

CENTRAL BOARD OF SECONDARY EDUCATION

2, Community Centre, Preet Vihar, Vikas Marg, Delhi-110 092.

NO.D(A)/PA/ML/05

2nd March, 2005

Circular No:10/2005

All Heads of Institutions affiliated to CBSE

Subject : Introduction of Mathematics laboratory and internal assessment in
Mathematics at the secondary level

Dear Principal,

As you are aware, the Board has already issued notification introducing the concept of Mathematics Laboratory in all its affiliated schools vide circular no: 03/04 dated 28th January, 2004. The schools were advised to get the Mathematics Laboratory ready by 31st March, 2005. The schools are now requested to inform whether they have the facilities of Mathematics Laboratory or not.

In continuation of the above circular, I am pleased to forward to you the decision of the Board to introduce the concept of practical activities in Mathematics Laboratory and this will be a part of internal assessment in Mathematics in secondary classes. The suggestions detailed in the enclosed circular would be applicable for the students of class IX from the academic year 2005-06 and for the students of class X appearing in the examinations of March 2007.

You are requested to bring it to the notice of all concerned for necessary action.

Yours faithfully,

G.Balasubramanian
Director (academics)

Introduction of Mathematics Laboratory and internal assessment in Secondary Classes

As you are well aware, study of Mathematics has been central to all learning systems from time immemorial. As a vital component of the '3R's, emphasis has always been laid on the basic skills of numbers and their extensive use in giving a form and name to several of the thought patterns of human cognition and understanding. Over the centuries, mathematics has developed as a discipline of study with a focus, a purpose and a scheme. The various inputs to learning of mathematics have aimed at developing certain basic and essential skills for its use in daily life as well as in furtherance of knowledge.

Over the years, an apparent complexity seems to have appeared in the content and the processes involved in the learning of mathematics especially at the school level. Concepts of mathematics are seen as difficult to understand and appreciate, thanks to some myth associated in the transaction of the curriculum. Fear for the learning of the subject increases the resistance to the learning process. The situation needs to be attended to. The remedy lies in creating a right ambience for the learning of the subject. It lies in redesigning the transaction of the curriculum in which the paradigm of learning would help in developing a familiarity and ownership of the subject. It lies in creating a conducive environment in the classroom where the learner learns the basic and essential concepts and skills by doing simple activities. It is in this direction, CBSE has endeavored to launch the idea of Mathematics Laboratory in schools. The Board has instructed all the schools to open a Mathematics Laboratory in their campus to facilitate the effective learning of Mathematics. Guidelines to schools have been prepared and sent.

What could be done in Mathematics laboratory?

Mathematics Laboratory should facilitate in doing simple experiments and projects that would lead to empowerment of the following skills among the learners:-

- Numerical skills
- Observation skills
- Thinking skills
- Analytical skills
- Understanding logic
- Skills of comparing
- Skills of interpretation
- Problem solving skills
- Decision making skills
- Spatial analysis and interpretation
- Life skills
- Skills of games

Many similar skills could be identified and nurtured.

How could the above be achieved?

The Board feels that the establishment of a Mathematics Laboratory does not involve a high cost. Most of the above skills could easily be developed by using indigenous materials like paper, sticks, pins, thread, plywood, cardboards and several other simple locally available materials. It is not necessary that the schools should always adopt established result-oriented practical work. The objective of the laboratory is to promote critical thinking and ability to approach a problem in different ways. It calls for firing the imagination of the learners so that they are creative and contributive. In all such exercises, the processes are more important than the products. It is therefore essential that our students are exposed to think differently and approach problems without any fear. It calls for taking the concepts of Mathematics beyond the limitations of the text books. The Board believes that such open ended approach, if carried out with a sense of sincerity of purpose among the affiliated schools could bring about an entirely positive learning atmosphere in the schools.

The space required for doing such exercise is quite limited. Though the schools should endeavor to establish a separate unit for the Mathematics laboratory so that it remains in focus, the absence of adequate space in schools currently should not hinder the cause. A vibrant classroom can also be a temporary Mathematics Laboratory. In case of inadequacy of classrooms, even space/corners in the floors can be dedicated to the Mathematics Laboratory. It is the type of work that is being done that matters more than where exactly it is conducted, though a rightful place for Mathematics laboratory would add a flavour to the cause and the concept.

Internal Assessment in Mathematics:

As an extension of the above intent of the Board to make the learning of Mathematics a more purposeful exercise, the Board has decided to provide scope for internal assessment in Mathematics. The need for internal assessment arises from the fact that the motivation, commitment and the imaginative faculties of the learner in any discipline cannot be evaluated through a one-shot examination at the end of an academic year. It has to be seen through over a period of time and assessed by the teacher who is a witness to the process of growth and development.

It is also felt that the objective is not to merely evaluate a learner in a public examination and award marks, but a paradigm shift to self-actualized learning in the classroom and in the extended hours of schooling. Keeping this in view the Board has decided to award 20 marks for the internal assessment of the learners in the secondary classes.

The distribution of Marks will be as under:

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| ➤ Evaluation of skills | 10 Marks |
| ➤ Assessment of Record work | 5 Marks |
| ➤ Assessment through Summative and formative tests | 5 Marks |

How would the evaluation be done?

Step 1: Evaluation of skills

10 Marks

1. The assessment would be on any two skills.
2. The assessment would be done during the course of a test spread over a period of an hour and a half for a group of students not exceeding twenty in number

3. The assessment will be done at the end of the class IX as well as class X independently by the school
4. The Board would be listing different types of skills in its publication to be brought out specifically for this purpose. The type of skills would be separately listed for classes IX as well as X. However, the schools are free to identify and test similar skills or applications based on the above to test the thinking faculties of the learners.

Distribution of Marks will be as follows:

- Identification and interpretation of the problem – 2 marks
- Drawing a road-map or flow chart for solving the problem – 2 marks
- Interpretation of the concepts involved in the problem – 2 marks
- Assessment of the hands-on skills(how the students have used materials/sketches/other appliances) – 2 marks
- Recording and reporting procedures – 2 marks

The schools would keep a record of the skills tested and the modus operandi of the procedures adopted for the above evaluation for verification by the Board whenever necessary for a period of six months. The evaluation will be internal and done by a team of two teachers of the school teaching mathematics at the secondary or senior school level.

Step 2: Assessment of the Record - work done:

5 Marks

The students would be required to do at least 10 skill based activities in the course of the academic year based on the skills listed in page 1 of the circular or related skills. Suggestive activities will also be found in the book to be brought out by the Board. However, the school would be free to suggest related activities outside those suggested by the board or facilitate the students to design related activities which would enhance their creative skills and critical thinking competencies. A record of the work done shall be maintained by the student. The same will be assessed at the end of the academic year in Class IX and in the month of December in Class X.

The skill based activities will carry five marks. The record work shall be maintained by the school concerned and would be subject to the inspection of the Board, if found necessary.

Step 3: Assessment through summative and formative tests

5 Marks

Continuous Assessment will be an input of the reflection of the performance of the students in their first and second terminal examinations. Five marks are allotted for the same.

How could the marks be allotted?

Different strategies are recommended for class IX and class X

For class IX

- Reduce the marks of the first term examination (Aug- Sept) to ten and work out the achievement of the student
- Reduce the marks of the second term examination (Nov- Dec) to ten and work out the achievement of the student

- Add the values of both and thus the achievement of the learner works out to their performance out of twenty
- Reduce the same to the achievement out of 5
- If the achievement of the candidate works out to a decimal, round it off to the next higher value if it is 0.5 and above. If it is less than 0.5 then round it off to the lower number.

For class X

- Reduce the marks of the final assessment of class IX to ten and work out the achievement of the student
- Reduce the marks of the first term examinations of class X to ten and work our the achievement of the student
- Add the value of both and thus the achievement of the learner works out to their performance out of twenty
- Reduce the same to the achievement out of 5
- If the achievement of the candidate works out to a decimal, round it off to the next higher value if it is 0.5 and above. If it is less than 0.5 then round it off to the lower number.

The above exercise is intended to motivate and sustain the interest level of the student and facilitate him to link his academic performance with other related activities.

The Board believes that the rich experience and ancient wisdom of this country in the field of Mathematics, as evidenced in various fields like astronomy and other indigenous technologies, was but a testimony of the keen interest India had in the subject. It is necessary to revive this love for the subject by several pedagogical reforms. It is felt that the above initiatives of the Board would go a long way in building an appropriate climate for effective transaction of the subject of Mathematics in classrooms and its extended learning beyond the campus of the school.

The Board intends to implement the above scheme for the class IX from the ensuing academic year 2005-06 and for class X for the academic year 2006-07.
