NCERT

Source Book on Assessment for Classes VI - VIII

Science

S. Amal Jerry Arputharaj, 10 years
St. Patrick Modern Higher Secondary School, Puducherry

Source Book on Assessment

for Classes VI–VIII

SCIENCE

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FOREWORD

National Council of Educational Research and Training (NCERT) has published innovative textbooks based on National Curriculum Framework (NCF)–2005. The new approach advocated in NCF–2005 attempts to infuse subject knowledge with the awareness of children's own learning strategies. While reforms in teacher training are being initiated as a parallel process, the challenge of changing the traditional system of examination and evaluation has emerged as a major focus. The present system is accustomed to classifying and labeling children on the basis of a test or examination. The Source Book signifies NCERT's resolve to provide to teachers and administrators a new vision and approach for assessing children's progress.

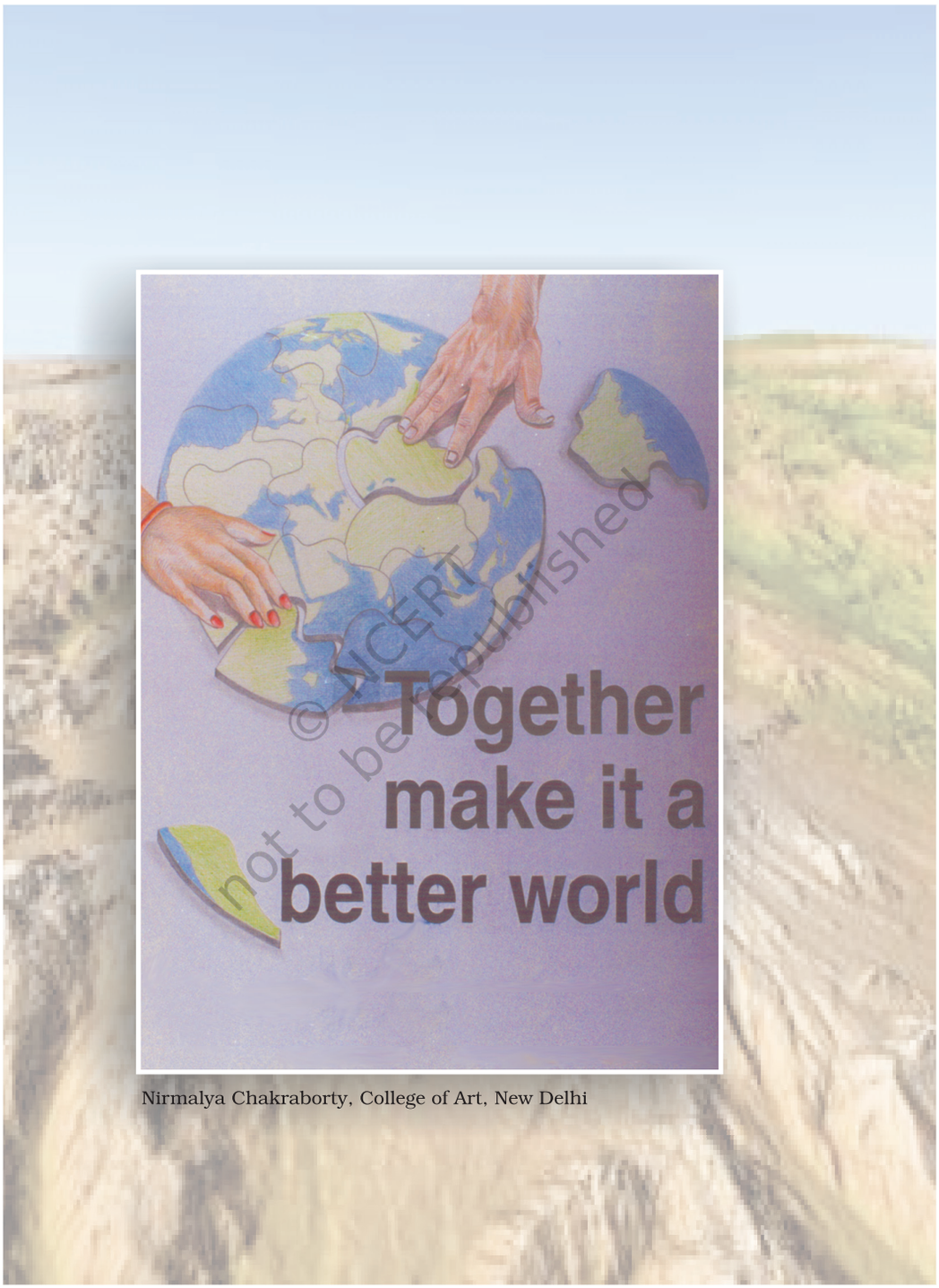
We earnestly hope that the Source Book will receive attention in all segments of our complex system of education in India, both in its centrally-run components, such as Kendriya Vidyalayas, Navodaya Vidyalayas and the State-controlled schools of different types. It highlights the importance of cooperative classroom culture in the learning process at Upper Primary Stage. The vision of a universalised system of education implies patience and kindness for every child, irrespective of her or his style and pace of learning. Only a system which is kind and gentle to every child can ensure the joyful learning.

The development of this Source Book was a collaborative exercise. We wish to thank all the experts and institutions which participated in this exercise at different stages. NCERT's Department of Education in Science and Mathematics (DESM), especially its *Head*, Professor Hukum Singh and other colleagues have accomplished a major breakthrough in the long and painful history of evaluation reforms. This project received vital inputs from several other departments of NCERT and its Regional Institutes.

The vision of NCF–2005 emanates from the great struggle symbolised by Gandhi and Tagore to soften the heart of educationist towards the little child. This Source Book is dedicated to that struggle.

Director
National Council of Educational
Research and Training

New Delhi
19 April 2011



Nirmalya Chakraborty, College of Art, New Delhi

PREFACE

We have been hearing a lot about the need for a child-centered education. In our view, a real child-centered education would be the one in which the child is at the centre of love and affection of all her/his tasks and she/he receives only encouragement to do better and not chided or berated for not doing well in a certain activity or task.

This Source Book has been developed keeping in view the child at the centre of all attention — by the teacher, parents, school administration etc. We believe that if a child receives accolades for doing something good and positive response for improvement for not doing something very good then the child will grow up as a confident person, ready to take up any challenges in life. That in our view is the essence of education.

We present this Source Book with a message to teachers and administrators that children are a precious treasure and hope of our future, therefore they, deserve all our love and affection. They need to be nurtured at all stages of life at school. It does not mean that no assessment should be carried out. Infact we are stressing that more stress should be laid on learning and the assessment of this should be continuous and comprehensive. But it should take place with as little stress to the child as possible. It has been observed that in some cases, if the child is stressed too much by frequent examinations and is labelled as a 'slow learner' and 'slow achiever', it may simply put the child off and the child may withdraw from the teaching-learning process and may become a misfit in society.

We urge teachers to change their mind set and look at the process of assessment with an open and positive frame of mind. They may then be able to appreciate the process of assessment outlined in this Source Book.

The Source Book has been divided into five chapters:

Chapter 1 introduces the teachers to the basic aspects of science as a discipline, and goals of science teaching at the Upper Primary Level. It also compares the existing practices of assessment with the proposed continuous and comprehensive evaluation.

Chapter 2 deals with the indicators of learning, and how they play a vital role in assessing the learner comprehensively. Although a long list of indicators could be drawn, only the most essential indicators, appropriate to the stage have been chosen. Examples and the indicators given here are only suggestive. Teachers have the freedom to plan their own items and evolve suitable criteria for assessment.

Chapter 3 deals with the various tasks (methods) that can be followed to make the assessment more comprehensive and objective. For the suggested tasks, examples are drawn from the National Council of Educational Research

and Training (NCERT) textbooks. Although a time frame and criteria of assessment are suggested for each activity, they are only suggestive and the teacher has the freedom to modify them according to the needs of the learner and learning environment.

Chapter 4 provides the details and the mechanism for recording and reporting the assessment of an individual learner over the entire session (year). The need for maintaining individual learner's records is also discussed.

Chapter 5 contains case studies directly from classrooms. It is hoped that these would help teachers to carry-out the assessment through the various tasks set by them.

This book has been made possible because of the active participation of many people. I wish to thank *Director,* NCERT, Professor G. Ravindra, specially for his keen interest in the development of the book and for all the administrative support. I acknowledge with thanks the dedicated efforts and valuable contribution of Dr Anjni Koul, *Coordinator* of this Source book. I am also grateful to the review committee for their comments and suggestions. I express my gratitude to the members of the Editing Team who worked tirelessly in bringing this book to the present form. We warmly welcome comments and suggestions for improvement from our readers.

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CHAPTER 1

INTRODUCTION

Science is a way to understand the natural world around us. Humans have always been curious about the objects and phenomena that are an integral part of nature. From the earliest times, they have explored the physical and biological phenomena of the environment and have established relationships between organisms and the environment. They have also designed tools and techniques to explore and understand the various aspects and details of nature. This has made science a very dynamic and expanding body of knowledge, creating newer domains of experience.

Science and Scientific Method

- The continuous expansion of knowledge in science can be attributed to honest application of the scientific method that is so firmly engrained in scientific studies and researches.
- Broadly speaking, the scientific method involves several interconnected steps: observation, looking for similarities and patterns, making hypotheses, deducing their consequences and testing them. Verification of hypotheses, theories through observations and controlled experiments enable us to arrive at principles, theories and laws governing the physical world.
- The laws of science are never viewed as fixed eternal truths. Even the most established and universal laws of science are regarded as provisional and may be modified in the light of new observations, experiments and analyses. Consider, for instance, the classification of organisms. The classification has undergone several modifications in the past and we now follow the five-kingdom classification. This however is not final, as it continues to be under the scrutiny of scientists and new systems of classification may be proposed in future.

Science — A Social Endeavour

Ever since its birth, science has exhibited a potential to be beneficial and harmful, emancipative and oppressive. Modern science is also playing a dual role in society. In the process of learning science, some of the tasks may involve interaction with the community in which a child lives. These tasks bridge the gap between school, home and community. Thus, science is also to be seen ultimately as a social endeavour and not merely as a subject of study in the classroom. School science education must make an attempt to sensitise our students about the various aspects of science, which teachers of our schools are otherwise engaged in.

1.1 Science Teaching-Learning

In our country, science teaching-learning is an essential component of school education up to the secondary stage. From Classes I–V, the primary level, simple concepts of science infused with the fabric of our society, its social, cultural traditions and practices, are taught as environmental studies. From Classes VI–VIII, the Upper Primary Level, science is taught as a discipline that comprises of an assemblage of various concepts drawn from both physical and biological sciences. It is visualised as an integrated discipline, which is not partitioned into the different branches of science such as physics, chemistry, biology and environmental science.

Science at Upper Primary Level

- Concepts in science included at this level are an extension of the concepts dealt with at the primary level. An attempt is also made at this stage to highlight the fact that concepts of science form the basis for technological innovations and developments that lead to improvement in the quality of life.
- Scientific concepts taught at this stage are so chosen that they relate to the everyday experiences of learners. Most of these concepts can be learnt by performing activities/experiments.
- The pedagogy of science should reflect an approach that should include tasks like making simple models, meaningful investigations, surveys, peer interactions, field studies and group activities.
- Students must be encouraged to collect, organise and reflect on the information so that science learning also becomes a social venture.
- Greater emphasis should be laid on the learning processes of science (process skills). These skills include observation, hypothesis, manipulation of variables, measurement, data collection and analysis, drawing inferences, making generalisations and promoting creativity. The development of the process skills in science should continue through the Upper Primary Stage to enable children learn by themselves so that they can continue to learn even beyond school.
- At the Upper Primary Level, science classes should encourage learners to explore and seek additional information related to the concepts and wherever possible establish relationship between concepts in science with day-to-day life experiences. An appropriate assessment strategy will undoubtedly encourage students in this task as they are required to seek information by reading related scientific literature, newspapers, magazines, books, consulting internet resources and interacing with the community.

The Concerned Teacher

As teachers, we are at times. surprised or dismayed by the students' performance in tests. Although the students seem to be performing well in the classroom, their performance in tests comes as a surprise and often disappoints us. While we are in the habit of attributing poor performance in tests to students' inadequacies and failures, have we at any time introspected and analysed the various other factors that might have contributed to the poor performance? One conscientious teacher made a small departure and asked the students to write, without mentioning their names, why they performed poorly in the tests. Some of the students' responses were:

"Tests did not cover the subject matter we learnt in the class."

" We spent a lot of time learning only one topic and there was only one question from that topic."

"We had to memorise too many things for the test."

"There were too many questions in the question paper."

"We did not know how much to write for each question."

"We did not understand some questions."

"Many questions were confusing."

The teacher used the students, comments and decided to have 'more frequent tests with lesser content rather than fewer tests covering large content area'.

She used simple language to frame the questions, gave explicit instructions and removed all ambiguities. She carefully organised the test items in a consistent and uncluttered way to ensure that students did not inadvertently miss any item. She gave them sufficient time to answer all the questions.

When the teacher assessed the performance, she was pleased that most of the questions were answered and the students' performance matched with her expectations.

1.2 Assessment in Science

*Assessment is an essential component of all teaching-learning processes. It not only assesses the extent of learning by students, but is also meant to reflect on the performance of the teacher. In this sense, it is both a reflected (student's performance) and a reflective process (teacher's performance). The reflective evaluation occurs when the teacher looks back over a lesson or a

* Assessment and Evaluation are generally used interchangeably. Refer Appendix

series of lessons and analyses what went well and what needs improvement. During reflection, we ask ourselves questions such as:

- **What went well?**
- **How can I improve upon the lesson?**
- **What would I change if I had to teach the lesson again?**

In short, it helps teachers to assess their performance and, where necessary, enables them to evolve new methods of teaching.

1.2.1 What is our Usual Method of Assessment?

Now, let us look at the scenario in our science classes and see whether it caters to the two features of assessment discussed in the foregoing paragraph.

In our classroom, the usual method of assessment is the paper-pencil or written tests. We call these tests by different names such as, unit test, mid-term examination, preparatory examination, annual examination etc. Paradoxically, these have only different names but in reality, they all have essentially similar characteristics limited to testing mostly the rote memorisation. Written tests gives us only quantitative scores or achievement levels that may not be reflective of the actual learning that has taken place. They are, in fact, quite arbitrary because they do not holistically and objectively evaluate the learner. With the prevalence of such dubious and questionable assessment methods, the teacher and students cannot draw any reliable conclusions. However, without giving a serious thought to these limitations, we award numerical scores or grades to the students and rank them based on these scores. Poor performance and low scores are often interpreted as 'student failure'. **Repeated branding of students as 'failed' may de-motivate them and in some cases may even lead to their opting out of the school system altogether.** These tests never indicate teacher inadequacies such as faulty teaching strategy or defective assessment methods.

Such an assessment does not help a teacher to reflect upon her/his performance and provides clues and pointers that will help her/him modify her/his teaching methods. In conclusion, this method of assessment is of a little help either to the student or to the teacher. It is possible that rote memorisation has completely bypassed the essential learning that was desired. Therefore, it may be wrong to presume that a higher achievement in a 'test' reflects better learning.

Another feature of the assessment that is usually practised is a product-based assessment and not process-based assessment. Product-based assessment is done at the end when the teacher feels that "presumably something has been taught or learnt". So only the product of the teaching-learning situation is assessed. Process-based assessment is a method of assessment that involves the assessment of the various skills which the children may have acquired during the learning process. Unfortunately, in our school system, the 'process

assessment' is almost entirely overlooked in spite of the fact that the product assessment offers only a very limited scope for us to comprehensively assess the students capabilities.

Such an assessment ultimately boils down to testing the ability of students to memorise facts and concepts of science and reproducing them when asked, and we do not even give them the freedom of expressing themselves in their own individual styles. Can we ever be satisfied with such an assessment?

The tests which we conduct are too formal, structured and cause a great deal of stress to the students, teachers and parents. Such tests seldom focus on the most important aspects of the mind, that is, its ability to organise facts and information and relate it to the real life situations.
It is important to remember that all the students in a class do not learn in the same way although the same teacher teaches them at the same time. Students learn at their own pace and in their own style, which to a large extent depends on their socio-cultural and intellectual levels.

It is interesting to note that in the existing methods of assessment, it begins only after teaching stops. In the different types of tests like, unit test, mid-term and annual examinations etc., only the information acquired is tested but the mode and mechanism of assessment remains more or less the same. In the existing system, teachers award marks for the test that is conducted. On the basis of the marks, teacher ranks learners. Often students also rank themselves. Those with higher marks consider themselves 'superior' to others even when the difference is as little as one mark! Is our system of assessment so perfect that it can discriminate between students even on the basis of one mark? This half-a-mark or one mark is sufficient to create a superiority-inferiority complex which may be detrimental to the student's progress.

Given so many limitations of the present assessment system in our science classes, can we devise a method of assessment that helps us overcome the deficiencies of the present system? Can we wean ourselves away from a system of product assessment to a more dynamic, informal, broad-based and comprehensive assessment that assesses each and every inherent skill of a student? Yes, this is possible if we can integrate assessment with the teaching-learning process. Such a method of assessment is at the core of the continuous and comprehensive assessment.

1.2.2 An Alternative — Continuous and Comprehensive Evaluation

The Continuous and Comprehensive Evaluation (CCE) is a systematic way to assess learner's abilities, analyse her/his performance, provide appropriate feedback to each learner and help them to progress.

All of us perform this task intuitively whenever we are interacting with students in a teaching-learning situation, but may not be keeping a record of the learner's progress. The assessment of the student's learning is not conveyed to the students as qualitative markers. Even in instances where a feedback is given, it is not given in an organised and systematic way. Consequently, the child does not know how to improve her/his work and performance for future.

In the continuous and comprehensive evaluation, an attempt is made to assess and give a feedback on different qualitative aspects of learning and understanding to each child. This helps children to learn even from their mistakes and promote readiness for better learning. It also helps to overcome the pitfalls, if any, over a period of time. In order to achieve this, we must plan many different ways to collect information about each student. Such an assessment also provides ample scope for academic enrichment of the teacher as well.

The salient features of the continuous and comprehensive evaluation are:

- It uses various methods to collect data about the learner's achievements.
- It analyses each learner's work and provides feedback that helps and guides learning.
- It guides the learner towards self-assessment so that learner can take responsibility of her/his academic growth.
- It enables teachers to share records/information/interpretation with colleagues for the overall academic growth of the learner.
- It helps teachers to plan and innovate their teaching strategies.

The term 'continuous' refers to an evaluation that goes on uninterrupted throughout the year. In other words, the teacher observes learning patterns of each student continuously and provides qualitative feedback. For its effectiveness, an attempt should also be made to remember that appreciation and encouraging remarks, rather than harsh comments, always motivate the students to perform better. The teacher also monitors the progress of each student over a period of time and helps her/him to learn better. For doing this, the teacher has to maintain a regular written record of individual student's work with explicit qualitative comments on it.

The term 'comprehensive' also needs a little elaboration. The term comprehensive suggests that during assessment in science, we must observe a child's performance not only on the scientific processes, scientific knowledge and creativity she/he is experiencing while learning science, but also how they contribute to her/his attitude, behaviour and values.

Comprehensive refers to holistic learning and assessment. Science is an observational and experimental discipline. National Curriculum Framework (NCF)–2005 recommends for science a 'hands-on' enquiry-based pedagogy. All these aspects must find place in assessment also.

Some of the basic scientific processes that can be expected at the Upper Primary Level are :

- **Observation:** Has the child observed a phenomenon accurately or superficially?
- **Experimentation:** Has the learner skillfully planned and performed an experiment or activity? Was the learner able to handle the material and equipment properly?
- **Measurement:** Was the learner able to take and tabulate the readings accurately?
- **Analysis and Interpretation:** Did the learner use reason for analysing the results of the experiment and interpret them correctly?
- **Communication:** Did the learner express the outcome in an organised way?
- **Creativity:** Did the learner exhibit innovativeness and creativity in planning the activities?

In short, comprehensiveness means that teachers are required to look into these aspects and assess the learner more objectively and provide necessary feedback.

The specific aspects of learning tasks which enable the teacher to assess her/his learners are called indicators. Some or all of these indicators will be found in different assessment tools that teachers use in science classes. These include assignments, experiments, projects, surveys etc. These indicators will help teachers to give very specific and qualitative feedback that is of immense value for the learner to enhance her/his learning abilities.

The academic and professional benefits of the continuous and comprehensive evaluation may be summarised as follows:

- It helps to build a system of feedback which helps the learner to enhance her/his learning capabilities.
- It is a less formal, stress-free method of evaluation which benefits the learners, teachers and parents.
- It reduces the undue emphasis that is given to the written test, mid-term and annual examinations.
- It encourages thinking and reasoning in learners which are vital to learning.
- It erases the fear of pass/fail.

- It discourages rote memorisation.
- It allows adoption of diverse tasks to identify the strengths of each learner.
- It is a systematic process of planning, documentation and recording of assessments enabling us to take decisions related to improvement in learning.
- It helps the teacher in professional development.
- It ensures that school education is useful for practical life.
- It highlights child's skills, interests, attitude and motivation and her/his response to different situations, both in and out-of-school.

Children with special needs – a challenge but not a problem

Children with special needs have been included in the mainstream of our education system. We often come across children with learning difficulties, hearing impairment, visual impairment, locomotor difficulties etc. For such students, teachers will have to design alternate activities while keeping their learning objectives similar to those of the other students. The teacher should take into account the specific problem of the student and plan alternate strategies of assessment. These children may or may not learn in the same manner and pace as the other children. Only when this is realised and they are learning-enabled, a healthy inclusive environment can be created in the classroom where all the students, those with and those without learning difficulties can learn together. Teachers will have to be more flexible when dealing with the assessment of children with special needs. The assessment strategies will have to be specially planned for this group of learners.

1.3 Assessment — When and How?

Another critical question that is often asked is when and how often should children be assessed?

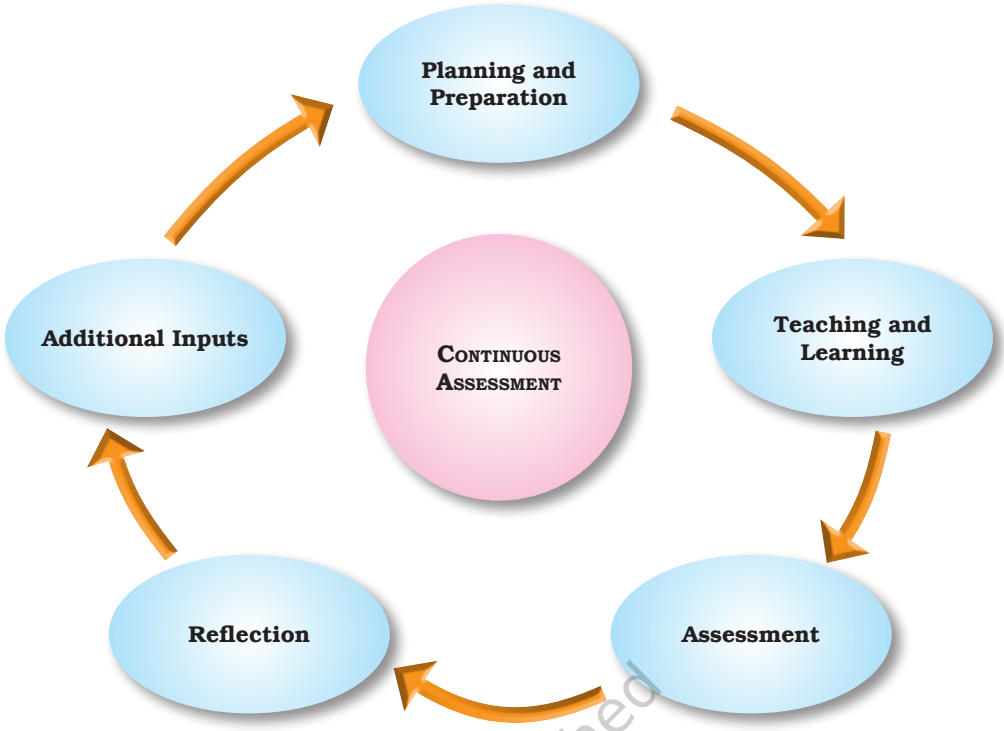
- Ideally, assessment should be continuous and must go along with the teaching-learning process.
- In order to make the assessment objective and holistic, all aspects of learning need to be given due importance.
- Such assessments need to be flexible and the manner and modalities may vary from situation to situation and sometimes from one student group to another.

- It is a fact that teachers regularly observe children in almost each and every class and keep track of their progress in their own individual styles and self-evolved criteria.
- To give credence to these observations and make it helpful to the students, we must arrive at a method of recording these observations at regular intervals.
- The assessment should necessarily focus on the qualitative performance of the children along with their achievements in various tasks.
- This can be done by maintaining a profile for each child and periodically updating it. This is required in order to reflect upon, derive feedback, plan and implement measures to enrich and enhance children's learning. This will call for a judicious cycle of events that includes assessment, documentation, providing constructive feedback and monitoring the child's progress.
- One cannot undermine the importance of informal observations that are constantly collected by the teachers whenever they are interacting with children. The only additional task for the teacher is to record them periodically and monitor the progress of the child. This will also help the teachers to reflect upon their efforts and readjust their teaching strategies wherever required.

As teachers, we must realise that we do not have to test everything. From among the variety of assessment tools, we must learn to choose those which are appropriate for a specific content area taking into account the classroom situation. A paper-pencil test cannot be the only way of assessment.

A test includes several activities like setting a question paper, administering the test, valuation and tabulation of marks. All these are time-consuming tasks and put pressure on teacher's time. Moreover, many a times tests are repetitive in nature and students can predict the pattern and types of questions that are likely to be asked. This renders tests as being a routine tasks and often futile. If a shift is made to Continuous and Comprehensive Evaluation (CCE), it will obviate the need to hold mid-term and annual examinations. It will reduce substantially the pressure on teachers and students. Moreover, the precious time saved in holding these examinations, can be utilised for the teaching-learning processes. This will benefit all the stakeholders since a relatively stress-free school system will be created in our society. It will also ensure greater teacher empowerment and foster a healthier school environment. CCE to a great extent fulfills the above need and also checks *ad-hocism* that is prevalent in our assessment practices.

It should be reassuring for the teachers to know that this idea of CCE is not very different from what they have been doing all along. It has same steps which you might have followed as shown in the model.



The new input is to make assessment more systematic and less stressful to teachers and students. The document is aimed at making the work of the teacher more purposeful and efficient and make the students, better and responsible learners.

There are several myths and fears associated with the CCE. These are summarised as :

Myths and Fears	Reality
It increases teacher's work as it includes large number of tasks in addition to existing tasks — tests, examinations etc. It dilutes teaching and learning. It is a waste of time to write qualitative outcomes of tasks. It is impractical to record each task of each student.	It is true that CCE needs better planning and organisation. However, it integrates assessment with teaching-learning and makes it more interactive, meaningful and effective. All achievements of a learner are continuously assessed and the necessary feedback to the learner is provided then and there. This leads to the progress of the learner and gives teacher an idea of her/his performance over time.

1.4 Why this Source Book?

It has been a long felt need that the methods of assessment that are followed in our science classes have to be revamped and a system of assessment be evolved that measures the true potential of learners and helps them in the learning process. This source book is intended to provide the science teacher with such methods of assessment that will make it more systematic, meaningful and purposeful. An attempt has been made to present the matter in a simple teacher-friendly language. Several methods of assessment have been suggested in the source book. Teachers can adopt suitable methods or combination of methods that will suit the nature of the content and their local conditions. Samples taken from the NCERT textbooks of Classes VI to VIII are discussed and ways to carry out a systematic assessment have been suggested. The samples discussed are intended to motivate the teachers so that they can plan many other items of assessment for implementation in their schools.

A simple five-point grading system has been recommended as this was found to be both adequate and appropriate for this stage of schooling. This may be uniformly followed for all the assessment tasks. Specific qualitative criteria that may be helpful in the assessment have been identified for the various assessment tasks that are suggested in the source book.

> "The task of the modern educator is not to cut down jungles, but to irrigate deserts"
>
> — *C.S. Lewis*

Think and Reflect

- What are the methods, that you normally use in your class to assess the students? Comment.
- Mention the steps you will take to help a special child in inclusive setting of your classroom.

Chapter 2

INDICATORS — A FRAME OF REFERENCE

2.1 Indicators and their Significance

In the previous chapter we have discussed that the comprehensive assessment involves all-round assessment of performance and personality of the learners which, in turn, may depend on several factors. There could be a number of parameters to be assessed separately and continuously, which are known as learning indicators. Learning indicators help us to know the extent to which objectives of learning have been achieved. These indicators facilitate us to know the progress of the process of learning and about the acquisition of processes of science in students. In order to make assessment easier, a set of indicators have been identified. These have been worked out for Upper Primary Level. The assessment process needs to be a way of providing information and feedback to the extent to which school and teachers have been successful in imparting quality education to every child. For a teacher to assess a child's progress, there is a need to specify certain objectives. The objectives of learning reflect the child's level of achievement in performing any/various tasks during learning of science. The indicators of learning provide the teacher the basis of what to look for in a child when a child performs a particular task. For example, a teacher can give various natural fibres to Class VII children and ask them to classify on the basis of their source (animal/plant). In this activity, a child first observes the fibres carefully, finds out similarities and differences between them and then classifies them according to their sources. The observation and classification done by a child expresses her/his level of understanding of a given topic. The classification based on the observation is an "indicator" that indicates the child's ability to observe and classify.

The Upper Primary Level is a crucial step in the life of every child. The skills acquired at this level help children to build a stronger foundation to understand concepts of gradually increasing complexity, later in their lives. The indicators help teachers in a number of ways by:

- focusing on and understanding student's learning.
- suggesting a reference point for children's learning which can be communicated to the child, parents and others to gauge her/his progress.
- providing a framework for monitoring and recording the progress of a child.

- providing necessary feedback for the improvement of teaching-learning process.

However, indicators are only provided as a broad frame of reference. The teacher may like to adapt them as per state syllabi in general and local requirements in particular.

2.2 Indicators for Upper Primary Stage

A list of indicators has been suggested so that teachers can assess children on day-to-day process. In doing so, the teacher may observe 4-5 children everyday.

Each indicator consists of various abilities which need to be developed in a child over a period of three years.

Before children enter the secondary level, we should have helped their abilities and concepts to develop along the following indicators. One will notice that some of the indicators are coupled in order to make assessment teacher-friendly as well as child-friendly.

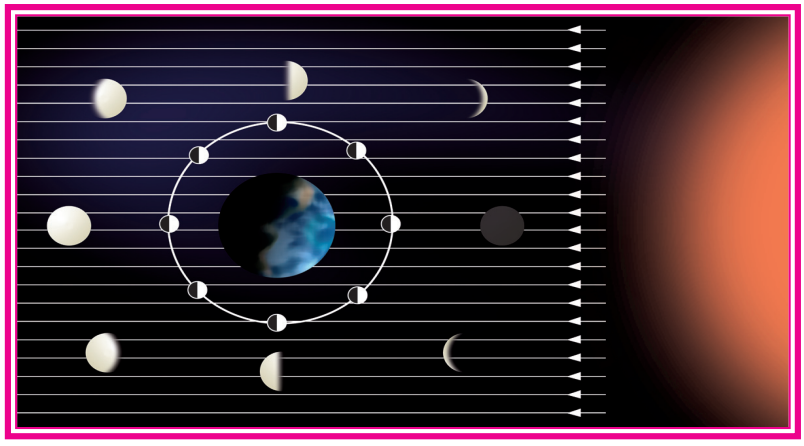
2.2.1 Observation and Enquiry

Phases of the moon

- Observes an object, an event or a phenomenon
- Uses all senses to collect information
- Identifies similarities and differences between objects or between events
- Recognises the order/sequence that takes place in the events or phenomena
- Asks questions to get information about objects, events or phenomena
- Identifies questions which can be answered by their own investigations
- Raises critical questions that help deeper analysis
- Thinks critically about one's own reasoning.

What advantage does *amoeba* derive by changing shape?

Why do fishes and frogs lay eggs in hundreds whereas a hen lays only one egg at a time?



Positions of the moon in its orbit and its corresponding phases

Before starting the topic 'Moon', the teacher assigns a class project to observe the moon and record detailed descriptions regarding size, shape and position of the moon in the form of sketches. The teacher initiates the topic by comparing the sketches of the moon made by the children. She/he finds some discrepancies regarding the shape and position of the moon. The discussion is carried out in the class to point out these discrepancies. During this discussion, a number of questions were raised by the children, such as:

1. Why does the moon change its shape?
2. Why does the moon look different at different places in the sky?
3. Why does it move?
4. Why does the moon rise at different times?

2.2.2 Experimentation/Classification/Design/Plan and Organisation

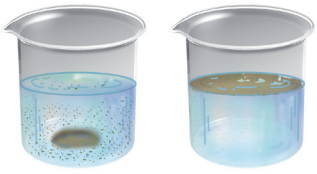
- Identifies a group of objects on the basis of observable characteristics
- Identifies similarities in the group of objects
- Identifies differences in the group of objects
- Groups the objects on the basis of one characteristic at a time
- Interacts with teacher for safety instructions
- Follows safety measures while working in the laboratory to avoid any harm or accident
- Handles things, equipments with care – individually and in a group
- Performs activities individually or in groups in a systematic manner
- Uses standard and non-standard measures in making comparisons and in recording readings/observations

Sealed can with hot water being cooled

- Reviews one's ideas according to the feedback given by others
- Improvises on materials and investigative procedure.

A teacher asked her/his students to collect leaves of various plants from their surroundings. She/he encourages them to collect different types of leaves. Next day, she/he puts the leaves together for observation. She/he asked the children to write the different characteristics on the basis of which leaves can be classified. The children identified characteristics such as shape, colour, size, design etc. With the help of the children, the teacher develops the classification system. During this discussion she/he shows examples of simple leaves, compound leaves and their leaflets, points out shapes of the leaves etc.

Different shapes, sizes and colours of leaves



What disappears, what doesn't

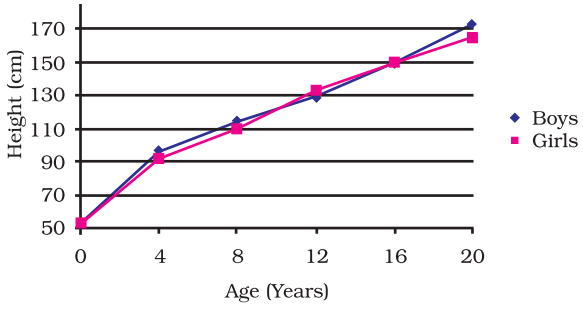
In order to classify substances according to their solubility in water by performing an experiment, the teacher collects various substances such as sand, coal powder, salt, sugar, saw dust, chalk powder, washing soda etc. The children are then asked to perform the experiment in groups to check the solubility of the given substances in water. The children write their observations in tabular form and classify substances as soluble and insoluble in water.

2.2.3 Collection and Presentation of Data or Sample/Recording of Data/Reporting

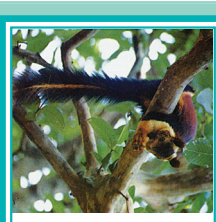
- Discusses with others to get information of a particular event, phenomenon.
- Reads tables, graphs, pictures and maps with gradually increasing complexity.
- Reports and narrates an event or process; in oral or written form.

Age (Years)	Height (cm)	
	Boys	Girls
0	53	53
4	96	92
8	114	110
12	129	133
16	150	150
20	173	165

The Table shows the data on likely heights of boys and girls as they grow in age

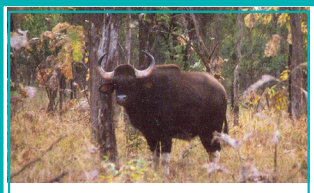


The children are asked to collect and paste pictures, information, photographs of different animals and write about their habitats and adaptations for survival. The children are told to present this information in the form of charts which can be displayed in the classroom.

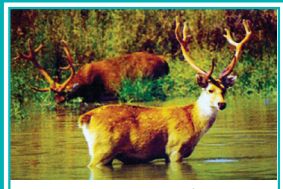


Giant squirrel

Tiger

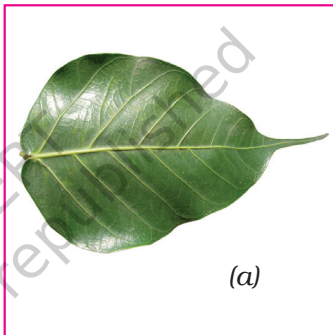


Wild buffalo



Barasingha

The children are asked to collect leaves from six different plants. On the basis of their venation the children will determine the type of root system of the plants.



(a) (b)

Leaf venation (a) reticulate (b) parallel

2.2.4 Communication Skills

- Expresses her/his ideas in simple words
- Listens and responds to others' ideas
- Accepts feedback from others and appreciates that others' may have a different point of view
- Describes the situation/event and communicates in their own language

Listening and responding to each other

Expressing her ideas

Lev Vygotsky claimed that before a person can internalise knowledge, she/he must share the knowledge with others.

Learning of science provides many opportunities of communication for the children. The act of making observations, inferences and performing experiments not only permits children to communicate but also help to understand science topics they are working on. There are many ways in which children can communicate. The teacher may use any method to check children's communication skills. The emphasis of assessment for this indicator is to check whether a child can communicate her/his ideas in simple words either orally or in a written form. It enables teacher to find out whether a child has understood the concept.

2.2.5 Provide Explanation

- Makes simple hypotheses – to explain observations or relationships
- Recognises the need to test hypotheses by gathering more evidence.

On a bright sunny day the teacher takes the students out into the school garden. She/he selects a healthy well watered plant growing in the sun and covers a transparent polythene bag on a leafy branch and secures it with a string.

She/he asks the students to observe the inner surface of the bag after a few hours. She also asks them to note down their observations and provide an explanation for the same.

What does the leaf do?

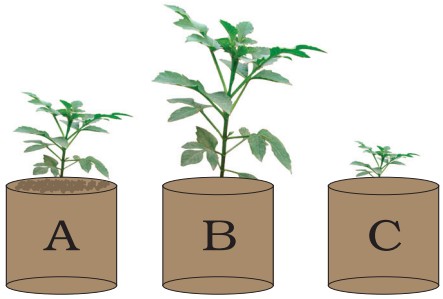
2.2.6 Draw Conclusion/Inference

- Draws inference based on evidence observed through experience/ experiments
- Accepts ideas when a more logical one is put forward
- Treats every conclusion as being open to challenge
- Identifies or predicts possible causes of any event/phenomena
- Makes logical connections, using evidence or patterns to make predictions.

Ask children to select seeds of *moong* or gram and soak them overnight in water.

- Take 3 empty containers and mark them as A, B and C.

- Container A contains, soil mixed with some cowdung (manure).
- Container B contains, soil mixed with a little urea (fertilisers). Container C contains soil to which nothing has been added.
- The children were asked to put 8 to 10 seeds each in containers A, B and C.



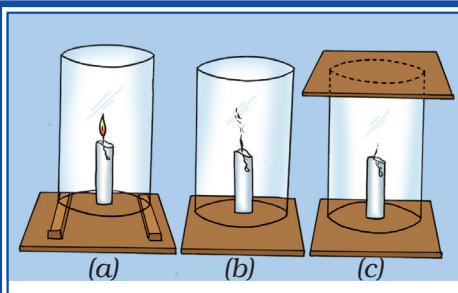
Soil mixed with cowdung *Soil mixed with urea* *Only soil*

- They were asked to water them for 7-8 days and observe the growth of the plants.

The children will observe that the growth of the plants was fastest in container B. From their observation they may conclude that fertilisers are the best source of nutrients for plants. However, the teacher may also highlight the merits and demerits of fertilisers.

(Caution : Be careful while handling burning candle).

Fix a lighted candle on a table. Put a glass chimney over the candle and rest it on a few wooden blocks in such a way that air can enter the chimney (a). Observe what happens to the flame. Now remove the blocks and let the chimney rest on the table (b). Again observe the flame. Finally, put a glass plate over the chimney (c). Watch the flame again. What happens in the three cases? Does the flame flicker off? Does it flicker and give smoke? Does it burn unaffected? Can you infer anything at all about the role played by air in the process of burning?



Experiment to show that air is essential for burning

2.2.7 Analysis/Application to Daily Life/Life Experiences

- Analyses the observations/data which may lead to inferences and applications to daily life


Pebbles and stones are removed from sand by sieving

- Attempts to relate her/his knowledge of science to daily life experience.

Winnowing

Jaltrang

To find out how a child can apply her/his knowledge to daily life, teacher may ask oral questions, prepare a questionnaire or frame a Multiple Choice Question (MCQ) test. A sample is given below :

Oral question : Why are electric wires made of copper?

Written question : Why are convex mirrors used as side view mirrors?

MCQ : Why are antacids given to a person suffering from acidity?

(a) to increase acidity

(b) to neutralise the acid

(c) to neutralise the base

(d) to increase basicity.

2.2.8 Values/Attitude/Concern

- Takes initiative, responsibility while doing group work
- Shares and works with others; being considerate and helpful to others
- Is aware of one's strengths and weaknesses
- Has a strong sense of justice and readiness to act for a just cause
- Shows concern for the environment
- Avoids wastage of material, and uses them judiciously

Collage of posters

- Is sensitive towards disadvantaged or differently abled
- Is conscious of inequality in the family and society; being able to reflect and question the inequality.

This indicator reflects the personality of the learner and can be assessed by observing the day-to-day behaviour of the child. The indicator should be treated as a tool to bring about desirable improvement in the child's behaviour. All children belonging to the same class do not behave in the same manner. However, specific instances should be considered and positive feedback given to the child or her/his parents. For example, if a child is working in an activity room and if she/he uses equipment, apparatus and chemicals carefully then such a child should be appreciated for her/his attitude and concern. Similarly, if a child finds a tap leaking and informs the school authorities, she/he should be appreciated for taking up the cause of water conservation and acting on it.

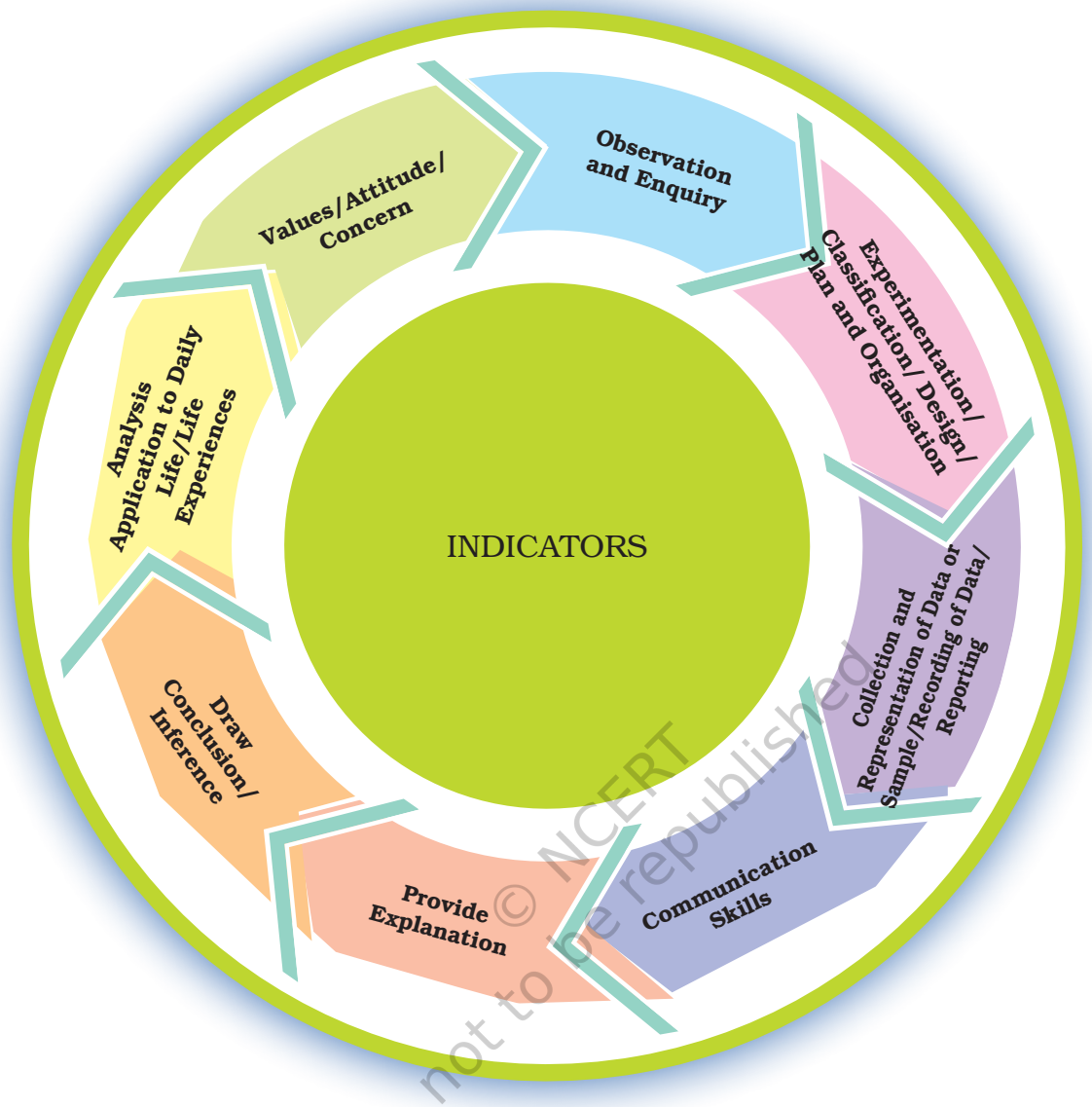
Putting garbage heaps in pits

Burning of leaves produce harmful gases

Indicators are linked to each other : One task can assess many indicators

The processes implied by the indicators unfold when we try to understand and construct knowledge about something. We observe, discuss, express, explain, analyse and classify. We also question, analyse and perform experiment. We take initiative and help one another. We are sensitive to social issues. Many processes take place together, though we engage with one kind of process more deeply at some time.

Since there may be some overlapping in the content of indicators, assessment tasks can be designed in a holistic manner so as to assess more than one indicator at the same time.



Think and Reflect

- Have you ever assessed your students on their ability to perform an experiment individually or in a group?
- Through which activities of your class, can you assess students on the indicator like co-operation?
- Can you think of any other indicator which is not mentioned in this chapter?

CHAPTER 3

METHODS OF ASSESSING STUDENTS' LEARNING

Classrooms must provide a suitable climate for interaction between the learner and the teacher, so that effective learning can take place. Effectiveness of a class depends on the methodology adopted by the teacher and the extent of interactions the teacher plans and holds with the students. The traditional chalk and talk approach to teaching practised in most of our schools does not bring about optimal learning in children. It often demotivates the learner and blunts their inquisitiveness and creativity. Teachers should adopt teaching strategies which offer space for individual children to learn at their pace and in their style rather than being too rigid and dogmatic about the learning process. Classrooms must provide an opportunity for active, collaborative and friendly learning.

Every learner is unique. It is of utmost importance to recognise and value each learner and her/his diverse intelligence to provide an opportunity to bloom. Assessment being an integral part of teaching-learning process should be done before as well as during the teaching-learning process. Classroom learning and assessment go hand in hand. However, it is advisable not to grade the performance of children all the time. There should be scope for self-assessment for students as well.

There are a number of aims of assessment, such as to assess understanding of the scientific concepts, attitude, aptitude and interest. Each method of assessment has its own value for the teacher as well as the learners. Sometimes a single task may serve more than one purpose. Therefore, we need to be aware of a range of possible modes/methods of assessment.

3.1 NEED FOR ASSESSMENT

While planning lessons, a teacher keeps in mind of what the students are aware of. During the teaching-learning process, the teacher uses different methods of assessment (tools and techniques) to confirm the extent to which learning has taken place.

Assessment at this stage should be brief and short, and it should motivate learners for further learning and revisiting their pre-conceived notions of various concepts. It should be done in order to sustain interest of the learners.

- There is scope for the teacher to assess students' learning while teaching-learning is taking place. This gives immediate feedback to the

teacher, whether learning is taking place as planned. It also helps the teacher to identify students who have not learnt as much as was expected so that she/he could give additional inputs to them.

- At the end of the teaching-learning process, the teacher needs to get the evidences of learning of the learners.
- A number of methods of assessment help the teacher to identify suitability, to formulate/reformulate learning objective and learning design.
- The teacher can provide information about multiple aspects of learning of the progress of the learner to the parent and school administration and seek their cooperation.
- It is also useful in determining the effectiveness of teaching strategies of the scientific concepts.
- At all these phases of teaching the teacher uses different methods of assessment to get feedback for herself/himself as well as for the students.

Different methods of assessment need to be applied to assess understanding of science. Before choosing any method it is necessary to think of the various possible ways of assessment. There are four basic methods of organising assessment, namely:

Individual Assessment: In this assessment, the focus is on one individual while she/he is performing a task. It helps the teacher to identify the strengths and weaknesses of an individual child.

Group Assessment: In this assessment, the focus is on the learning and progress of the task performed by a group of children working together. This method of assessment is found to be more useful for assessing social skills, cooperative learning processes and other value-related dimensions of a child's behaviour.

Self Assessment: This refers to the child's own assessment of her/his learning and progress in knowledge, skills, processes, interests, attitudes etc. It also helps to assess values such as honesty, acceptance of one's short-comings, knowing one's strengths and weaknesses. It is important to note that self assessment is arrived at with the active involvement/assistance by the teacher.

Peer Assessment: It refers to one child or a group of children assessing other children. It hones, interpersonal skills. It may help the child to develop an impartial attitude, improve listening skills, inculcate team spirit, leadership quality and time management.

3.2 Methods of Assessment (Tools and Techniques)

Assessment of learners by various methods in different situations helps us in recognising abilities of the learner. The teacher may choose one or more of the

following methods of assessment during different stages of teaching-learning process :

- Oral interaction between the teacher and learners, or among the learners themselves
- Providing answers/drawing diagrams/solving numerical problems etc.
- Performing activities, writing reports/making records of the activities.
- Science quizzes/puzzles
- Projects
- Class/home work/assignments
- Science exhibition
- Field trips
- Written tests
- Science journals.

The task assigned to the learner may be assessed on the basis of some indicators. The main indicators by which they may be assessed are listed in Chapter 2, which are suggestive in nature. Depending upon the task, the teacher may select one or more indicators from this list or devise her/his list of indicators.

On the basis of these indicators, the teacher may assess the performance of learners while they are performing the task. The record of learners' performance may be kept in a tabular form. A sample of such a table is given in Chapter 4 (Table 4.4).

The teacher may maintain a record of assessment in the following ways:

1. The teacher may assign marks to each of the indicators in a task. To each student, teacher may award marks for each indicator, add them up and may convert them into grades. For example, if the task has been assigned 10 marks, then the conversion to grades can be done according to the following scheme :
   - 9,10 marks – A
   - 7, 8 marks – B
   - 5, 6 marks – C
   - 3, 4 marks – D
   - < 3 marks – E

The basis of grading system is that, a group of students may be placed qualitatively in a common grade. Therefore, the teacher need not look at the assessment so minutely that she/he is forced to award fractional marks, e.g. ½, ¼.

2. The teacher may not assign the marks to the indicators. She/he may simply tickmark in the boxes for the indicators that the learner has attempted and award the grade.

3. The teacher may not follow either scheme 1 or 2 and may simply assess the task qualitatively and award an overall grade.

All the learners working in a group should be assigned the same grade.

The learners may be communicated only through grades obtained by them along with the teacher's comments. However, if scheme 1 is followed, then the teacher must keep a record of marks herself/himself, obtained by the learners on each indicator. Such a record must be kept for each task undertaken by a learner during one academic session. These records will help the teachers identify learner's strengths and weaknesses. The teachers will provide opportunities to the learner to overcome her/his weaknesses. In fact, this will also enable the teachers to form groups of learners, in such a way that in each group, there are learners with diverse sets of strengths and weaknesses, so that they learn from each other.

A consolidated report of qualitative assessment of each learner may also be communicated to the parents. If this is done all through the school years, it may help the learner in making informed choices regarding subjects and careers in future. However, reporting should be done in such a sensitive manner, that even though it communicates learner's strengths and weaknesses honestly, it also appreciates the achievements of the learner.

It may not be possible for a teacher to simultaneously assess all the groups in a class while they are performing a task. So the teacher may decide to assess only a few groups at a time. The other groups may be assessed at other times while they are performing some other task. There is no need to try to assess the entire class on the same task. The learners may not be informed that they are being assessed on the task they are doing because this may kill their spontaneity. However, the teacher will need to do some planning in this regard in the beginning of each session.

Now we shall discuss how to use the methods mentioned earlier to assess learners.

3.2.1 Activities/Demonstrations

Activities and demonstrations are essential pedagogic strategies particularly in science. They enhance learning and help in better understanding of the concept among learners. It motivates them and nurtures their observation and experimental skills. A general discussion on the process and outcomes of the activity/demonstration enhances the interpretative and communication skills of the students. If learners are allowed to express their findings, it will enable them to develop good communication skills.

As far as possible, learners should perform the activities in groups. This provides learners an opportunity for collaborative learning. The group size may

depend upon the type of activity, the student's strength, the apparatus and space available. However, if possible, one group should not consist of more than 4-5 learners. As far as possible the groups should be heterogeneous.

While the learners are performing an activity they should be encouraged to discuss among themselves and also across the groups. The emphasis should be on self-exploration by the learners with minimal intervention by the teacher. The teacher should, encourage learners to report their observations honestly. At the same time, the teacher must appreciate honest reporting. If there are differences in findings of different groups they should be provided time to discuss, repeat the activity if necessary and analyse the possible causes for these differences.

To elaborate how learners can be assessed using various indicators, a few examples of activities have been picked up from NCERT textbooks. A tentative assessment plan is given for each of these activities.

For each activity, some Indicators of Learning are given in Column II. Activity Specific Indicators (What can be assessed) are listed in Column III and Assessment of Learner (Check-list) are listed in Column IV.

In each of the following examples of activities, there are detailed instructions for the teacher (in colour) and Tables to help her/him to assess her/his students. It is imperative that the teacher welcomes all the questions without worrying about their quality so that the curiosity of the student is not dampened.

Activity 1 Measuring the Body Temperature

Individual Activity **Class VII**

Measure the body temperature of some of your friends (at least 5) with a clinical thermometer and enter the data in the given Table.

Table – Body Temperature

Name	Temperature (°C)

Correct method of reading a clinical thermometer

Assessment Table

Sl.No.	Indicators of Learning	Activity Specific Indicators (What can be Assessed)	Assessment of Learner (Check-list)
1.	Experimenting/ Collecting data	Washes and wipes thermometer before use	Yes/No
		Jerks the thermometer to bring the level of mercury below 35°C	Jerks thermometer carefully so that it does not break. Brings mercury level below 35°C
		Places the bulb of thermometer at appropriate place of the body	Yes/No
		Keeps it there for about one minute	Uses clock to monitor time and keeps it there for atleast one minute
		Reads the mercury level in the thermometer	Holds thermometer parallel to her/his eyes and the point to be read is in front of her/his eyes
		Measures temperature of 5 students	Follows correct procedure while measuring temperature of each student
		Washes and wipes the thermometer before the next use	Yes/No
		Washes and wipes the thermometer and puts it back in its case	Yes/No
2.	Presenting data	Enters names and temperatures in the Table	Enters data in correct columns. Fills both columns. Fills data for all 5 students Speaks out temperature with its unit

3.	Analysing data and drawing conclusions	Realises that the body temperature of every person is not the same	Yes/No
		Realises that the temperature of human bodies is in the range 35-42°C	Yes/No
		Finds that for a healthy person, normal temperature is around 37 °C	Yes/No
4.	Providing explanations	Answers questions related to the procedure	Why wash thermometer before and after use? Why bring mercury level below 35°C? Why place it under the tongue for one minute? Is the temperature of all the students the same?
5.	Asking questions	Shows interest/curiosity in getting related knowledge	Why thermometer is kept at a particular place in the body? Why mercury is used in thermometer? Why Celsius scale is used? What is the other scale?
6.	Values/attitudes/ concerns	Shows concern so that no accident takes place	Yes/No
		Take care to wash and wipe thermometer before and after each use	Yes/No
		Takes and records temperature of 5 students honestly	Yes/No

Activity 2

Reaction of Metals and Non- metals with Acids

Group Activity **Class VIII**

Note : Half the number of groups in the class be assigned to work with dilute hydrochloric acid and the remaining groups can work with dilute sulphuric acid.

Warning : Keep the mouth of the test tube away from you and others. Use test tube holder to hold the test tube.

Take samples of metals and non-metals listed in the Table in separate test tubes and label them as A, B, C, D, E and F. With the help of a dropper add about 5 mL of dilute hydrochloric acid/dilute sulphuric acid to each test tube one by one. Observe the reactions carefully. If no reaction occurs in the cold solution, warm the test tube gently. Bring a burning matchstick near the mouth of each test tube. Record your observations in the Table and draw the necessary conclusions.

Table : Reaction of Metals and Non-metals with Acids

Test Tube	Metal/ Non-metal	Reaction with Dilute Hydrochloric Acid		Reaction with Dilute Sulphuric Acid	
		Room Temperature	Warm	Room Temperature	Warm
A	Magnesium (ribbon)				
B	Aluminium (foil)				
C	Iron (filings)				
D	Copper (turnings/ peeled flexible wire)				
E	Charcoal (powder)				
F	Sulphur (powder)				

Conclusions : _____

_____

_____

_____

Assessment Table

Sl.No.	Indicators of Learning	Activity Specific Indicators (What can be Assessed)	Assessment of Learner (Checklist)
1.	Experimenting/ Collecting data	Collects following apparatus/material • Magnesium ribbon • Aluminium foil • Iron filings • Copper wire • Charcoal powder • Sulphur powder • Dilute hydrochloric acid • Dilute sulphuric acid • Test tubes • Test tube stands and holders • Droppers • Match box • Heating device	Whether required apparatus/material has been identified correctly?
		Cleans test tubes before activity	Yes/No
		Puts small quantities of metal and non-metal samples in separate test tubes	Yes/No
		Labels each test tube	Yes/No
		Takes 5 mL of dilute acid using dropper	Yes/No
		Adds acid to first test tube	Yes/No
		Brings a burning matchstick near the mouth of test tube	Whether brings a burning matchstick near the mouth of test tube carefully?
		Tries to listen to pop sound	Yes/No
		If no reaction, warms the test tube gently	Yes/No

		Brings a burning matchstick near the mouth of the test tube again	Yes/No
		Repeats process with the other test tubes	Yes/No
2.	Presenting data	Writes observations in the given Table	Yes/No
3.	Analysing data and drawing conclusions	Concludes that non-metals (Charcoal, sulphur powder) do not react with acids	Yes/No
		Metals react with acids • Some metals (_____) react with dilute hydrochloric acid at room temperature • Some metals (_____) react with dilute hydrochloric acid on warming • Some metals (_____) react with dilute sulphuric acid at room temperature • Some metals (_____) react with dilute sulphuric acid on warming • Some metals (_____) do not react with dilute hydrochloric acid/sulphuric acid at room temperature/on warming • Some metals (_____) on reaction with acids, give out a gas that burns with a pop sound	Is the child able to identify the metals/ non-metals which react with dilute hydrochloric acid/sulphuric acid at room temperature and after warming. Is the child able to identify the metals which do not react with dilute hydrochloric acid/sulphuric acid at room temperature and after warming Yes/No
4.	Providing explanations	Answers questions related to the procedure	Why bring a burning matchstick near the mouth of the test tube?

5.	Asking questions	Shows interest in getting related knowledge	Why do non-metals not react with acid? Why is their a pop sound? Which gas comes out? Why does reaction take place on heating in some cases? Why do some metals react with dilute hydrochloric acid and some with dilute sulphuric acid?
6.	Applications related to daily life experiences	Student may relate to life experiences such as normally acidic substances like lemon, tamarind, raw mango, tomato are not kept in metal vessels such as copper	Why are acidic substances not kept in metal vessels?
7.	Values/ attitudes/ concerns	Holds the test tube with its mouth away from her/him and others	Yes/No
		Washes and dries test tubes after the activity before storing	Yes/No
		Uses chemicals judiciously	Yes/No

Activity 3 Making a Model and Using of a Stethoscope

Group Activity **Class VII**

Take a small funnel of 6-7 cm in diameter. Fix a rubber tube (50 cm long) tightly on the stem of the funnel. Stretch a rubber sheet (or a balloon) on the mouth of the funnel and fix it tightly with a rubber band. Put the open end of the tube near one of your ears. Place the mouth of the funnel on your chest near the heart. Now try to listen carefully. Do you hear a regular thumping sound? How many times did your heart beat in a minute? Count again after running for 4-5 minutes.

Model of stethoscope

Record your own pulse rate and heartbeat and that of your friends while resting and after running and record in the Table. Do you find any relationship between your heartbeat and pulse rate?

Table : Heartbeat and Pulse Rate

Name of Person	While Resting		After Running (4-5 Minutes)	
	Heartbeat	Pulse Rate	Heartbeat	Pulse Rate

Assessment Table

Sl.No.	Indicators of Learning	Activity Specific Indicators (What can be Assessed)	Assessment of Learner (Checklist)
1.	Experimental Skills	Fixes rubber tube to the stem of the funnel	Yes/No
		Fixes rubber sheet/ balloon on the mouth of the funnel	Yes/No
2.	Observation and Reporting	Counts heartbeats with the fabricated instrument	Correctly places the instrument near the heart
		Counts the pulse rate	Yes/No
		Tabulates the data	Records correct entries in each column

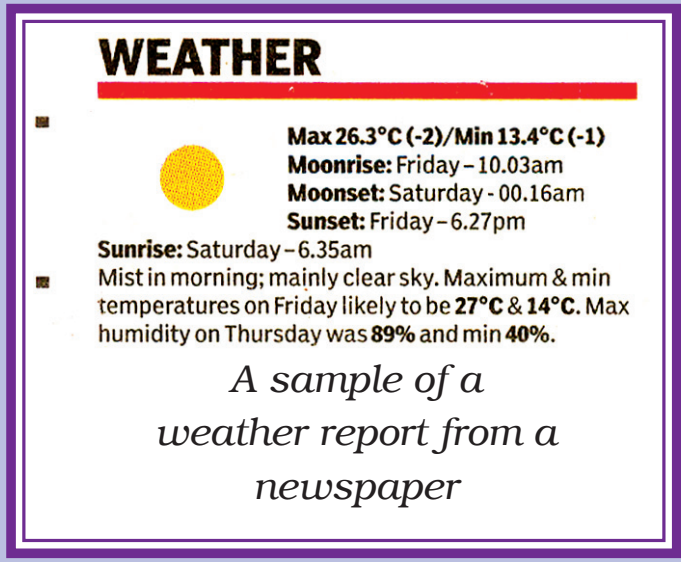
3.	Asking Questions	Shows interest/ curiosity in getting related knowledge	Can we use materials other than the rubber sheet on the mouth of the funnel? What is the function of the rubber sheet?
4.	Analysis/ Applications	Establishes relationship between heartbeats and pulse rate	Possible explanation
		Realises the significance of measurement of heartbeat and pulse rate	Applies understanding to daily life Normal pulse rate is 70 – 80 per minute
		Realises the significance of doctor measuring the heartbeat and the pulse rate of a person	Pulse rate increases after exercise Pulse rate increases when suffering from fever

Activity 4 Weather Data for a Week

Individual Activity **Class VII**

Cut out the weather report for a week from any newspaper. If you do not get a newspaper at home, borrow from your neighbours/friends and copy/paste these reports in your notebook. You can also collect weather reports from a library or internet.

Now record the information from the weather reports collected by you in the given Table.



A sample of a weather report from a newspaper

Table : Weather Data for a Week

Date	Max. Temp. (°C)	Min. Temp. (°C)	Min. Humidity (%)	Max. Humidity (%)	Rainfall* (mm)

*Leave the space for rainfall blank if the data is not available

Assessment Table

Sl.No.	Indicators of Learning	Activity Specific Indicators (What can be Assessed)	Assessment of Learner (Check-list)
1.	Reporting data	Tabulates data	Yes/No Checks that data is entered in definite order (datewise/haphazard)
2.	Analysing data	Arrives at correct conclusion/inference	Possible conclusions are : • Temperature varies everyday • Rainfall may or may not take place • Increased humidity increases the likelihood of rainfall (Children may arrive at varied conclusions)
3.	Application to daily life	Correlates with the environment Possibilities : • Range of maximum/ minimum temperature during June/December • During rainy season with increase in humidity, number of days of rainfall increases	Learner relates temperature, humidity and rainfall with reasons

4.	Cooperation/ Values	Acknowledges the references	Learner realises that generation, collection and analysis of data involves a number of persons even if they were not directly in contact with each other

Activity 5

Role of Microorganisms in Disposal of Waste

Group Activity **Class VIII**

Pot containing plant waste

Take two pots and fill half of each pot with soil. Mark them A and B. Put plant waste in pot A and things like polythene bags, empty glass bottles and broken plastic toys in pot B. Cover the pots with a layer of soil. Set the pots aside. Observe them after 3-4 weeks.

Pot containing polythene bags, broken plastic toys and empty glass bottles

Assessment Table

Sl.No.	Indicators of Learning	Activity Specific Indicators (What can be Assessed)	Assessment of Learner (Checklist)
1.	Experimental Skills	Segregates waste into biodegradable and non-biodegradable	Yes/No
		Covers the waste properly with soil	Yes/No
2.	Observation and Reporting	Notices the difference in the state of materials in both pots after 3-4 weeks	Observes correctly/ incorrectly
		Tabulates data	Records correct entries in each column

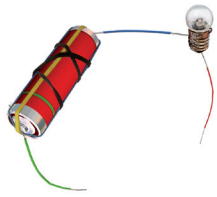
3.	Asking Questions	Shows interest/ curiosity in related knowledge	Yes/No Type and number of queries Possibilities : • Does decomposition take place only in soil or in water, air too? • Can any non-living thing be decomposed?
4.	Analysis/ Applications	Possible explanation Apply understanding to daily life	Realises: • Role of microbes in waste decomposition and disposal • Importance of segregation of waste
5.	Concern/Values/ Attitude	Relates her/his understanding for the conservation of environment	The child is aware of : • Accumulation of non-biodegradable waste causing pollution to environment • Use of microorganisms in cleaning the environment • Use of microorganisms for formation of manure • Works with the team to collect waste from the surroundings, segregate and dispose off properly • Displays leadership qualities

Activity 6 — Electric Conductors and Insulators

Individual/Group Activity **Class VI**

Make a tester as shown in Fig. Bring the free ends of the two wires close, to let them touch each other. Does the bulb light up? Collect samples of different types of material such as key, eraser, scale, matchstick, glass

bangle, iron nail etc. Bring the free ends of the wires of your tester in contact with the two ends of the samples you have collected one by one. Make sure that the two wires do not touch each other while you are doing so. Does the bulb glow in each case? Make a Table and record your observation.



A conduction tester

Table : Conductors and Insulators

Object Used	Material it is Made of	Bulb Glows? (Yes/No)
Key	Metal	
Eraser	Rubber	
Scale	Plastic	
Matchstick	Wood	
Glass Bangle	Glass	
Iron Nail	Metal	

Assessment Table

Sl.No.	Indicators of Learning	Activity Specific Indicators (What can be Assessed)	Assessment of Learner (Checklist)
1.	Experimental skills	Makes the tester	Collecting samples of a variety of material Displays skills for making connections, choosing bulbs and cells
		Uses the tester correctly	Whether uses different materials

2.	Observation and reporting	Observes whether bulb glows or not with a particular material	Yes/No
		Fills up the third column of the above Table as per observations	Yes/No
3.	Analysing data/Drawing conclusions	Draws correct conclusions/ inferences on the basis of observations	If the bulb glows, the material is conductor of electricity. If the bulb does not glow, the material is insulator.
4.	Application	Explains the use of various materials in electrical appliances on the basis of conclusions	Wires are made of conductors: copper, aluminium Handles of electrical appliances are made of insulators
5.	Attitude	Takes adequate safety measures in life	Does not touch electrical appliances without guidance

Demonstration : Test for Starch

We would require a leaf, spirit, a beaker, test tube, heating device, water, a plate and iodine solution for this activity.

Put a leaf in a test tube and pour spirit to completely cover the leaf. Now, put the test tube in a beaker half filled with water. Heat the beaker till all the green colour from the leaf comes out into the spirit in the test tube. Take out the leaf carefully and wash it in water. Put it on a plate and pour some iodine solution over it.

What does the leaf contain?

Assessment Table

Sl.No.	Indicators of Learning	Assessment of Learner (Check-list)
1.	Experimental Skills	What was the colour of leaf? How much spirit was added to the test tube? What care was taken while pouring spirit into the test tube? Why was the beaker only half-filled? Was the base of the test tube in contact with the bottom of the beaker?
		What was the extent of heating? Was there any change in the colour of spirit solution? How was the leaf taken out from the hot solution? What care was taken to prevent damage to the leaf? What was the colour of leaf? What kind of plate was used for placing the leaf? What was the colour of iodine solution? How much solution was poured over the leaf? What happens to the colour of the leaf when iodine solution is poured on the leaf?
2.	Analysis and Drawing Conclusions	Why did the leaf lose its colour on boiling in spirit? Why did the leaf turn blue-black on addition of iodine solution?
3.	Providing Explanations	Can this test be done without removing chlorophyll? Why is chlorophyll removed?
4.	Asking Questions (Possible queries by children)	Students may be encouraged to ask questions. They should not be assessed based on their queries.
5.	Applications to daily life	Why do leafy vegetables provide us with nutrition? What is the importance of leaves in vegetation?
6.	Values/ Attitudes/ Concerns	Why are plants necessary for the survival of organisms?

3.2.2 Projects

Use of Projects for Assessment

Project work in science is usually an organised search, construction or task directed towards a specific purpose. Project work may involve a student or a small group of students. It provides an opportunity to the students to identify a problem, to design a work plan, to address the problem, to search for appropriate resources, to carry out their own plan and to draw conclusion on the basis of data/information collected. In the process, the students learn fundamental principles of science, methods and processes of science, and are exposed to the phases involved in a scientific investigation. The activities related to the project may involve use of laboratory, library consultation, multimedia, internet, collection of information/data from the field or at home through surveys/ interviews/collection of samples.

The experimental work may provide children an opportunity to have hands-on experiences in manipulation of a variety of tools, devices and apparatus and the process help them to imbibe laboratory skills and skills of self-expression. In yet another type of project, children may be involved in interacting with their peers, teachers, experts and/ or members of the community to seek information on various issues and concerns to be addressed. Preparation of charts/models/publicity material, organisation of campaigns to focus attention on one or more social issues may also fall under the category of projects.

Many projects can be designed with a view to further extend/clarify the concepts of science to be learnt through the prescribed syllabus. Questions asked by the children in the classroom may provide the basis for investigation as these are likely to sustain interest of children.

Projects help to stimulate interest in science, arouse curiosity, develop ability of independent critical thinking, and provide experience in using the tools and techniques besides relating science with daily life situations and development of self-confidence. **As far as possible project work should be done during school hours, particularly at the Upper Primary Stage. If the nature of the project is such that it has to be done outside the school hours, teachers should encourage the students to do it themselves. The teacher should exhort children to work by themselves without involving their parents on a given project and report the task honestly. At the same time the teacher should also appreciate the honest reporting without worrying too much about the perfection of the task assigned.**

The type of project, its duration and the month in which it has to be done, should be according to the nature of the content and local conditions. Projects done in a group facilitate development of social traits like leadership quality, cooperation, compassion and tolerance.

Children often tend to be over enthusiastic; a teacher's role therefore ought to be guiding their wards to go for realistic project choices. The teacher's role in the project work is of a guide and a facilitator at all stages of the project.

Students can use a checklist while evolving their project to be clear and precise about their work. An example is given below :

- What do I want to find out?
- What materials do I need?
- What have I to do?
- What did I find out?

Project 1 **Class VII**

Involvement of the Learner	:	**Individual/Group**
Statement of the Project	:	Comparison of the moisture content in soil samples from different locations
Type of Project	:	Survey/**Investigation/**Charts/Models/ Toys /Role Play/Visits/Interview
Mode of Presentation of Findings	:	**Report/**Chart/Model/Toy/Story telling/ Debate/Discussion

Procedure

Select different locations for collection of soil samples. Weigh each sample of soil. Dry each sample of soil in the sun. Weigh them again and find out the loss of weight in each sample of soil. Also find out loss of moisture per unit weight of the soil. Compare moisture content of soil from different locations and relate it to the type of soil.

Children collecting soil

Assessment Table

Sl.No.	Indicators of Learning	Activity Specific Indicators (What can be Assessed)	Assessment of Learner (Check-list)
1.	Designing the project	• Selects different locations for collection of samples • Labels the samples	• Whether the selected locations have different types of soil? • Yes/No
2.	Experimentation/ Observation	• Weighs and records the same amount of each sample of soil and puts them separately • Dries all the samples of soil in the sun • Weighs and records each dried sample of soil separately	• Properly handles the samples while drying and weighing them • Records weight of soil sample in appropriate units
3.	Analysing and Drawing Conclusion	• Finds out loss of weight in each sample of soil and computes loss of moisture per unit weight of soil or in terms of percentage • Compares moisture content of soil from different locations and relates it to the type of soil	• Relates loss of weight of samples on drying with their moisture content • Makes correct calculations to estimate loss of weight in soil sample • Reports moisture content of each type of soil

Project 2 **Class VII**

Involvement of the Learner : **Individual/Group**

Statement of the Project : Comparison of deposition of soot/dust on leaves of plants at different locations

Type of Project : **Survey**/Investigation/Charts/Models/Toys/Role play/Visits/Interview

Mode of Presentation of Findings : **Report/**Chart/Model/Toy/Story telling/Debate/Discussion

Procedure

Observe the trees, shrubs and herbs planted by the roadside. Note whether their leaves have some soot/dust deposited over them. Make similar observations with the leaves of trees in the school compound or a garden or a park. Is there any difference in deposition of soot on leaves of trees near the road side? What could be the possible reason(s) for this difference? Take a map of your city or town and try to identify regions in the map where you have noticed very thick layer of soot on the plants by the roadside. Compare with the results obtained by other classmates and mark these areas on the map. Perhaps the results from all the students could be summarised and reported in newspapers.

Children observing trees, shrubs and bushes

Assessment Table

Sl.No.	Indicators of Learning	Activity Specific Indicators (What can be Assessed)	Assessment of Learner (Check-list)
1.	Designing the Project	• Selects locations • Collects samples of leaves with soot/dust deposition from different locations and labels them	• Whether the selected locations have same type of plants? • Whether the environmental conditions in selected locations are different?
2.	Experimenting/Observation	• Estimates the amount of soot/dust deposited on samples collected from each location and compares them	• Selects appropriate method for estimation of amount of soot/dust? Say, for example, by taking equal number of

			leaves of same type or same weight of leaves or any other • Method of comparison could be one of the following or any other. Only visual/collection of soot and dust by (i) wiping it with tissue paper/cloth/ cotton (ii) dipping equal number of leaves from different locations in same amount of water and comparing the turbidity
3.	Analysing and Providing Explanation	• Identifies the location(s) where leaves have higher deposition of soot/ dust on them • Provides reason for differences in soot/ dust deposition	• Correctly identifies the factors and relates deposition of soot/dust on leaves with the human activities/natural conditions in the surroundings of plants. (For example, Open to dust/ Traffic movement/ Combustion of fuels/ Industry/Factory)
4.	Reporting	• Describes the method followed for conducting project and draws appropriate conclusion	• Description of method • Evidences (samples of leaves) • Conclusion/inference in accordance with the evidences
5.	Concerns/ Attitude/Values	• Takes initiative in spreading awareness of air pollution	• Yes/No

Project 3 **Class VIII**

Involvement of the learner : **Individual/Group**

Statement of the Project : Investigation of practices of self-medication in the neighbourhood.

Type of project : Survey/Investigation/**Interview**/Charts/Models/Toys /Role play/Visits

Mode of Presentation of Findings : **Report/**Chart/Model/Toy/Story telling/Debate/Discussion

In our country people suffering from common ailments like cold and cough, mild fever, diarrhoea, vomiting often avoid consulting a medical practitioner. Instead, they often resort to buy medicines themselves or on the advice of the person manning medicine shops. This practice of self medication is not a healthy practice and sometimes may result in health complications.

Chemist shop

Assessment Table

Sl.No.	Indicators of Learning	Activity Specific Indicators (What can be Assessed)	Assessment of Learner (Checklist)
1.	Planning for interview schedule	• Identifies the set of people (families/ doctors/ chemists) to be interviewed and obtains their permission • Prepares questionnaires for interviewing and collects information	• Whether the questions framed can elicit desired information within stipulated time frame • Steps taken to record the information
2.	Analysing the collected information	• Looks for any common pattern	• Whether any pattern identified
3.	Preparation of report/ presentation	• Presents collected data in tabular form • Describes the steps followed for development of	• Description of method • Recognition of patterns based on evidences

		questionnaire and mode of collecting information • Conclusion / inference	• Conclusion / inference in accordance with the evidences
4.	Concerns/ Attitude/Values	• Takes initiative in spreading awareness about harmful effects of self-medication	• Yes/No

Project 4 — Class VII

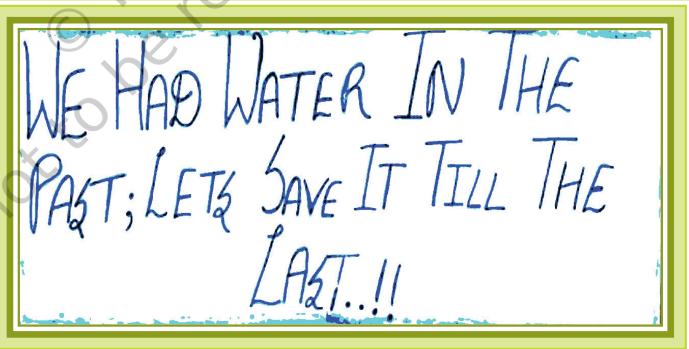
Involvement of the Learner : **Individual/Group**

Statement of the Project : Carry out an awareness campaign on the importance of conservation of water

Type of Project : Survey/Investigation/**Awareness Campaign (Charts/Slogans/Posters)**/ Models/Toys /Role play/Visits/Interview

Mode of Presentation of Findings : Report/**Chart/Slogans/Posters/Banners**/ Model/Toy/Story telling/Debate/ Discussion

Prepare charts/posters with appropriate slogans to convey the need for conservation of water and organise an awareness campaign using this material.



Assessment Table

Sl.No.	Indicators of Learning	Activity Specific Indicators (What can be Assessed)	Assessment of Learner (Checklist)
1.	Planning and Organising the Task	• Identifies different aspects of water conservation that could be highlighted through the campaign	• Whether the selected topics cover a wide spectrum of issues concerning water conservation?

		• Collects relevant reference material from different sources (books, newspapers, magazines, publicity folders/brochures of Government and non-government agencies, internet) • Decides about the mode of campaign (procession/meeting with the members of target group/ putting up posters at strategic locations)	• Are the issues chosen for the campaign appropriate keeping in view the interests of the target group?
2.	Organisation and Presentation	• Writes slogans and prepares charts/ posters/banners • Seeks permission of school authorities/ civil administration (if required) for the proposed campaign • Carries out the campaign	• To what extent were the materials prepared for the campaign informative, attractive and suitable? • Whether the campaign material had variety? • Successful organisation of the campaign. (Were multiple copies of publicity material used for campaigning, particularly if the campaign was carried through procession or putting up posters at strategic places)
3.	Reflecting (Concerns/ Attitude/Values)	• Motivates peers to participate in the campaign and share specific responsibilities • Shares the strengths and weaknesses of the campaign with peers/teachers	• Success in motivating peer groups for participation in the campaign • Effectiveness and honesty in communication

Project 5 **Class VIII**

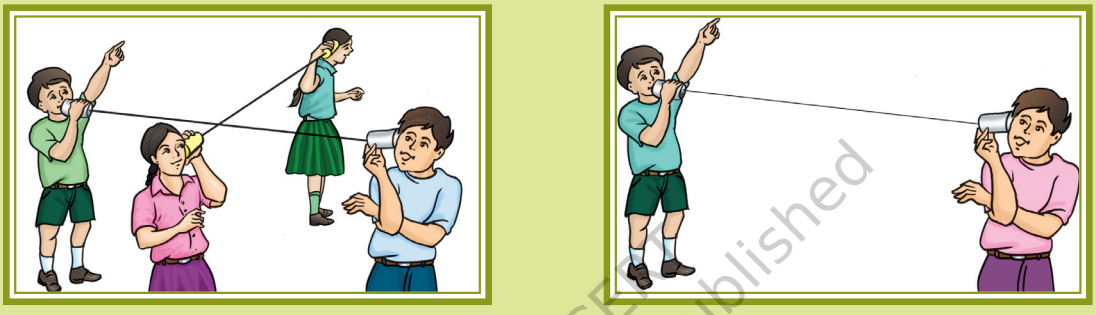
Involvement of the Learner : **Individual/Group**

Statement of the Project : Make a toy telephone

Type of Project : Survey/Investigation/Charts/Models/**Educational Toys** /Role play/Visits

Mode of Presentation of Findings : **Report**/Chart/Model/**Demonstration of Toy**/Story telling/Debate/Discussion

Note : A design of a toy telephone is shown in the Fig. Students may be asked to make toy telephones either individually or in groups using different types of materials for mouthpiece/receiver and the connecting strings.



Toy telephones

Assessment Table

Sl.No.	Indicators of Learning	Activity Specific Indicators (What can be Assessed)	Assessment of Learner (Check-list)
1.	Experimentation/ Designing	• The group makes toy telephone using the selected materials	• Assembles the materials to make a neat and efficient toy telephone
2.	Observation (Testing the working of toy telephones)	• Each group labels its toy telephone • Each group tests each toy telephone (made by all groups) and confirms whether working or not	• Takes care of factors that may affect the working of the toy e.g. string should be taut, control on loudness of voice to ensure its transfer through the string and not directly
3.	Analysing and Reporting	• Describes the steps involved in fabricating the toy telephone and the method used for their comparison	• Report reflects all the basic features for fabrication of toy telephone

3.2.3 Debate

Class VII

Involvement of the Learner : **Individual/Group**

Theme : Conservation of Plants and Animals

Topic : 'Habitat destruction due to encroachment is affecting wildlife!'

Note : The debate on the suggested topic may be organised by the teacher in the class ensuring participation of all the students. One of the ways could be to divide the class into 6/8/10 groups and assigning half the groups to speak in favour and the other half to speak against the topic. At the time of debate while members of one group present their views, members of the groups opposing the view may be given opportunity to ask questions.

Forest life

Assessment Table

Sl.No.	Indicators of Learning	Activity Specific Indicators (What can be Assessed)	Assessment of Learner (Check-list)
1.	Planning for the debate	• Identification of points of debate through discussion in each group and distribution of specific tasks to its members • Collection of relevant material from different sources (books, newspapers, magazines, publicity folders/brochures of Government and non-government agencies, internet) and their use to evolve the views of the group for the debate • Preparing answers to questions that may arise during the debate	• The points identified are relevant • The group assigns responsibilities to its members • Individual members in a group participate in evolving group strategy and take up responsibility for answering questions during the debate

2.	Concerns/ Attitude/Values (Cooperation among members of the group)	• Presentation of the views of the group in a systematic manner • Attending to questions of opposing groups	• To what extent were the views of the group relevant and supported with proper references or data • Coordination in the group during the presentation • Satisfactory explanation of questions asked

3.2.4 Written Test

What is a written test?

In a written test, the teacher frames a set of questions to assess whether teaching has resulted in the expected understanding of a subject. The questions framed for the test invite students to write the answers within a specified time.

What purpose does the written test serve?

Written test can assess what a student has learnt. The task can be given any time during the teaching-learning process. It helps in grading the students according to their performance. The outcome of the written test could be used to improve the teaching-learning process. Written test is also used to help the child to express what she/he has learnt and where she/he has to put in a little extra effort.

How frequent should the written tests be?

Apart from teaching, a number of learning activities are conducted for the students throughout the session such as classwork, homework, projects, group discussions, oral tests, practical activities, field trips, demonstrations etc. In all these learning activities, students are continuously assessed by the teacher in one way or the other. This assessment is for the continuous improvement of the learner.

However, it is suggested that the session should be divided into three terms, each of three to four months and one written test should be conducted in each term at a time convenient to the teacher. It is also suggested that teachers of different subjects of a class may sit together and decide on a time-table for written tests so that the student is not unduly burdened.

It is very important to understand that the written test can be from a part of the total content of the term. The remaining part of the content can be assessed in other ways like home/class assignments, activities, projects etc., as mentioned above.

What to test?

The main purpose of administering a test is to assess the extent of learning, in a given content area, the learner has attained. The questions are framed from the given content to test accomplishment of the learner.

It is however essential that the teacher must have some idea of the expected learning level of the students so that the questions must be set accordingly.

The types of questions that are usually included in a written test are Multiple Choice Questions (MCQs), Short Answer Questions (SAQs) and Long Answer Questions (LAQs). Written test can also be in the form of an open book test. Illustrated examples of the various types of questions are given below.

1. Multiple Choice Questions (MCQs)

Examples

1. A virtual image larger than the object can be produced by a

(a) concave lens

(b) concave mirror

(c) convex mirror

(d) plane mirror Answer (b)

Indicator : Reasoning and comparing the images formed by various mirrors.

2. Tooth decay is caused due to

(a) the acids released by bacteria acting on food particles left in between the teeth.

(b) fungi acting on food particles in the teeth

(c) the worms making holes in the teeth

(d) irregular shape of the teeth Answer (a)

Indicator : Analysis (making hypothesis, application to daily life)

3. The increase in the number of herbivores leading to overgrazing may result in

(a) conversion of fertile land into barren land

(b) increase in water holding capacity of the soil

(c) decrease in atmospheric temperature

(d) improved texture of the soil Answer (a)

Indicator : Concern for environment

4. Consider the following statements :

(a) Both acids and bases change colour to all indicators.

(b) If an indicator gives a colour change with an acid, it does not give a change with a base.

(c) If an indicator changes colour with a base, it does not change colour with an acid.

(d) Change of colour in an acid and a base depends on the type of indicator.

Which of these statement(s) are correct?

(i) All four (ii) (a) and (d) (iii) (b) and (c) (iv) only (d)

Answer (iv)

Indicator : Reasoning based on concepts of acids, bases and salts.

A multiple choice question consists of a stem in the form of a statement, a part of the statement or a question. Four options are given, one of which is the correct answer. A good MCQ should have options which are closely related, so that the student has to apply her/his knowledge to arrive at the correct response. MCQ questions are very useful for assessing a large number of students in a short time period as it takes less time than written responses.

Assessment of MCQ

Full credit to correct answer. Teacher may discuss in the class why one choice is correct and the other three are inappropriate.

2. Short Answer Questions (SAQs)

A : Fill in the blanks:

- A Plant with parallel venation will have ———————— roots.

Ans. Fibrous

Indicator: Observation/classification/differentiation between roots of plants on the basis of venation.

- Ant bite is treated with moist baking soda because the nature of the substance present in saliva is ———.

Ans: Acidic

Indicator: Application of the concept of neutralisation between acidic and basic substances related to daily life.

- Loudness is determined by ——— of vibration.

Ans: Amplitude

Indicator: Identifying the factor effecting the loudness of sound.

- Lightning conductor is placed at the ———— of the building to protect it.

Ans: Top

Indicator: Observation/logical thinking

Assesment of SAQs (Fill in the Blanks)

Full credit to correct answer, even if there is slight mistake in the spellings. The mistakes of the students including the spellings should be rectified by the teacher.

B. Diagram-based questions:

Answer the following questions on the basis of the photograph shown above.

(a) Name the site.

(b) If the place is left open and uncleaned, what kind of organisms will it breed?

(c) Can you suggest ways to minimise the adverse effect of such places?

Indicator : Observation/application/awareness

Assessment: It is an open ended question. Student may give a variety of answers. Teacher may be flexible in assessing such answers. The teacher should discuss the answers to the questions in the class.

C. Activity-based questions:

An activity or demonstration is done by the teacher or the students. This is followed by questions.

An example is given below :

- Mix some soil to water in a glass tumbler.
- Let it stand for half an hour.
- Observe the water carefully and note your observations.

- If the water is still muddy, impurities can be separated by filtration using a filter paper.

After the teacher demonstrates the above activity, the following questions may be asked :

(a) Why did some soil settle at the bottom of the beaker?

(b) What will you call this process?

(c) What is the role of filter paper in this activity?

(d) If you do not have a filter paper, which other material can you use in such an activity?

Indicator: Observation, analysis, application

Filtration using a filter paper

Assessment: Appropriate credit should be given for the answer. Some students may not be able to write/mention the process, the role of the filter paper or the name of material which can be used in place of the filter paper**.** The acitivity may be revised in the class to ensure that every student understands the concept.

Short answer questions may have fixed-response or they could be open-ended. They may require the student to respond in one word, a few words or a few sentences. The type of SAQs are: Fill in the blanks, Completion of statements, True/False, Match the columns, Figure based, Graph based etc. These questions help to assess simple recall, understanding application etc. It is important that answers should be precise and to the point.

3. Long Answer Questions (LAQs):

1. List various nutrients present in food. Name two food items which are rich in any two of these nutrients. Explain their functions.

Indicator : Recall and explanation

Assessment

(i)	List of nutrients	4 marks
(ii)	Names of the food items containing various nutrients	2 marks
(iii)	Role of nutrients in our body	4 mark
	Total	10 marks

(a) Sometimes students write food items in place of nutrients**.** Teacher may explain the difference between nutrients and food items.

(b) Students are not able to identify the correct role of different nutrients. Teacher may suggest to the student to revise the topic or explain the concept in class again.

2. Why should an electrician use rubber gloves while replacing an electric fuse? Explain.

Indicator: Application, explanation

Assessment

(i)	Student understands that rubber gloves are poor conductor of electricity	1 mark
(ii)	Student also understands that human body is a conductor of electricity	2 marks
(iii)	In the absence of gloves, she/he may conduct electric current through her/his body and get electric shock, which may be fatal	2 marks
	Total	5 marks

Students may give answers of the following types :

(a) Gloves protect her/his hand

or

(b) Gloves protect her/his life

or

(c) Gloves are poor conductor of electric current

or

(d) Without gloves she/he may get shock

The teacher may help the students to understand the right concept of conductors and insulators

3. (a) Is rusting a physical change or a chemical change? Explain.

(b) Why is rusting of iron object faster in coastal areas than in deserts?

Indicator: Identification, explanation and application.

Assessment

(i)	Rusting is a chemical change	1 mark
(ii)	Reason for — why is it a chemical change?	2 marks
(iii)	Explanation for — why rusting is more common in coastal areas?	2 marks
	Total	5 marks

It is suggested that teacher should revisit the phenomena of rusting if students are not able to differentiate between physical and chemical changes. She/he may also perform some activities to explain this concept.

4. How will you make the environment of your school/home clean?

Indicator: Observation, environmental concern

Assessment: It is an open-ended question and students may give a variety of answers. Teacher may be flexible in assessing such answers.

The answers may include various points. Some of these may be

(a) dumping of garbage at a proper place.

(b) periodic cleaning of your surroundings.

(c) planting saplings, maintaining gardens and potted plants.

(d) checking the wastage of water

(e) cleaning drains from time to time

(f) covering drains properly etc.

The teacher should discuss all the possible answers.

Answers to LAQs may be about 8-10 lines. If required, this may include the related diagrams, graph, table etc. LAQs allow students to express their knowledge, understanding and application of the concepts in writing. At the same time these questions also develop the skills of elaborating/explaining and illustrating an activity.

4. Open Book Questions

On burning, a non-metal A reacts with oxygen to produce a gas B. B is dissolved in water. You may use the textbook to answer the following questions:

(i) What is the name of the non-metal?

(ii) Which gas is formed when this non-metal reacts with oxygen?

(iii) What change of colour will you find when strips of red and blue litmus papers are dipped in the solution formed in the jar?

Indicator: Identification/classification/drawing inference

Assessment: Appropriate credit should be given for the answers.

Some students may not be able to write correct name of non-metal or the gas etc. The concept may be revised in class by the teacher to ensure that every student understands the concepts involved.

In an open book test, the student can take help of the textbook while answering questions. Students find such questions very useful, as there is no burden of memorising any answers.They get full opportunity to explore the book for the correct answer. In an open book test a concept may be given in the form of a statement and a set of questions may be asked. The student is allowed to search the answer in the book for writing it in the answer sheet.

3.2.5 Crossword Puzzle

Rational

1. To engage the students in a fun-filled and participatory form of teaching-learning process, students love to take up the challenge of filling up crossword puzzles.
2. The students can use 'clues' and 'cues' to solve the puzzle. 'Clues' are in the form of sentences and 'cues' are in the form of letters given in the crossword. Clues given for solving the crossword puzzle are based on various indicators of learning such as, observation, classification, analysis and application of concepts.

Class VI

Topic : Light, Shadows and Reflections

Type : Individual, Self/Peer assessment in the classroom

Time alloted : (a) For solving the crossword puzzle = 20 minutes

(b) For self/peer assessment = 10 minutes

Activity : To solve the crossword puzzle on the basis of the clues given.

Support Material

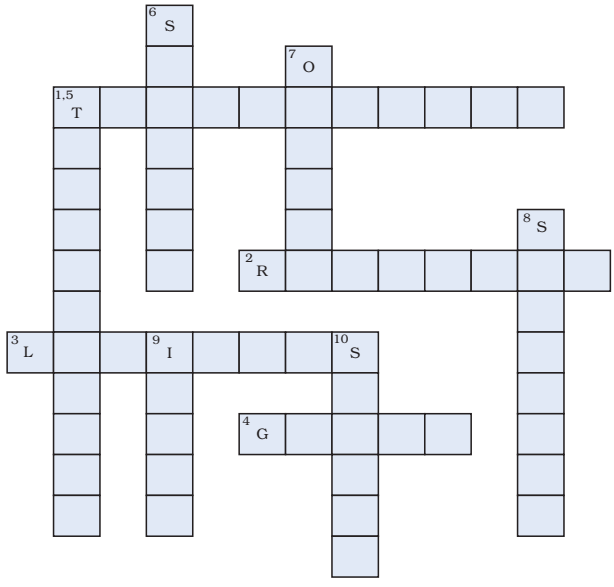
- Blank Crossword Puzzle grid with clues are written below.
- Assessment Table for Self-assessment/Peer assessment.

Note : To save paper, the crossword puzzle grid and the assessment table can be given back to back on one sheet.

Solve the Crossword Puzzle
(Front Page of the Worksheet)

Across

1. We can see through glass because it is a _____ object.
2. We see our image on the surface of a pond because water _____ light.
3. _____ objects give out or emit light of their own.
4. The shadow of _____ material which cannot be seen clearly on a screen.



Down

5. Butter paper is a _____ object because we can see partially through it.
6. The shadow of an eagle on earth gets _____ as it flies towards the sky.
7. A wooden scale is _____ because it does not allow light to pass through it.
8. Image formed in a pinhole camera is inverted because light moves in a _____ line.
9. The _____ of an object is formed when light gets reflected from a mirror.
10. The _____ is formed on a screen when an opaque object comes in the path of light.

(Back Page of the Worksheet)

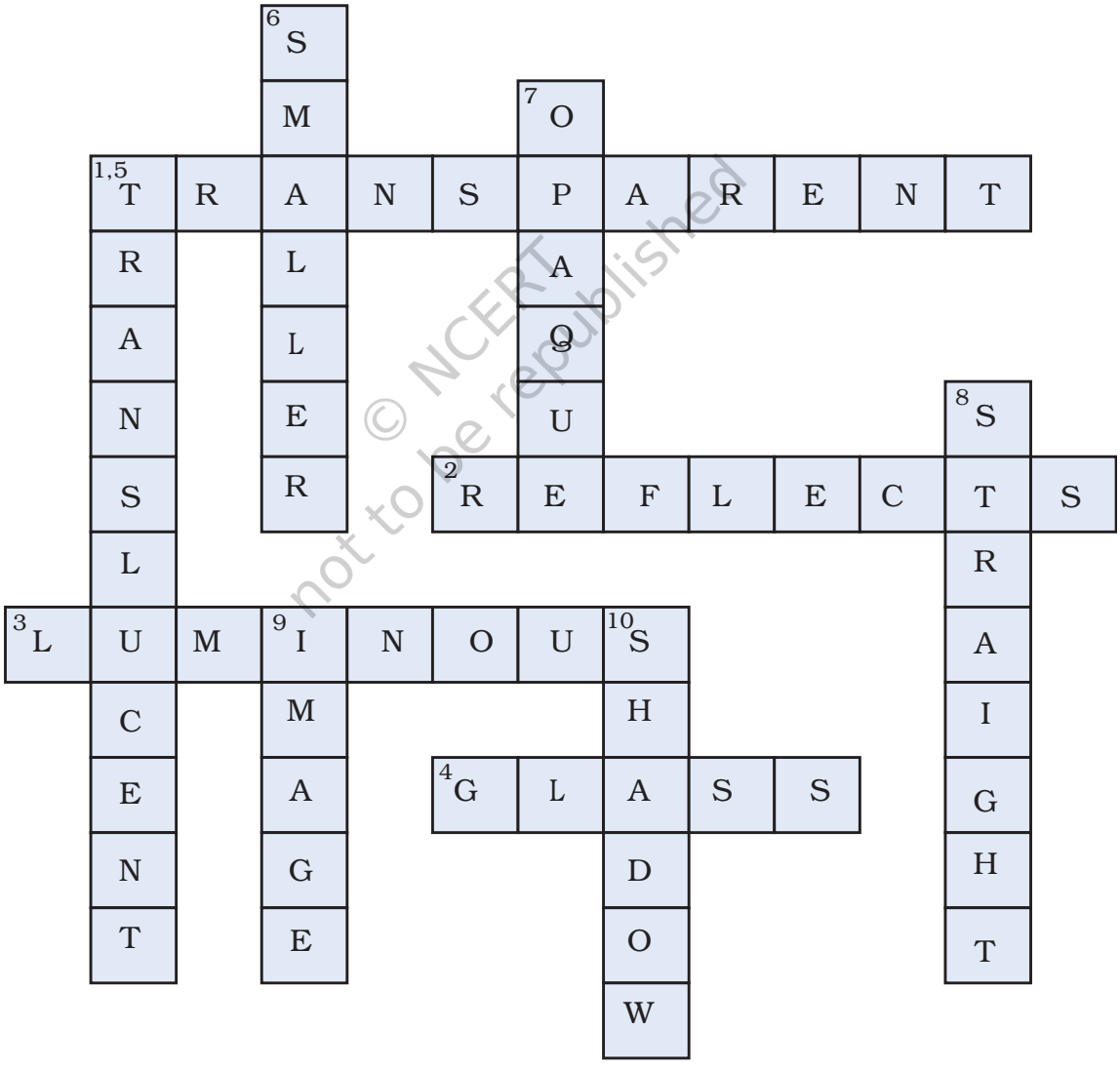
Assessment Table

Sl.No	Indicators of Learning	Clues Based on Indicators	Assessment of the Learner (Put a Tick (√) for Correctness)
1.	Observation	Across 1	☐
		Down 9	☐
		Down 10	☐
2.	Classification	Across 3	☐
		Down 5	☐
		Down 7	☐
3.	Analysis/ Application	Across 2	☐
		Across 4	☐
		Down 6	☐
		Down 8	☐

Note

- The answer should be discussed in class before self-assessment/peer assessment.
- The answer should not be included in the Assessment Table, which is to be given to the students.
- Qualitative assessment based on the indicators can be given by the assessor.

Answer Key



3.2.6 Field Trip

Field trip is an educational activity that gives outdoor experience which cannot be provided in the classroom. It excites students of all ages, especially when they are in the upper primary stage. It helps to relate concepts of science learnt in the classroom to real life and to the environment. It enhances their observation and data recording skills. Students are active, motivation is elevated and critical thinking is also enhanced. It is not necessary that a field trip be always conducted at a far off place. Even a visit to the school garden can be rewarding. There may be many interesting places in the vicinity of the school which may be worth visiting for the students.

Class VIII

Theme : Conservation of Plants and Animals

Mode of Presentation : Presentation of group reports

Involvement of the Learner : Group

Procedure

A. Pre-visit

This will include the choice of a biodiversity park or a park in the neighbourhood of the school. A prior visit by the teacher can be helpful in order to decide on issues like time required, mode of transport needed, other requirements for the trip, such as permission from authorities. The teacher may advise the students about what to study on the trip.

Instructions given to the students will include an introduction to the place to be visited and material to be taken along :

- Notebooks/Worksheet
- Pen/Pencils
- Hand lenses
- Specimen bags
- Water bottles

B. During the Visit

Students will be divided into groups and there will be a discussion with the teacher about the division of responsibilities. The teacher and students will identify specific group tasks to be undertaken during the visit.

Field Trip

Example

Group I will study sizes and shapes of different plants.

Group II will study different types of leaves (colour, venation, whether simple or compound ---).

Group III will study types of flowers and fruits.

Group IV will study major structural features of birds, insects and animals found in the park.

Group V will observe animal behaviour.

Note : The group tasks given above are suggestive and the teacher can choose activities appropriate to the site to be visited.

C. Post-visit

- The students will record/tabulate their observations in their notebooks/ worksheets.
- This can be followed by a groupwise discussion of the information gathered and consolidation of knowledge with the help of the teacher.
- The task can be concluded with an oral/written group presentations.

Assessment Table

Sl.No	Indicators of Learning	What can be Assessed
1.	Observation	Variety of flora and fauna observed. Relevance of observations according to assigned group task. Details of observation.
2.	Asking Questions	Quality of questions asked/discussion. For example, is the pink, yellow colour of rose natural or have they been produced by mixing two or three different breeds? Level of relevance between classroom learning and the field situation.
3.	Reporting and Recording	Whether a student has organised her/his observations? Is the reporting relevant to the observations made? Is there clarity in the presentation made?
4.	Attitude/Concern for Environment	Concern for environment. Were students making use of dustbins to throw wrappers of eatables etc? Were students showing concern for the birds and animals or were they disturbing them? Were the students able to relate the trip to the importance of maintaining biodiversity and the consequences of imbalance in nature?

3.2.7 Quiz

Quiz : As a means of learning and assessing

Quiz is an intellectual pursuit which is both educative and entertaining. It is an entertaining mind sport which tests a persons' mental ablity, attention, general awareness and speed with which a person can recall and process the information. It expands a person's horizon of knowledge, sharpens memory and prompts spontaneous communication. It is of equal interest to the participants and to the spectators. Quizzes are generally assessed on the basis of a number of questions answered correctly.

Class VII

Topic : Light

Number of Students : 40

Involvement of the Learner : Group

Procedure

First Round — **Observation and Recall Round**

For Team 1

Question : What kind of reflecting surface is in the inner side of a serving spoon?

For Team 2

Question : What kind of reflecting surface is the surface of a shiny cycle bell?

For Team 3

Question : What kind of reflecting surface is the inner portion of the headlight of a car?

For Team 4

Question : What kind of reflecting surface is the inner portion of a room heater?

Second Round — **Experimentation and Observation Round**

For Team 1

Question : Which mirror forms diminished and real image?

For Team 2

Question : Which mirror forms enlarged and virtual image?

For Team 3

Question : Which mirror forms diminished and virtual image?

For Team 4

Question : Which mirror forms enlarged and real image?

Third Round — Application Based Round

For Team 1

Question : Which lens is used for reading small letters?

For Team 2

Question : Which mirror is used as rear view mirror?

For Team 3

Question : Which lens is used in a microscope?

For Team 4

Question : Which mirror is used by dentists during dental check up?

Fourth Round — Reasoning and Explanation Round

For Team 1

Question : What happens to a ray of light when it passes through a glass prism? Give reason for your answer.

For Team 2

Question : What acts as a prism in the atmosphere? Explain.

For Team 3

Question : What is the composition of white light? How will you support your answer?

For Team 4

Question : How can you get white light after dispersion through glass prism?

Assessment

1. As it is a team effort, each member of the team should be given the same score.
2. All the students should participate in deciding the answer. It provides an opportunity for active, collaborative and friendly learning.
3. The doubts or queries must be discussed once the quiz is over.

Assessment Table

Sl.No.	Indicators of Learning	Team 1	Team 2	Team 3	Team 4
1.	Observation and Recall (First Round)				
2.	Experimental and Observation (Second Round)				
3.	Application Based (Third Round)				
4.	Reasoning and Explanation (Fourth Round)				

3.2.8 Science Exhibition

An exhibition can provide a forum for the display of the work done by the students throughout the year. It serves to motivate the students and provides a feedback to parents about their child's progress. It can also help students share their work with one another in order to build a better understanding of the concepts involved.

The display of various models can provide a spark to other students to participate in such events. In addition this will also provide viewers a glimpse of what science can do.

Mode of Presentation : Display of models, graphs, charts, project reports, surveys, activity reports, scientific toys, dramatisation.

Involvement of Learner : Individual/Group

Procedure

- The class will be divided into groups of five students each. Each group will be given sufficient time for preparation.
- Class discussion facilitated by the teacher will be held in order to identify themes for the exhibition.

  Example : One group can choose the topic 'light' to prepare models, projects, activities, charts, pictures, graphs, surveys etc., to display.
- Choice of time to hold the exhibition can be such that a wide audience is assured. The occasion can be the Science Week, Parents-Teacher Meeting, School Assembly or any other appropriate time.
- The responsibility of putting up the exhibits and maintaining them during the exhibition will be shared by the group concerned.
- The audience can ask questions about the working of various models and the students should be able to answer these queries.
- Finally, the role of teacher would be that of a 'mentor' suggesting improvement of the event.

Science Exhibition

3.2.9 Class Assignment/Home Assignment

Any task in the class during the process of teaching-learning can be considered as Classwork. Learners in the class get involved in various tasks, such as, demonstration, experiment, project, class discussion, presentation, written task etc. These include observing, questioning, discussing, handling material, drawing conclusions, communicating etc. All of these activities can be the basis of assessment. Classwork assessment should be an ongoing process. It should form an integral part of Continuous and Comprehensive Evaluation.

Various tasks undertaken in the class present a variety of situations for a learner to learn at her/his own pace, in her/his own style or according to her/his level/ability of understanding. These tasks also enable a learner to apply her/his learning to her/his day-to-day experiences.

As in other tasks the classroom assessment helps in

- knowing the effectiveness of teaching-learning process.
- comparing the various approaches implemented.
- identifying the learning gaps of the learner immediately.
- providing additional instructions/inputs to pluging the identified gaps.
- providing feedback to the learner for improvement of her/his learning.

Example **Class VI**

Type : Numerical-based Problem

Duration : 5 Minutes

Topic : Motion and Measurement of Distances

Q. Convert the following units of measurement as directed.

(i) 1 cm = _____ m

(ii) 5 m = _____ mm

(iii) 18 km/hr = _____ m/s

(iv) 20 minutes = _____ second

(v) 60 second = _____ hours

Objectives

- To provide enough practice to the students so that they can interconvert units.
- To give them practice in the use of standard units and their symbols.
- To give them enough practice in manipulating standard units while solving numerical problems.

Assessment Table

Sl.No.	Indicators of Learning	Activity Specific Indicators (What can be Assessed)	Assessment of Learner (Check-list)
1.	Understanding of Concept	Learner has understood the relation between the units and sub-units of physical quantities such as distance, time etc.	Can do interconversion between units
2.	Application of Concept	Learner has applied this understanding to interconvert the given units	

Note : This kind of assessment can be conducted as peer assessment also. Students can interchange the worksheets and check each other's work. Common mistakes can be identified and the concept can be dealt again.

Type : Observation-based Task **Class VII**

Duration : 10-15 Minutes

Topic : Light

(Assessment done after the completion of the sub-topic spherical mirrors)

A set of different types of mirrors (plane and spherical) can be provided to the learners. Learners are given 10-15 minutes to observe the mirrors and images formed by them. After the observation they can be assessed on the given worksheet or orally.

Worksheet

Q1. Fill in the blanks:

(i) The mirror which produces virtual and magnified image is a _____.

(ii) The mirror which produces virtual and diminished image always is a _____.

(iii) The mirror which produces both inverted and erect image is a _____.

(iv) The mirror which produces virtual and same sized image is a _____.

Q2. Give reasons for the following:

(i) Concave mirror is used by dentists.

(ii) Convex mirrors is used as rear view mirrors.

Q3. Give one difference between real and virtual image.

Assessment Table

Sl.No.	Indicators of Learning	Activity Specific Indicators (What can be Assessed)	Assessment of Learner (Checklist)
1.	Observation/ Enquiry	Identifies different types of mirrors	Can identify convex, concave and plane mirrors by (i) touching, (ii) looking into them
2.	Providing explanation/ Relating to day-to-day life	They will provide reasons for the use of different mirrors for different purposes	Were able to relate the type of mirrors with its usage

Type : Diagram-based Task **Class VII**

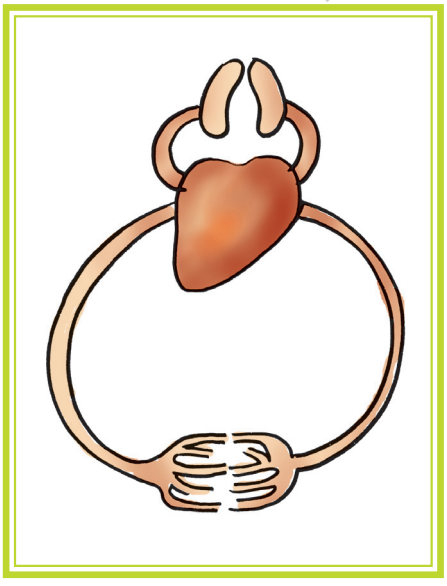
Duration : 30 Minutes

Topic : Transportation in Animals and Plants

Note: Assignment to be given after the topic "Parts of Heart and the Direction of Flow of Blood" has been taught.

Q1. Observe the given diagram of a heart and make an 8-step flow chart to show the path of blood in the human heart.

Note: The first and the fourth steps are given. Specify at each step of the flow chart whether the blood flowing is deoxygenated or oxygenated.



Pathway of Blood	Oxygenated or Deoxygenated
1. Right Auricle	
2.	
3.	
4. Lungs	
5.	
6.	
7.	
8.	

Assessment Table

Sl.No.	Indicators of Learning	Activity Specific Indicators (What can be Assessed)	Assessment of Learner (Checklist)
1.	Observation	Correlate parts of heart with the various steps in the flow chart	Shows the pathway in correct sequence
2.	Classification	Indicate the type of blood (oxygenated/deoxygenated) in each step of the flow chart	Understands the role of heart and lungs in the circulation of blood

Type : Demonstration-based Worksheet **Class VII**

Duration : 20 Minutes

Topic : Acids, Bases and Salts

The teacher will demonstrate the following activities in class.

1. Activity
   - Mix some water with lemon juice in a plastic cup/tumbler/test tube.
   - Put a drop of the above solution on a strip of red litmus paper with the help of a dropper. Is there any change in colour?
   - Repeat the same exercise with the blue litmus paper.
2. The teacher may also carry out the activity with the help of substances like – shampoo, tap water, detergent solution, vinegar, baking soda solution, sugar solution, soap solution etc.
3. Teacher may ask the students to record their observations in a tabular form given below.

Students' Worksheet

Sl.No.	Test Solution	Effect on Red Litmus Paper	Effect on Blue Litmus Paper	Inference
1.				
2.				
3.				
4.				
5.				
6.				

Assessment Table

Sl.No.	Indicators of Learning	Activity Specific Indicators (What can be Assessed)	Assessment of Learner (Checklist)
1.	Observation and Reporting	Observes the correct/ appropriate change in colour for red litmus/blue litmus paper	Reports that the blue litmus turns red in acidic solution and red litmus turns blue in basic solution
2.	Analysis	Analyses the colour change and correlates with the nature of substance	

Home Assignment

The basis for assessment of home assignment is the same as for the class assignment. The same indicators and tools would apply here too. An example of home assignment is given below.

Class VIII

Topic : Cell – Structure and Functions

Q. Differentiate between the following in a tabular form. Support your answer with diagrams and examples.

1. Cell wall and cell membrane
2. Prokaryotic and eukaryotic cells
3. Plant and animal cells

Assessment Table

Sl.No.	Indicators of Learning	Activity Specific Indicators (What can be Assessed)	Assessment of Learner (Checklist)
1.	Observation and Reporting	Designs a table for writing the differences on the basis of observation of features	Yes/No
2.	Classification	Classifies similar features related to the concepts	Yes/No
3.	Application/ Reasoning	Gives examples	Giving appropriate examples with reasons
4.	Drawing Skills	Supports the answer with neat and appropriate diagrams	Whether able to draw neat and labelled diagrams?
5.	Values/ Attitudes/ Concern	Neatness, completeness, punctuality	Whether able to complete the work on time?

3.2.10 Science Journal

The teacher may advise students to maintain a Science Journal. She/he may encourage students to write their experiences and ideas on daily basis and collect information by consulting resources available to them. On topics related to the concepts dealt within the class, Science Journal will help foster a sense of scientific inquiry in the child.

For example, if a child gets interested in knowing more about, say, earthquakes and earthquake-resistant buildings, she/he may be encouraged to collect the details of such buildings by exploring the library or the internet. This information may be compiled in the Science Journal.

As another example, suppose a student, while going through the chapter on 'Habitats' gets interested in learning more about desert. She/he may use a globe to find out about deserts of the world. She/he may also find out how people live there and cope with the shortage of water and may find out about other animals which have adapted to desert conditions for their survival. The child may collect newspaper articles on any subject such as the latest development in the field of Space Science, Medicine, Food Production, Robotics etc. Articles like Do You Know, Quires, Poems etc., can also be included in the Science Journal.

Recently, there was a report in the newspaper on a controversy about the nature of the bamboo plant, whether it was a grass or a tree. Since children are familiar with the bamboo plant from their science textbook, they could search various sources to find out the true nature of this plant. This information should form a part of their Science Journal.

The Science Journal can be maintained by an individual child or collectively by a group or by the whole class. The teacher may go through the Science Journal and give feedback to students in the form of encouraging comments/remarks.

3.2.11 Anecdotal Records

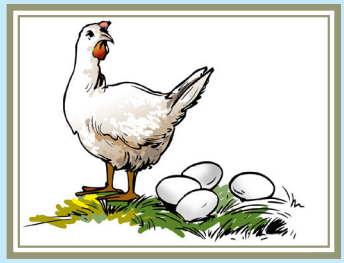
Anecdotal record refers to written description of a child's progress that a teacher keeps on a day-to-day basis. It provides observational narrative records of significant incidents in a child's life.

During teaching-learning process, the teacher sometimes comes across enquiry-based questions, observed by the children whose validity is much beyond the classroom. The records of such anecdotes and the response of children to these anecdotes can be a powerful tool for assessment and guiding them to the right path.

Example

While teaching 'Fertilisation' in Class VIII, the teacher told that a hen lays an egg which is already fertilised and sits on it to hatch it. A child suddenly asked the following question:

"Why does the hen take the trouble of laying an egg and hatching it, instead of directly delivering the chick?"



This question sets a wave of excitement in the class and every child started thinking about the answer to this question. Various possible answers were discussed in the class. It so happened that the teacher herself was new to biology teaching. She scrambled for a possible answer that she could find. She said that she would consult the biology expert. However, in her assessment this child stood outstanding. Anecdotes of this type can arise in any class and such an out of the box thinking should alert the teachers to use these opportunity to assess her students.

3.2.12 Portfolio

Student portfolio provides evidence of a students' knowledge, skills and attitudes. It is a documentation of the students' growth. Portfolios are portraits of the students during a term or throughout the year. All tasks assigned to the students and assessed by the teacher should go into her/his Portfolio.

Portfolio helps in a variety of ways :

- It enables the teacher to assess the child holistically.
- It helps the learner in reflecting and assessing their own work for further improvement.
- It fosters increased communication between teacher and student, teacher and parent, and teacher and other professionals in the school regarding the student's achievement, progress and growth.
- A portfolio is a collaborative effort between the teacher, the student and the parents.
- Portfolio helps the teacher to assess the child's attitudes, interests, ideas, learning styles, strengths and weaknesses, process skills, inquiry skills and content acquisition.

The portfolio of each student should be maintained wherever possible – School or Home. The portfolio can contain early drafts as well as improved drafts of the tasks. These help in showing the development of thinking and process skills. From the portfolio, students will decide with their parents and teachers regarding the material that will be considered for reporting. The portfolios should be periodically reviewed and the learners kept updated for their comprehensive development.

Think and Reflect

- Choose any topic from *Science Textbook of Class VIII* and construct ten Objective Type Questions for the same. Also, mention the essential points you have kept in mind while framing these questions.
- Name and explain the indicators which a teacher would keep in mind while evaluating a project work?
- Go through the *Science Textbook of Class VII* and suggest a few field trips to enrich each chapter of the textbook.

CHAPTER 4

RECORDING AND REPORTING

INTRODUCTION

A teacher assesses students on various tasks during the course of teaching-learning process. This helps teachers to assess the performance of the students. The feedback provided by assessment guides the teachers in improving their teaching practices. The assessment has to be recorded and reported to children, their parents and school authorities. It must be emphasised that reporting to children would be in a positive framework. It should appreciate their achievements with a view to improving their abilities. Recording and reporting also help teachers to understand strengths and weaknesses of their students. If Continuous and Comprehensive Evaluation (CCE) is carried out in the manner suggested in the sourcebook, it will obviate the need to hold semi-annual and annual examinations. This will reduce considerably mental stress on children, teachers and parents. In addition, this will save almost a month of precious teaching time, which teachers can utilise in improving teaching-learning process.

4.1 RECORDING AND REPORTING HELP TEACHER

Recording and Reporting help the teachers:

- to get feedback about teaching-learning process.
- to use additional resources and teaching method to strengthen the concepts.
- to provide feedback and motivate students for their improvement.
- to share performance of students with parents and school administration and seek their cooperation.

4.2 GRADING STUDENTS' PERFORMANCE

The achievements of the students are usually measured in terms of marks. At the moment this is being carried out by awarding marks on a scale that may run from 0-100. The performance of the students depends on the tests conducted. If a test happens to be easy, the performance of the students is likely to be good and if the test happens to be difficult, the performance is

likely to be poor. Therefore, comparison of students' performance between subjects and from year to year may not be possible. It is because neither the zero, nor the 100 are absolute. Zero does not indicate no ability at all and 100 does not indicate the perfection in achievement. Further, a difference of about 10 per cent marks may occur when evaluated by different persons/examiners. Therefore, a comparison on the basis of variation of a few marks is not justified. This shortcoming can be overcome if the students are placed in ability bands (grades) that represent a range of scores. Even the National Policy on Education–1986 had recommended the introduction of Grading system for assessing the achievement of the students.

4.2.1 Direct Grading

In direct grading, the performance of an individual is assessed in qualitative terms and is directly expressed in terms of letter grades. This method may be profitably used for the assessment of all areas of learning. The advantage of direct grading is that it minimises the inter-examiner variability. Direct grading, however, tends to be subjective. Direct grading can be made on a suitable scale.

4.2.2 Indirect Grading

In this method, the performance of a student is first assessed in terms of marks and subsequently transformed into grades by using different modes. It is based on a pre-determined standard that becomes a reference point for assessment of students performance. It involves direct conversion of marks into grades. It is just like categorisation of students into five groups, namely; distinction (75 per cent and above), first division (above 60 per cent and less than 75 per cent), second division (above 45 per cent and less than 60 per cent), third division (above 33 per cent and less than 45 per cent) and unsatisfactory (below 33 per cent). If teachers feel comfortable in assigning marks, they may assign marks and convert them into grades by referring Table 4.1.

TABLE 4.1 **Matrix for Grade**

Sl.No	Letter of Grade	Range of Marks	Grade Point
1.	A	90-100	5
2.	B	70-89	4
3.	C	50-69	3
4.	D	30-49	2
5.	E	< 30	1

At Upper Primary Stage a five-point grading scale is quite appropriate. The advantage of this method is that it smoothes over the errors of measurement that creeps in due to various types of subjectivity.

Example

TABLE 4.2 The Marks Obtained and Conversion to Grades by Different Students are Given Against their Names

Sl.No.	Name of the Student	Marks out of 100	Grades
1.	Mannat	93	A
2.	Angela	60	C
3.	Rajani	63	C
4.	Zeenat	20	E
5.	Kunal	78	B
6.	Shyam	87	B
7.	Ali	45	D
8.	Manju	58	C
9.	Sandhya	18	E

4.3 Reporting Students' Performance

In place of existing half-yearly and annual examinations scheme, the scheme of CCE, where all the learning tasks integrated in the teaching-learning process will form a part of assessment. It will provide continuous feedback to the students. The feedback to the student will be provided with positive suggestions and improvement, so that the students have a sense of achievement.

Students' activities along with their assessment are maintained in a portfolio as discussed in Chapter 3. Following paragraph discusses the sample of report cards that the teachers can maintain for each student.

During an academic session, there may be three terms. It is not necessary that each term may span three months (equal duration for each). Depending upon the local conditions, the span of terms may be adjusted so that the teacher gets equal teaching time in each term. Table 4.3 shows an example of tentative plan of various activities which may be undertaken during the academic session.

- During one term the optimum number of tasks to be taken up may be four to six. The teacher may choose a task depending upon the content and context including the written task.
- For avoiding clashes among the various tasks organised in the school in all subjects, it is advisable that different subject teachers of a class should together plan out the tasks to be undertaken before each term. This will facilitate smooth functioning of the class.

- If possible two or more subject teachers can plan together a single project. By doing this the workload of teachers will be reduced and even the stress on students will be minimised.
- As far as possible projects should be carried out during school hours. If the nature of project is such that it has to be done outside school hour, teachers should encourage students to do the project on their own with minimal help from parents.
- All the tasks done by students should be maintained in a student's portfolio either by the student herself/himself or by the teacher.
- Assessment tools available with the teacher are class assignments, activities, projects, quizzes, puzzles, field trips, surveys, interviews, written tests and any other tasks.
- The written test should not be considered an examination. They should be short and may be held frequently. However, the assessment of only one written test shall be included in the Report Card per term.
- The class assignment can be given regularly. In the assignment teachers can ask their students to attempt a few problems, draw a diagram, sketch a flow chart, write a summary, attempt short questions etc., to be completed by the student in the class itself or at home.
- "Any other" in the following can include any other tasks undertaken by the teacher.

TABLE 4.3 **Suggestive Plan of Various Tasks to be Assessed During an Academic Year**

Task Planned	Term I			Term II			Term III		
Months	**MI (1)**	**MI (2)**	**MI (3)**	**MII (1)**	**MII (2)**	**MII (3)**	**MIII (1)**	**MIII (2)**	**MIII (3)**
Class Assignment (c)	c1	c2		c3	c4			c5	c6
Activity (a)			a1		a2		a3		
Projects (p)			p1					p2	
Quiz(q)				q1					
Puzzle (P)							P2		
Field Trip (f)						f1			
Written Test (w)		w1				w2			w3
Any Other									

MI (1), MI (2), MI (3) indicates months of first term. The Roman number indicates the term and Arabic number indicates the month.

Table 4.3 shows the suggestive plan of various tasks to be assessed during the academic year. It can be seen from the Table 4.3 that there can be a variety

of assessment tools available with the teacher like class assignment, activity, project, quiz, puzzle, field trip, written test and any other task.

Table 4.4 shows how a teacher should prepare a detailed record for the activity which was assessed. It will help to maintain the record for each child as shown.

TABLE 4.4 Recording for Teacher's Record : Term I

Roll No.	Name of the Student	Activity									Teacher's Remark
		Name of the Activity	Experimenting /Collecting Data	Presenting Data	Analysing Data and Drawing Conclusions	Providing Explanations	Asking Questions	Applications Related to Daily Life Experiences	Values/Attitudes/ Concerns	Grade	
1.	Arif	Measure the body temperature of some of your friends with a clinical thermometer	✓	✓	x	x	✓		✓	B	
2.	Shalu		✓	✓	x	x	x		✓	C	

Note : Similar Tables may be made for recording the achievements of learners for other tasks and also for Terms II and III.

Name of the Student	Learning Difficulty	General Remarks
Arif	The child was not able to derive any conclusion from her/his collected data She/he could not explain the reasons for using the thermometer in a particular way	• Very good in performing experiments but needs guidance to analyse data • Individual attention was given to her/him and she/he was encouraged to arrive at a conclusion by asking leading questions
Shalu	The child was not able to give an explanation for the questions asked	• Good at recording and reporting but needs encouragement for oral communication

Table 4.5 shows the tasks chosen by Aman and Seema out of their Portfolio for the purpose of reporting.

TABLE 4.5 Sample Plan of Students' Record of Portfolio : Term I

Name of the Student	Activity	Project	Class Assignment	Field Trip	Quiz	Any Other	Written Test
Aman	a1	p1	c1				w1
Seema		p1	c1			o1	w1
..							
..							

Table to be continued for other two terms.

Table 4.5 shows the format for students' record of portfolio. Towards the end of the term the grades obtained by the student are reported to the parents and administrators for the tasks done by the students.

Table 4.6 shows the record of assessment to be maintained by each teacher for each student separately term-wise.

TABLE 4.6 Subject Teacher's Record

Roll No.	Name of the Student	Term I Marks (Maximum 10)				Remarks
1.	Aman	a1*	p1	c1	w1	
		B(7)	A(9)	B(8)	B(7)	
2.	Seema	o1	p1	c1	w1	
		A(9)	B(7)	A(9)	C(6)	
3.	.....				.....	
4.	....				.....	

* a1, p1, etc., indicate the type of task which is assessed as indicated in Table 4.6. Numbers inside brackets indicate the mark obtained and the letter alongside indicate the grade allotted by the teacher after assessment.

4.4 Sample of Progress Records

A few sample records of various schools currently in use are shown below. In these the emphasis is on written test rather than in all academic tasks. There is no mention of various activities/tasks done in the science class. Further the grading system followed by different schools may be different. Some schools follow seven-point scale while some others follow nine-point scale. At upper primary level of school education, it is advisable to follow five-point scale of grading. This scale reduces comparison range for students.

In the sample report cards, performance in science is being assessed on the basis of marks obtained in written tests (FA_1 and FA_2). It is important to understand that formative assessment is carried out while the concepts are being 'formed' which makes it an integral part of the teaching-learning process. Giving only written tests, no matter how frequent, negates the significance of continuous and comprehensive evaluation.

Sample 1

Name of the School : XX School, Term I

Academic Performance

Roll No. : **Name of the Student**

Class/Division :

Subject	Grade
Language I English	C1
Language II Hindi	B1
Mathematics	C1
Science and Technology	C2
Social Science	C2
Computer Science	B1
Moral Education	C1
Language III Sanskrit	B2

Sample 2

Name of the School : YY School, Term I

Academic Performance Scholastic Areas – 1A

Subjects	FA1 10%	FA2 10%	Total FA 20%	SA1 20%	Total FA+SAI 40%	Grade Point
Language I English	A2	B1	B1	C1	B2	7.0*
Language II Hindi	B1	A2	B1	B1	B1	8.0
Language III Sanskrit	A2	B1	B1	B2	B1	8.0
Mathematics	A2	A2	A2	B2	B1	8.0
Science and Technology	B1	A2	B1	C2	B2	7.0
Social Science	B2	B1	B2	C1	B2	7.0
Computer Science	A1	B1	A2	D	B2	7.0
Moral Education	A2	C1	B1	B1	B1	8.0
					CGPA	7.5

*Seven-point scale is used for grading students performance. Same pattern is followed for Term II.

Sample 3 NAME OF THE SCHOOL : ZZ SCHOOL: TERM I

Cumulative and Comprehensive Evaluation Record

Name : **Roll No.**

Class/Section :

Subjects	First Term	Prelims
	Marks out of	Marks out of
English	087.9/100	083.0/100
French	083.9/100	081.5/100
Mathematics	078.5/100	083.1/100
General Science	084.3/100	085.0/100
Social Science	094.5/100	095.0/100
Total	429.1/500.0	427.6/500.0
Perc./Grade	085.8% A	085.5% A

Qualitative Profile in Science and Technology	
Traits/Aspects/Concept	Feedback and observation excellent ability to understand, learn and recall
Scientific skill	Displays good observation, inquisitiveness and analytical mind
Written Work/Presentation	Very neat and systematic, good ability for diagrams, and uses correct scientific terms
Application and Project Work	Excellent project work skill, executes projects independently and in time

A child's performance need not always be given in terms of grades. Qualitative feedback given by teacher about her/his strength may serve as a motivation for her/his work to perform better in future.

Considering the objectives of CCE, the reporting should be done to the students and parents in such a manner that it gives to the parents an idea regarding progress of the child in different areas as well as qualitative improvement in her/his performance. The child as well as parents should know the areas where she/he needs to work harder and where there is scope for improvement. The child is given the freedom to show case the best of her/his work.

It is advisable that students should not be labeled by descriptions such as slow learner, low achiever etc. The main emphasis should be on learning. The students are still in their formative stage of development and can improve their learning abilities.

The suggestive format for progress report of the child is given in Table 4.7.

TABLE 4.7 Suggestive Format for the Progress Report of the Child's Performance

Name :

Class/Section : **Roll No.**

Subjects	Tasks	Term I Grade	Term II Grade	Term III Grade	*Overall Remarks
Science	Activity Project/ Survey/ Interview Assignment Field Visit Quiz/ Puzzle Written Test Any Other				
Teacher's Comments					
Principal's/ Headmaster's Signature					
Teacher's Signature					
Parent's Signature					

* Note : Remarks of the teacher would be based on the indicators of learning.

CHAPTER 5

STRAIGHT FROM THE CLASSROOMS

During the planning of this Source Book, a lot of discussion took place about the indicators of learning and the various methods of assessment. It emerged that many teachers are already using many of these methods and indicators of learning in assessing their students. It was then decided to collect actual case studies from some teachers, which are given in this chapter. To retain their original flavour, these are given in the form submitted by the teachers making only minimal changes.

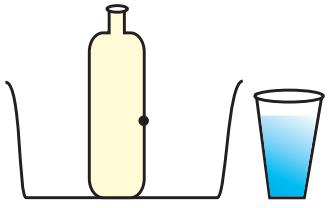
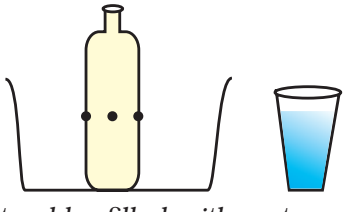
5.1 CASE STUDY

Activity : Individual

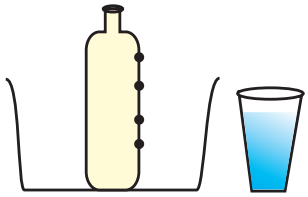
A teacher has been teaching Science at Upper Primary Level for many years. Her experience is described here. On the basis of my experience, I feel that most concepts can be learnt with interest and assessed effectively through activities. These activities help in enhancing many skills of a student, like observations, asking questions, investigations, manipulations, analysis, arriving at conclusions etc.

The assessment done through activities also provides scope for taking additional steps. Let me share one of my particular experiences of assessing students through individual activity. This was done in Class VIII, consisting of 40 students during a 35 minute period. I had decided to assess only 6 students that day but I did not inform them.

An activity was designed to study the concept that liquids exert pressure laterally and pressure depends upon the depth of the liquid column. Three setups were arranged in the school ground as follows :

Setup I	Setup II
 *A tub, a tumber filled with water and a plastic bottle with one hole on its side wall*	 *A tub, a tumbler filled with water and a plastic bottle with three holes at the same height*

Setup III



A tub, a tumbler filled with water, a plastic bottle with four holes but at different heights.

Now the students were told what they were supposed to do. Students to be assessed were asked to go individually to each setup one by one, and pour water in each plastic bottle.

All the students were asked to observe the streams of water coming out of the holes. After the activity was done, students were given a worksheet (with a few questions) to be answered individually. (I could have also written the questions on the blackboard).

Worksheet

Name : **Duration :** 10 minutes

Class :

Q1. What do you observe in each set of the apparatus?

(i) Setup I → _____

(ii) Setup II → _____

(iii) Setup III → _____ 3

Q2. Was there any difference in the flow of water in Setup II and Setup III?

(a) If yes, what was the difference?

_____ 1

(b) What do you think this difference was due to?

_____ 2

Q3. What conclusion do you draw from this activity?

_____ 2

Experimental skill (Handling apparatus etc.) 2

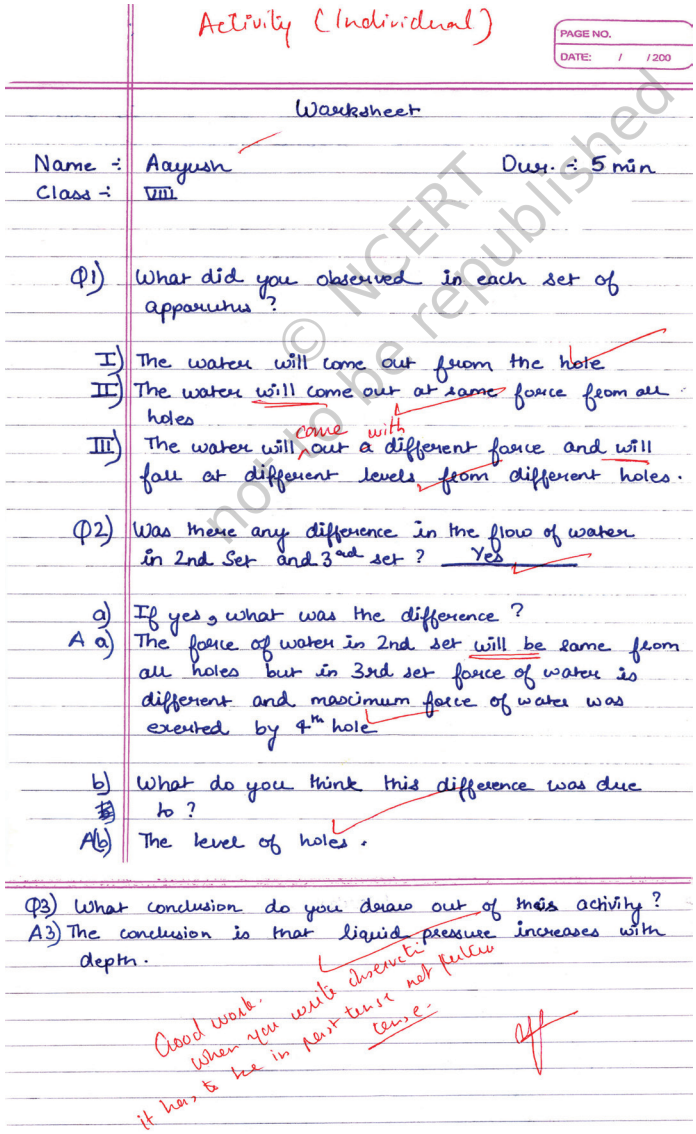
Assessment of Activity

Sl.No.	Indicators	Tasks	Marks
1.	Observation and Reporting	Correct answers to Q1 and Q2(a)	3 + 1
2.	Application/Analysis/ Reasoning	Correct answers to Q2(b) and Q3	2 + 2
3.	Experimental skill/ handling of apparatus etc.	While doing the activity	2

I assessed all the worksheets. However, I entered the grades in my record only for the six students who were to be assessed. I analysed all the worksheets to assess how effective was the teaching-learning experience in developing the understanding of the concept of liquid pressure among the students. I found that most of the students had made the correct observations regarding the flow of water through the holes, but were not able to interpret the results in a correct manner. A few were not able to conclude and infer that liquids exert pressure sideways and liquid pressure depends upon the height of the liquid column.

I decided to undertake some additional steps and hence demonstrated the activity again in the class giving some examples applying the concept. I found that this time the concept was understood by most of the learners.

I also follow a practice of giving a very simple assessment task in the beginning of the session on some difficult (as misconceived by the student) concept such as concept on 'Force'. This helps in motivating the students and boosting their confidence in the subject.



Activity (Individual)

PAGE NO.
DATE: / /200

Worksheet

Name :- Aayush Dur. :- 5 min
Class :- VIII

Q1) What did you observed in each set of apparatus ?

I) The water will come out from the hole
II) The water will come out at same force from all holes
III) The water will come out with a different force and will fall at different levels from different holes.

Q2) Was there any difference in the flow of water in 2nd set and 3rd set ? Yes

a) If yes, what was the difference ?
A a) The force of water in 2nd set will be same from all holes but in 3rd set force of water is different and maximum force of water was exerted by 4th hole

b) What do you think this difference was due to ?
A b) The level of holes.

Q3) What conclusion do you drawn out of this activity ?
A3) The conclusion is that liquid pressure increases with depth.

Good work. When you write downward it has to be in plural term not pulled cause.

5.2 Case Study

Type of Project — Interview

My experience with Class VIII while teaching 'Crop Production and Management'

I always noticed that the students found the chapter on 'Crop Production and Management' a very 'Dry Topic'. So, it was a challenge for me to make it interesting for the students. Moreover, students from the urban areas wonder why they are being taught this chapter when they are not going to pick up farming as a profession?

So, I decided to let the students learn beyond the classroom and interact with the farmers and gardeners by interviewing them. They were given guidelines regarding the aspects of crop production and management that they were expected to find out through the interview.

They were also sensitive towards interpersonal relationships and dignity of labour.

I allotted one week for preparation (fixing up the location, interviewing and reporting). The task was divided into three steps.

Step 1 : An interview with a gardener.

Step 2 : Organising the collected information in tabular form.

Step 3 : Presenting the event in the class.

The rationale behind giving the task to the students were as follows :

- to develop communication skills in students.
- to develop interpersonal relationship in students.
- to link the lesson taught with the surroundings.
- to make the students learn beyond the classroom.
- to inculcate the value of appreciation and dignity of labour.
- to develop the spirit of innovation by applying the principles of science in everyday situations.

Note : I intentionally selected this method of assessment so that it could be assessed by different subject teachers — Science, English/Hindi language, Social Science or Mathematics. This is an efffort to reduce stress on the learners. The student could be guided by the subject teachers as per the perspective of the related subject.

The criteria for assessment from the science perspective are given in detail. Other subject teachers may suitably modify/plan the criteria for assessment pertaining to the indicators identified for the respective subject area.

I gave the following instructions to the students.

1. If interviewing a school gardener, an appropriate time has to be chosen.
2. If interviewing a farmer in a far-away location, the students should be accompanied by a teacher/adult.
3. The students should prepare an appropriate questionnaire.
4. Students may use camera for taking photographs.
5. The students were given freedom to present the findings of the interview in written form/dialogue form (role play), as power point presentation or as an article with photographs and pictures.

Assessment Record of an Interview

Sl. No.	Indicators	Tasks
1.	Observation and Reporting	To observe and report • Which crops/plants are grown in the field/ garden? • How is the soil prepared before sowing? • What is the basis of selection of seeds that are sown? • Which crops/plants are grown in that part of the year and when are they harvested/removed? • Which crops/plants are grown in other parts of the year and when are they harvested/removed? • Which plants/trees are perennial? • Which manure and fertilisers are added to the soil and when? • What measures are taken to control plant pests? • What are the sources of water for the crops/ plants? • What are the implements used for doing various tasks in the field/garden? • How is the produce (crop/seeds/flowers/ fruits) stored and transported?
2.	Classification	The data collected from above could be presented in a tabular form to classify various aspects of growing crops/plants.
3.	Questions Asked/Analysis/ Application	• The quality of questions generated for the interview. • Did the student analyse any situation which needed improvement in the field/garden? • Did the student suggest some method for improvement?

4.	Presentation of Skills	The technique of presenting the interview in written form/dialogue form (role play)/power point presentation/as an article with photos or pictures.
5.	Values/Attitude	• Could the student build a rapport and strike a conversation with the farmer/gardener? • Does the student have the right attitude (composure, adaptability, respectful) while interviewing the farmer/gardener? • Does the student show/express appreciation for the efforts made by the farmer/gardener to grow plants? • Does the student show concern for management of food resources?

I assessed the students qualitatively on the basis of the indicators given in the assessment Table.

My Observations and Additional Input

- It was observed that students were good at observation and reporting.
- They were also good at collecting data and presenting it in a tabular form.
- Most of the students had prepared questions for interview in a graded form. The questions were well-connected.
- However, some students lacked sensitivity towards the profession and educational background of the farmer or the gardener. As an additional input, the next batch of students were sensitised by reminding them that if not for them we would lack in food resources or green spaces.
- They were also sensitised towards dignity of labour by giving a helping hand to the farmer/gardener during any part of the day. This way they appreciated the efforts that are put in growing crops and other plants.
- The students also needed sensitisation towards management of food resources. They were asked to bring clippings from newspapers highlighting the spiralling prices of food items on everyday basis and also in the case of grains rotting in godowns and starvation deaths.

INTERVIEW

Group 1 took interview of a gardener of the school. The questions and answers are presented here.

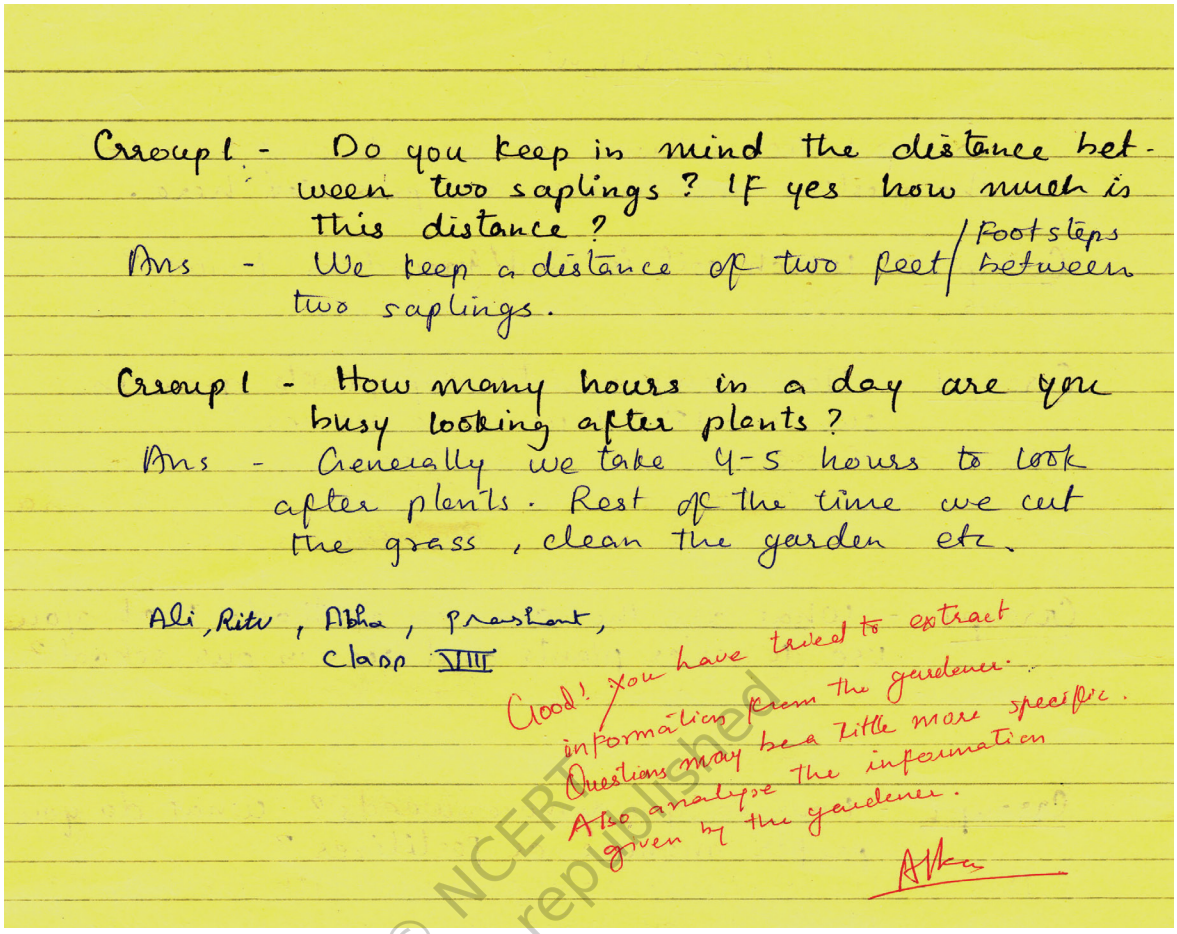
Group 1 - Which soil is used/found in NOIDA ?
Ans - Noida is rich in sandy and mixed soil.

Group 1 - How many varieties of plants grow in our school? Tell us some names.
Ans - There are many varieties of plants / trees in our school such as Ashoka, Neem, Aloevera Barbdanzes etc.

Group 1 - What are the common methods that you use to water plants and trees in our school?
Ans - We use hose pipes, sprinklers and drip irrigation pipes.

Group 1 - How do you remove weeds? What do you prefer manure or fertilizer?
Ans - We generally remove weeds with the help of khurpi or by hand. In school, we use both, manure as well as fertilizers.

Group 1 - What is the amount of water you give to trees or how frequently you water plants in summers and winters?
Ans - In summers we water 2-3 times whereas in winters we pour water once a day.


Group 1 - Do you keep in mind the distance between two saplings? If yes how much is this distance?

Ans - We keep a distance of two feet/Footsteps between two saplings.

Group 1 - How many hours in a day are you busy looking after plants?

Ans - Generally we take 4-5 hours to look after plants. Rest of the time we cut the grass, clean the garden etc.

Ali, Ritu, Abha, Prashant,
Class VIII

Good! You have tried to extract information from the gardener. Questions may be a little more specific. Also analyse the information given by the gardener.

Abha

5.3 Case Study

Awareness Campaign through Posters/Slogans

A teacher teaching science at Upper Primary Stage found that the section on 'Conservation of Water' of the chapter titled 'Water: A Precious Resource' in *Science textbook* of NCERT for Class VII could be transacted in a better way through a project. The rationale for selecting this topic was to make children aware of the need for conservation of water.

Her class consisted of 40 students. For convenience she decided that the children would work in groups of 5 students each. The project work was carried out in three periods spread over three days.

Objective of the Project : To make students aware of the importance of conservation of water.

Guidelines/Instructions

First Day/Period

- Eight groups each with 5 students were formed.
- Each student was asked to identify different aspects of water conservation.

- Each group was suggested to make a list of resource materials (books, newspaper, magazines, internet, surroundings etc.) to be consulted and to collect the same.
- Each group was given 15-20 minutes to discuss the topic and to plan, design, display materials (posters, charts and slogans etc.) for creating awareness about importance of conservation of water.
- The students were asked to make a list of raw materials (chart paper, pastel colours, scissors, pencils etc.) and bring them to the class on the following day.

Second Day/Period

Students were asked to work in their groups to make the poster as planned the previous day.

Each group was given 30-35 minutes to accomplish this task. In addition, the group was also asked to write a paragraph on their project work for presentation in class.

Third Day/Period

Each group presented their project work in class. During the presentation, the members of other groups were encouraged to interact.

The assessment by the teacher was a continuous process from the first day which was based on the indicators as enumerated below.

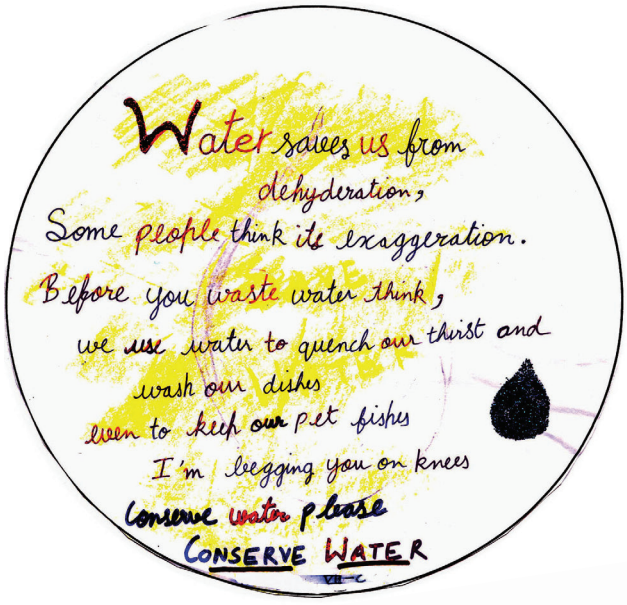
Assessment Table

Sl.No.	Indicators of Learning	Activity Specific Indicators (What can be Assessed)	Assessment of Learner (Checklist)
1.	Planning for preparing publicity material like charts, posters, slogans etc.	• Identification of different aspects of water conservation • Identification and procurement of relevant source material • Assigning specific tasks to members in the group	• Relevance of various aspects concerning water conservation selected for prepairing material • Relevance of source materials • Equitable distribution of responsibilities to members of the group in keeping with their abilities and interests

2.	Development of material (charts, posters, slogans)	• Sharing of ideas in the course of developing material • Providing opportunity to each member in the group to make meaningful contribution • Motivating peers to contribute to the development of the material • Presenting the relevant aspects of the topic on chart	• Group behaviour – cooperation, coordination, respect for views of others. Relevance of material developed with the given topic • Aesthetic appeal of the material developed – (attractive, relative proportion of the letter size/visuals/ language)
3.	Creativity	• Visual presentation in charts and posters • Slogans	• Originality of slogans/messages/ picturisation
4.	Sharing ideas with peers	• Presentation of group work in the class	• Confidence during presentation and attending to queries raised on the project work (friendly/ formal/aggressive)

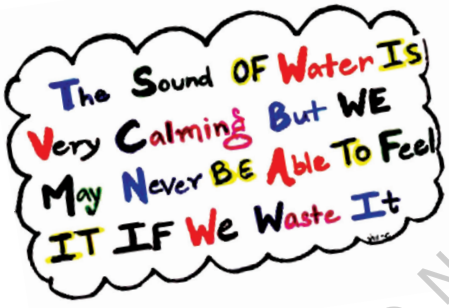
The Teacher's Observations and Additional Input

- During presentation, some children were unable to speak in front of the class. The children were asked to read out the slogans or messages written in the charts/posters to raise their confidence level.
- One of the groups had shown water pollution rather than water conservation in the chart, because they were not able to differentiate between water conservation and water pollution. The teacher explained the difference between conservation and water pollution. They were then asked to modify their project and present it in class the next day.
- It was observed that a few students were not participating in the group task; rather they were feeling more comfortable in working alone. The teacher motivated them to work in a group.
- The teacher observed that most of the students shared, exchanged their ideas in a friendly manner. However, some students got a little agitated while answering the queries made by the peer. Such students were counselled.



B

Message conveyed very well! Improve the slogan by adding some suggestions on water conservation.



B

You have a great poetic and aesthetic sense! Beautify the slogan further with some tips on water conservation

5.4 Case Study

Crossword Puzzle 1

A teacher teaching Science to Class VIII, found that students like to solve Crossword Puzzles on topics like microorganisms and their uses; diseases caused by deficiency of vitamins and minerals etc. She describes her experience in her own words.

I decided to assess the topic, 'Microorganisms — Friend and Foe,' using a crossword puzzle. This crossword puzzle included questions/clues based on the indicators like observation, reporting, classification and applications.

There were 45 students in my class. I distributed Worksheet to the students with

(i) blank crossword puzzle grid and clues;

(ii) a Table for peer assessment.

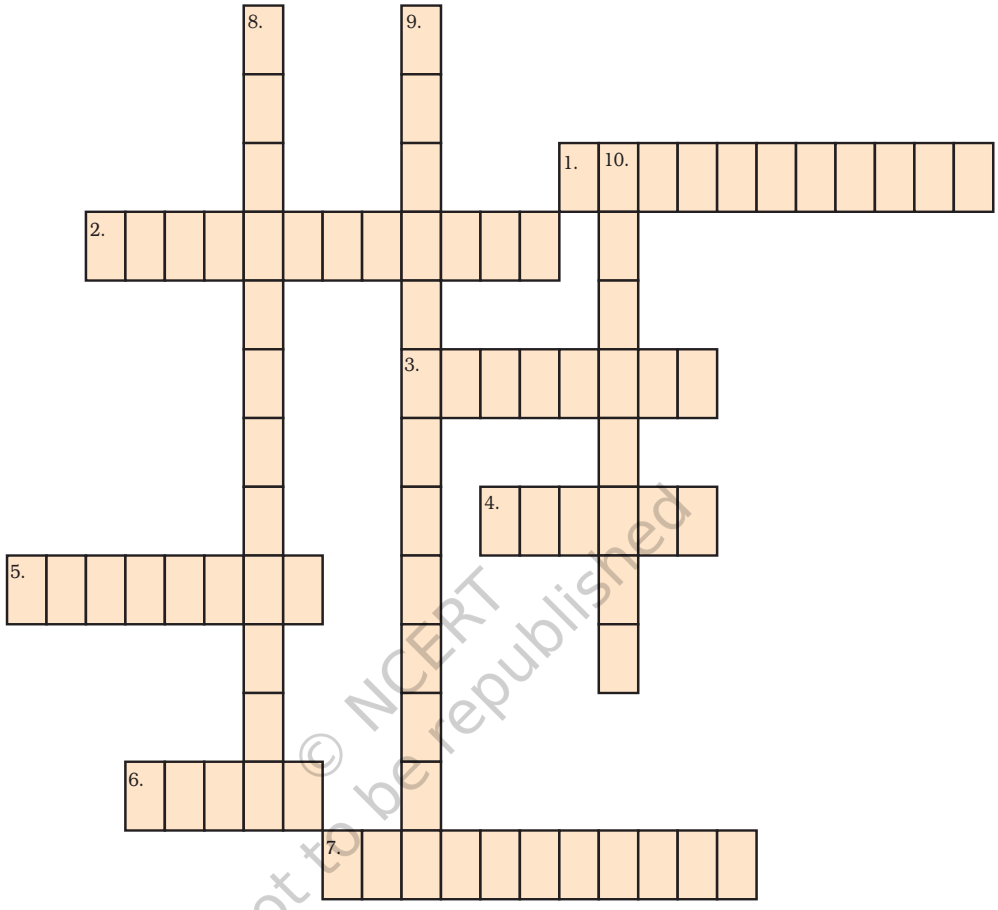
To save paper, the crossword puzzle grid and the assessment Table were given back to back on the same sheet. I gave them15 minutes in the class for the puzzle to be solved and 10 minutes for peer assessment.

Front Page of the Worksheet

Name :

Crossword Puzzle **Class :**

(Microorganisms — Friend and Foe) **Date :**



Clues

Across

1. A class of medicines produced by some bacteria and fungi that kill or stop the growth of disease-causing microorganisms.
2. The process of converting sugar into alcohol.
3. The group of microorganisms that cause diseases like typhoid and tuberculosis.
4. This disease is caused by a microbe that is transmitted by a mosquito.
5. The group of microorganisms that cause diseases like dysentery and malaria.
6. Microorganism that is used for making breads, pastries and cakes.
7. A form of processed milk that is safe for drinking.

Down

8. A disease caused by bacteria which can be prevented by vaccine.
9. Bacteria that promotes the conversion of milk into curd.
10. A gas in the atmosphere that is converted into usable compounds in the soil by leguminous plants.

(Back Page of the Worksheet)

Name :

Assessment Table for
Crossword Puzzle

Class :
Date :

Sl.No.	Indicators for Learning	Indicator-specific Clues	Assessment of Learner — Put a tick (√) for Correct Answer
1.	Observation	Across 2	☐
		Across 7	☐
		Down 8	☐
2.	Classification	Across 1	☐
		Across 3	☐
		Across 5	☐
3.	Application/ Analysis/ Reasoning	Across 4	☐
		Across 6	☐
		Down 9	☐
		Down 10	☐

No. of ticks :

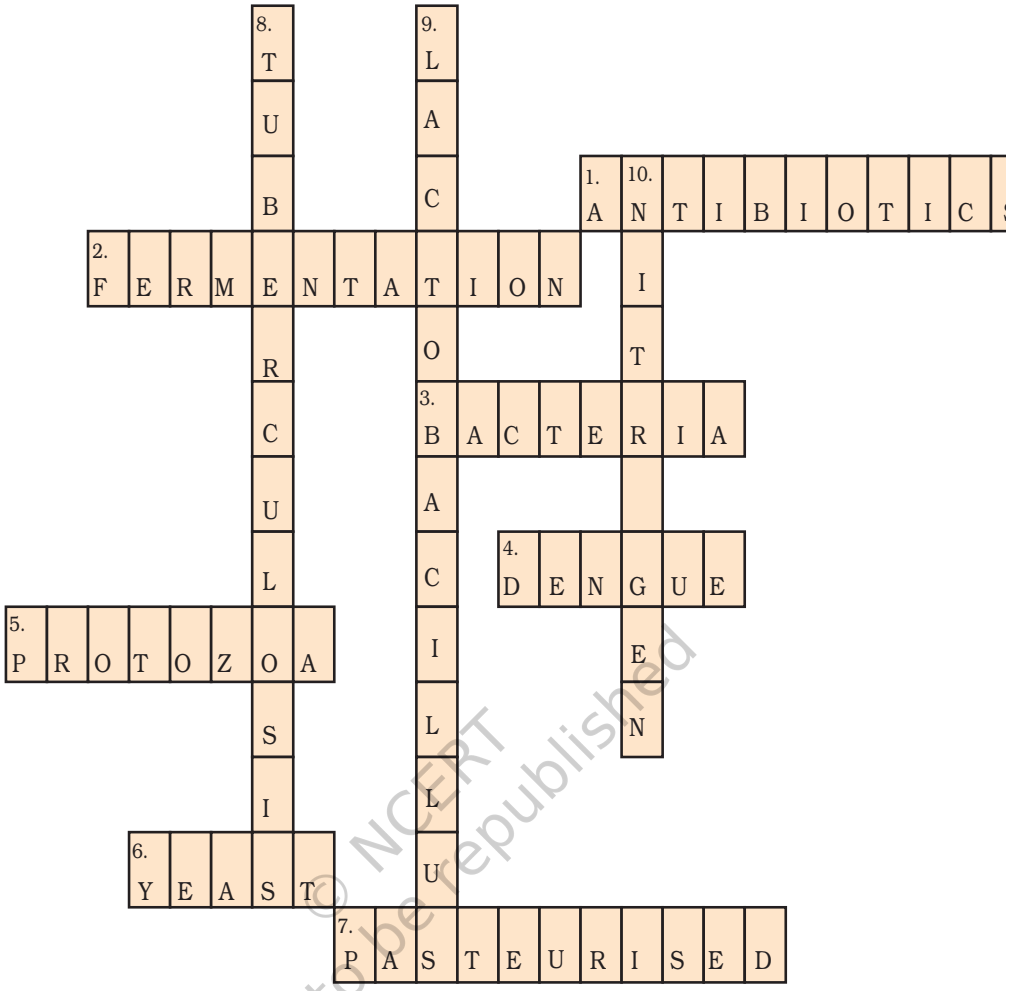
Grade A (9 and 10)
B (7 and 8)
C (5 and 6)
D (3 and 4)
E (2 and 1)

Assessed by :
Peer

I discussed the answers in the class before the peer assessment.

Answer key was not included in the assessment Table, which was given to the students.

Answer Key



General .Observation

I observed that a few students were unable to use the classification-based clues correctly. The possibility may be that either I did not emphasise much on classification or the students were not able to understand the methodology.

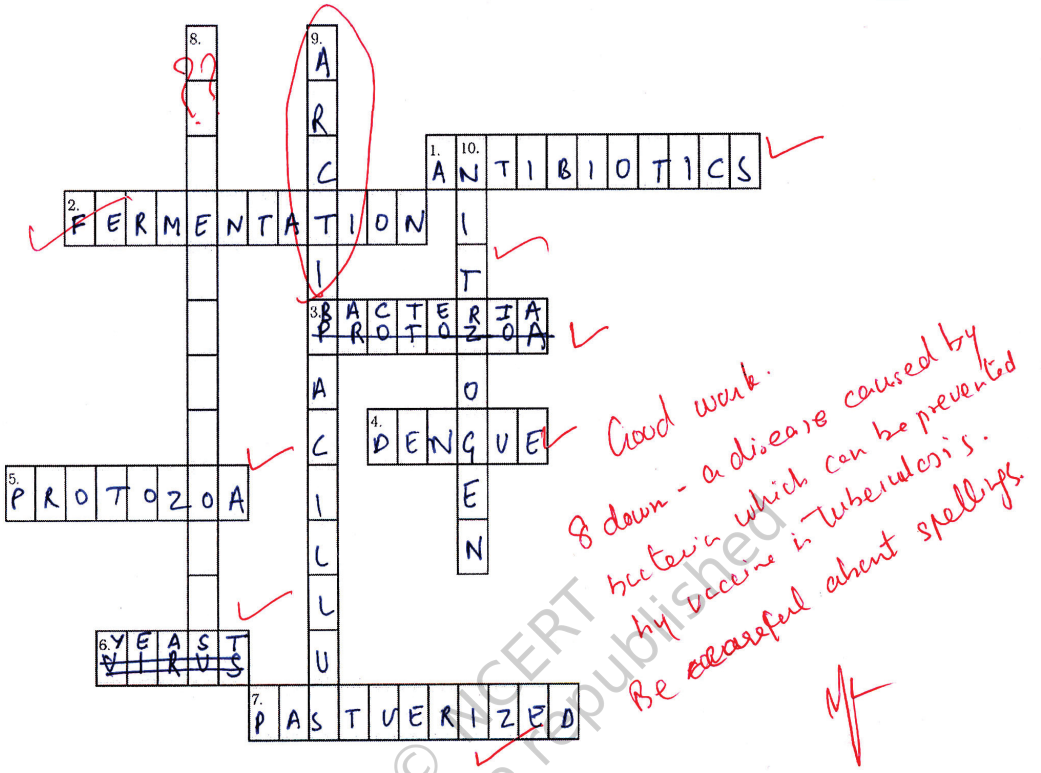
I identified the students, who were having difficulty in classifying microbes into their various groups. I took two approaches to further clarify the concept:

1. Putting examples in their respective groups such as
   (a) Rhizobium belongs to the group Bacteria
   (b) Plasmodium belongs to the group Protozoa
2. Citing examples for groups such as
   (a) Algae — Spirogyra, Chlamydomonas
   (b) Diseases transmitted by carriers — Malaria, Dengue

Name :

Crossword Puzzle **Class :**

(Microorganisms — Friend and Foe) **Date :**



Crossword Puzzle 2

Another experience of a teacher with the use of crossword puzzle in the classroom is presented below.

Class : VIII

Theme : Metals and Non-metals

Mode of Presentation : Worksheets

Involvement of Learner : Individual **Time :** 15 Minutes

Rationale

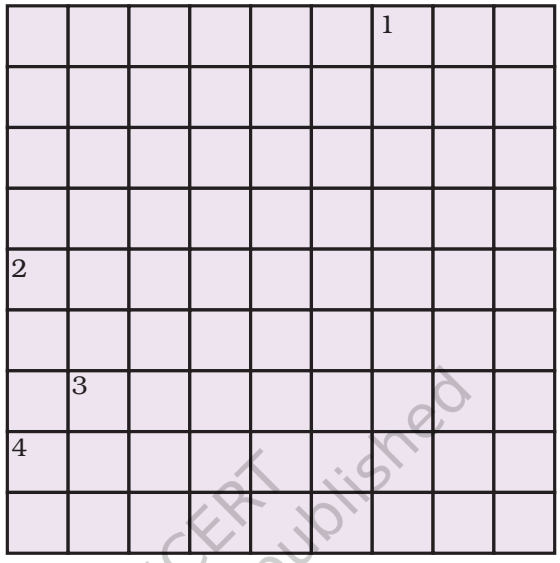
I gave this task to students to make them familiar with the different properties of metals and non-metals. It will help in enhancing students, scientific vocabulary in an interesting manner.

- I constructed a crossword puzzle with different types of questions/clues. A grid has to be made where the solutions are filled up and the rest of the squares are left blank.
- I distributed worksheets to the students with blank crossword puzzle grid and clues. Sometimes I draw the puzzle on the blackboard and each student can note it in her/his notebook.

I gave the following instructions :

- The vertical blanks can be filled with the help of clues/suggestions given in the 'down' column whereas the horizontal blanks can be filled with hints given in the 'across' column for the respective numbers.
- I interacted with students to understand the reasoning for the answers given.

Complete the Puzzle



Down

1. A metal which is the component of chlorophyll.
3. Sound produced by burning hydrogen gas.

Across

2. A gas is liberated when metal reacts with dilute acids.
4. Ringing sound is produced by metals.

Assessment Table

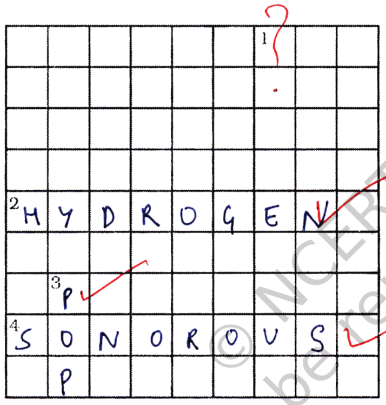
Sl.No.	Indicators of Learning	Crossword Puzzle Clues Based on Indicators	Assessment of Learner
1.	Observation	Down 3 Across 4	☐ ☐
2.	Application	Down 1 Across 2	☐ ☐

I discussed the answer for each question after assessing students answer sheet to strengthen their concept.

Answer Key

						1 M		
						A		
						G		
						N		
2 H	Y	D	R	O	G	E	N	
						S		
	3 P					I		
4 S	O	N	O	R	O	U	S	
	P					M		

Complete the Puzzle



Good.
One of the metal component of chlorophyll is Magnesium

Down

1. A metal which is the component of chlorophyll.
3. Sound produced by burning hydrogen gas.

Across

2. A gas is liberated when metal reacts with dilute acids.
4. Ringing sound is produced by metals.

5.5 Case Study

Declamation

An expereince of a Science teacher who used declamation as an assessment tool for her class is shared below.

Class : VII

Chapter : Water — A Precious Resource

Title : A Day in Summer — Not a Drop of Water at Home

Type : Oral (Individual/Group)

Time Allotted : 60 Minutes (I clubbed 2 Periods)

I gave a chance to students to share and express their experiences about a day in summer without a drop of water at home. This was also to highlight the importance of water in our daily lives.

I made 3 groups of 6 students each in advance. Each group was told to prepare its presentation on the assigned topic.

- Group 1 : "My Day at Home without Water".
- Group 2 : "Causes of Water Crisis".
- Group 3 : "Solution to Water Crisis".
- Each student of the group was given 2-3 minutes for declamation.

My role was that of a 'mentor' to assess and give suggestions for improvement.

Method of Assessment

1. I asssessed each student individually.
2. To foster team work and team spirit I decided that the assessment of each individual will also contribute to the assessment of the group.
3. I told the remaining students to sit as audience. They interacted at the end of the declamation by raising questions. These students were to be assessed for a similar kind of task later.

Assessment Table

Sl.No.	Indicators of Learning	Activity-specific Indicators (what can be Assessed)
1.	Observation	• Observes a situation or a crisis at hand minutely
2.	Enquiring	• Finds out causes of water crisis and measures that can be adopted to prevent
3.	Communication Skills	• Expresses views/experiences/ suggestions in a lucid manner
4.	Providing Explanations/ Analysis of data/ Reasoning	• Provides actual data from various sources • Categorises the causes and solutions of water crisis • Analyses the causes of water crisis • Give relevant arguments • Explains how a solution to the crisis is workable

5.	Relating to Daily-life Experiences	• Gives examples from one's own experiences/surroundings
6.	Attitude	• Has a positive approach towards solving a problem/crisis

5.6 Case Study

Quiz

Class : VI

Topic : Motion and Measurement of Distances

Time :1 Period (40 Minutes)

Number of Students : 40

One day a teacher got an arrangement period in Class VI against a Mathematics period as the Mathematics teacher was on leave. So, she thought of doing something productive and entertaining. The idea of quiz came to her mind and she conducted a quiz based on 'Motion and Measurement of Distances'.

She divided the class into four teams A, B, C and D. In order to save time she utilised the way students were sitting in the class in four different rows.

Following instructions were given to students before starting the quiz :

- There were to be three rounds.
- The quiz was to be initiated by her and subsequently questions were to be asked by the students.
- The first question was asked by the teacher and was to be answered by team A. Then team A was to frame a question for team B. Team B would answer it and frame a question for team C. In this manner question and answer were to circulate around all the teams.
- Assessment was to be made on the basis of the quality of question framed and the answers given.

  This was because she felt that the concept of clarity can also be judged by not only giving the answer, but also by framing a good quality question.
- Each team were to prepare questions or give answers only after discussing with other members of the team.
- Five marks were for framing questions and five marks for the correct answer.

To begin, she asked the first question to team A.

Q. Can we use hand span for measuring accurately the length of your classroom? Give reason.

Ans. (Team A) — No. Different people have different hand spans and therefore, measurement will be inaccurate. (On hearing this a child of team C said that

distance to be measured is large and cannot be measured accurately with hand span. To this the teacher added that the chances of personal error are greater in using the hand span. Hence, we use a metre scale.)

Question of Team A for Team B.

Q. What kind of motion is the motion of a car wiper?

Ans. (Team B) — Rectilinear

(Here the teacher intervened and explained the difference between the rectilinear motion and the periodic motion).

Question of Team B for Team C.

Q. If you are moving in a car and someone is watching you from outside, are you in motion or the person standing outside the car is in motion?

Ans. (Team C) — We are in motion.

(Here the teacher explained the concept of relative motion.)

Question of Team C for Team D

Q. A boy was skipping a rope. During skipping, the boy was thinking about the type of motion of the rope? Help him to find the answer to his question and explain it to him.

Ans. (Team D) — Circular motion. As the distance of hand from the point of rotation is the same.

Here the teacher explained that the hand moving the rope was itself a circular motion.

In this way the first round was over. Similarly second and third rounds of the quiz were conducted.

Assessment

1. Since, it was a team effort, each member of the team was given the same score.
2. It was taken care that all the students participated in deciding an answer or framing a question. It provides an opportunity for active, collaborative and friendly learning.

Assessment Sheet

	Team A Marks for Answer + Marks for Question	**Team B** Marks for Answer + Marks for Question	**Team C** Marks for Answer + Marks for Question	**Team D** Marks for Answer + Marks for Question
Round 1				

Round 2				
Round 3				

She observed that it was an entertaining mind sport which had tested students' mental ability, alertness and general awareness. It was of equal interest to the students, who asked questions and those who gave answers and to the spectators (listeners). Answering a question which others cannot, was a great confidence booster to the students.

Benefits of Conducting the Quiz

- Students displayed a wonderful team work.
- Normally shy students too, participated actively.
- As discussions had gone into framing questions, and answers, this led to peer education, raising the confidence level of even the weaker students.
- The doubts and queries were discussed and clarified by the intervention of the teacher.

5.7 Case Study

Class Assignment

Class : VI

Topic : Changes Around Us

Type of Assessment : Worksheet

Task : Individual Worksheet **Time :** 30 Minutes

Rationale

1. To assist understanding of the concept in depth.
2. To familiarise that some changes can be reversed and some cannot be reversed.
3. To enable students to understand that materials change their physical state on changing the temperature.
4. To strengthen the concept that a change may occur by heating a substance or by mixing it with some other substance.

I gave the worksheets to the students after teaching the Topic 'Changes Around Us'.

Worksheet

Q 1. Listed below are certain changes. For each change, write whether the change can be reversed or not

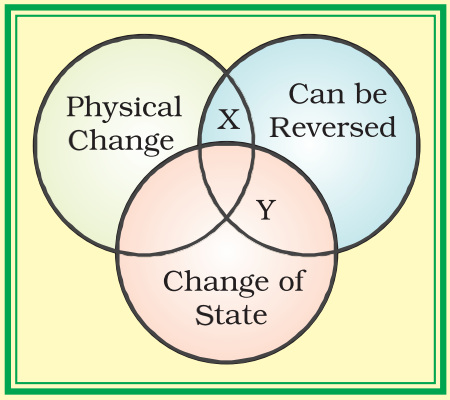
(i) Dissolving sugar in water

(ii) Melting of ice

(iii) Burning of paper

(iv) Ripening of a mango
(v) Magnetising an iron needle.

Q 2. Study the diagram carefully and answer the following questions:



(a) Which of the following could be X?
(i) Cooking of rice
(ii) Melting of wax.

(b) Which of these could be Y?
(i) Making *paneer* from milk
(ii) Freezing water to ice.

Q.3 Use a sharpener to sharpen a blunt pencil. The blade of the sharpener cuts the wood of the pencil to expose the lead inside. Now observe the change.
(i) What type of change has the pencil undergone? (Reversible or Irreversible)
(ii) Will the sharpener also undergo a change? (Yes/No)
(iii) After using the sharpener for sometime, will it sharpen the pencil as effectively as it was in the beginning. (Yes/No)

Assessment Table

Sl.No.	Indicators of Learning	Activity-Specific Indicators (What can be Assessed)
1.	Classification	Classifying appropriately as reversible or irreversible change Q No. 1
2.	Analysis/Application	Analysing the type of change appropriately and applying in real life situations Q. No. 2
3.	Observation and Reporting	Observing the changes taking place in sharpening the pencil
4.	Attitudes	Completing the task in allotted time

Note : I could have asked Questions 1 and 3 orally and asked students to write their answers in the notebook. For Question 2 : diagram could have been drawn on the blackboard and students could have answered orally.

CLASS VII

Q1. A drawing sheet changes when you draw a picture on it. Can you reverse this change? True / Yes — Why?

Q2. Athick coating of a paste of plaster of paris (POP) is applied over the bandage on a fractured bone. It becomes hard on drying to keep the fractured bone immobilized. Can the change in POP be reversed? No — Why?

Q3. A bag of cement lying in the open gets wet due to rain during the night. The next day the sun shines brightly. Do you think the changes, which have occurred in the cement , could be reversed? No

Q4. Classify the following changes into suitable categories wherever possible.

i) Boiling of egg — ~~Slow~~ Fast, Irreversible, Chemical
ii) Fire in a house — Fast, Irreversible, Chemical
iii) Growth of plant — Slow, Irreversible, Chemical
iv) Mixing sugar in milk — Fast, Reversible, ~~Reversible~~ Chemical Physical
v) Formatin of clouds — Slow, Irreversible, ~~Chemical~~ Physical

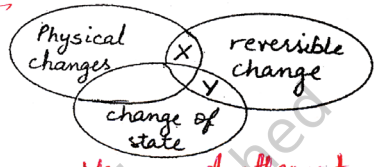
Q5. Listed below are certain changes. Mention whether these are reversible or irreversible

i) heating of coil of electric heater ii) ripening of fruits iii) melting of gold
iv) magnetizing of a needle v) soil erosion due to flood vi) evaporation of water
vii) burning of paper viii) digestion of food ix) rotting of egg x) photosynthesis

Q6. Take a pencil which is blunt. Use a sharpener to sharpen the pencil. The blade of the sharpener cuts the wood of the pencil to expose the lead inside.
Observe the change.
What type of change the pencil has undergone ? Will the sharpener also undergo a change? After using the sharpener for sometime, will it sharpen the pencil as effectively as it used to do earlier. No — why ??

Q7. Study the venn diagram carefully & answer the following questions

a) Which of these could be X?
i) Cooking of rice ii) Melting of wax
b) Which of these could be Y?
i) Making paneer from milk
ii) Making ice from water.



Very good attempt- Please try to give reason wherever you are writing responses in the form of Yes or No

Q8. Given below is a change that occurs in nature. What kind of change(s) take place in the process?

Ice $\underset{\text{Cooling}}{\overset{\text{heating}}{\rightleftharpoons}}$ water $\underset{\text{cooling}}{\overset{\text{heating}}{\rightleftharpoons}}$ steam

Good
Physical
Reversible (Reversible)

5.8 Case Study

Home Assignment

Class : VI

Topic : Fibre to Fabric

The teacher gave home assignment after the completion of the topic 'Fibre to Fabric'. She demonstrated the difference between natural fibre and synthetic fibre by bringing them over the flame of a candle. After the demonstration the students were asked to observe the samples of fibres — Natural Fibre, Synthetic Fibre, Knitted Fibre, Weaved Fibre.

Assignment

On the basis of your observations

Q. Differentiate between the following in a tabular form:

(a) Natural fibre and synthetic fibre

(b) Fibre and yarn

(c) Knitting and weaving.

Note : Children may also be asked to paste samples of fibres and fabrics on a sheet of paper.

Assessment Table

Sl.No.	Indicators of Learning	Activity Specific Indicators (What can be Assessed)	Checklist
1.	Observation and Reporting	• Observes the loose thread or yarn from one of the edges of the fabric • Presses one end of the yarn to split it into their strands of thread (fibres) • Observes the two sets of yarns in a weaved fabric • Observes that a knitted fabric is made of a single yarn	• Can differentiate between natural and synthetic fibres, knitting and weaving
2.	Analysis	• Analyses the nature of natural and synthetic fibres on the basis of burning them over the flame of a candle	

CLASS :- VI

HOMEWORK :

Name :- Aankansha.

Question / Answers.

Q1) Differentiate between the following in a tabular form :-

a)

	Natural fibres	Synthetic fibres.
i)	The fibres of some fabrics such as cotton, jute, silk & wool are obtained from plants & animals. These are called natural fibres. ✓	i) Fibres made from chemical substances, which are not obtained from plant or animal sources. These are called symentic fibres. egs. ?

b)

	Fibre	Yarn.
i)	The thin strand of thread that we see, are made up of still thinner strands called fibres	i) Fabrics made up of yarns and yarns are further made up of fibres.

c)

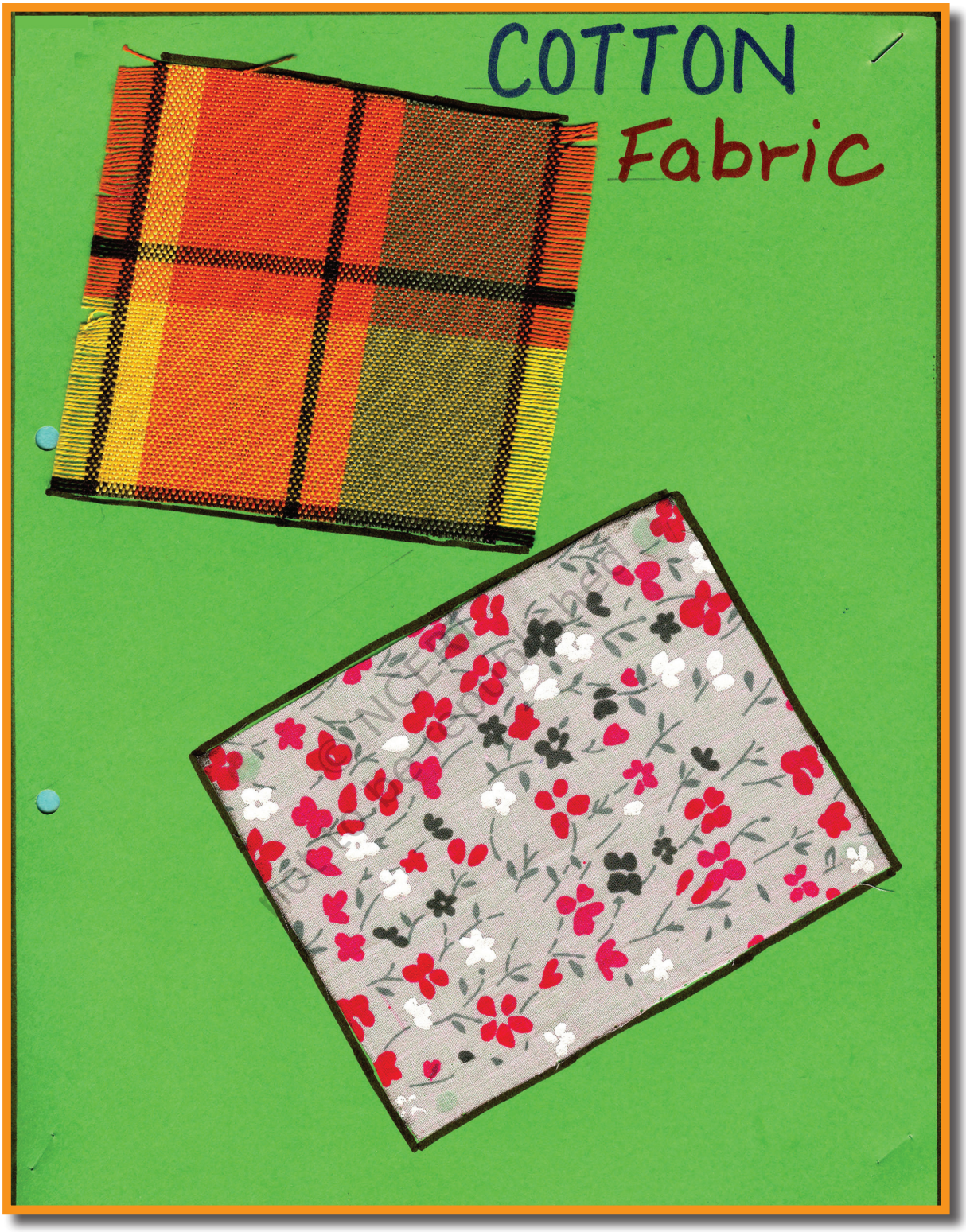
	Knitting	Weaving.
i)	In Knitting a single yarn is used to make fabric.	The process of arranging two sets of yarn togethes to make a fabric is called weaving

egs ?

Good work.

Give examples wherever neeessary.

Collect Sample of synthetic fibre like nylon, polyester etc.


COTTON
Fabric

5.9 CASE STUDY

Science Journal

Class : VIII

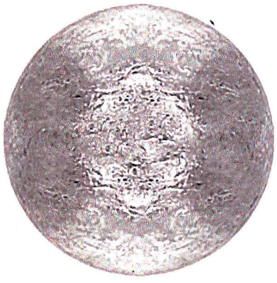
My experience with Class VIII while teaching Science is that children like to maintaine their Science Journal. They usually collect the information on the topics which are dealt in the Class. They also share these informations with their classmates. I do not grade these Journals but I go through them and give them encouraging remarks. This Journal was made by a group of students.


TECHNOLOGY

ELECTRONIC TOXIC

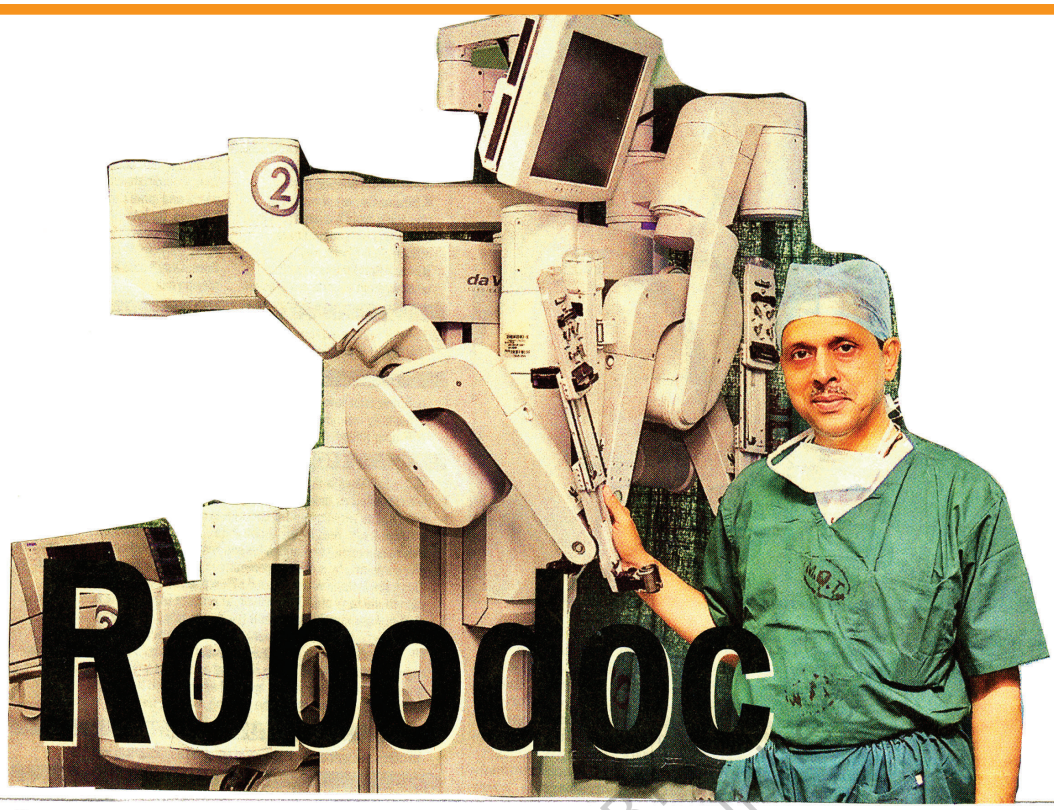
LEAD :- Found in soldering of printing circuit boards and glass pannels of moniters. It causes damage to the central and peripheral nervous system.

CADMIUM :- Found in SMD chip resistors in featured detectors and semicond-uctors. It effects kidneys.



MERCURY :- Used in thermostates sensors relays and switches, and in measuring circuits boards and dischare lamps it causes damage in brain.

HEXA VALENT CHROMIUM :- Used as corrosion protection of untreated and galvised steel plates It causes DNA damage and strong allergic reaction.



Robodoc

[SURGERY IS GETTING SAFER, MINIMALLY INVASIVE, AND PROMISING QUICK RECOVERY TIME, THANKS TO ROBOTS]

- Surgery would be done by robots.
- Breakthrough in surgical capabilities.

Robotic surgery is being applied in a wide range of specialities ranging from general surgery, cardiac surgery, Thoracic surgery, Vascular surgery etc.

"With this robot India will soon serve as a preferred destination for advanced Robotic Surgery."


Space

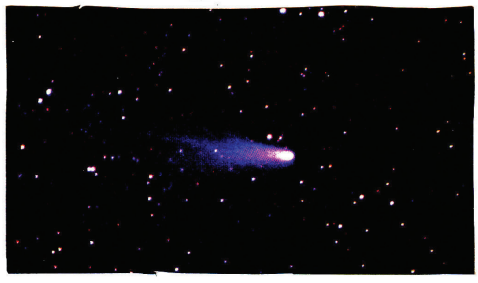
BLACK HOLES

Black holes are places where gravity is so strong that it stucks everything in, including light.

- If you fell in a black hole you'd stretch like a spaghetti.
- The swirling gases around a black hole turn it into an electrical generator, making it spout jets of electricity billions of kilometers out into space.
- The opposite of black holes may be white holes which spray out matter and light like fountains

DARK MATTER

Dark matter is space matter we cannot see because, unlike stars and galaxies, it does not give off light.



- It is of two kinds – the matter in galaxies (galactic), an the matter between them (intergalactic).
- The future of the Universe may depend on how much dark matter there is. Its gravity will eventually stop the universe's expansion and make it shrink again.

SICK OF THE GOLD

VIRAL DISTRESS

Viral diseases increase in winter because the cold brings down peoples natural immunity and makes them more susceptible to infection. Use hot water to clean contaminated linen as the virus can like on furnishings and rugs for many days.

COLD ATTACK

Falling temprature also up chances of heart attacks and strokes in people with high blood pressure and heart disease, with people over 65 years at greatest risk. In cold, blod vessels constrict and the blood viscosity - thickness which causes increased clot formation in the arteries - goes up, triggering symptoms of chest pain and attacks in people with marginal heart disease.

Women have a better sense of smell than men. (F)

ORGANS

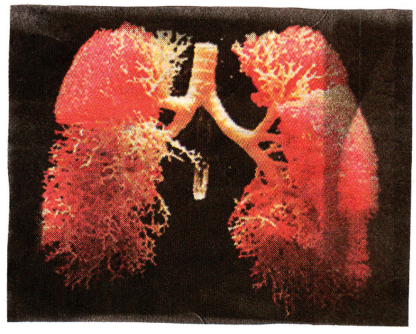
LAB-GROWN ORGANS

This year the news of succesful intestinal tissue being developed using stem cells in the US. With work on to grow nerve, liver, heart and pancreas in the lab, and the successful development of artificial kidneys by Indian-American using nanotechnology, findings announced over the next two years will make organ shortage history. For kidneys alone, from the 1.5 lakh people who suffer end-stage organ failure each year and need a transplant, barely, 3,500 find donors

The lifespan of a tastebud is ten days. (F)

CUSTOMISED CURES

New vaccines to treat cancers of breast, lung, skin and lymph nodes will be launched to help millions get treated. Many deaths can be prevented after the launch of this vaccine.



We are born with 350 bones, and die with 206 bones (F)

— x — x —


FOREST

PLANTS

There are more than 250,000 different kinds of plants, ranging from tiny plankton barely visible under a microscope to giant trees hundreds of feet tall, the world's largest living things. 40% of the world's land is covered by trees and grass.

• BIGGEST LEAVES

The biggest leaves belong to the raffia palm tree, which can grow 65 feet long.

• BAMBOO

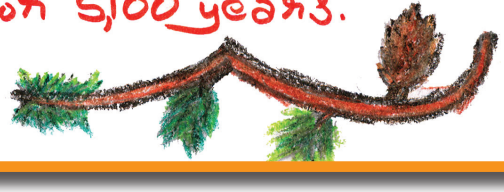
Bamboo is an unusual plant. It is a kind of grass and starts off with a soft, bendy, herbaceous stem.

DO YOU KNOW?

The first plants to grow on land were plants such as fungi and lichen which grow from tiny cells called spores.

• THE LONGEST LIVING TREE.

The oldest surviving tree was a Bristlecone pine in Nevada, which had lived for 5,100 years.

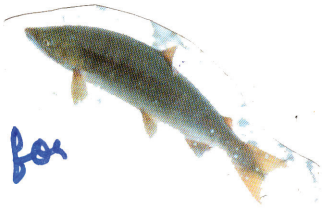


ANIMALS

• DODO

The doda bird of the Mauritius island used to lay its eggs on the ground There was no animal in the islands that was dangerous for the doda or for its eggs. Then human came to Mauritius. They brought goats and pigs. Pigs ate the dodo eggs. Some dodos were killed and eaten by humans. The dodo soon became extincts.

• SALMON



The salmon are river and sea fish caught or farmed in huge quantities for food.

When salmon reach their spawning grounds, they mates The female lays upto 20,000 eggs

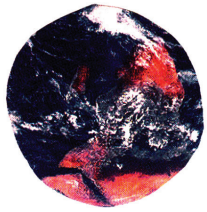
• EELS

Eels are long, slimy fish that looks like snakes. Baby eels are called elvers

Some eels live in rivers, but most live in the sea, including moray eels, and conger eels.

EARTH'S FORMATION

- The solar system was created when the gas cloud left over from a giant supernova explosion started to collapse in on itself and spin.
- For a long time the surface of the Earth was a mass of erupting volcanoes.



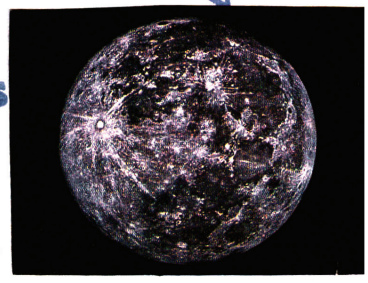
MOON

Moons are the natural satellites of planets. Most are small rock globes that continually orbit the parent planet, held in place by the planets gravity

- There are 65 known as moons in the solar system

SOLAR ERUPTIONS

Solar flares are sudden eruptions on the suns surface. They flare up in just few days, then take more than half an hour to die away again.

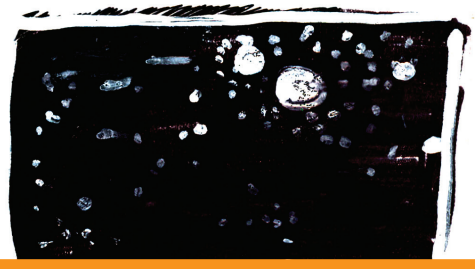


- Solar flares reach temperature of 10 millions °c and have the energy of a million atom bo

SUPERNOVA

A supernova is the final, gigantic explosion of a supergiant star at the end to its life.

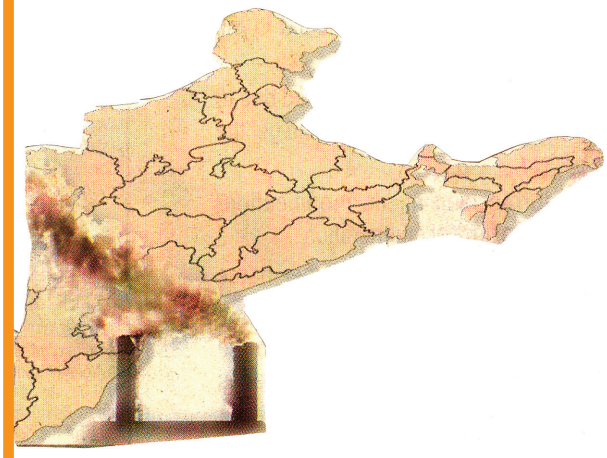
A supernova lasts for just a week or so, but shines as bright as a galaxy of 100 billion ordinary stars.



WEATHER.

- Fork lightning flashes from cloud to ground. Sheet lightning flashes within the cloud. Lightning heats the air so music it bursts in a clap of thunder.
- Natural snowflakes are six-sided and consist of crystals that are mostly flat plates. But under a magnifying glass, you can see that no two snowflakes are ever the same.
- Mist forms when the air cools to the point where the water vapour it contains condenses to water.
- Smog is a thick fog made when fog combines with polluted air.
- Upslope fog forms when warm, moist air rises up a mountain and cools.
- The atmosphere is a sea of colourless, tasteless, odourless gases, mixed with moisture and fine dust particles.
- The stratosphere glows faintly at night because sodium from salty sea spray reacts chemically in the air.

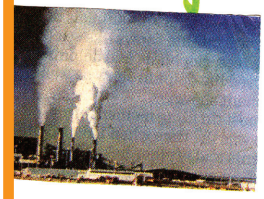
PEOPLE MAY HAVE TO GO VEGETARIAN TO SAVE THE PLANET



People would have to consider turning vegetarian to help reduce global carbon emissions. "Meat is wastiful use of water and creates a lot of green-house gases.

• CLIMATE CHANGES

Glaciers receding at rate of 10-15 meters every year. Himalays temprature is increasing at rate of 0.06°C anually.



India has one of the best records of climate change mitigation withe one of lowest per capita carbon emission in the world.

- It's automobile industries has better clean technology.
- Major city has introduce clean fule like CNG & LPG
- Goverment has proposed mandatory blending of ethanol in petrol.
- India has also introduce a new variety of wheat, which can sustain increase in temp. upto 4°.

FOREST

- Forest can develop wherever the average temperature is greater than 10°c in the warmest month and rainfall exceeds 200mm annually.
- Forests in India are divided into six broad types, and further subdivided into 16 types.
- Fodder from the forest forms an important source of food for cattle and other grazing animals in hilly and arid regions and during a drought.
- Most elephants weigh less than the tongue of a blue whale.
- Fer-de-lance snakes have 60-80 babies, each with a deadly poisonous.
- White cats with blue eyes are usually deaf.
- A crocodile cannot stick its tongue out.
- To purr, cats use extra tissue in the larynx. This tissue vibrates when they purr.
- Sharks can swim even when they are sleeping.
- The evaporation from a large oak or beech tree is from 10 to 25 gallons in 24 hrs.
- A single rye plant can spred upto 400 miles of roots underground.
- Dolphins can sleep with one eye open.
- An ostrich eye is bigger than it's brain.
- Hippos can open their mouth as wide as a 4 feet tall child.

ENVIRONMENT

- Every ton of recycled office paper saves 380 gallons of oil.
- About 1% of U.S landfill space is full of disposable diapers, which take 500 years to decompose.
- Homeowners use upto 10 times more toxic chemicals per acre than farmers.
- Americans use 50 million tons of paper annually - consuming more than 850 million trees.
- Over 100 pesticides ingredients are suspected to cause birth defects, cancer, and gene mutation.
- Every day 40,000 children from preventable diseases.
- Every year we throw away 24 million tons of leaves and grass.
- Leaves alone account for 75% of our solid waste in the fall.
- The coldest place is Vostok in Antarctica, where it averages −72°F (−57.8°C). The hottest Dallol in Ethiopia, where is averages 93°F (34°C) in the shade, and can get much hotter.
- The Atacama Desert in Chile, with an annual average of just 0.02 in. of rain.
- Mt. Wai-'ale-'ale in Hawaii, with upto 350 rainy days a year.

Human Body

- Our eyes are always the same size from birth, but our nose and ears never stop growing.
- The average person's skin weights twice as much as their brain.
- There is a disease called ichthyosis that turns the skin scaly like a fish.
- Human hair and fingernails continue to grow after death.
- Our hand can live a seperate life.
- We can live after being dead if we die hanging upside down.
- Don't laugh too much it can kill you Fatal Hilarity is a death result of laughter and many have died.

FACTS

HEALTH

- Our body has 1,200 species of bacteria. Human use only 10% of their brain.
- The brain sucks up 20% of oxygen that we inhale
- Our eyes have 2 million working parts.
- 75% of the body's blood is in veins.
- Lack of vitamin A ruins night vision.

TECHNOLOGY

- Atoms are so tiny that, even if you put 4 million atoms side by side, they would be only the width of a pin head
- Very fast cars, such as dragsters and rockets cars, need parachutes to slow them down quickly.
- The biggest oil tanker is longer than the Eiffel Tower is tall and carry inough oil to fill over 300 olympic sized swimming pools.

SPACE

- The life chemical formaldehyde can be detected in radio emissions from the galaxy NGC_{253}.
- Recent theories suggest there may be many other universes which we can never know.
- Black holes and white holes may join to form tunnels called warm holes.- and these may be the secret to time travel
- One day on Venus lasts 5,832 earth hours.

MADE BY:
POORNIMA
MANVIKA
NISTHA
ADITI
SHWETA
URJASWI
ASHIMA
SUBI
SHUBHI
JASLEEN
VIDHUSHI
SIKTA
DEVESH
ANUJ
ARUNDHATI
LABONI

CLASS - VIII-A

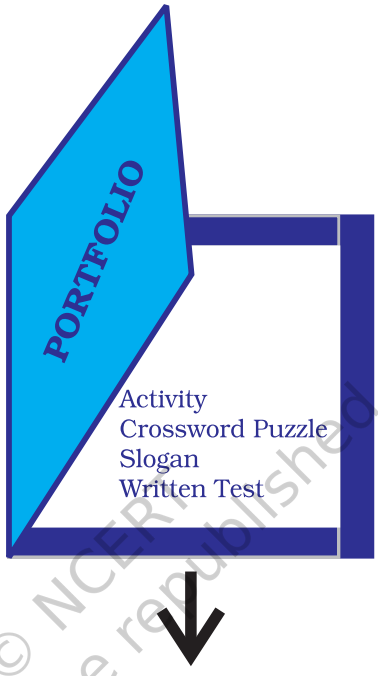
Excellent work :)

Very informative collection.

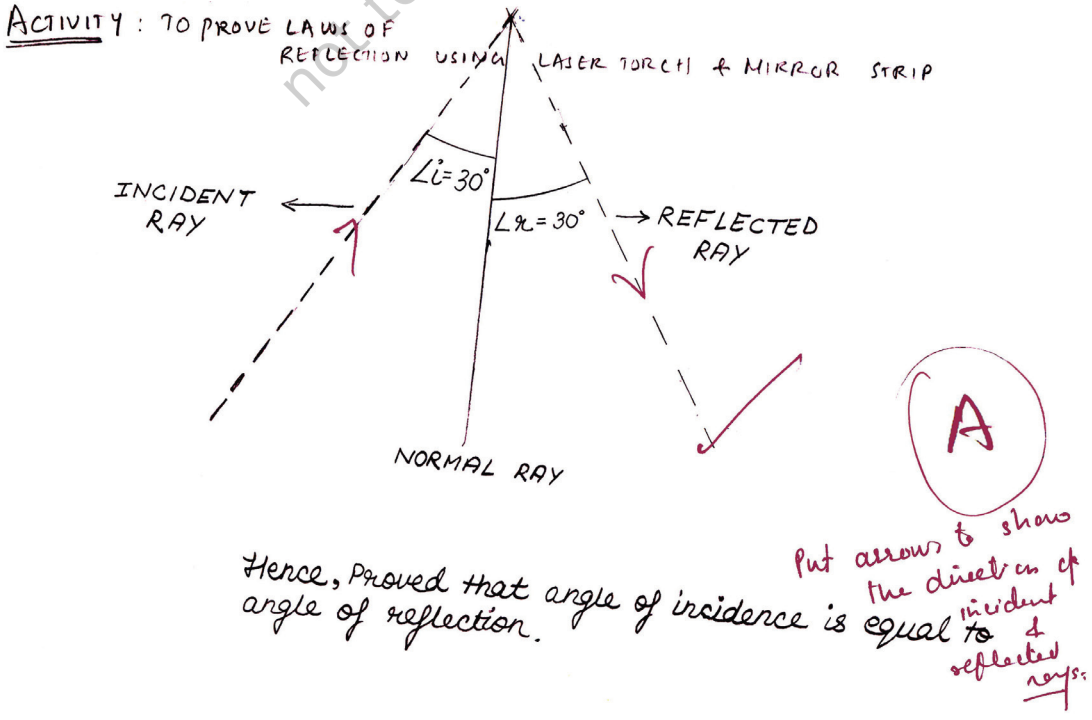
5.10 Case Study

Portfolio

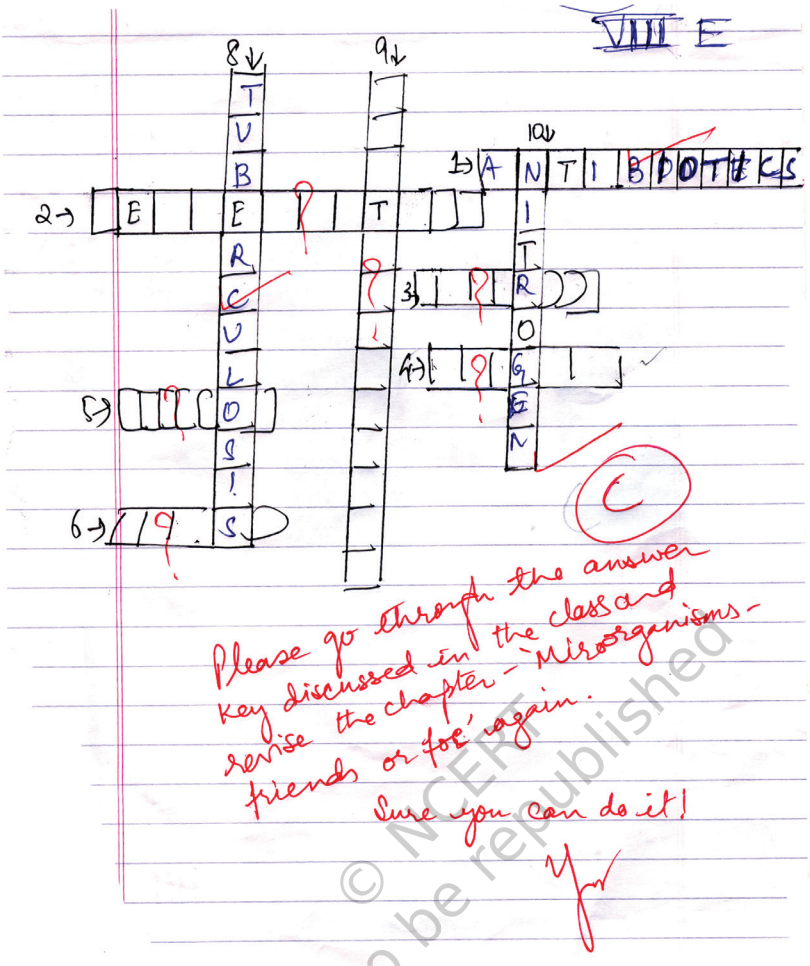
I am a teacher teaching Science at Upper Primary Stage. In my class children maintain their portfolios. Towards the end of the term, the grades obtained by the students are reported to their parents and administrators for the task done by the students. Following tasks were decided by the student to report.



Activity



Crossword Puzzle



Slogan

Good sense of humour — Keep it up! Frame more lines on conservation of water

Written Test

FORCE AND PRESSURE

1. What type of forces are involved in each of the following situations: ~~Muscular~~
   i. Arun throws a stone to hit a mango on a tree and the mango falls down ~~gravitation~~ gravitational
   ii. Shiela pedals her bicycle using her legs. The wheels of the bicycle rub along the road as the cycle moves on. Muscular, Frictional
   iii. Attraction or repulsion between two charged balloons. Electric
   iv. The water flows towards the ground as soon as we open a tap. Gravitational
   v. Motion of the moon in its orbit around the earth gravitational

2. Explain what happens:
   (a) To the speed of a moving football when the player is striking it
      i. In the direction of its motion The spud increases
      ii. Opposite to the direction of its motion The spud decreases

   (b) To the speed of a bicycle
      i. when the rider pedals faster it increases
      ii. when the brakes are applied ~~it stops (due to friction)~~ decreases

3. Give Reasons
   i. some people experience nasal bleeding at high altitudes

because the atmospheric pressure at high altitudes is less and thus the ~~blood~~ internal pressure is higher than the external air pressure which makes the blood vessels to burst out.

   ii. Deep sea divers wear special suits

burst

~~to overcome~~ liquid pressure increases with depth. To overcome this high pressure of water under the sea and not to get ~~collapsed~~ collapsed under it.

   iii. Rahul and Usha were fighting when Rahul hit Usha with the edge of a ruler. It was much more painful for Usha than when he hit her with the flat side of the ruler.

because on the edge of the ruler area of contact between ruler and Usha is less so pressure is more whereas the surface area is more on the flat side and ~~less~~ pressure is less and thus, she doesn't feel much pain from the flat side.

iv. When you wear high heeled shoes, you ~~exert~~ exert more ~~less~~ pressure on the ground than when you wear flat shoes.

As the ~~to~~ surface area of contact between the heel and the ground, therefore the pressure exerted is more on ground unlike flat shoes.

v. At higher altitudes, fountain pen starts leaking.

At higher altitudes, the air pressure decreases, so the ~~p~~ the pressure inside the ink becomes greater than the external pressure. Thus, the ink starts leaking

vi. Tyres are threaded.

so that there is an increase in the friction between the tyres and the ground.

vii. It is difficult to walk on wet or icy roads.

On wet or icy roads, area is smooth and therefore, friction is less. Thus, ~~not~~ due to less friction, it is difficult to walk. The water forms a layer between the foot and ground so it and with dishes provide friction to walk.

4. Explain how it is possible to drink a liquid using a straw.

When we apply force to drink through straw, the air pressure in the straw decreases. Thus, the air pressure inside the liquid is more as compared to straw and the liquid is forced to come up in the straw.

5. Why are the walls of a dam thickened near the base?

1) As it is a very high-raised building, therefore the pressure of the building ~~is~~ spreads near the base.
2) The liquid pressure is more at the bottom.

6. Why is it difficult to cut vegetables with a blunt knife?

because in blunt knife the contact area between the knife and the vegetables, so less pressure is applied.

is more

7. Choose the correct answer:

A. When the object is thrown up, the force of gravity
   a. Is opposite to the direction of motion
   b. Is in the same direction as the direction of motion
   c. Becomes zero at the highest point
   d. Increases as it rises up

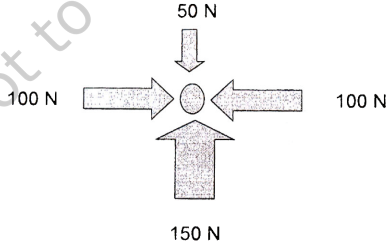
B. A feather and a coin released simultaneously from the same height do not reach the ground at the same time because of the:
   a. Resistance of the air
   b. Force of gravity
   c. Force of gravitation
   d. Difference in mass

C. The normal force per unit area is called::
   a. Pressure
   b. Thrust
   c. Balanced force
   d. Pascal

D. If the sum of all the forces acting on a moving object is zero, then the object will:
   a. Slow down and stop
   b. Change the direction of its motion
   c. Accelerate uniformly
   d. Continue moving with constant velocity

E. The resultant of a balanced force is:
   a. Non Zero
   b. Equal to Zero
   c. Equal to acceleration produced in the body
   d. None of these

F. Use the diagram to answer the following question. The arrows below show forces acting on an object

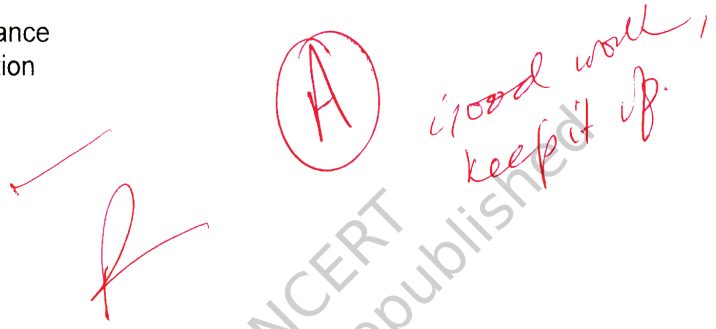


What is the net force on the object and in what direction the object should move?
   a. 100 N to the right
   b. 100 N to the left
   c. 100 N to the upward
   d. 150 N to the upward\

G. A force that one surface exerts on the another when two rub against each other is called:
   a. Gravity
   b. Acceleration
   c. Inertia
   d. Friction

H. An example of the balanced force is:
   a. A car sliding on ice
   b. A tug of war game in no one wins
   c. A car hitting a telephone pole
   d. A roller coaster going down the first drop

I. A force that pulls falling objects to earth is called:
   a. Free Fall
   b. Gravity
   c. Air resistance
   d. Acceleration



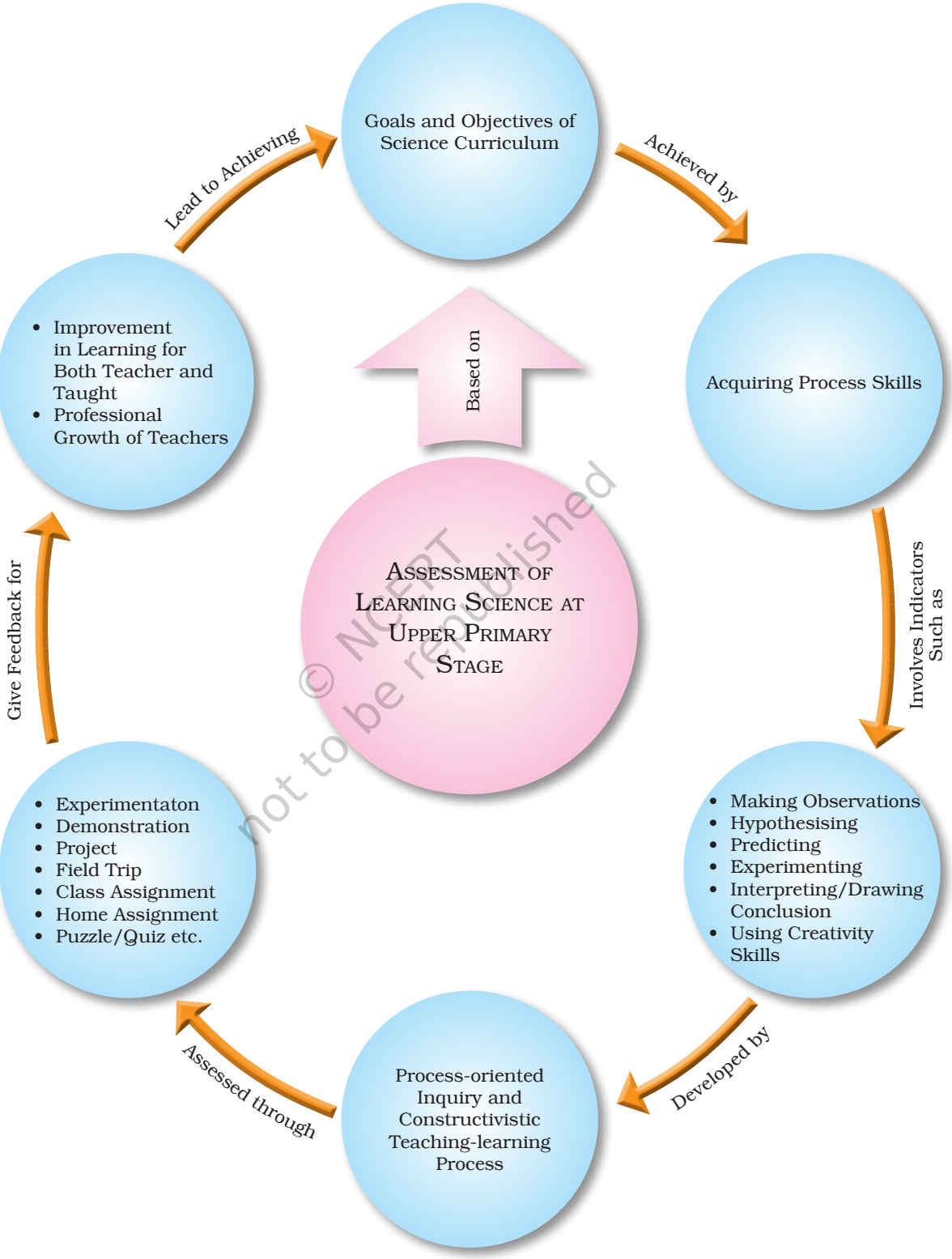
Think and Reflect

If you were to assess your students on the topics

- Force
- Heat
- Reproduction in plants
- Metals and Non metals,

How would you proceed?

LET US SUM UP



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"Winning doesn' t always mean being first----------winning means you're doing better than you' ve done before."

— Bonnie Blair

APPENDIX

MEASUREMENT, ASSESSMENT AND EVALUATION

The word 'measurement' is derived from the Greek word '*metron,*' which means to measure or an act of measuring.

Measurement is also the process of assigning numbers to individuals or their characteristics according to some specified rules.

For example, weight of a student is 42kg, marks obtained by Seema are 18/20 and so on. In both these cases, we have simply collected some information using some established rule or standard. All these are examples of measurement. If weight of a girl of 14 years is 25 kg then we can say that it is too less, or the marks obtained by a student in Science test is 18/20, we can say that she has performed well. *Giving this type of meaning to obtained measurement is known as assessment.* Thus, 25 kg or 18/20 in above cases is measurement while 'too less' and 'very good' are examples of assessment.

Suppose a student gets marks in Science as follows :

First Term	12/30
Second Term	18/30
Third Term	25/30

From this, one can infer or judge that she has *improved continuously.* This way, we have not only assessed the student but *evaluated* also. This evaluation includes measurement and value judgement. Thus, evaluation may be understood as:

Evaluation = Measurement + Value Judgement

We have seen above, that measurement is the process of obtaining a numerical description of the degree to which an individual possesses a particular characteristic. Assigning meaning to the measurement is assessment whereas the final opinion or overall judgement which you form on the bases of several assessments is known as evaluation. The term measurement is limited to quantitative description of pupils, i.e., the results of measurement are always expressed in numbers. Evaluation on the other hand, includes both quantitative

description (measurement) and qualitative description (non-measurement) of pupils. In addition, evaluation always includes value judgement concerning the desirability of the results. To sum up, assessment is a procedure to gather information on student's performance.

To sum up, assigning marks is an example of measurement, marks plus meaning to marks is an example of assessment and finally marks plus meaning to marks along with value judgement is an example of evaluation.

Mark ~ Measurement

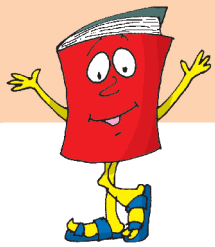
Marks + Meaning to marks ~ Assessment

Marks + Meaning to marks + Value judgement ~ Evaluation

However, for all practical purpose, we would be using the term assessment equivalent to evaluation as the term assessment has multiple meaning such as :

- It is measurement and testing
- It is evaluation
- It helps to diagnose individual difficulty
- It is a procedure to gather information on student's performance.

Notes



A Time to Reflect

Why Should Children be Assessed?

Since we are all concerned about children's learning, assessment needs to be undertaken for a number of reasons:

- Support and improve every child's learning and development.
- Observe what changes and progress takes place over time.
- Identify individual and special needs and requirements.
- Plan teaching-learning situations in a more suitable way.
- Enhance the child's self-understanding and personal development.
- Achieve curriculum aims/syllabi objectives.
- Improve on-going teaching-learning in classroom.
- Provide evidence of children's progress to communicate to parents and others.

What Should be Assessed?

- Children's learning/performance in different subject areas.
- Achievement of skills – academic, inter personal, etc.
- Interests, attitudes and motivation amongst other aspects.
- Change and progress over time.
- Children's response to educational inputs, situations and/or opportunities.

When Should Assessment be Made?

- Continuously throughout the year.
- Periodic reflection by the teacher 3 or 4 times in a year.

How Should the Assessment Process be Undertaken?

Steps that can be followed are:

- Collecting information/evidence.
  - A variety of sources
  - Different ways/methods
- Recording of information/evidence.
- Making sense of collected information/evidence.
- Sharing and communicating feedback on assessment.

How can Assessment Information be Used?

It can be used to :

- Improve children's learning and performance.
- Provide the right kind of learning opportunities, materials, aids, equipment etc.
- Bring out the best in children.
- Improve teaching-learning processes.
- Cater to differences in children and their special needs.
- Move children from one level of learning to a higher level.

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विद्यया ऽमृतमश्नुते

एन सी ई आर टी
NCERT

राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्
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