that how can you appreciate it ?

- Situations of congratulating.
- Appreciating.
- Recognising the issues of nature.
- Appreciating the efforts of the scientists.
- Planning to participate in Science clubs, seminars.
- Preparing slogans, pamphlets.
- Preparing songs, poems.
- Writing essays about special days, science concepts.

### **Model Questions :**

1. Which issues do you take into consideration to tell that plants play a key role in animals' nutrition ?
2. Write an essay stating the advantages of by productions of plants in our real life.
3. Write slogans on 'Child marriages - a social evil'.
4. Blood is purified in kidneys. So many wastes are removed from the blood in nephron of the kidney. Which issue make you surprise in excretory system.
5. When you know the heart pumping method circulatory system which issue did you remember particularly ? What's the reason for that ?
6. Write 5 songs on the prevention of HIV / AIDS.

## **7. Concern towards biodiversity application to real life :**

This academic standard is achieved when the student utilises the learnt items in his / her real life. We should keep the following issues while assessing this academic standard.

- Recognising the importance of biodiversity.
- Trying for the conservation of biodiversity.
- The principle of Live - Let Live.
- Applying the science principle to real life.
- Applying equipments, process to real life.



### Model Questions :

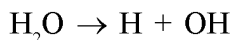
1. We know that by taking different types of food materials we will get vitamins. For this what changes shall we take in our food habits ?
2. Which plants can you get in your village. Among these by products of which plants do you use in your real life ?
3. Think that there is much scarcity of water for drinking and cultivation in your village. What advice do you give to prevent this ?
4. For which works fossil fuels are used in your house ? What measures do you take to conserve them ?
5. Write any 4 slogans on the necessity of forests and on their conservation.
6. Government made an act on determining sex through ultrasound scanning and telling it as a crime. What do you do to tell this to others ?
7. Write a small essay supporting that genes are the cause to form different characters in organisms ?
8. Syatha's in-laws worried for having daughter in her second delivery. How will you make them agree that she is not all responsible for having daughter ?

(In exams question on 6 and 7 academic standards will be given in the same section)



## Conceptual Understanding - Questions

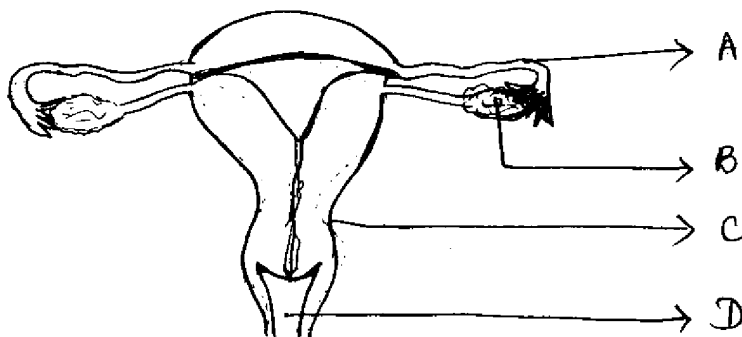
1. Photosynthesis process provides food for all organisms. It mainly takes place by two phases. Light reaction is first phase.



Above equation in light reaction shows what ?

2. Describe how oxygen enters the blood in lungs with the help of Block diagram ?
3. Classify different types of blood vessels in Humans ? On what bases you classify blood vessels?
4. Classify the substances given below ?  
Ptyaline, Leptin, Morphine, Riboflavin, Testosterone, thiamin, Niacine, Sucrase, Nicotine, Amylase, Leptine, Retinol, Quinine, Calciferol, Adenaline, Tripsin.
5. Plants shows mutations in different situations ? Give examples ?
6. Describe followed artificial vegetative methods to produce large scale production of plants.
7. What reasons responsible for decrease 'of' in number of top carnivours and Biomass starting from production in a food chain ?
8. In Human body "A" is a pumping organ. From lungs blood vessel "B" with oxygenated blood enters upper "C" part of left chamber of the organ. When "C" chamber contracts blood flows into "D" lower left chamber. "D" chamber contracts blood is pumped to all parts of the body except lungs through blood vessel E. De oxygenated blood from body parts is collected by blood vessel "F" and opens upper "G" right chamber. This chamber contracts blood flows "H" lower chamber. Lastly "H" contracts De-oxygenated blood sent to lungs by blood vessel "I".
  - (a) "A" represent what organ ?
  - (b) (i) B (ii) E (iii) F and (iv) I are what blood vessels ? Write their names.
  - (c) (i) C (ii) D are what chambers ?
  - (d) (i) G (ii) H are what chambers ? Write their names.

9.



(i) Write the labelled parts of A, B, C, D above drawn Human female reproductive system.

A : .....

B : .....

C : .....

D : .....

(ii) In which part fertilization takes place ?

(iii) Which part is in connection with implantation ?

(iv) What is ovulation ?

## II. Short answer type questions

1. Write names of the given sentences.

(i) Organelle in which photosynthesis occurs.

(ii) Life process in which complex food is converted into simple substances.

(iii) The part after large intestine in digestive tract.

(iv) Deficiency of Vitamine "K" causing disease.

2. What is the role of Epiglottis in respiration and swallowing food.

3. Anil fell down in going to school got knee injury start bleeding after some time he was wondered by seeing blood clott ? Why blood clotted ?

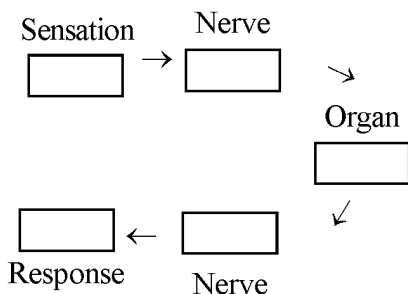
4. In our body kidneys are important excretory organs. Write other accessory excretory organs and excretory wastes ?



5. Divide the following into groups. Walking, blinking of eye lids, heart beat, laughing, digestion of food and reading. How you divide them into groups ?
6. In a flower self fertilization taking place. Write the process, the flower organs which involve in self fertilization.
7. Vasu is doing experiment, lab activities in his classroom. He is tired due to hungry. How hungry feeling occurs ? How one will know ?
- 8.
9. How does the given below concepts differ ?  
(a) (b)
10. Forest are renewable resource. Write sentences supporting this.

### III. Very Short answer type questions

1. Fermented Idly and Dosa flour gives smell ? What micro organism is responsible for this.
2. Why we feel sticky of stem and leaves of a plant effected with aphids ?
3. A substance given below consists of other three substances. What is that substance ? Where is it produced ?  
Uric Acid, Sodium, Oxalate, Urine.
4. We remove our hand when we touch a hot subject. Find out its reflex action.



5. You may eat grapes with no seeds. How they formed ? Write some other fruits names ?
6. What teeth you use when you eat peas and banana ? Why



7.

♀ \ ♂	Y	y
Y	YY	Yy
y	Yy	yy

Write Phenotypic and Genotypic ratio of table given at side.

8. The bio mass of a producer in an eco system is calculated as 3500 kg. Calculate the bio mass of primary, secondary, tertiary consumers.
9. What is sustainable development ? Why it is needful for us ?

### Collection of Information

- If you have a chance to collect information about components of food and enzyme works on digesting those components from reference book. Prepare your own tabular column to collect information.
- Collect information about different types of diseases and their effects of malnutrition in our country. Prepare a report.

Report name :

Aim :

Model table :

Analysing Report : 1.

2.

3.

Conclusion

3. Observe and analyse the questions in the table given below.

	Newly borned	(Children)	(Children)	Children	Youth / Adults	Athletics
Heart beat	100-150	90-120	80-120	70-130	60-100	40-60

- In which age group rate of heart beat more ?
- In which age group rate of heart beat is less ?
- Why heart beat in Athletics less ?





- d) What are reasons for more rate of heart beats differences between the newly born and children ?

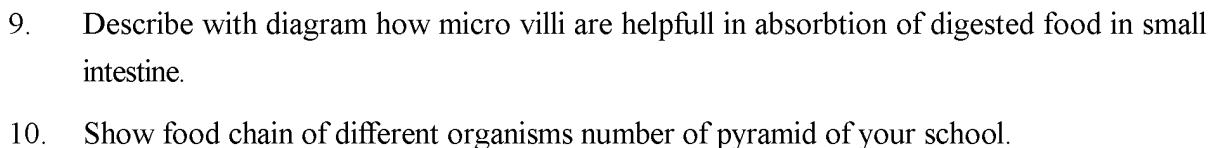
4. Observe the table given below and analyse the questions.

Name of the animal	Weight of the body	Weight of the heart	Heart beat per minute
Blue whale	1,50,000 kgs	750 kgs	7
Elephant	3000 kgs	12-21 kgs	46
Man	60-70 kgs	300 grams	76
Koal tit	8 grams	0.15 grams	1200

- a) Why heart beat is less in animals with more weight ?
- b) Why heart beat is more in animals with less weight ?
- c) What is the relationship between weight of the body and rate of heart beat ?
- d) Why the weight of heart is less than body weight ?
5. What hormones and endocrine glands are responsible for the formation of secondary sexual characters in Adolescent children. Write in a table.
6. In your village what programmes you will implement awareness about polio and "AIDS". Write in a table.

### Communication through Drawing

1. Draw a diagram of peristaltic movement of food in alimentary canal Oesophagus. Write how it performs.
2. Draw a flow chart of Respiratory passage of Humans.
3. Write T.S. of flow of blood in arteries and veins ? Write flow of blood in between them.
4. Draw a diagram of different stages of systole and diastole.
5. Draw a diagram of Reflex arch. Describe the functions of different parts of Reflex arch.
6. Draw a diagram of a plant it is showing phototropism. Explain why plants possess such type of response.
7. Describe the mode of fertilization in plants with a diagram.
8. Draw a peristaltic movement of food in stomach. Describe movement of food in stomach.



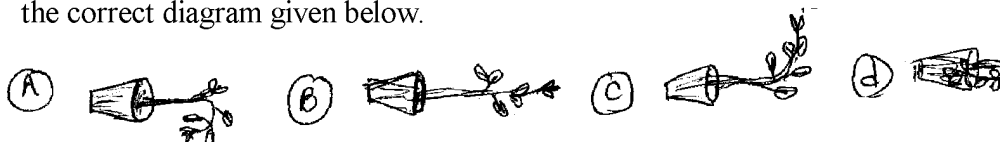
1. How can you say proper utilization of natural resources helpful on the nation's economical growth.
2. What programmes you will impliment (suggest) to make awareness of farmers in Agriculture.
3. What suggestions you will give to farmers to reduce denature of soil his field.
4. Draw a cartoon of diagram showing understanding how to conserve water.
5. Write what friendly ecosystem activities you will conduct in your school.
6. Write what programmes you are conducting to provide awareness of an health-cleanliness and family planning.
7. Describe what life skills one should develop in Adolescent stage.
8. Describe what disaster occur on earth, if photosynthesis life process stops.

1. Acid present in Gastric juice ( )
  - a) Sulphuric Acid
  - b) Hydrochloric Acid
  - c) Nitric acid
  - d) Phosphoric acid
2. Agents present in exhaled air ( )
  - a) CO<sub>2</sub>, O<sub>2</sub>
  - b) O<sub>2</sub>, water vapour
  - c) CO<sub>2</sub>, water vapour
  - d) water vapour
3. Which of the following is correct order of human excretory system ( )
  - a) Kidneys → Urinary bladder → Urethra → Ureters
  - b) Kidneys → Ureters → Urinary bladder → Urethra
  - c) Kidneys → Urethra → Ureters → Urinary bladder
  - d) Kidneys → Urethra → Urinary bladder → Ureters





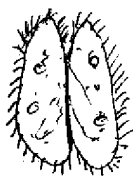
4. If we observe potted explant growing horizontally on ground for some days. What will be the correct diagram given below. ( )



5. Which is not correct pair ( )

- (a) Adrenaline - pituitary gland (b) Testosterone - testes  
(c) Insuline - pancrease (d) Oestroedal - (Overies) overy

6. Below drawn diagram shows what process ( )



- (a) Budding (b) Binary fission (c) Regeneration (d) Saplings

7. What nerve place an important role in identification of taste ( )

- (a) 6 cranial nerve (b) Thick nerve (c) 5 cranial nerve (d) 10 nerve

8. The process of inheritance of varied characters to offspring from parents ( )

- (a) Inheritance (b) Mutations (c) Diversity (d) Environment

9. Consumer are divided based on the factors given below in an eco system ( )

- (a) Consumed food (b) Trophic level  
(c) Consumed food, trophic level (d) Energy

10.  This logo shows what ( )

- (a) Re use (b) Reduce (c) Recover (d) Recycle

11. Find out wrong pair ( )

- (a) Saliva - ptyaline (b) Pancreatic Juice - Amylase  
(c) Gastric juice - Lipase (d) Intestinal juice - peptidose



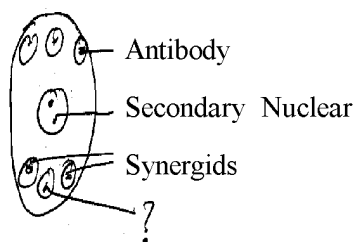
12. Identify correct sentence given below : ( )

- (a) Right kidney - slightly lower than left kidney
- (b) Right kidney - slightly higher than left kidney
- (c) Right kidney - left kidney are same height
- (d) Right kidney is nearer to vertebral column than left kidney.

13. Way of passage of urine in human body ( )

- (a) Kidneys                      (b) Ureters                      (c) Urethra                      (d) Urinary bladder

14. Name the part which is asked as a question mark (?) ( )



- (a) Granular cell              (b) Polar cell              (c) Egg cell              (d) Hard cell

15. Photosynthesis process is determined on the production of Carbohydrates but not on the production of glucose. Reason is ( )

- (a) Carbohydrates are intermediary product in photosynthesis
- (b) Glucose which is formed in photosynthesis immediately converted into Carbohydrates
- (c) Carbohydrates dissolve in water
- (d) Glucose is not tested.

16. What part of your wrist is pressed by a Doctor to examine the pulse rate ( )

- (a) Vein                      (b) Artery                      (c) Capillary                      (d) Lymph vessels

17. What is not really concerned with excretion given below ( )

- (a) To send  $\text{CO}_2$  out                      (b) Defecation
- (c) Sweat                      (d) to remove urea

18. Chromosomal number becomes half in certain types of cells in cell division. This type of cell division takes place in ( )

- (a) In testes only              (b) In ovaries only              (c) In both                      (d) In all body cells



19. In synthetic stage of cell division cycle which substance synthesized more ( )  
(a) RNA (b) RNA and proteins  
(c) DNA (d) Glucose
20. Which animal is having less number of Chromosomes ( )  
(a) Onion (b) Monkey (c) Ascaris (d) Rat
21. the rate of transpiration is more in the following days of atmosphere ( )  
(a) Cold, humid, air (b) Hot, humid, dry (c) Hot, humid, air (d) Hot, dry, air
22. What will happen to plants if rate of respiration more than the photosynthesis ( )  
(a) Live long but can't store carbohydrates (b) Dies  
(c) Plants grow rapidly (d) Growth reduce dies due to hungry
23. What is the reason to keep a plant in dark for 48 hrs to know photosynthetic experiment in plants ( )  
(a) To remove green substances from leaves  
(b) To remove Carbohydrates  
(c) To prove no photosynthetic process takes place  
(d) To know there is no Carbohydrates in the leaves.
24. What is the reason for heart beat ? ( )  
(a) Closing of tri cuspid and bicuspid valves  
(b) Closing Aorta and pulmonary valves  
(c) Blood flows rapidly through valves  
(d) Flow of blood in ventricles
25. What membrane covers the nerve ( )  
(a) Plasma lemma (b) Neurolemma (c) White matter (d) Grey matter
26. Mixed gland which acts as exocrine and endocrine gland ( )  
(a) Pituitary gland (b) Thyroid (c) Parathyroid (d) Adrenal cortex
27. Path way & sperm release from the testes ( )  
(a) Seminal duct, epididymis, urethra (b) Urethra, epididymis, seminal duct  
(c) Epididymis, urethra, seminal duct (d) Epididymis, seminal duct, urethra



28. After fertilization implantation of zygote takes place in the uterus walls of females ( )  
(a) some months (b) three weeks (c) month (d) probably
29. What methods are to be followed by farmers in scarcity of water ( )  
(a) short yielding crops (b) growing commercial crops  
(c) drip irrigation (d) give gap between crop
30. The failure of the kidney is called ..... ( )  
(a) ESRD (b) MSRD (c) ASRD (d) KSRD
31. Need of green chlorophyll pigmented molecules in leaves because ( )  
(a) break down of water molecule into Hydrogen and Oxygen  
(b) For to release green light  
(c) For to trap solar energy  
(d) None
32. What is missing in food chain of grass - frog - snake ( )  
(a) Grass hopper (b) Lion (c) Goat (d) Amoeba
33. What chemical is used to know the presence of Carbohydrates in leaves ( )  
(a) Methylated spirit (b) Iodine  
(c) methylated spirit, Iodine (d) None
34. Why we use KOH in a bottle in the experiment to know  $\text{CO}_2$  is necessary for photosynthesis ( )  
(a) To absorb chlorophyll in leaves (b) To absorb air in bottle  
(c) To absorb  $\text{CO}_2$  in bottle (d) To absorb water vapour in the bottle
35. Energy change takes place in photosynthesis ( )  
(a) Conversion of light energy to heat energy  
(b) Conversion of light energy to chemical energy  
(c) Conversion of light energy to electrical energy  
(d) Conversion of heat energy to chemical energy
36. Site of light reaction ( )  
(a) Grana of chloroplasts (b) Stroma of chloroplasts  
(c) Mitochondria (d) Golgi complex



37. Reason for to call hill reaction as light reaction ( )  
(a) Break down of water molecule is by light  
(b) Break down of chlorophyll atom by light  
(c) Conversion of Hydrogen Ions of water to Hydroxyl Ions  
(d) Water is formed by combination of Hydrogen and Hydroxyl Ions
38. The substance which is not having relation with Autotrophic nutrition ( )  
(a) ATP (b) NADP (c) NADPH (d) ATGC
39. Reason for Cascuta plant to perform parasitic nutrition ( )  
(a) Absence of chlorophyll in leaves (b) Absence of roots  
(c) Stem is weak (d) Less absorbtion of water
40. Emulsification in digestive system is due the presence of ( )  
(a) Saliva (b) Gastric juice (c) Peptic (d) Bile juice
41. Reasons for formation of ulcers in stomach ( )  
(a) Uneasy (b) Stress and strain (c) Bacteria (d) All
42. The characters of one of the protein deficiency disease are accumulation of water in inter cellular spaces, dry skin, motion ( )  
(a) Kwashiorkor (b) Marasmus (c) Cellegra (d) Obesity
43. Find out who am I  
I am a vitamin  
Healing of wounds, fracture of bones  
doesn't takes place in the absence of me.  
I am in vegetables, citrus fruits, and in germinating seeds.  
Who Am I ( )  
(a) Retinol (b) Niaccine (c) Follic Acid (d) Ascorbic Acid
44. Agents in Exhaled Air ( )  
(a) CO<sub>2</sub> (b) Water Vapour (c) Nitrogen (d) All
45. Energy stored in one ATP ( )  
(a) 7200 cal (b) 7200 kilo cal (c) 7500 cal (d) 7500 kilo cal



46. Read the following sentences ( )  
(a) Digging contour field bunding horizontally  
(b) Glincidia plants store nitrogen in soil  
(c) Crop yield is measured in T.M.C.  
(d) Supply of water by spinklers is called micro irrigation  
What are correct sentences mention above  
(a) 1, 2, 3 (b) 2, 3, 4 (c) 1, 3, 4 (d) 1, 4
47. These plants grow in Eustaries Respire with roots ( )  
(a) Seedless plants (b) Mangrove plants (c) Glincidia plants (d) Mono cot plants
48. Read the following sentences ( )  
(a) Blood vessels carry blood from body parts are veins  
(b) Arteries are not strong as veins  
(c) Pulmonary Artary carries blood from heart to lungs  
(d) Superior vena cava collects deoxygenated blood from upper parts of the body like head and neck  
What are correct sentences  
(a) 1, 2 (b) 2, 3 (c) 3, 4 (d) 1, 3
49. Write in sequence different phases of Human Cardiac cycle ( )  
(a) Ventricle systole (b) Auricle diastole  
(c) Ventricle diastole (d) Auricle diastole  
(a) 1, 2, 3, 4 (b) 2, 1, 4, 3 (c) 3, 1, 2, 4 (d) 4, 3, 2, 1
50. Read below sentence. Identify in which part it is wrong. Explain with suitable word. Uni Cellular organisms like Amoeba transport of substances takes place by means of Brownian movements. ( )  
(a) No wrong in above sentences (b) Paramoecium  
(c) Cytostone (d) Respiration
51. Place of filtration of blood in Nephron ( )  
(a) Bowneys capsule (b) Herles loop  
(c) Proximal convuluted tubule (d) Distil convuluted tubule
52. Match the items of first line with second line.  
First line : 1. Charles Elton 2. Charles Darwin 3. Lavoisier  
Second line : (a) Respiration is a combusion process (b) Ecosystem (c) Evolution  
(a) 1-a - c 3 - a (b) 1-a 2-b 3-c (c) 1-c - a-3 - b (d) 1, 2 - c-3 - a





## How to assess the answers ?

Summative evaluation is a test that observes children's progress in fixed standards. So based on the weightage of questions and academic standards questions can be given anywhere from the text book. There is no need to prepare primary "Key", because the questions, by nature facilitate answering on own and analysing. Hence we should not be under the impression that all the students will write the same answers. Sometimes the child may write the answer different from the text book depending upon his own thought and experience. If it is correct, then it should be considered. Teachers may correct the papers and award marks as they have been doing till now. But the answers vary from student to student hence they should be careful in awarding marks.

There will not be any division of marks based on the number of points or pages. The answers written by students are also not routine. Hence there will be chaos on how to correct the papers observe the following academic standardwise assessment indicators (value points) to get a clear idea.

### Conceptual Understanding

40% of weightage is there for Conceptual Understanding. There will be essay, short, very short and multiple choice questions. 16 marks in all will be there for this standard. The questions will cover the aspects like explaining, comparing, differentiating, giving reasons, analysing. Similarly the questions will not be direct but thought provoking. Look at the question below.

A person reached a fixed distance once by walking and next time by running. When do his legs ache ? Why ? The same question may be asked why do legs ache when we run ? Observe the following points to assess the answers to such questions.

1. Information written by students should be relevant and sufficient.
2. Check the relevance of the answer to the question, though the child has written the answers on his own.
3. Have they drawn pictures wherever necessary ?
4. Have they explained with examples.
5. Did they write similarities and differences in the form of a table.
6. Have they mentioned proper reasons ?



7. Identify whether the answer is mugged up taken from guide. Give importance to the answers written on their own.

## **Questioning - Making hypothesis**

This standard develops the nature of questioning and imagining to make hypothesis among students. The student has to write thought provoking questions on different concepts as answers. So they get a chance to write different questions. Similarly a student has to write her/his imaginations under hypothesis. If a question has many aspects to and as its answer it becomes a hypothesis.

### **Suggestions to assess this standard**

1. Identify logic and rationality in the questions written by the students.
2. Identify clarity in the things imagined than ambiguity.
3. Marks should be awarded based on quality of the questions and not on quantity (number of questions)
4. Answers to be written by children are mostly.
5. Give more importance to the questions written on their own.
6. The correct answer must be identified even in objective and multiple choice questions.

## **Experiments and field trips**

Experiments and field trips are very important in teaching of science. This standard helps the student to develop scientific vision and scientific attitude and curiosity to learn science. Hence, if this standard is assessed specifically and the results are analysed, it helps in increasing the experimental skills among students.

### **Suggestions to assess**

1. Is there any importance to scientific aspects in the things written by the student.
2. Have they written according to the steps like objective, arrangement of tools, observation, result, precautions (All the experiments may not have these steps)
3. Have they written the result and commented on it ?
4. Have they drawn the diagram to explain (diagram must be given due importance)
5. Have they written what the result could be if they change the variables. Observe.



## **Information Skills**

In the academic standard information skills and project works, project works are not given in the written exam. Only information skills will be tested. Even in this there will not be questions ending with collect the information. Hence we consider two aspects while assessing this standard

1) Collecting the information

2) Analysing the information

### **Things to be observed to assess**

1. Have they prepared tables according to the given information.
2. Have they written the method of collecting information in detail ?
3. Have they entered the classified information in the tables ?
4. Is the method of analysing the information correct ?
5. Have they written, numbers, data, principles / formulae and scientific words without any mistakes ?
6. Have they followed scientific method while commenting on the information ? Have they written on their own.

### **Drawing pictures, graphs / making models**

1. There should be clarity in pictures, diagrams microscopic pictures, whatever they draw.
2. Do not find the mistake in the children's own drawings with the feeling that the diagram should be like the one in the textbook.
3. Consider whether the picture drawn is conveying the information or not.
4. Do not give much importance to the artistic skills.
5. Proper marks should be allotted to the information if asked to write along with the diagram.
6. Diagram should be labelled.
7. Check whether drawing and commenting on the graphs are as per the proofs.
8. Symmetry of tools must be considered when their diagrams are drawn.



## **Aesthetic Sense / Appreciation / Values, Daily life Application**

This academic standard is useful in making the children persons with scientific vision. The questions in this standard provide scope for writing a variety of answers.

- Mostly the answer will be written on their own. Check the standard related to the topic asked.
- Understand the answer form. Understand the productive form of the answer and give importance to it rather than the direct answer.
- Only true things must be written when writing about scientists.
- Desired feeling must be assessed when cartoons and satirical pictures are drawn.
- Slogans must not be less than five as per marks.
- Observe the conversations written in order / sequence without any disorder or messing up.

## **Teacher's role in Assessment**

Continuous Comprehensive Evaluation is a special method. Formative and Summative Evaluations take place separately. Since summative evaluation is a written the following are the special suggestions for teachers to correct the answer scripts.

- Teachers need subject knowledge, tactics and patience.
- Spontaneity is needed to assess the answers written by the students.
- Answers written by children on their own must be assessed carefully. Do not think that they must have written some stories. Children may at loss if you assume in such a way.
- Observe whether the answers are in accordance with the question or not. If associated questions are given, allot proper marks to them.
- See whether the diagrams drawn by students are sufficient to give the information. There is no rule that they should draw the pictures exactly as given in text book.
- Should develop an understanding in the following aspects reading the reports, analysing them, writing tables, bar graphs, pie charts etc.
- Should have an understanding about writing the flow chart, reading it and writing a report about it.



- The answers written to the questions in the last standard are of more linguistic native. Help of language teachers can be taken while assessing poem / song / short story / conversation / essay / slogan etc.

Assessing as per the type of questions. The following are the type of questions as per the proposed reforms in class 10 examinations.

1. Essay type questions
2. Short answer questions
3. Very short answer questions
4. Multiple choice questions.

To assess answers to these questions a special method has to be followed. The answer scripts must be evaluated as per the allotted marks.

- |                                |   |          |
|--------------------------------|---|----------|
| 1. Essay type questions        | - | 4 marks  |
| 2. Short answer questions      | - | 2 marks  |
| 3. Very short answer questions | - | 1 mark   |
| 4. Multiple choice questions   | - | 1/2 mark |

Suggestions to correct essay type answers.

1. Since they are essay type they must be complete. Approximately 10-12 sentence should be there.
2. Answers should give complete knowledge of the topic.
3. Observe whether scientific terminology is used or not while writing answers to such questions.
4. Even though the child is writing own answer check whether the concepts are related to the answer.
5. Check whether a sequence is followed in writing answers.
6. Do not give much importance to spelling mistakes.
7. Award full marks to the pictures if drawn where needed.
8. Experiments must be written as per the steps.
9. Tabular form should be given importance while writing the comparisons, differences & similarities.



10. While assessing the answers written to questioning 6th & 7th academic standards, there should be a fine observation.

### **Short answer questions**

- 5-6 sentences in an answer are enough.
- Correct the answers to questions like commenting the pictures or looking at the pictures in accordance with the questions.
- Even if the question is complicated / twisted the answers must be direct.
- The answers must be assessed as per the academic standard.
- Even the rough diagrams must be considered where diagrams are asked.

### **Very Short answer questions**

- The answers to these questions should be in 2-3 sentences. They will be direct questions. Children should try to give direct answers. While assessing we must check whether they have answered briefly and appropriately.

### **Multiple choice questions**

- Answers to the multiple choice questions must be identified and written in the brackets.
- Though only 1/2 mark questions the answers will not be direct.



**GENERAL SCIENCE PAPER-II**  
**Biological Science (English Version)**

**Time : 2.45 mts.**

**Maximum Marks : 40**

**Instructions :**

- i) This question paper comprises **Four** sections (I, II, III, IV).
- ii) **ALL** the questions are compulsory.
- iii) There is overall choice. However there is internal choice to the questions under Section I.
- iv) In the time duration of 2 hours 45 minutes, 15 minutes of time is exclusively allotted to read and understand the question paper.

**SECTION - I**

**(4 × 4 = 16)**

**Instructions :**

- i) Answer all the questions.
- ii) Each question carries Four marks.
- iii) There is internal choice for each question. Only one option from each question is to be attempted.
- iv) Answer each question in **8 to 10** sentences.

1. Compare the process of Nutrition in plants and Animals

(OR)

Raju asked his teacher, he gets tired while playing games. Write reasons and process for it.

2. How plants absorb water through root hairs ?

(OR)

Describe the process of dialysis in man with a neatly labelled diagram.

3. Examine the table given below and write answers to questions.

Sl.No.	Name	Age	B.P. Reading	Remark
1	Ravi	38	120/80	N.B.P.
2.	Ramu	36	90/70	L.B.P.
3.	Somu	40	140/110	H.B.P.
4.	Madhu	45	150/120	H.B.P.



- A) What matter you observing after analysing the given information.
- B) What is the relation of Age and B.P.
- C) What are the effects of high B.P. and low B.P.
- D) What represents Numerator ? What represents Denominator ?

(OR)

Read the following matter answer the given questions.

To understand the functional relationship between these the phases of cell cycle. Dr. N. Rao and his research associate. Dr. Johnson conducted experiments on cell fusion technique. His researches revealed that the cell cycle is sequential unidirectional and controlled by a series of chemical signals. His experiments are considered to be a milestone in the cell cycle studies.

$G_2$  : 3.5 hrs M : 1 hr.

- 1. Identifying above diagram findout cell cycle gap.
- 2. What does the word cell fusion process ?
- 3.  $G_1$ , S,  $G_2$  stages are called what ?
- 4. The duration of M stage is higher than inter stage - what is the reason ?
- 4. Describe organs and systems participating in digestion. Write their functions briefly.

(OR)

Suma selected character mainly round yellow, wrinkled green pea seeds. She crossed these plants in her garden . Explain her results with the help of a checker board

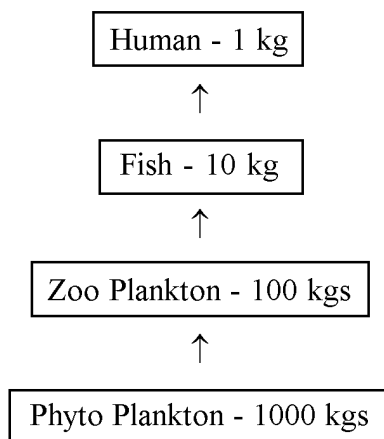
## SECTION - II

(6 × 2 = 12)

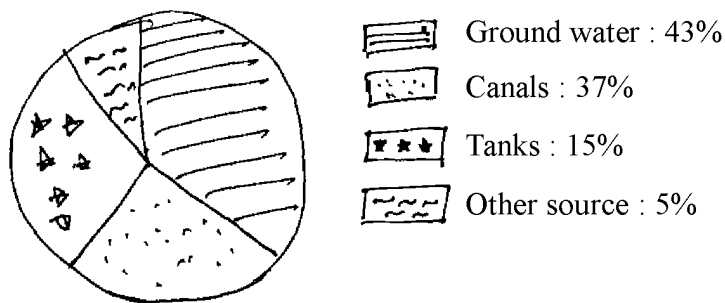
### Instructions :

- i) Answer all the questions.
  - ii) Each question carries two marks.
  - iii) Answer each question in **4 to 5** sentences.
- 
- 5. Why number of organisms decrease more from producers to consumers.
  - 6. Observe flow chart and describe.





7. Given diagram describing AP's water sources. Write water conservation methods.



8. Ravi's father wants to grow potato crop in his field. He wants to discuss some doubts with Agricultural Officer. Write what questions he will ask to clarify his doubts.
9. Nature is the sum of different ecosystems. There is a coordination between different components of the eco systems. How you appreciate the coordination of the eco systems?
10. Some students are killing grasshoppers on grassland ecosystem for fun. How you will argue ? Write reasons.

### SECTION - III

#### Instructions :

- Answer all the questions.
  - Each question carries One marks.
  - Answer each question in **1 to 2** sentences.
- 
11. Tilak didnot take food even though he felt hungry. After sometime he gets relief from hungry. Write reasons for it.
12. What happens absence of mototic cell division in organisms.



13. In order to identify onion roots under microscope. (6 × 2 = 12)

14. Observe the following chart and write answers.

♀ + ♂	Y	y
Y	YY	Yy
y	Yy	yy

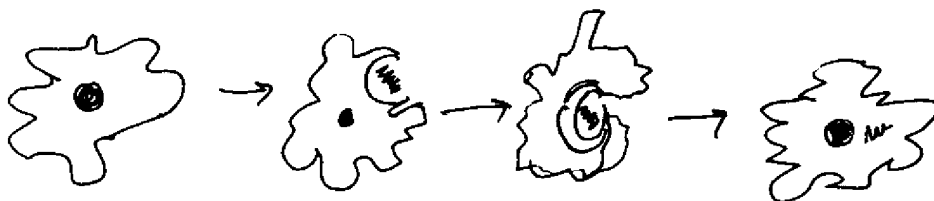
A) Above chart shows what ?

B) What is phenotypic ratio of  $F_1$  generation

15. Draw the diagram of Synaps and label its parts.

16. Prepare some slowguns on conservation of water.

17. Observe the diagrams given below. Write your observations.



## SECTION - IV

$$\left( 10 \times \frac{1}{2} = 5 \right)$$

### Instructions :

- i) Answer all the questions.
- ii) Each question has Four choices. Choose the correct answer for each question and write the relevant alphabet (A, B, C, D) against the question number in your answer booklet.
- iii) Each question carries 1/2 mark.

18. Saliva pH with ..... nature (      )

- a) Acid                      b) Base                      c) A and B                      d) None

19. In cell cycle given below stage is divided into  $G_1$ , S and  $G_2$  stages (      )

- a) Prophase                      b) Interphase                      c) Metaphase                      d) All

20. It took long time clotting of blood when Rani's finger was cut. Imagine what will be the reason. (      )

- a) Defeciency of Vitamin-D                      b) Defeciency of Vitamin-K  
c) More blood is Rani's body                      d) Less blood in Rani's body



21. Every day Vikki's brother in a given time passes urine on bed. What is the reason ( )
- a) Less production of advenaline      b) More production of Vassopresin  
c) No production of advenaline      d) Vassopresin not at all release

22. To test for the presence of carbohydrates in wheat floor. The following are mixed ( )
- a) first Saliva next Iodine      b) first Saliva next Jiline  
c) first Iodine next Saliva      d) first Jiline next Iodine

23. A student observe pollengrain on a slide with microscope. He observed the fallowing structure. ( )



"x" denotes what.

- a) Acid      b) Base      c) A and B      d) None
24. Observe the following equation and findout the correct answer for "?"
- $$(\text{CH}_2\text{O})_n + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O} + ?$$
- a) Energy is not released      b) Energy is not oxidised  
c) Small amount of energy is released      d) Ethyl Alcohol formed with small amount of energy
25. Photosynthesis takes place in chlorophylls and produced glucose and carbohydrates. What will happen if chlorophyll is absent. ( )
- a) Production of Carbohydrates      b) Plant dies not place  
c) Plant grows more      d) All
26. Heart is an important organ for in circulation. For proper functioning of heart every one ( )
- a) Taking Nutritious diet      b) Doing exercise  
c) Developing smoking habit      d) A and B
27. Sujatha told to cut grass and green plants to keep the surroundings clean. This is opposed by Raffee. Why ? ( )
- a) Need more labour      b) Takes more time  
c) Disturbs equilibrium      d) Artificial environment



**GENERAL SCIENCE PAPER-II**  
**Biological Science (English Version)**

**Time : 2.45 mts.**

**Maximum Marks : 40**

**SECTION - I**

**(4 × 4 = 16)**

**Instructions :**

- i) Answer all the questions.
- ii) Each question carries Four marks.
- iii) There is internal choice for each question. Only one option from each question is to be attempted.
- iv) Answer each question in **8 to 10** sentences.

1. Describe formation of urine in nephron. Why nephrons are called structural and functional unit of a kidney.

(OR)

Write main differences of the following

( )

- (a) Mitosis - Meiosis division
  - (b) Photosynthesis - Respiration
  - (c) F1 Generation - F2 Generation
  - (d) Soaking pit - percolation tank
2. Explain different stages of photosynthesis.

(OR)

Write your opinion on evolutionary evidences of the following information. In all these animals forelimbs are structurally similar but perform different functions according to the habitat in which they live.

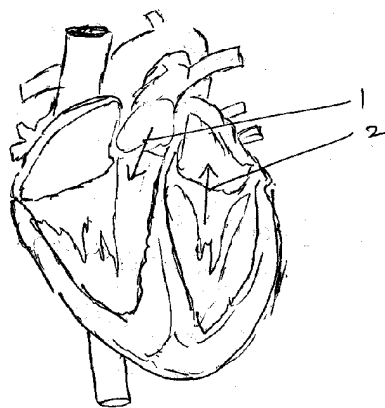
3. To understand the activity of Saliva. What test to be conduct on carbohydrates ? Write what precautions to fallow while doing activity.

(OR)

Deepaks father wants to grow coloured flowers and big fruit plants. What methods he has to fallow ? Describe why ?



4. Observe the given heart diagram.
- A) Draw flow of deoxygenated blood.
  - B) 1, 2 Blood flowing ways showing in diagram correct or not. Write reasons.
  - C) From which bloods heart receives blood.
  - D) How lub dub sound produced by heart.



(OR)

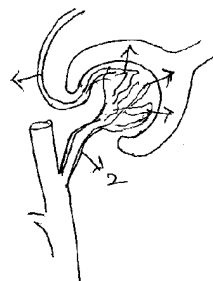
What is ecological pyramid ? What concepts are revealed by pyramid of Biomass ?

## SECTION - II

(6 × 2 = 12)

### Instructions :

- i) Answer all the questions.
  - ii) Each question carries two marks.
  - iii) Answer each question in **4 to 5** sentences.
5. After knowing human digestive and excretory systems. Do you change your food habits ?
6. Prepare an interview questionnaire on fossil fuels who managing a petrol bunk ?
7. Draw flow chart showing law of independent assortment ?
8. What will happen if diagram is absent in the body ?
9. What makes you excitement in continuity of life by cell division.
10. Observe the given diagram.  
Name 1, 2 parts given in diagram. Why 2 blood vessel is larger than 1 blood vessel.

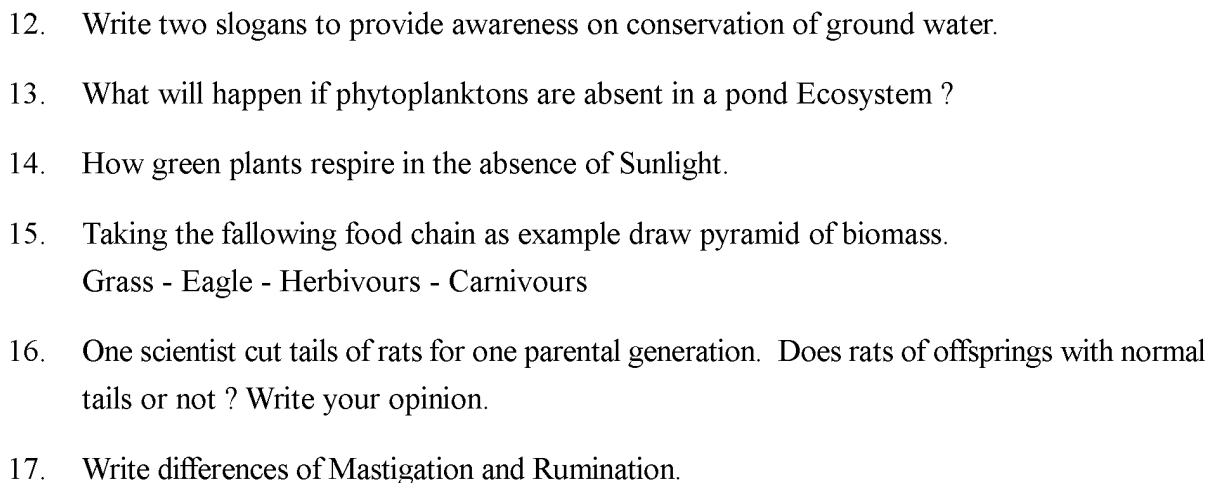


## SECTION - III

(7 × 2 = 14)

### Instructions :

- i) Answer all the questions.
  - ii) Each question carries One marks.
  - iii) Answer each question in **1 to 2** sentences.
11. What is the reason of folding of leaves by touch me not plant when they are touch.



### Instructions :

- i) Answer all the questions.
- ii) Each question has Four choices. Choose the correct answer for each question and write the relevant alphabet (A, B, C, D) against the question number in your answer booklet.
- iii) Each question carries 1/2 mark.

18. If our teeth arrangement ratio is 3 : 2 : 1 : 2. In this one (1) shows what type of teeth number  
a) Incisors                  b) Canines                  c) Molars                  d) Pre molars        (      )
19. Upper membrane of heart is called pleura. Upper membrane of heart is called like this  
a) Hyper Cardium    b) Pericardium                  c) Apicardium                  d) Upper cardium (      )
20. Neetha strike bat on ground when she was out in match. What hormone worked in her at that time.  
a) Adrenaline                  b) Thyroxine                  c) Testosterone                  d) Ghrelin (      )
21. Weak deer doesn't live long in a forest according to darwins principal. What concept it shows  
a) Evolution                                  b) Acquired Character  
c) Ecosystem                                  d) Survival of fittest (      )
22. Concept that belongs to '3R'. Necessary for Environment Conservation is (      )  
a) Preparation of plates with banana leaves  
b) Usage of grass bags only







**GENERAL SCIENCE PAPER-II**  
**Biological Science (English Version)**

**Time : 2.45 mts.**

**Maximum Marks : 40**

**SECTION - I**

**(4 × 4 = 16)**

**Instructions :**

- i) Answer all the questions.
- ii) Each question carries Four marks.
- iii) There is internal choice for each question. Only one option from each question is to be attempted.
- iv) Answer each question in **8 to 10** sentences.

1. Write reasons for the following.
  - (i) In blood circulation why blood from stomach and intestine transport through liver and to heart. Why not directly to heart ?
  - (ii) Before blood transfusion why donor has to know the blood group of recipient.
  - (iii) Veins are only valves. Why valves are absent in arteries ?
  - (iv) Why arteries are situated in deeper parts of the body ? (A.S-1)
2. A boy conducted an experiment factors responsible for photosynthesis. He took a plant grown in a pot. He kept the potted plant in dark for 24 hrs. Second day morning he fixed a black paper in the middle of selected leaf and kept the potted plant in sunlight for few hours. Write answers to the following questions.
  - (i) What factor he wants to know in photosynthesis ? Why ? (A.S-3)
  - (ii) Is there any control in this experiment ? Describe if is it ?
  - (iii) Before conducting experiment why he kept the plant in dark for 24 hours.
  - (iv) Write different steps student conducting experiments to recognise the presence of carbohydrates.





3. Analyse the table given below.

Animal Name	Weight of the body	Heart weight	Heart beat for minutes
Blue Whale	1,50,000 kgs	750 kgs	7
Elephant	3000 kgs	12 - 21 kgs	46
Human man	60 - 70 kgs	300 grams	70 - 80
Coaltit bird	8 grams	0 - 15 grams	1200

1. In the above table which animal is with more body weight ?
  2. Reason for heart weight less than body weight ?
  3. What is the relation between weight of the body and weight of the heart.
  4. Why rate of heart beat is more in animals with less weight.
  5. Why rate of heart beat is less in animals with more body weight.
  6. What is the relationship between weight of the heart and its number of heart beats.
4. What is dialysis ? In what conditions dialysis is conduct ? Describe the process of dialysis with a diagram.

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## SECTION - II

(6 × 2 = 12)

### Instructions :

- i) Answer all the questions.
- ii) Each question carries two marks.
- iii) Answer each question in **4 to 5** sentences.

- 
5. Write differences between Harmones and enzymes. (A.S-1)
  6. Why Mendal selected pea plants for his genetic experiments (A.S-1)
  7. Describe double circuit circulation with the help of a diagram.
  8. What will happen if natural resources are exhaust rapidly. (A.S-6)
  9. If decomposers are eleminated from food web what will happen.
  10. When we get angry it doesn't stay for a long time and it controlled after sometime. What is the reason ?



### SECTION - III

(7 × 1 = 7)

#### Instructions :

- i) Answer all the questions.
- ii) Each question carries One marks.
- iii) Answer each question in **1 to 2** sentences.

11. Why blood should maintain constant osmotic blood pressure ?
12. What is difference between Reflex arc and .....
13. What questions you will ask in an interview a person using vehicle on the consumption of petrol.
14. Is there any difference in number of chromosomes when 8 months child is compared with 18 years old person.
15. How Basophils are different from Neutrophils ?
16. Draw a diagram of food in Oesophagus. The process of movement is called.
17. Write two slogans on the wastage of electricity to make awareness to the people.

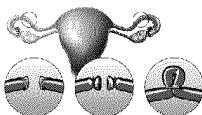
### SECTION - IV

#### Instructions :

- i) Answer all the questions.
- ii) Each question has Four choices. Choose the correct answer for each question and write the relevant alphabet (A, B, C, D) against the question number in your answer booklet.
- iii) Each question carries 1/2 mark.

18. What factor doesn't increase the rate of respiration. ( )  
a) light intensity      b) humidity      c) temperature      d) గాఢత
19. Nerve impulse takes place with ( )  
a) Ventricular systole      b) Ventricular diastole  
c) Auricular systole      d) None
20. Reflex arc is controlled by ( )  
a) Brain      b) Vertebral column  
c) Autonomous nervous system      d) Paripharal nervous system



21. What is the life span of *Carpus leuteum* after pregnancy ( )  
a) 4 days                      b) 10 days                      c) 14 days                      d) 25 days
22. Reason for yellow colour of urine ( )  
a) Urochrome                      b) Vasopressin                      c) Creatine                      d) Oestrogen
23. Stopping the usage of insecticides means ( )  
a) Control on using insecticides  
b) Ban on insecticides  
c) Following Eco-friendly agricultural methods  
d) Bio-chemical reaction
24. Use of soaking pit ( )  
a) Supply water to irrigation                      b) To increase underground water level  
c) Storage of rain water                      d) To stop floods in rainy season
25. Given diagram shows what ( )  
  
a) Surgery to heart valve                      b) Surgery to Ureters  
c) Surgery to spermatozoa                      d) Surgery to female falloplan tube
26. Reasons for decrease of ground water ( )  
a) less rain fall                      b) deforestation                      c) No controll on borewells                      d) All
27. A tank filled completely with pistia plants means ( )  
a) formation of imbalance in Ecosystem                      b) increase of producers  
c) decrease of consumers                      d) All



## IX. Teacher's Readiness

Readiness to do a job and believing in oneself are essential for a person to do a job successfully. No job will be successful when the people involved in doing it are not ready for it. That is why we often say that only those jobs / assignments will be successful which are done with commitment in word and deed. This can be called 'readiness'.

### Why Readiness?

When we want to go to another place or when we want to conduct a programme either in the school or in the house, we plan for it at least two or three days in advance. We look for answers to questions like How to conduct? What do we need? Who to meet? How to sequence various activities? Which place is suitable? etc. Then, we make a list of all that has come out of this planning and thinking. Shall we call it readiness?

In the same way, as a teacher of Biological science, we too need such readiness. Let us have a look at the present state of affairs in our schools. On the pretext of heavy syllabus, and showing the urgency of covering the syllabus within the allocated time, the science teacher is attending the class without any plan or schedule. That is why the teaching learning activities are 'passive' and teaching is restricted to 'lecturing'.

Experiments in laboratory or classroom has become a rare sight in our schools, so the teaching learning process is not able to develop in children any scientific outlook. In the name of science, children's brains are filled in with information. No opportunities are given to them for knowledge construction. It is high time that the physical science teacher learnt how to get ready to face these challenges and be an effective teacher.

### Readiness in the teaching of Biological Science"

- Teaching Biological science without readiness is useless
- Since readiness is essential, the Biological science teacher should get ready in the following way. S/he should :
  - ◆ Read the lesson to be taught thoroughly



- ◆ Prepare plans according to teaching strategies/methods (year plan, unit plan and lesson plan)
- ◆ Have complete understanding of the nature of children in class and their strategies of learning
- ◆ Design teaching learning activities to develop required process skills and to achieve targeted academic standards
- ◆ Get ready to elaborate on key concepts, mind-mapping, activities and experiments in the lesson
- ◆ Get ready with all the materials and resources required to conduct activities, experiments, field visits, projects identified for the lesson
- ◆ Get ready to demonstrate the experiment and then guide children to do it either in groups or individually.
- ◆ See that children analyze the results of the experiments, make generalizations and thus construct knowledge
- ◆ Encourage and give suitable instructions / precautions to children when they are involved in doing activities and experiments
- ◆ Develop in children good comprehension of the key concepts through thought provoking questions. While preparing these questions the teacher should keep in view the previous knowledge of children and the phenomena they come across in day to day life.
- ◆ Encourage children to collect information / write answers on their own for questions given under the heading 'Think & Discuss'
- ◆ Make children read the contents of 'Do you know' and encourage them to collect and exhibit similar information in the classroom
- ◆ Do the experiments beforehand to make sure everything goes well
- ◆ Get ready with all the required materials to teach the lesson before going to the class
- ◆ Raise awareness in children about biodiversity and lead them to appreciate her/his surroundings and the beauty and diversity embedded in them
- ◆ Identify the possible project work / field visit in the lesson and get ready with worksheets / instruction sheets / information
- ◆ Check the observations sheets / worksheets and records of children regularly
- ◆ Get ready with assessment tools to check whether the targeted academic standards have been achieved in the classroom or not
- ◆ Inform children about their performance soon after marking the answer papers
- ◆ Develop / design remedial measures and additional teaching learning activities for slow learners



- ◆ Keep pace with the changes in the fields of science and technology and adapt his teaching accordingly
- ◆ Collect additional information through internet and reference books and pass it on to children

Let us hope that teachers will get ready to teach as shown above, and try to give children quality education, which brings out the creativity in children and make them future scientists

### **Additional activities to be taken up by the Biological science teacher**

The teacher should:

- Get the laboratory ready to conduct experiments
- Get the classroom ready to conduct experiments If there is no laboratory or if it is not in a good condition
- Exhibit the photographs of scientists in the laboratory and celebrate their birthdays
- Conduct school exhibition, science quiz and science day during every academic year without fail
- Visit the place selected for field visit at least a few days in advance, collect required information and obtain necessary permissions
- Work as a guide in conducting project works by dividing children into groups and giving them suitable instructions/ worksheets/ material
- Collect the names, addresses and phone numbers of important people in the society around the school with a view to make them partners in school development. The teacher should also establish science club in the school and conduct interesting programmes to arise curiosity and the zeal to learn among children

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## X. Biology Laboratory

### **Bioscience experiments :**

1. What is the importance of experiments in bioscience?
2. What is the relation between textbook and laboratory?
3. How to conduct the laboratory?
4. What to do before, while and after the experiment?
5. What is the role of the teacher in conducting bioscience experiments?
6. What are the required equipment, chemicals to conduct experiments in the lessons of 10th class bio science?

Conducting experiments in science is an important skill process. In science and technological revolution there is an important place for experiments. Experimental results done by the scientists are key for many revolutionary changes in human life. Ronald Ross found the life history of malaria insect through his experiments. That is why bio science teacher should help the students to do experiments, understand the concepts, principles on their own to construct the bio science knowledge. Through this students build their knowledge. By doing experiments like these students can develop scientific attitude.

In studying bio science there is a specific place for experiments among skill process. To achieve the desired standards, doing the experiments and testing the results on their own with locally available experiments is an experiment. In bio science, it is necessary to observe many items under microscope. So, the teacher has to prepare the students in using the microscope and in making the slides. In bioscience experiments teacher has to train the students including experiments, direct observations (eg : parts of the plant, models of organisms), drawing the diagrams etc.

### **Importance of experiments :**

1. Prove and understand bioscience truths, principles, rules.
2. Develops the capacity to find solutions for everyday problems.
3. Know the answers for the questions like why. What?



4. Develop interest towards bio science.
5. Prepare to conduct new experiments.
6. Learn bio science in natural environment.
7. Laboratory helps the students to understand the concepts by doing.

Makes the chance to think of alternatives for the deficiency of resources in everyday life.

## **Textbook - Laboratory**

Tenth class bioscience text book is like laboratory manual. It helps to study the science in scientific methods of experiments, activities, field trips etc. Almost in every lesson there are experimental activities, if there are no lab activities in some lessons this text book help the teacher to make the activities in the text book as lab activities. Teacher, thinking on his/her own or collecting make the students to do new variety of experiments which are not mentioned in the text book.

For example, there is no lab activity in the lesson reproduction - generating system to observe mitosis. But the activity of observing mitosis in the roots of onion with the help of microscope can be change laboratory activity. Text provides the teacher the convenience that if there is any problem to do the laboratory activity, it makes the students to think an alternative for it and do the activity with the locally available resources. A scientist can not work to solve the determined problem. At some situations when he goes on with his work some new findings occur. Some new problems arises. This happens naturally, liberally, creatively without any restriction. Keeping this in mind the activities in this textbook are framed. Every lesson divides into as classroom teaching, laboratory activity. This means that laboratory activity lies internally in the lesson. So, make the children to do the laboratory activities compulsory. Don't think that they can be done after completion of the lesson. Train the children to follow scientific slips while doing the laboratory activities. Make the children to prepare report on laboratory activities and exhibit them.



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## XI. Science Resources

Science changes continuously and brings in development. This development helps human beings to better their life styles, to properly use nature and environment and protect them. Hence, teachers need to understand the advances/changes in science. For this s/he has to depend on a number of resources of which reference books are most important.

The works of Galileo and Kepler helped Newton in discovering ‘The law of gravitation’. In discovering ‘The theory of relativity’, Einstein was benefited from the books written by Riemann. The reference books should not only be used to get information but also to know the frontiers of science and to find solutions to unsolved questions and to search for explanations to inexplicable phenomena. Usually, reference books pose many questions. Good results can be achieved if they are understood and used appropriately in the teaching learning activities.

There are a number of institutions, schools, individuals and governments who are trying to bring science to the reach of everybody. For this, they have put in their websites a lot of information about the procedures to conduct various experiments and the techniques to prepare various tools and apparatus. Also, there are some good magazines that serve the same purpose.

These resources guide you, and help you in furthering your zeal to acquire knowledge, so the list of some resources is given below for your use.

### BIOLOGICAL SCIENCE

1. Glass beakers 100ml - 2 sets.
2. Glass beakers 200ml - 2 sets.
3. Glass beakers 500ml - 2 sets.
4. Plastic beakers 200ml - 2 sets.
5. Watch glass - 50.
6. China dish - 50.
7. Test tubes - 2 boxes.
8. Boiling tubes - 1 box.
9. Point brushes - 50.



10. Forceps - 50.
11. Glass slides - 5 boxes.
12. Cover slips - 10 boxes.
13. Simple microscopes - 10.
14. Compound microscopes - 10.
15. Hand lenses - 10.
16. Dissection tray - 5.
17. Dissection boxes - 5.
18. Permanent slides - cytology (plant cells tissues; animal cell, tissues).  
Algae - common slides.  
Fungi - common slides.
19. Tilling tools (hand spade, hand plough) - 2 sets.
20. Indicators  
Methelene blue - 2 bottles.  
Jonus green - 2 bottles.  
Safranine - 2 bottles.
21. Litmus papers - Blue litmus, Red litmus papers
22. Glycerin - 2 bottles.
23. Bell jars - 4.
24. Glass tubes - 20.
25. Rubber tubes - 20.
26. Thermos flasks - 5.
27. Rubber stoppers - 20.
28. Retard stands - 10.
29. Iron tri-pad - 10.
30. Spirit lamps - 10.
31. Funnels - 10.
32. Nylon rope - 5 sets.
33. Hand glouses - 10 boxes.



## **Charts:**

1. Flow charts - for Life Processes, Digestion, Respiration, Excretion, Reproduction.
2. Mendal theories.
3. Plant cell.
4. Animal cell.
5. Bio-geo chemical cycles.
6. Food webs.
7. Ecological pyramids.
8. World, India maps.

## **TEACHERS' RESOURCE BAG**

### **Some Resource Books that make Science a Fun**

- 1 The Third Book of Experiments, Leonard De Vries, Carousel Books
- 2 Science Works, Ontario Science Centre, Ontario
- 3 Toying Around with Science, Bob Friedhoffer, Franklin Watts, New York
- 4 The Science Explorer, P. Murphy, E. Klages, L. Shore, An Owl Book
- 5 700 Science Experiments for Everyone, Compiled by UNESCO, Doubleday
- 6 100 Amazing Science Fair Projects, Glen Vecchione, Goodwill Publishing House, New Delhi
- 7 365 Simple Science Experiments with Everyday Materials, Richard Churchill, Sterling Publishers
- 8 The Book of Experiments, Leonard De Vries, Carousel
- 9 Joy of Learning, (Standards 3 to 5), Center for Environmental Education, Ahmedabad, India
- 10 Experiments for You, John Tollyfield, Evans Brothers, London
- 11 How to Turn Water Upside-Down, Ralph Levinson, Beaver Books, London
- 12 Experiments with Everyday Objects, Kevin Goldstein-Jackson, Granada Publishing, New York
- 13 Simple Science Experiments, Batstord, Hans Jurgen Prees
- 14 Let's Discover Science, David Horsburgh, Oxford University Press
- 15 Chai Ki Pyali Mein Paheli, Partho Ghosh & Dipandar Home (Hindi) National Book Trust, New Delhi 110016
- 16 UNESCO Source book for Science in the Primary School, Harlen & Elstgeest, National Book Trust, New Delhi 110016



- 17 Soap Bubbles, C.V. Boys, (Eng/Hin), Vigyan Prasar, C-24 Qutub Institutional Area, New Delhi 110016
- 18 The Chemical History of a Candle, Michael Faraday (Eng/Hin), Vigyan Prasar, New Delhi, info@Vigyanprasar.gov.in
- 19 Science in Everyday Life, J.B.S. Haldane, Vigyan Prasar, New Delhi, info@Vigyanprasar.gov.in
- 20 VSO Science Teacher's Handbook, Andy Byers, Ann Childs, Chris Lane (Hindi) Eklavya, Bhopal, pitara@eklavya.in
- 21 Environment & Self-Reliance, Yona Friedman, Eda Schaur (Eng/Hin), Vigyan Prasar, New Delhi
- 22 Energy & Self-Reliance, Yona Friedman, (Eng/Hin) Vigyan Prasar, New Delhi, info@vigyanprasar.gov.in
- 23 The Story of Physics, T. Pammanabhan (Eng/Hin) Vigyan Prasar, New Delhi, info@vigyanprasar.gov.in
- 24 On the Various Forces of Nature, Michael Faraday, Vigyan Prasar, New Delhi, info@vigyanprasar.gov.in
- 25 The Insect World of J. Henri Fabre, Vigyan Prasar, New Delhi, info@vigyanprasar.gov.in
- 26 The Autobiography of Charles Darwin, Vigyan Prasar, New Delhi, info@vigyanprasar.gov.in
- 27 The Bicycle Story, Vijay Gupta, Vigyan Prasar, New Delhi, info@vigyanprasar.gov.in
- 28 Aakash Darshan Atlas, Gopal Ramchandra Paranjpe, NCERT, Sri Aurobindo Marg, New Delhi 110016
- 29 Preparation for Understanding, Keith Warren, illus. by Julia Warren, UNESCO
- 30 Resonance Journal of Science Education, Indian Academy of Sciences
- 31 Balvignanic, Eklavya, Bhopal

*Courtesy : Aha! Activities, Eklavya, Bhopal*

## **Websites & E-Resources for School Science**

1. LET'S DISCOVER SCIENCE PART I By David Horsburgh (out of print but downloadable as a pdf file from the link:  
<http://vidyaonline.org/arvindgupta/david1.pdf>)
2. LET'S DISCOVER SCIENCE PART II By David Horsburgh (out of print but downloadable as a pdf file from the link:  
<http://vidyaonline.org/arvindgupta/david2.pdf>)
3. LET'S DISCOVER SCIENCE PART III By David Horsburgh (out of print but downloadable as a pdf file from the link: <http://vidyaonline.org/arvindgupta/david3.pdf>)



4. LET'S DISCOVER SCIENCE PART IV By David Horsburgh (out of print but downloadable as a pdf file from the link:  
<http://vidyaonline.org/arvindgupta/david4.pdf>)
5. LET'S DISCOVER SCIENCE PART V By David Horsburgh (out of print but downloadable as a pdf file from the link:  
<http://vidyaonline.org/arvindgupta/david5.pdf>)
6. LEARNING ABOUT LIVING PART ONE By David Horsburgh (out of print but downloadable as a pdf file from the link:  
<http://vidyaonline.org/arvindgupta/D6.pdf>)
7. LEARNING ABOUT LIVING PART THREE By David Horsburgh (out of print but downloadable as a pdf file from the link:  
<http://vidyaonline.org/arvindgupta/D7.pdf>)
8. THINKING AND DOING By David Horsburgh (out of print but downloadable as a pdf file from the link:  
<http://vidyaonline.org/arvindgupta/thinkanddo.pdf>)
9. SMALL SCIENCE for Classes I to V (with the accompanying Workbooks and Teachers' Books) Homi Bhabha Centre for Science Education, TIFR, Mumbai.  
<http://www.hbcse.tifr.res.in/smallscience>.
10. <http://www.arvindguptatoys.com/> contains an enormous list of books on enlivening science learning, rated by Arvind Gupta. Many of them can be downloaded for free.
11. LOW COST EQUIPMENT FOR SCIENCE AND TECHNOLOGY EDUCATION - Vol. 1 - Compiled by UNESCO  
<http://unesdoc.unesco.org/images/0010/001023/102321eb.pdf> Provides ideas on how to make school science equipment using inexpensive materials.
12. LOW COST EQUIPMENT FOR SCIENCE AND TECHNOLOGY EDUCATION - Vol. 2 - Compiled by UNESCO -  
<http://unesdoc.unesco.org/images/0007/000728/072808eb.pdf> Provides ideas on how to make school science equipment using inexpensive materials.
13. <http://www.exploratorium.edu/> is a fascinating website with tons of resources, activities and continuous updating to reflect the latest developments in the field.
14. <http://www.johnkyrk.com/> has links to animations of cell structure, cell biology, DNA, etc.
15. [http://www.bbc.co.uk/schools/scienceclips/ages/8\\_9/circuits\\_conductors\\_fs.shtml](http://www.bbc.co.uk/schools/scienceclips/ages/8_9/circuits_conductors_fs.shtml) has an interactive tutorial on conductors.
16. <http://www.primaryschool.com.au/science/results.php?kla=Science%20and%20Technology&unit=Switched%20On> has links to several interactive lessons like the one above.



17. <http://www.juliantrubin.com/bigten/pathdiscovery.html> allows the user to simulate online repetitions of famous experiments or inventions.
18. <http://www.freeindia.org/biographies/greatscientists/> has biographies of Indian scientists.
19. <http://www-gap.dcs.st-and.ac.uk/~history/Indexes/Indians.html> has info on ancient Indian mathematicians.
20. <http://www.calcuttaweb.com/people/snbose.shtml> has some more biographies of Indian scientists.
21. <http://www.shodor.org/succeed/curriculum/FOR/observation.html> contains an interactive module to test one's observation powers.
22. [http://www.scienceclass.net/PowerPoints/NOS\\_Test\\_Review.ppt](http://www.scienceclass.net/PowerPoints/NOS_Test_Review.ppt) contains a PPT that talks of the nature of science.
23. [http://www.scienceclass.net/PowerPoints/NOS\\_Test\\_ReviewGT.ppt](http://www.scienceclass.net/PowerPoints/NOS_Test_ReviewGT.ppt) contains a second such PPT.
24. [http://www.scienceclass.net/Teachers\\_Lessons.htm](http://www.scienceclass.net/Teachers_Lessons.htm) contains many valuable links to lessons on science topics for middle school level.
25. <http://www.science-class.net/TAKS/taks.htm> has many links to PPTs that elaborate specific concepts for middle school.
26. <http://teachers.net/lessons/posts/1228.html> (a website leading from [http://www.curriki.org/xwiki/bin/view/Coll\\_rmlucas/LabClassificationofShoes?bc=;Coll\\_rmlucas.10](http://www.curriki.org/xwiki/bin/view/Coll_rmlucas/LabClassificationofShoes?bc=;Coll_rmlucas.10) Classification) describes an activity wherein children have to classify shoes, so as to understand the importance of classification. (Useful in all branches of science, particularly chemistry and biology.)
27. [http://www.encyclomedia.com/videoarctic\\_food\\_chain.html](http://www.encyclomedia.com/videoarctic_food_chain.html) has a video on the arctic food chain.
28. <http://www.kbears.com/ocean/octopus/index.html> has a presentation and info on the octopus.
29. <http://magma.nationalgeographic.com/ngexplorer/0309/articles/mainarticle.html> contains rich info on underwater life.
30. <http://www.seaworld.org/animal-info> has a plethora of links and info on animals.
31. <http://www.seaworld.org/fun-zone/coloringbooks/pdf/emp-penguin.pdf> has a colouring page for kids to have fun, when learning about animals.
32. <http://kids.nationalgeographic.com/Animals/CreatureFeature/> is a superb site where you can click on an animal to find out more about it. The 'more' includes facts, a video with sound, a map of places where it can be found, etc.
33. Resources for Teaching Middle School Science (1998) - [http://books.nap.edu/catalog.php?record\\_id=5774](http://books.nap.edu/catalog.php?record_id=5774) (ISBN 0309057817) National Science Resources Center of the National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and the Smithsonian Institution



34. Resources for Teaching Elementary School Science (1996) - [http://books.nap.edu/catalog.php?record\\_id=4966](http://books.nap.edu/catalog.php?record_id=4966) (ISBN 0309052939) National Science Resources Center of the National Academy of Sciences and the Smithsonian Institution
35. <http://www.exploratorium.edu/explore/hands-on.html> contains many online as well as hands on activities for children of this age group and younger.
36. <http://fi.edu/tfi/activity/act-summ.html> contains many online as well as hands on activities for children of this age group and younger.
37. [http://www.bbc.co.uk/schools/scienceclips/ages/10\\_11/science\\_10\\_11.shtml](http://www.bbc.co.uk/schools/scienceclips/ages/10_11/science_10_11.shtml) contains activities listed alphabetically, topic wise.
38. [http://www.bbc.co.uk/schools/scienceclips/ages/9\\_10/changing\\_sounds.shtml](http://www.bbc.co.uk/schools/scienceclips/ages/9_10/changing_sounds.shtml) contains simple sorting and tabulation exercises for Class V and below.
39. [http://www.bbc.co.uk/schools/scienceclips/ages/10\\_11/forces\\_action.shtml](http://www.bbc.co.uk/schools/scienceclips/ages/10_11/forces_action.shtml) contains more complicated tabulation and interpretation exercises for Class VI/VII.
40. [http://www.bbc.co.uk/schools/teachers/ks4/bitesize\\_chemistry.shtml](http://www.bbc.co.uk/schools/teachers/ks4/bitesize_chemistry.shtml) contains chemistry assessment worksheets for Classes VIII and IX.
41. <http://www.bbc.co.uk/schools/gcsebitesize/chemistry/classifyingmaterials/> contains exercises for assessing classification of matter, atomic structure, bonding and formulae/equations for Class VIII and above.
42. <http://www.bbc.co.uk/schools/gcsebitesize/physics/electricity/> has some thinking-type questions for Class VIII and above.
43. <http://www.bbc.co.uk/schools/gcsebitesize/physics/forces/> has excellent questions for Classes VII, VIII and above.
44. <http://cse.edc.org/products/onlinecurr/catalog.asp> has an online catalogue of web-based resources for middle and elementary school science.
45. <http://www.explorelarning.com/index.cfm?method=cResource.dspView&ResourceID=491> has a beautiful animation of the photoelectric effect, can be shown to Class VIII.
46. <http://www.explorelarning.com> has a number of interactive simulations to learn science, appropriate for this age group.
47. <http://cse.edc.org/products/onlinecurr/WBMISearchResults.asp> has a complete list of topics and the modules available therein, for students of this age group and a little older as well.
48. <http://www.blupete.com/Literature/Biographies/Science/Scientists.htm> has links to biographies of scientists.
49. <http://www.juliantrubin.com/bigten/pathdiscovery.html> is a website with a collection of links for discovery and invention.



50. <http://www.fordham.edu/Halsall/science/sciencesbook.html> is an Internet Sourcebook for the History of Science.
51. <http://www.middleschoolscience.com/tunefork.htm> has a good activity for learning about the tuning fork and sound vibrations, suitable for Classes VII and VIII.
52. [http://www.pbs.org/benfranklin/exp\\_shocking.html](http://www.pbs.org/benfranklin/exp_shocking.html) has a lovely interactive simulation of the kite experiment performed by Benjamin Franklin.
53. <http://www.pbs.org/teachers/sciencetech/> has grade-wise, topic-wise lesson plans for middle and primary school science teaching.
54. <http://www.learner.org/resources/series90.html> has a set of videos on the science of teaching science.
55. <http://www.outlookindia.com/scriptur11w2.asp?act=sign&url=/full.asp?fodname=20050328&fname=Science&sid=1> has Nobel Prize-Winning Science Discoveries made palatable for children.
56. [http://www.teachernet.gov.uk/teachingandlearning/subjects/science/science\\_teaching\\_resources/](http://www.teachernet.gov.uk/teachingandlearning/subjects/science/science_teaching_resources/) provides links to a number of e-teaching learning resources for primary science.
57. <http://www.firstscience.com/home/> is a leading online popular science magazine featuring articles on important breakthroughs, the latest science news, video clips, blogs, poems, facts, games and a whole lot more science-related content.
58. Chakmak: Science magazine for children [http://www.eklavya.in/go/index.php?option=com\\_content&task=category&sectionid=13&id=57&Itemid=84](http://www.eklavya.in/go/index.php?option=com_content&task=category&sectionid=13&id=57&Itemid=84)
59. Sandarbh: A resource bank for teachers [http://www.eklavya.in/go/index.php?option=com\\_content&task=category&sectionid=13&id=51&Itemid=72](http://www.eklavya.in/go/index.php?option=com_content&task=category&sectionid=13&id=51&Itemid=72)
60. Srote: Science and Technology features -[http://www.eklavya.in/go/index.php?option=com\\_content&task=category&sectionid=13&id=56&Itemid=81](http://www.eklavya.in/go/index.php?option=com_content&task=category&sectionid=13&id=56&Itemid=81)
61. <http://www.gobartimes.org/20090315/20090315.asp> is a bi-monthly children's magazine highlighting news and views on environment and development through comic strips, cartoons, quizzes, essay competitions and interactive pages. It also serves as a useful teaching aid in classrooms for teachers.
62. <http://edugreen.teri.res.in/index.asp> is a website for children that makes environmental learning fun
63. <http://www.nuffieldcurriculumcentre.org/go/Default.html> provides links to websites of various science projects that undertake to enliven science teaching
64. <http://www.exploratorium.edu/ifi/resources/workshops/teachingforconcept.html> provides a link to the paper "Teaching for Conceptual Change: Confronting Children's Experience; Watson, Bruce and Richard Kopniecek; Phi Delta Kappan, May 1990".





## Some Important Organisations in Science Education

S.No.	Name of the Organisation	Contact Details
1.	Agastya International Foundation	Address : Kataria House, 219 Kamaraj Road, Bangalore - 560042. Phone : 080-25548913-16 Website : <a href="http://www.agastya.org">www.agastya.org</a> E-Mail : <a href="mailto:Maagastya@vsnl.com">Maagastya@vsnl.com</a>
2	Avehi-Abacus Project	Address : Third floor, K.K. Marg Municipal School, Saat Rasta, Mahalaxmi, Mumbai- 400 011 Phone : (022)2307 5231, (022)2305 2790 Website : <a href="http://avehiabacus.org">http://avehiabacus.org</a> E-mail : <a href="mailto:avcab@vsnl.com">avcab@vsnl.com</a>
3	Bangalore Association for Science Education (BASE)	Address : Jawaharlal Nehru Planetarium, Sri. T. Chowdaiah Road, High Grounds, Bangalore-560001 Phone : 080-22266084, 22203234 Website : <a href="http://www.taralaya.org">http://www.taralaya.org</a> E-Mail : <a href="mailto:taralaya@vsnl.com">taralaya@vsnl.com</a>
4	Bharat Gyan Vigyan Samiti/ Indian Organisation for Learning and Science	Address : Basement of Y.W.A. Hostel No. II, Avenue - 21, G-Block, Saket, New Delhi-110 017. Phone : 011-2656 9943, Website : <a href="http://www.bgvs.org">http://www.bgvs.org</a> E-Mail : <a href="mailto:bgvs_delhi@yahoo.co.in">bgvs_delhi@yahoo.co.in</a> , <a href="mailto:bgvsdelhi@gmail.com">bgvsdelhi@gmail.com</a>
5	Center for Environment Education	Address : Nehru Foundation for Development, Thaltej Tekra, Ahmedabad - 380 054, Gujarat Phone : 079-26858002 Website : <a href="http://www.ceeindia.org">http://www.ceeindia.org</a> E-Mail : <a href="mailto:cee@ceeindia.org">cee@ceeindia.org</a>
6	Center for Science and Environment	Address : 41, Tughlakabad Institutional Area, New Delhi-110062, INDIA Phone : 011-29955124/25, 29956394, 29956401, 29956399 Website : <a href="http://www.cseindia.org">http://www.cseindia.org</a> E-Mail : <a href="mailto:cse@cseindia.org">cse@cseindia.org</a>
7	C.P.R. Environmental Education Centre (CPREEC)	Address : The C. P. Ramaswami Aiyar Foundation No.1, Eldams Road, Alwarpet, Chennai Tamilnadu, India-600 018 Phone : 044-24337023, 24346526, 24349366 Website : <a href="http://www.cpreec.org">www.cpreec.org</a> E-Mail : <a href="mailto:cpreec@vsnl.com">cpreec@vsnl.com</a> , <a href="mailto:ecoheritage_cpreec@vsnl.net">ecoheritage_cpreec@vsnl.net</a>
8	Eklavya	Address : E-10, BDA Colony, Shankar Nagar, Shivaji Nagar, Bhopal - 462 016 Madhya Pradesh, India Phone : 0755-267 1017, 255 1109 Website : <a href="http://eklavya.in">http://eklavya.in</a>



S.No.	Name of the Organisation	Contact Details
9	Eklavya Institute of Teacher Education (EI)	Address : Eklavya Education Foundation, Core House, Off. C.G.Road, Ellisbridge, Ahmedabad-6 Phone : 079-26461629, Website : <a href="http://www.eklavya.org">www.eklavya.org</a> E-mail : <a href="mailto:eklavya@ekalavya.org">eklavya@ekalavya.org</a>
10	Homi Bhabha Centre for Science Education Research,	Address : Mr. H C Pradhan, Tata Institute of Fundamental V.N. Purav Marg, Mankhurd, Mumbai, 400088 Phone : 022-25554712, 25580036 Website : <a href="http://www.hbcse.tifr.res.in">www.hbcse.tifr.res.in</a> E-Mail : <a href="mailto:postmaster@hbcse.tifr.res.in">postmaster@hbcse.tifr.res.in</a>
11	Indian Science Congress Association	Address : 14, Dr. Biresh Guha Street, Kolkata - 17 Phone : 033-2287 4530 Website : <a href="http://sciencecongress.nic.in">http://sciencecongress.nic.in</a> E-mail : <a href="mailto:iscacal@vsnl.net">iscacal@vsnl.net</a>
12	Kalpavriksh Environment Action Group	Address : 134, Tower 10, Supreme Enclave, Mayur Vihar, Phase 1, Delhi 110 09 Phone : 011-22753714 Website : <a href="http://www.kalpavriksh.org">http://www.kalpavriksh.org</a>
13	Kerala Sastra Sahitya Parishad	Address : Parishad Bhavan, Chalappuram PO, Kozhikkode - 673 002, Kerala, India Phone : 0495-2701919, 9447038195 Website : <a href="http://www.kssp.org.in">http://www.kssp.org.in</a> E-Mail : <a href="mailto:gskssp@gmail.com">gskssp@gmail.com</a>
14	National Council for Science & Technology Communication (NCSTC)	Address : Department of Science & Technology Technology Bhavan, New Mehrauli Road, New Delhi-11001 Phone : 011-26567373, 26962819 Website : <a href="http://www.dst.gov.in">www.dst.gov.in</a> E-Mail : <a href="mailto:dstinfo@nic dot in">dstinfo at nic dot in</a>
15	Navanirmithi	Address : Navnirmithi, 301,302,303, 3rd floor, A wing, Priyadarshani Apartment, Padmavati Road, IIT Market Gate, Powai, Mumbai- 400 076. Phone ; 022-25773215, 25786520 Website : <a href="http://www.navnirmithi.org">www.navnirmithi.org</a> E-mail : <a href="mailto:contact@navnirmithi.org">contact@navnirmithi.org</a>
16	Nuffield Foundation	Address : 28 Bedford Square London WC1B 3JS Phone : 020 7631 0566, 020 7580 7434 Website : <a href="http://www.nuffieldfoundation.org">www.nuffieldfoundation.org</a> E-mail : <a href="mailto:info@nuffieldfoundation.org">info@nuffieldfoundation.org</a>

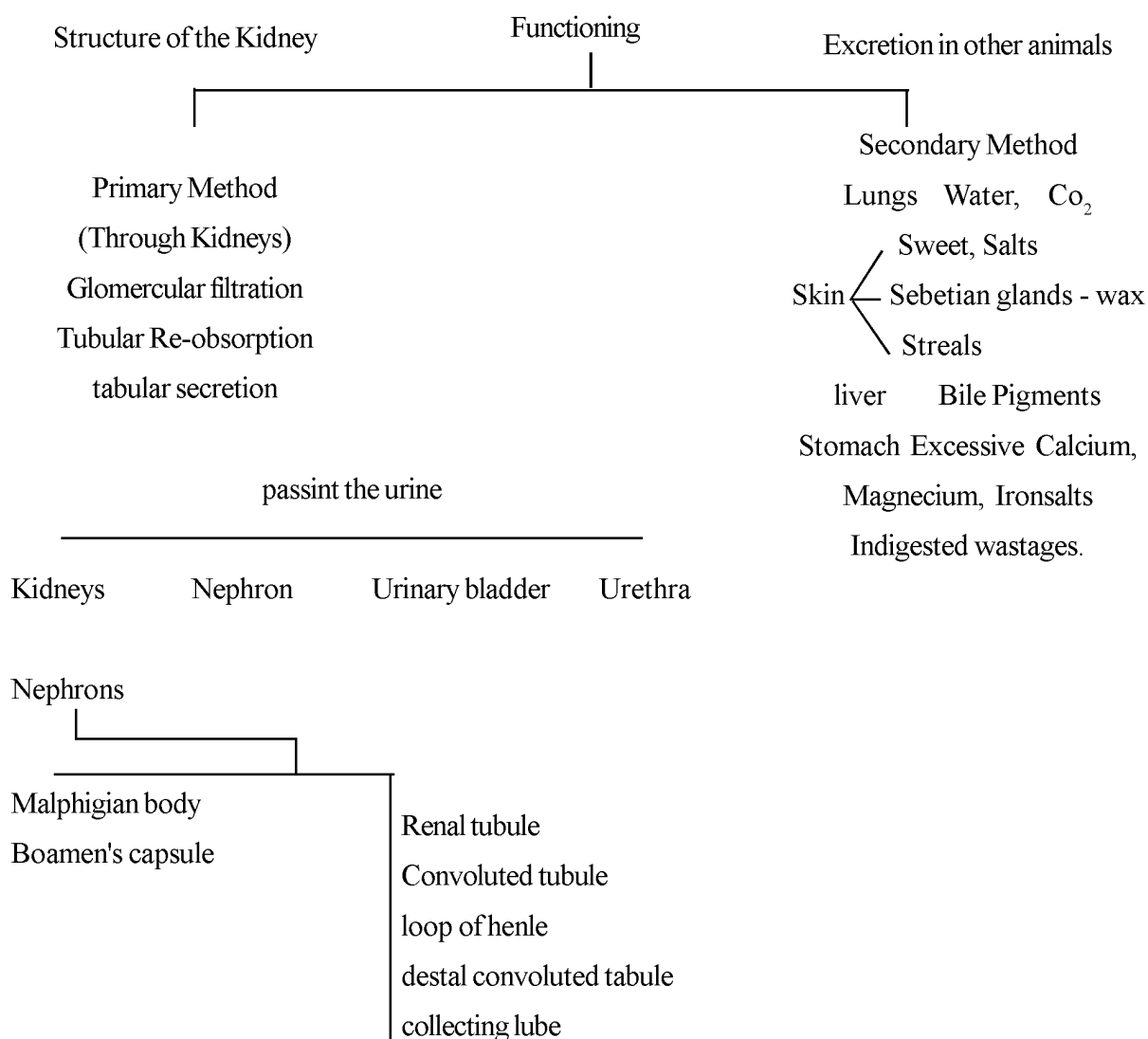


S.No.	Name of the Organisation	Contact Details
17	Rajiv Gandhi Foundation	Address : Jawahar Bhawan, Dr. Rajendra, Prasad Road New Delhi - 110 001, INDIA Phone : 011-23755117, 23312456 Website : <a href="http://www.rgfindia.org">www.rgfindia.org</a> E-mail : <a href="mailto:info@rgfindia.org">info@rgfindia.org</a>
18	State Institute of science education	Address : S.I.S.E (Rajya Vigyan Sansthan), P.S.M Campus, Jabalpur, M.P. 482001 Phone : 0761-2625776 Website : <a href="http://sisejbp.nic.in">http://sisejbp.nic.in</a>
19	Sutradhar	Address : 59/1, 3rd Cross, 10th A Main, Indiranagar 2 Stage, Bangalore 560038. Phone : 080-25288545 Website : <a href="http://www.sutradhar.com">www.sutradhar.com</a> E-Mail : <a href="mailto:sutra@vsnl.com">sutra@vsnl.com</a>
20	Tamil Nadu Science Forum	Address : Balaji Sampath, C2 Ratna Apts. AH 250, Shanti Colony, Annanagar, Chennai-600040, TAMIL NADU Phone : 044-26213638 Website : <a href="mailto:bsampath@eng.umd.edu">bsampath@eng.umd.edu</a>
21	Tamil Nadu State Council for Science and Technology,	Address : Directorate of Technical Education Campus, Chennai 25. Phone : 022-22301428 Website : <a href="http://www.tanscst.org">www.tanscst.org</a> E-mail : <a href="mailto:enquiry@tncst.org">enquiry@tncst.org</a>
22	Vidya Bhawan Society	Address : Fatehpura, Udaipur, Rajasthan 313001 Phone : 0294 2450911 Website : <a href="http://www.vidyabhawan.org">http://www.vidyabhawan.org</a> E-Mail : <a href="mailto:info@vidyabhawan.org">info@vidyabhawan.org</a> , <a href="mailto:vbsudr@yahoo.com">vbsudr@yahoo.com</a>
23	Vikram A Sarabhai Community Science Center	Address : Opp. Gujarat University, Navrangpura, Ahmedabad - 380 009 Phone : 079-26302085,26302914 Website : <a href="http://www.vascsc.org">www.vascsc.org</a> , E-Mail : <a href="mailto:info@vascsc.org">info@vascsc.org</a>



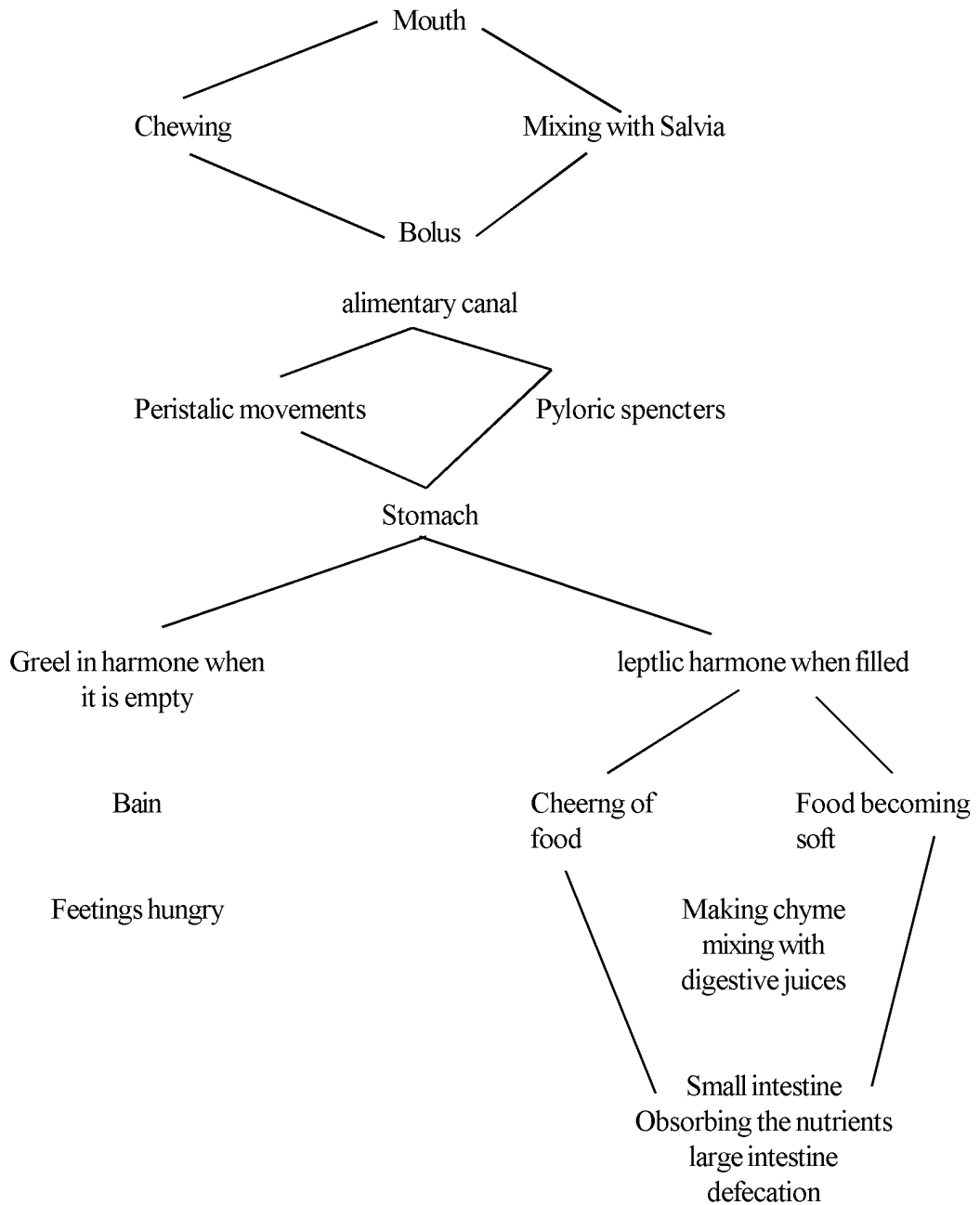
## XII. Concept Maps

### Excretion in animals (Human Being)



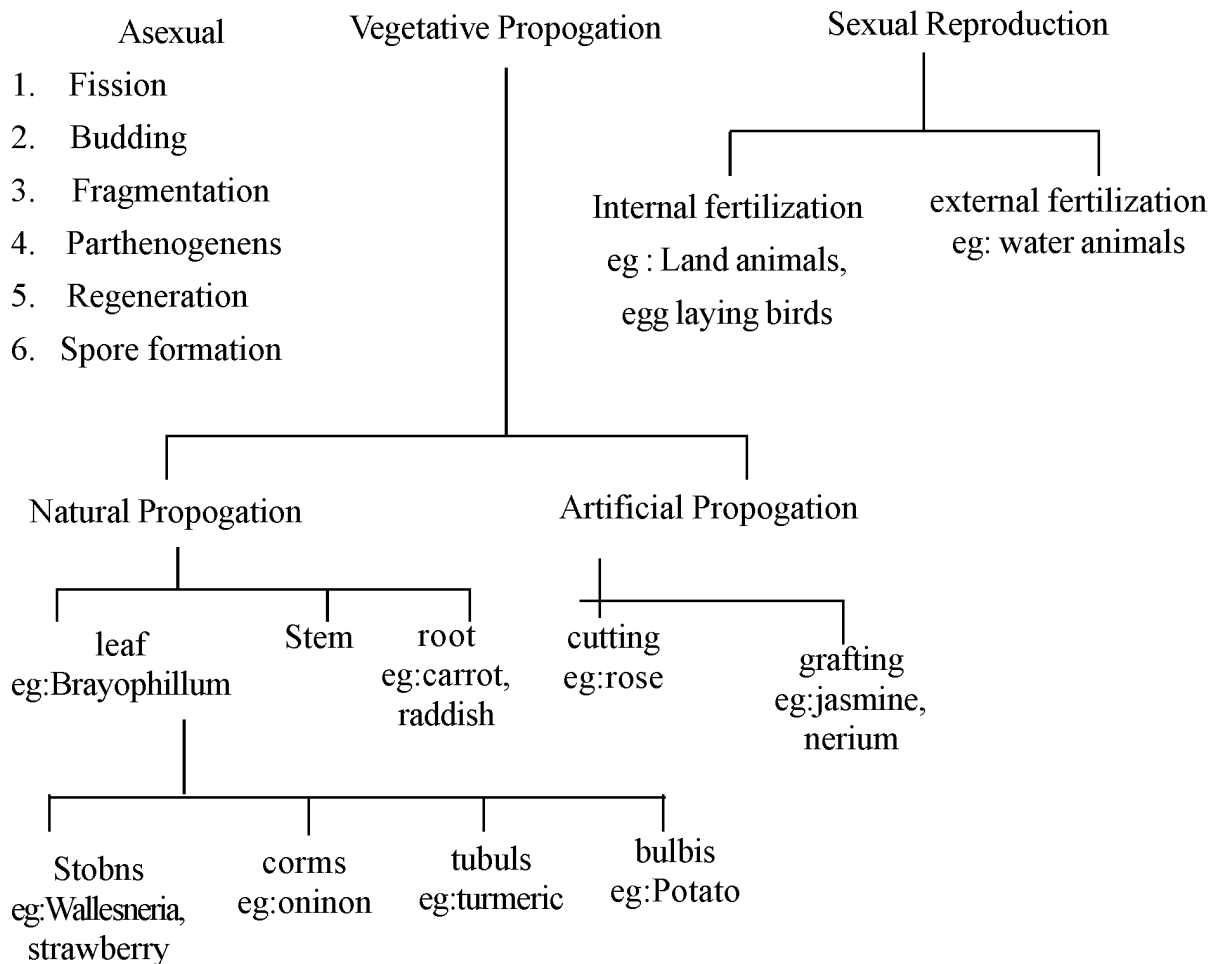
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## Coordination in life processes





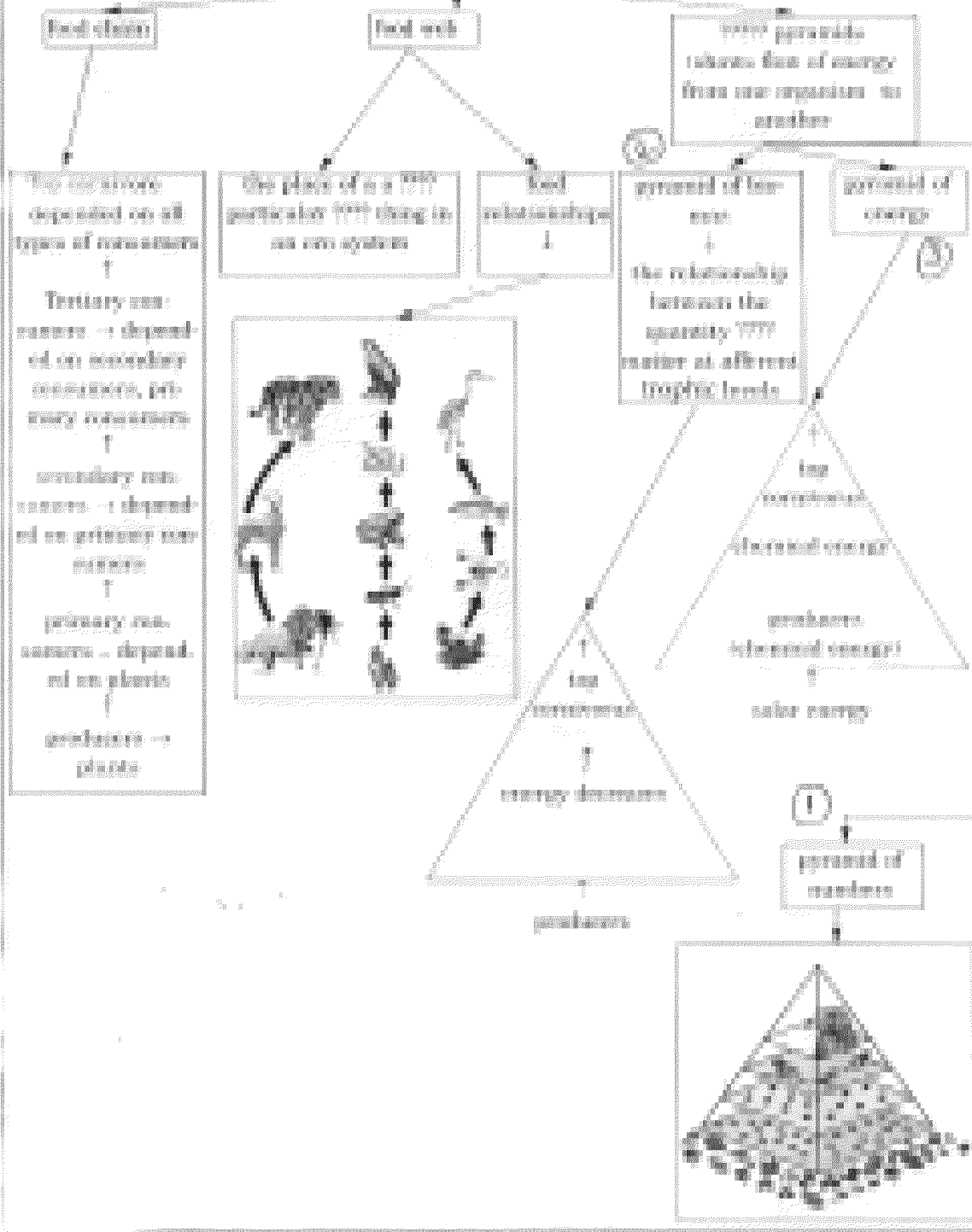
## Reproduction



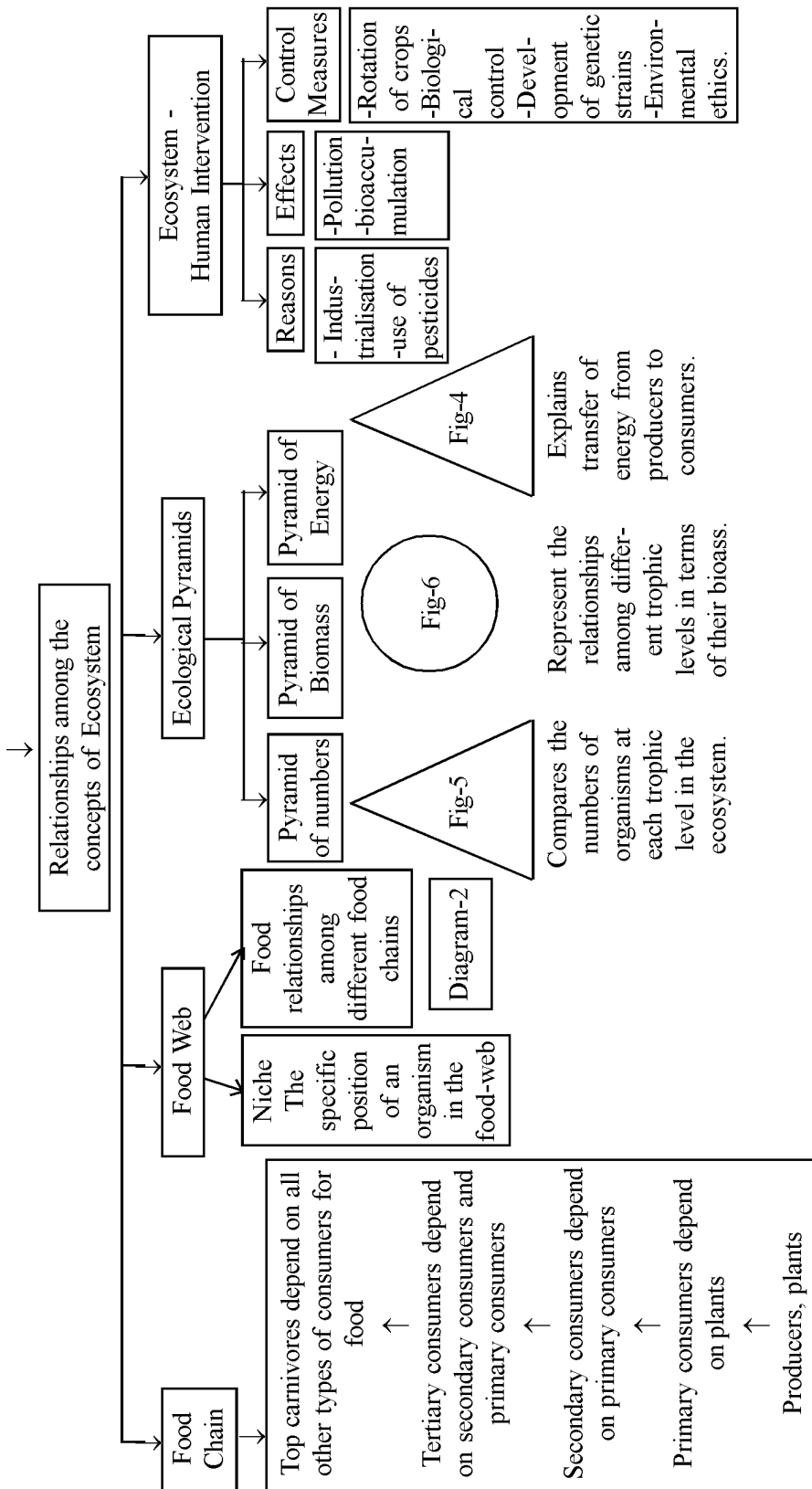


# OUR ENVIRONMENT, OUR CONCERN

## Concepts of relationships in an ecosystem

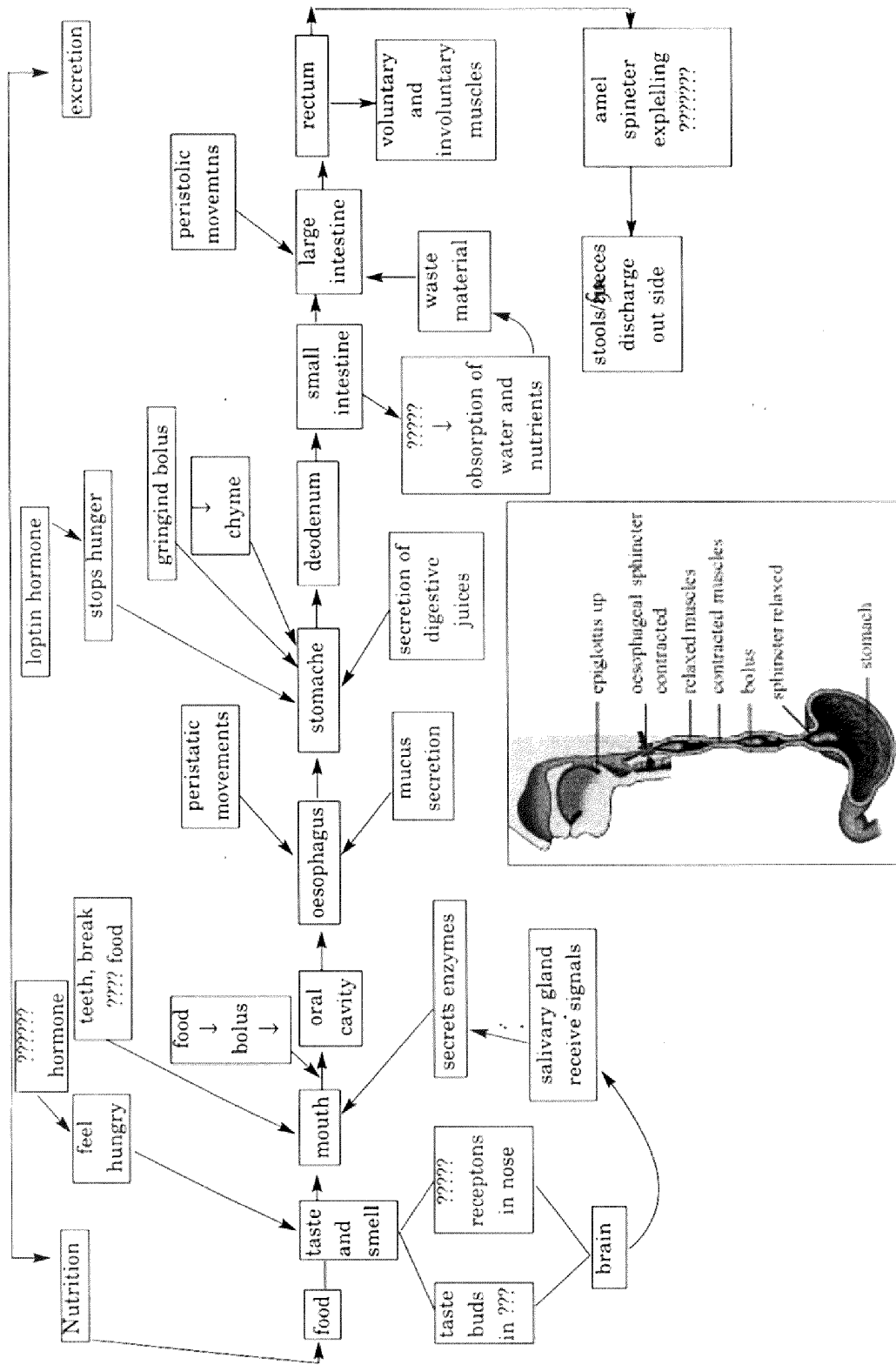


## Our Environment - Our Concern

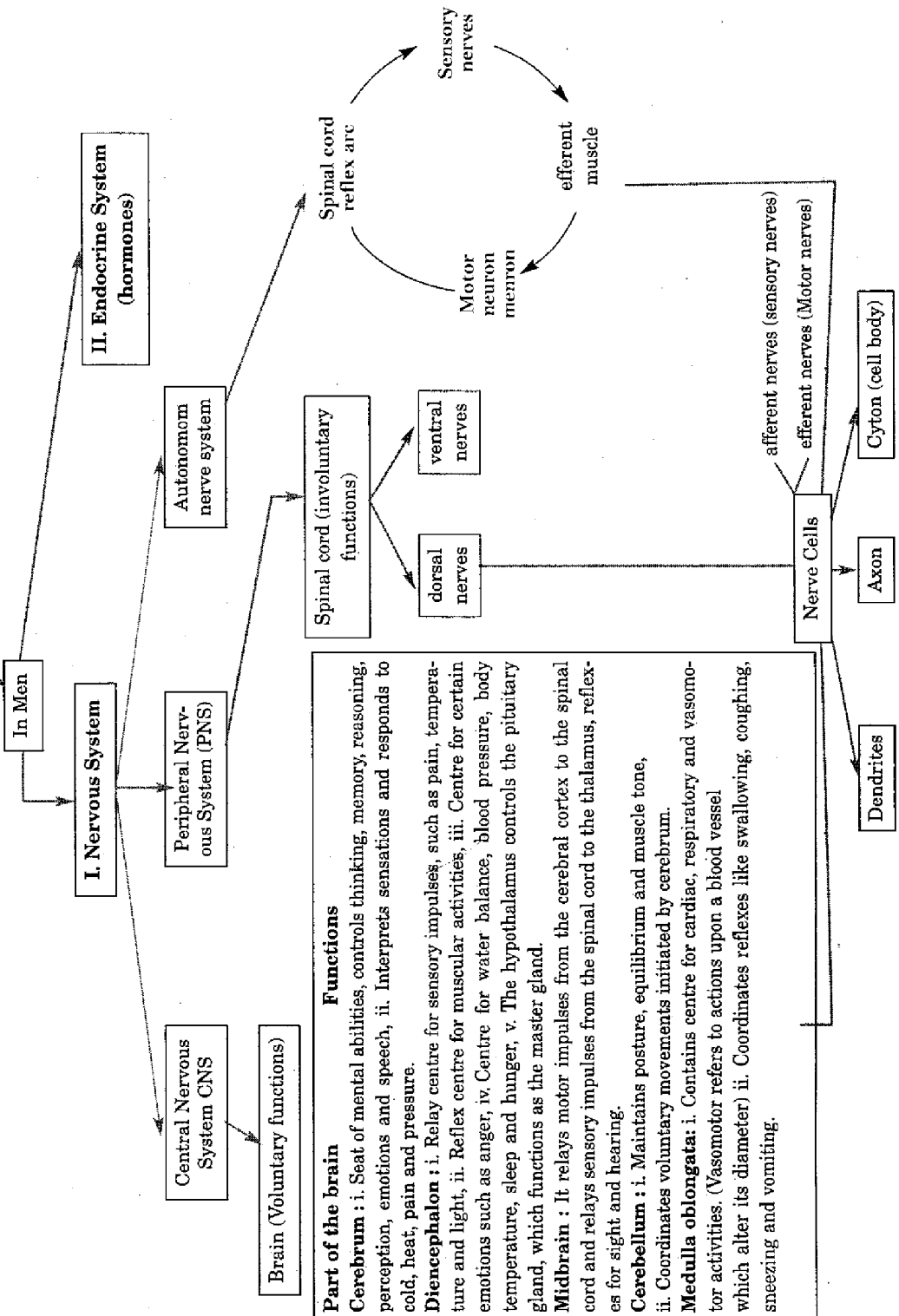


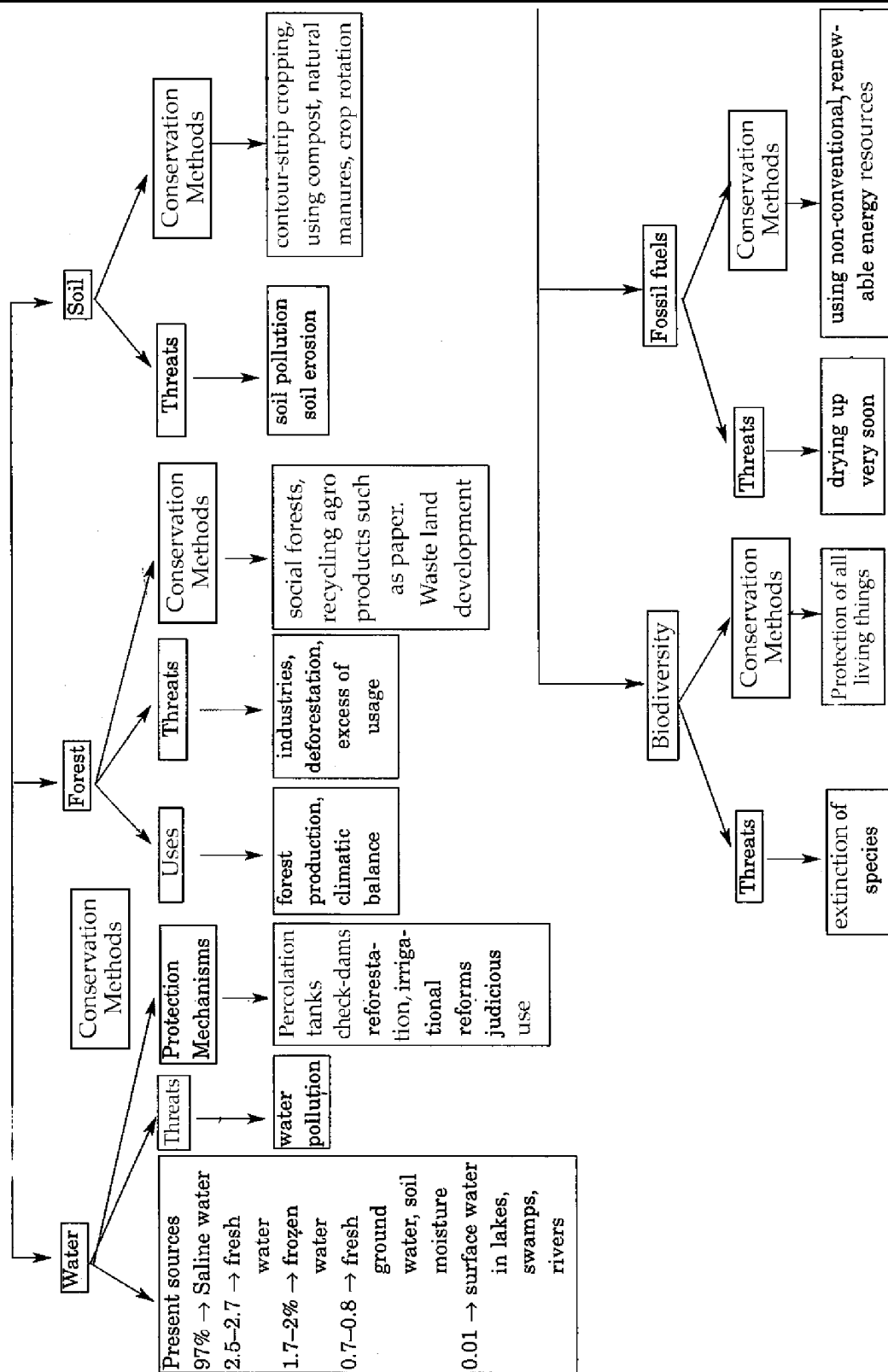


## COORDINATION IN LIFE PROCESS



# 7. COORDINATION





## COORDINATION

In Men

Name of the gland	Location	Hormone secreted	Response of body to hormone
Pituitary	Floor of brain	1. Somatotrophin	Growth of bones
		2. Thyrotrophin	Activity of thyroid gland
		3. Gonadotrophin	Activity of ovary and testis
		4. Adrenocorticotrophic hormone	Stimulates secretion from adrenal cortex
		5. Luteinising hormone	In males - secretion of testosterone. In female - Ovulation, development of corpus luteum and secretion of progesterone.
		6. Follicle stimulating hormone	In male - spermatogenesis In female - growth of graafian follicles, secretion, milk production and secretion of oestrogen
Thyroid	Neck	Thyroxine	General growth rate and metabolic activity
Ovary	Lower abdomen	Estrogen	Growth of the uterus and skeleton of the female Control of the 28 days menstrual cycle
Testis	Scrotal sac	Testosterone	Growth of hair on face, muscular development, deepening of voice, normal sexual behaviour, development of male sex organs
Adrenal	Attached to kidneys	Adrenalin	Increase in heart-beat rate. Rise in blood pressure Dilation of the coronary artery. Dilation of the eye.