CHAPTER- IV

DESCRIPTION OF TOOLS

For every type of research, we require certain instruments to gather factual information for exploring new fields. The instruments thus employed as means are called tools. The selection of a suitable tool is of vital importance for successful research. Tools are the means for collection of data for interpretation and to explore new fields. The selection of a tool is a difficult task in research and is dependent upon various considerations such as the objectives, the choice and availability of the tools, personal competence of the investigator to administer the tests and the like. According to J.W.Best, “like the tools in a carpenter’s box, each research tool is appropriate in a given situation to accomplish a particular purpose”. The choice of tools in a research piece has, therefore, to be proper and immediate to realize the set objective and allied major consideration.

For the present investigation, the following tools were accordingly chosen or self– developed as per need of the investigation:

A. Standardized Test
   1. Culture Fair Intelligence Test (Cattel R.B. and Cattel A.K.S.)
   2. Socio–Economic Status Scale (N.Kumar et.al.)

B. Self developed Tools
   3. Achievement Test for students
   4. Opinionnaire for Teachers
   5. Power Point Programme

A. Standardized Tests used in the study

4.1 CULTURE FAIR INTELLIGENCE TEST

(i) Description of the test

Culture Fair Intelligence Test measures individual intelligence in a manner designed to reduce, as much as possible, the influence of verbal fluency, cultural climate and educational level. There are three scales in the Culture Fair Series. For the purpose of the present study, Scale-2 has been used, which consists of four sub-sets. In the first subset, the individual is presented with an incomplete progressive series. His task is to select,
from among the choices provided, the answer, which best continues the series. The second sub-set is related to classification. The individual is presented with five figures. He must select one which is different from the other four. The third sub-set is related to matrices where the individual is asked to correctly complete the design or matrix presented at the left of each row. The fourth sub-set (or Topology), requires the individual to select, from the five choices provided, the one which duplicates the conditions given in the left box. Before each sub-test, examples are given so that the task requirements are clear to the examinees.

The reliability of the test (Scale-2, Form-A) by Spearman-Brown formula is 0.79 and K-R Formula 21 is 0.81. Direct concept validity of the test is 0.85.

(ii) Administration of the test

For conducting the test, test booklets and answer-sheets were distributed to the pupils. The students were asked to fill in the information at the top of the answer sheet. Then all the necessary instructions were given to the students. Time limits were strictly adhered to.

(iii) Scoring of the test

For scoring the answer sheets, scoring key available for scale 2 was used. The stencil key was laid over the left-hand side of the answer sheet using the ‘check-star’ to adjust it to the proper position. The total number of ‘X’s, showing through the holes was corrected and this number was recorded in the total score on the answer sheet. These raw scores were then converted into normalized IQ scores using Table 2 (Cattle and Cattle) provided in the manual for Scales 2 and 3 (Appendix-A).

4.2 SOCIO-ECONOMIC STATUS SCALE

Assessment of socio-economic status (SES) is an important aspect in community based studies. Evaluation of SES of a family would mean the categorization of the family in respect of defined variables such as education, occupation, economic status etc. Some of these variables can be evaluated simultaneously. Several methods or scales have been proposed for classifying different populations by socio-economic status. However, social transformation and fast growing economy have rendered these scales ineffective in measuring the SES over the years. Further, steady inflation and consequent fall in the value of currency make the economic criteria of the scale less
relevant. The most accepted scale for urban populations was proposed by Kuppuswamy in India in 1976. This scale takes account of education, occupation and income of the family to classify study groups into high, middle and low socio-economic status. But due to steady inflation and consequent fall in the value of the rupee, the income criteria in the scale lose their relevance. To determine the socio-economic status N.Kumar et.al. updated the Kuppuswamy’s socio-economic status scale up to 2007 and revised the family income per month (in Rs.) for 2007 (Appendix-B).

**Test-Reset Reliability**

The socio-economic status scale was administered to 40 students of IX class and the total score for each student calculated on all the items on the scale. Another administration of the scale was carried out on the same 40 students, 2 weeks later, after the first administration and the total score for each student calculated.

The agreement between the scores obtained from the two administrations of the scale was consequently determined by calculating the correlation coefficient between the two sets of students’ scores. The Pearson-r value of 0.80 obtained indicated that socio-economic status scale was quite reliable.

**Validity**

As this scale was initially proposed in 1976 in India, its updating was done in 2007. This modified scale can be administered very quickly in any setting for a large community as well as for small scale studies and it has provision of updating the scale over the years to maintain its high validity. This will make the scale relevant and useful and also allow individual researchers to modify it according to the period of their research.

**Administration of the Test**

Socio–Economic Status Questionnaire (SESQ) was distributed one each to all the students selected for study. The students were asked to fill his /her name, class, date, name of school, home address etc.on the space provided. Then the first item of the test was read and explained by the investigator simultaneously item-wise to help the students understand them properly. After finishing the SESQ, the students were asked to check back and make sure that no item has been missed.
**Scoring of the test**

The range of scores which can be obtained is from 3 to 27. With the help of the score card, the status score is obtained. On the basis of the total score, the respective class was found out.

<table>
<thead>
<tr>
<th>Raw Scores</th>
<th>Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>26-29</td>
<td>Upper (1)</td>
</tr>
<tr>
<td>16-25</td>
<td>Upper Middle (2)</td>
</tr>
<tr>
<td>11-15</td>
<td>Lower Middle (3)</td>
</tr>
<tr>
<td>05-10</td>
<td>Upper Lower Middle (4)</td>
</tr>
<tr>
<td>&lt;4</td>
<td>Lower (5)</td>
</tr>
</tbody>
</table>

### 4.3 ACHIEVEMENT TEST

Achievement tests are well suited to provide educators with objective feedback as to how much students are learning and understanding. Teachers teach and help the learners to learn. The learning that takes place is assessed or evaluated not only for the learners’ benefit but also for the teacher to evaluate his/her own work. At the end of a lesson or a group of lessons, the teacher needs to get feedback on what the learner has achieved, as a result of the teachers’ efforts and also indirectly to assess his/her own achievement as a teacher. This feedback comes with the help of a tool, known as “Achievement Test”.

Gronlund (1977) defined an achievement test as “a systematic procedure for determining, the amount a student has learned through instruction”.

In the words of Wiersma, W. and Jurs, S.G. (1990), achievement test “is a measure of knowledge and skills in a content area”.

Since no specific achievement test in the selected topic was available to test the effectiveness of ICT on IX grade mathematics students, so, an achievement test in mathematics for IX class on the topic “Surface Areas and Volumes” was prepared by the investigator herself to evaluate the pupils’ Knowledge, Comprehension, and Application.

Achievement tests were prepared for all the ten sub-units of power point programme consisting of 115 multiple choice questions in total and after try out the final draft had 80 questions. Achievement tests covered all the important aspects of the
lessons taught in the class by the teachers to both the control group and the experimental group. Four options were given for every question and only one option was correct. For each question, there were another four Statements that students had to choose to indicate their confidence level in answering the question. The students had to mark the correct option on the answer sheets. This was used as the pre-test and post-test. The test items were prepared based on a blueprint.

The following steps were followed for developing the tests:

4.3.1 Planning of the test

While going to construct a building, an engineer prepares a plan. Similarly, planning is necessary in constructing an objective based test in evaluation. Planning stage of the test tries to answer what content area is to be included in the test and what are the objectives that are going to be tested? The planning stage of a test should include the nature of the test items and the statement of conditions under which it will be administered. The Achievement Test was planned with the objective of measuring Achievement in Mathematics of IX grade students on selected topics. For planning of the Achievement Test, the following points were taken into account:

- Determining the purpose of a test;
- Identification and defining the intended learning outcomes;
- Preparing the test specifications; and
- Constructing relevant test items;

So, the Achievement Test was planned in mathematics of 1X class students on topic” Surface Areas and Volumes”.

4.3.2 Preparing the Achievement Test

For the preparing of Achievement Test the following points were taken into account:

- Instructional objectives
- Design
- Blue - print
Objectives of the Test

For the purpose of constructing Achievement Test, objectives were defined in behavioural terms from selected units of Mathematics textbook of class IX prescribed by CBSE. Since the major concern here was to test the academic achievement, it was accordingly, decided to test the three major areas of cognitive domain, i.e., Knowledge, Understanding and Application. After determining objectives, the learning outcomes were stated as observable terminal performance. In order to make sure that Achievement Test measures a desirable behaviour, test specifications were developed covering the objectives and subject-matter selected to be taught during the experiment. The test covered the content of the following units.

Unit 1 -Surface Areas

1.1 cuboids
1.2 cube
1.3 Right circular cylinder
1.4 Right circular cone
1.5 Sphere

Unit 2 –volumes

2.1 cuboids
2.2 cube
2.3 Right circular cylinder
2.4 Right circular cone
2.5 Sphere
Table 4.1 THE TEST COVERED THE CONTENT OF THE FOLLOWING UNITS/SUB-UNITS

<table>
<thead>
<tr>
<th>Unit 1</th>
<th>Surface Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Cuboids</td>
</tr>
<tr>
<td>1.2</td>
<td>Cube</td>
</tr>
<tr>
<td>1.3</td>
<td>Right Circular Cylinder</td>
</tr>
<tr>
<td>1.4</td>
<td>Right Circular Cone</td>
</tr>
<tr>
<td>1.5</td>
<td>Spheres</td>
</tr>
<tr>
<td>Unit 2</td>
<td>Volumes</td>
</tr>
<tr>
<td>2.1</td>
<td>Cuboids</td>
</tr>
<tr>
<td>2.2</td>
<td>Cube</td>
</tr>
<tr>
<td>2.3</td>
<td>Right Circular Cylinder</td>
</tr>
<tr>
<td>2.4</td>
<td>Right Circular Cone</td>
</tr>
<tr>
<td>2.5</td>
<td>Spheres</td>
</tr>
</tbody>
</table>

To decide the weightage to be given to different content areas, objectives and different forms of questions, expert opinions of the teachers were taken into consideration.

- **Preparation of the Blue - print**

Preparation of the blue - print helped the investigator to have an objective based Achievement Test giving due weightage to objectives, content and forms of questions. More than the required number of items was included in the test under each objective and content sub-unit. This was done to get enough items for the final test.
Table 4.2 NUMBER OF ITEMS IN THE FIRST DRAFT OF ACHIEVEMENT TEST AT DIFFERENT COGNITIVE LEVELS OF OBJECTIVES

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Sub-unit</th>
<th>Cognitive Levels of Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units ↓</td>
<td>↓</td>
<td>Q₁</td>
</tr>
<tr>
<td>Surface Areas</td>
<td></td>
<td>9,10,15,22,46,</td>
</tr>
<tr>
<td></td>
<td>Cuboids and Cube</td>
<td>52,63,66,67,73</td>
</tr>
<tr>
<td></td>
<td>Right circular Cylinder</td>
<td>6,12,13,16,23</td>
</tr>
<tr>
<td></td>
<td>Right circular Cone</td>
<td>17,20,31,93,95</td>
</tr>
<tr>
<td></td>
<td>Sphere</td>
<td>2,3,4,5,8,64</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volumes</td>
<td></td>
<td>1,33,58</td>
</tr>
<tr>
<td></td>
<td>Cuboids and Cube</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Right circular Cylinder</td>
<td>18,94</td>
</tr>
<tr>
<td></td>
<td>Right circular Cone</td>
<td>21,115</td>
</tr>
<tr>
<td></td>
<td>Sphere</td>
<td>24,25</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q₁=Knowledge  Q₂=Comprehension  Q₃=Application
**Table 4.3 Blue Print of First draft of Achievement Test**

<table>
<thead>
<tr>
<th>Objectives →</th>
<th>Sub-unit</th>
<th>Cognitive Levels of Objectives</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units ↓</td>
<td></td>
<td>Q₁</td>
<td>Q₂</td>
</tr>
<tr>
<td><strong>Surface Areas</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuboids and Cube</td>
<td>10</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Right circular Cylinder</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Right circular Cone</td>
<td>5</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Sphere</td>
<td>6</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td><strong>Volumes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuboids and Cube</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Right Circular Cylinder</td>
<td>2</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Right Circular Cone</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Sphere</td>
<td>2</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>35</td>
<td>31</td>
<td>49</td>
</tr>
</tbody>
</table>

Q₁=Knowledge    Q₂= Comprehension    Q₃=Application

- **Preparation of the test Items**

  Keeping in mind the above “Rules and Suggestions”, a total of 115 objective type items with a wide range of difficulty were constructed from ten sub-units of mathematics syllabus prescribed by Central Board of Secondary Education for class IX. Items were prepared in conformity with the Blue-print. While constructing items, it was ensured that no objective remained untested and language of the test items was understandable and unambiguous and the instructions very clear. The test items were arranged properly and
assembled in the order of difficulty into the test. Easy items were given a place in the beginning and difficult items towards the end. The preliminary draft in Achievement Test was given to experts in education and experienced Mathematics teachers for their opinion about the language and appropriateness of the items. Only those items were selected which were having 0% unanimity. Items in difficult language were modified to simple language. Finally, 80 items constituted the Achievement Test, containing the blanks type items, True /False type items and multiple choice type items prepared in conformity with the Blue - print.

- **Preparation of Directions to Test Items**

  Appropriate directions to test items were prepared, in a clear and concise way so that the students could understand them easily. As test was divided into three sections, viz., Multiple Choice Questions, Fill in the Blanks and True and False Questions, clear instructions were given at the beginning of each section. For the first section the students were asked to write the correct response in the answer sheet. For the second section (True/False), the students were asked to write T or F as the correct response in the answer sheet. For the third section (Multiple Choice Question), the students were instructed to write the correct response in the given answer sheet. For each question, there were another four statements that students had to choose from to indicate their confidence level in answering the question. They were as follows:

1. I am 100% confident that I am correct.
2. I think I am correct.
3. I think I am wrong.
4. I am 100% confident that I am wrong.

The students had to mark the correct option on the answer sheets.

- **Preparation of Directions for Scoring**

  To facilitate objectivity in scoring, scoring keys were prepared. Scoring Keys were prepared separately for Multiple Choice Questions, Fill in the Blanks and True and False Questions. Scoring Key was also prepared to assess their confidence level in answering the question.
• Practicability

Practicability of the test is maintained by means of the ease of administration, readiness of interpretation, economy in initial cost, practicability of securing materials, time required for scoring and analyzing the results. The prepared achievement test was easy to administer. It was economical, as were as reusable as the answer sheets were provided separately. Time needed for scoring was limited. Hence the test had good practicability.

4.3.3 First Try-Out

The first draft of the achievement test was administered on a group of 48 students of class X of S.D.Model Senior Secondary School, Karnal. At the time of administering the first draft of the achievement test, all due efforts were made to maintain a normal environment. The time limit was also observed on the subjects and they were given as much time as they required. The answer-sheets of achievement test were collected from the students for scoring purposes.

Two sets of marking scheme were used: (i) correct answers of students were given one mark and wrong answers were given zero marks regardless of their confidence level (actual score); (ii) answers that take into account students' confidence level using the four-point confidence level as shown in Table 4.4.

<table>
<thead>
<tr>
<th>QR</th>
<th>Confidence Rating</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>100% confidence that I am correct</td>
<td>3</td>
</tr>
<tr>
<td>C</td>
<td>I think I am correct</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>I think I am wrong</td>
<td>-1</td>
</tr>
<tr>
<td>C</td>
<td>100% confidence that I am wrong</td>
<td>-2</td>
</tr>
<tr>
<td>C</td>
<td>No response</td>
<td>0</td>
</tr>
<tr>
<td>W</td>
<td>100% confidence that I am correct</td>
<td>-2</td>
</tr>
<tr>
<td>W</td>
<td>I think I am correct</td>
<td>-1</td>
</tr>
<tr>
<td>W</td>
<td>I think I am wrong</td>
<td>1</td>
</tr>
<tr>
<td>W</td>
<td>100% confidence that I am wrong</td>
<td>2</td>
</tr>
<tr>
<td>W</td>
<td>No response</td>
<td>0</td>
</tr>
</tbody>
</table>

QR = Response to question, C = Correct answer, W = Wrong answer
After scoring the test items, the Achievement Test scores were organized in an ascending order. An analysis was made to find out their difficulty value (D.V.) and discriminative power (D.P).

**Difficulty Value**

“The difficulty value of an item may be defined as the proportion of certain sample of subjects who actually know the answer of item”. (Frank S, Freeman)

The index of difficulty (D.V) of each item of the test was calculated using the following formula:

\[
D.V = \frac{P_h + P_l}{2}
\]

\(P_h\) = Proportion of the right response of the upper group

\(P_l\) = Proportion of the right response of the lower group

The difficulty indices were analyzed using the Henning (1987) guidelines as shown in the Table 4.4

**Table 4.5: Henning’s Guidelines (Difficulty Value)**

<table>
<thead>
<tr>
<th>High Difficult</th>
<th>Medium</th>
<th>Low (Easy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\leq 0.33)</td>
<td>0.34-0.66</td>
<td>(\geq 0.67)</td>
</tr>
</tbody>
</table>

Based on the Henning’s Guidelines in the above Table, the 115 test items categorized in Table 4.6
Table 4.6 DISTRIBUTION OF DIFFICULTY VALUE (D.V) OF ITEMS OF FIRST DRAFT OF ACHIEVEMENT TEST

<table>
<thead>
<tr>
<th>Level of difficulty</th>
<th>Items</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>High(≤.33)</td>
<td>7,8,14,19,59,62,77,91,92,100,101,104,106,109,112</td>
<td>15</td>
</tr>
<tr>
<td>Medium(.34-.66)</td>
<td>1,2,3,4,5,6,9,10,11,12,13,15,16,17,18,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,60,61,63,64,65,66,67,68,69,70,71,72,73,74,75,76,78,79,80,81,82,83,84,85,86,87,88,89,90,93,94,95,96,97,98,99,102,103,108,110,111,113,114,115</td>
<td>96</td>
</tr>
<tr>
<td>Low(≥0.67)</td>
<td>69,73,105,107</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>115</td>
</tr>
</tbody>
</table>

- **Discriminative Power (D.P)**

Discriminative Power of an item may be defined as the extent to which success and failure on that item indicates the possession of the trait or achievement being measured (Marshall and Hales, 1972). Bean (1953) defined it as: “The degree to which the single item separates the superior from the inferior individual student in the trait or group of traits being measured”.

The index of discrimination (DP) is the difference between the proportion of the upper group who answered an item correctly and the proportion of the lower group who answered an item correctly.

Distribution of discriminating powers of items was calculated by formula

\[
DP = \frac{(R_U - R_L)}{0.5N}
\]

- \(R_U\) = Number of correct responses in the upper group
- \(R_L\) = Number of wrong responses in the lower group
- \(N\) = Total Number of correct responses.

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Ebel’s (1979) criteria and guidelines for categorizing discriminating indices is a widely quoted set of guidelines and, therefore, was used in this test analysis.

**Table 4.7: Ebel’s Guidelines (Discriminating powers)**

<table>
<thead>
<tr>
<th>Discriminating powers</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>.40 and above</td>
<td>The item is functioning quite satisfactorily</td>
</tr>
<tr>
<td>Between 0.30-0.39</td>
<td>Little or no revision is required</td>
</tr>
<tr>
<td>Between .20-0.29</td>
<td>The item is marginal and needs revision</td>
</tr>
<tr>
<td>&lt;.19</td>
<td>The item should be eliminated or completely revised</td>
</tr>
</tbody>
</table>

Based on the Ebel’s guidelines in the above Table, the 115 test items categorized as in Tables 4.8 to 4.11.

**Table 4.8 DISTRIBUTION OF DISCRIMINATING POWERS (D.P) OF ITEMS OF FIRST DRAFT OF ACHIEVEMENT TEST**

<table>
<thead>
<tr>
<th>Discriminating powers</th>
<th>Items</th>
<th>frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>.40 and above</td>
<td>3, 4, 11, 13, 15, 17, 20, 21, 22, 23, 25, 31, 34, 35, 38, 39, 46, 49, 55, 57, 61, 65, 66, 67, 72, 75, 78, 79, 83, 84, 85, 86, 88, 90, 93, 96, 97, 102, 111, 113, 114, 115</td>
<td>42</td>
</tr>
<tr>
<td>Between 0.30-0.39</td>
<td>1, 2, 5, 6, 9, 12, 16, 18, 24, 26, 27, 28, 30, 32, 33, 36, 37, 40, 41, 42, 43, 44, 45, 48, 50, 51, 52, 54, 58, 60, 63, 70, 71, 74, 76, 87, 94, 95</td>
<td>38</td>
</tr>
<tr>
<td>Between 0.20-0.29</td>
<td>29, 47, 56, 62, 68, 69, 73, 77, 82, 99, 100, 103, 106, 108, 109, 110</td>
<td>16</td>
</tr>
<tr>
<td>≤0.19</td>
<td>7, 8, 10, 14, 19, 53, 59, 64, 80, 81, 89, 91, 92, 98, 101, 104, 105, 107, 112</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>115</td>
</tr>
</tbody>
</table>
### Table 4.9 DISTRIBUTION OF DISCRIMINATING POWERS (D.P) OF TERMS OF FIRST DRAFT OF ACHIEVEMENT TEST

<table>
<thead>
<tr>
<th>Discriminating powers</th>
<th>frequency</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>.40 and above</td>
<td>42</td>
<td>Very Good Items</td>
</tr>
<tr>
<td>Between .30 and .39</td>
<td>38</td>
<td>Reasonably Good Items</td>
</tr>
<tr>
<td>Between .20 and .29</td>
<td>16</td>
<td>Needs Improvement</td>
</tr>
<tr>
<td>≤.19</td>
<td>19</td>
<td>Very Poor</td>
</tr>
</tbody>
</table>

### Table 4.10 ITEM ANALYSIS CHART (FIRST TRY-OUT)

<table>
<thead>
<tr>
<th>Level of Difficulty→ Discriminating Powers ↓</th>
<th>High Difficult (≤.33)</th>
<th>Moderate (.34-.66)</th>
<th>Low (≥.67)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤.19 (Bad)</td>
<td>7,8,19,59,91,92, 101,104,112</td>
<td>10,58,64,80,81,89,98</td>
<td>105,107</td>
<td>18</td>
</tr>
<tr>
<td>Between 0.20-0.29</td>
<td>14,62,77,100, 106,109</td>
<td>29,47,56,68,82,99, 103,108,110</td>
<td>69,73</td>
<td>17</td>
</tr>
<tr>
<td>Between 0.30-0.39</td>
<td>-----</td>
<td>1,2,5,6,9,12,16,18, 24,26,27,28,30,32,33,36,3, 7,40,41,42,43,44,45,48,50,51,52,54,58,60,63,70, 71,74,76,87,94,95</td>
<td>-----</td>
<td>38</td>
</tr>
<tr>
<td>.40 and above</td>
<td>-----</td>
<td>-----</td>
<td>3,4,11,13,15,17,20, 21,22,23,25,31,34,35,38,3, 9,46,49,55,57,61,65,66,67,72,75,78,79,83,84,85,86, 88,90,93,96,97, 102,111,113,114, 115</td>
<td>-----</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>96</td>
<td>4</td>
<td>115</td>
</tr>
<tr>
<td>Level of Difficulty → Discriminating Powers ↓</td>
<td>High Difficulty ($\leq .33$)</td>
<td>Moderate (.34-.66)</td>
<td>Low ($\geq .67$)</td>
<td>Total</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-----------------------------</td>
<td>------------------</td>
<td>----------------</td>
<td>-------</td>
</tr>
<tr>
<td>$\leq .19$(Bad)</td>
<td>7,8,10,69,82,89,92,100,106,107,108,109,110</td>
<td>53,56,62,73,77,80,81,91,103,104,101</td>
<td></td>
<td>24</td>
</tr>
<tr>
<td>Between .20-.29</td>
<td>14,19,29,47,99,105,59,64,68,112</td>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Between .30-.39</td>
<td></td>
<td>1,2,6,9,12,13,16,18,20,21,22,23,25,26,27,28,30,32,33,36,37,40,41,42,43,44,45,48,50,51,52,54,58,60,63,65,66,67,70,71,74,76,87,88,90,94,95,97,</td>
<td></td>
<td>48</td>
</tr>
<tr>
<td>.40 and above</td>
<td>98,</td>
<td>3,4,5,11,15,17,24,31,34,35,38,39,46,49,55,57,61,72,75,78,79,83,84,85,86,93,96,102,111,113,114,115,</td>
<td></td>
<td>33</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>95</td>
<td></td>
<td>115</td>
</tr>
</tbody>
</table>
Out of 115 items, 80 were selected having difficulty index between .34 and .66 and discriminating power above .30 for the test. These items were improved with respect to language and destructors (Appendix-C).

### 4.3.4 Second Try–Out

The revised version of the Achievement Test was administered on another group of 51 students of class X of **S.B.S Senior Secondary School, Karnal**. Again difficulty value and discriminating power of 80 items were computed. The distribution of discriminating powers and difficulty value can be seen in Table (4.12), Table (4.13), and the final draft in Table (4.14).

**Table 4.12 DISTRIBUTION OF DISCRIMINATING POWERS AND DIFFICULTY VALUES OF ITEMS OF FINAL DRAFT OF ACHIEVEMENT TEST**

<table>
<thead>
<tr>
<th>Level of Difficulty → Discriminating Index ↓</th>
<th>Moderate (.34-.66)</th>
<th>Remarks</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between 0.30-0.39</td>
<td>1,2,5,6,9,12,16,18,24,26,27,28, 30,32,33,36,37,40,41,42,43,44, 45,48,50,51,52,54,58,60,63,70, 71,74,76,87,94,95</td>
<td>Reasonably Good</td>
<td>38</td>
</tr>
<tr>
<td>.40 and above</td>
<td>3,4,11,13,15,17,20,21,22,23,25,31, 34,35,38,39,46,49,55,57,61,65,66, 67,72,75,78,79,83,84,85,86,88,90, 93,96,97,102,111,113,114,115</td>
<td>Very Good Items</td>
<td>42</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>80</td>
</tr>
</tbody>
</table>
Table 4.1 DISTRIBUTION OF DISCRIMINATING POWERS AND DIFFICULTY VALUES OF CONFIDENCE LEVEL IN ANSWERING QUESTIONS OF FINAL DRAFT OF ACHIEVEMENT TEST

<table>
<thead>
<tr>
<th>Level of Difficulty</th>
<th>Discriminating Index</th>
<th>Remarks</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate (.34-.66)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between 0.30-0.39</td>
<td>2, 5, 63, 74, 76, 87, 94,</td>
<td>Reasonably Good</td>
<td>07</td>
</tr>
<tr>
<td>.40 and above</td>
<td>1, 3, 4, 6, 9, 11, 12, 13, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 48, 49, 50, 51, 52, 54, 55, 57, 58, 60, 61, 65, 66, 67, 70, 71, 72, 75, 78, 79, 83, 84, 85, 86, 88, 90, 93, 95, 96, 97, 102, 111, 113, 114, 115</td>
<td>Very Good Items</td>
<td>73</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>80</td>
</tr>
</tbody>
</table>

Table 4.14 NUMBER OF ITEMS RETAINED IN THE FINAL DRAFT OF ACHIEVEMENT TEST AT DIFFERENT COGNITIVE LEVELS

<table>
<thead>
<tr>
<th>Cognitive levels of objectives</th>
<th>Serial Number of items retained</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge Level (Q₁)</td>
<td>1, 2, 3, 4, 5, 6, 9, 12, 13, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 31, 33, 46, 52, 58, 63, 66, 67, 93, 94, 95, 115</td>
<td>31</td>
</tr>
<tr>
<td>Understanding Level (Q₂)</td>
<td>11, 26, 27, 28, 30, 32, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 48, 49, 50, 51, 54, 65, 71, 72, 74, 84</td>
<td>28</td>
</tr>
<tr>
<td>Application Level (Q₃)</td>
<td>55, 57, 60, 61, 70, 75, 76, 78, 79, 83, 85, 86, 87, 88, 90, 96, 97, 102, 111, 113, 114</td>
<td>21</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>80</td>
</tr>
</tbody>
</table>
4.3.5 Standardization of Achievement Test

80 items constituted the final form of the Achievement Test. The Achievement Test was further standardized by experimental validation of the test that included establishing reliability and validity.

- **Reliability of the test**

  Reliability is one of the important characteristics of any test and measuring instrument. “Reliability means consistency of scores obtained by same individual when re-examined with test on different sets of equivalent items or under other variable examining conditions” (Anastasi, 1968).

  In the present study the reliability of the test was measured by split-half method. In this method the score obtained from each individual was divided into two groups by pooling the odd number items and even number items. Their scores were tabulated and reliability was determined by using the Spearman-Brown Prophecy formula. The reliability coefficient of the present test was 0.97. This shows that achievement test has high reliability.

- **Validity of the test**

  ‘Validity refers to the extent to which a test or a set of operations measures what it is supposed to measure” (E.E.Ghiselli).

  Achievement Test constructed for the study was taken for granted because this is in accordance with Guilford (1971) who said,” There are some measures whose validity is taken for granted, for example , Achievement Test scores”.

  The test was validated against the criterion of content validity. Content validity is an important criterion for the usefulness of the test, especially of an achievement test. It is a measure of the match between the content of the test and the content of “teaching” that precede it.

  It was observed that the items of the Achievement Test were distributed over all the units of the instructional objectives. For ascertaining the content validity of the Achievement Test, the help of the subject-matter experts was also solicited. A copy of the list of the behavioural objectives and Achievement Test was given to the subject-matter experts in mathematics. They were asked to give their judgments with regard to the congruence between each objective and the relative test item.
• Final form of the test

The final form of the Mathematics Achievement Test contained 80 items, along with a scoring key (Appendix-D).

The final form of pre-and post-tests consisted of 80 objective type items. Where each item was provided with four option answers (one correct and three distracters). For each question, there were another four statements that students had to choose from to indicate their confidence level in answering the question. They were as follows:

1. I am 100% confident that I am correct.
2. I think I am correct.
3. I think I am wrong.
4. I am 100% confident that I am wrong.

Two sets of marking scheme were used: (1) correct answers of students were given one mark and wrong answers were given zero marks regardless of their confidence level (actual score): ( ) answers that take into account students’ confidence level using the four-point confidence level as shown in Table 4.15

**Table 4.15: Codes for integrating confidence into marks.**

<table>
<thead>
<tr>
<th>QR</th>
<th>Confidence Rating</th>
<th>Four Points Coding</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>100% confident I am correct</td>
<td>3</td>
</tr>
<tr>
<td>C</td>
<td>I think I am correct</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>I think I am wrong</td>
<td>-1</td>
</tr>
<tr>
<td>C</td>
<td>100% confident I am wrong</td>
<td>-2</td>
</tr>
<tr>
<td>C</td>
<td>No response</td>
<td>0</td>
</tr>
<tr>
<td>W</td>
<td>100% confident I am correct</td>
<td>-2</td>
</tr>
<tr>
<td>W</td>
<td>I think I am correct</td>
<td>-1</td>
</tr>
<tr>
<td>W</td>
<td>I think I am wrong</td>
<td>1</td>
</tr>
<tr>
<td>W</td>
<td>100% confident I am wrong</td>
<td>2</td>
</tr>
<tr>
<td>W</td>
<td>No response</td>
<td>0</td>
</tr>
</tbody>
</table>

QR=Response to question, C=Correct answer, W=Wrong answer
4.4 OPINIONNAIRE FOR MATHEMATICS TEACHERS

- Opinionnaire-

Opinionnaire refers to a formal statement or estimation of professional advice. In the context of the present study, the Opinionnaire aids. The researcher in assessing effectiveness of the power-point programme in terms of content, presentation and its utility for Mathematics teachers. It also helps in studying the role of power point programme in creating the learning readiness, monitoring learning process, diagnosing learning difficulties. It also helps in evaluating the acceptability of power point programme by Mathematics teachers to further judge the effectiveness of the power point programme as compared to the traditional method of teaching. A thorough literature survey of Opinionnaire available for senior grade teachers of Mathematics was made to locate any such appropriate Opinionnaire based on power point programme catering to the topics selected for the study. Hence, it was decided to develop an Opinionnaire for Mathematics Teachers to seek their opinion on the power point programme.

An Opinionnaire was developed to elicit the opinions of the senior grade teachers of Mathematics to determine the effectiveness and the acceptability of the power point programme in teaching Mathematics. An Opinionnaire consists of items with three alternative responses at the 3-point rating scale (Agree, Disagree and Undecided). The Opinionnaire was submitted to the same two experts along with the design of the power point programme for establishing the validity. The format was accepted by both the experts. The opinion of 10 Mathematics teachers teaching at secondary school level was obtained.

- Development and Description of Opinionnaire

The subject teacher is considered the pivot upon which lies the success or failure of an educational programme. The Opinionnaire was meant to obtain information about the effectiveness of the power point programme for secondary school level for teaching Mathematics.
-The Opinionnaire comprised of three parts:

**Part A** - aimed at eliciting information from the teacher with regard to Name, Gender, Age, Profession, Place of Work and use of Computer in the classroom.

**Part B** - was meant for obtaining information regarding the relevance of content presented in the power point programme.

**Part C** - was meant for obtaining information regarding the relevance of designing of the power point programme.

**-Planning the Opinionnaire**

Planning stage of framing Opinionnaire focuses on the areas to be covered by the Opinionnaire which may also include the listing of items and the objectives of the Opinionnaire. This stage was very important because it threw light on the core areas of the power point programme. The Opinionnaire under reference was planned for the teachers of Mathematics with the objective of seeking their opinion on the statements of the power point programme for class IX.

The planning of Opinionnaire aims at:

- Determining the purpose of the Opinionnaire;
- Identifying and defining the intended teachers ‘opinion’;
- Preparing the Opinionnaire specifications; and
- Constructing relevant items for the Opinionnaire.

For constructing Opinionnaire, the objectives were outlined from the selected units of Mathematics textbook of class IX. The major concern was to seek the opinion of the teachers.

**-Objectives of the Opinionnaire**

To find out the effectiveness of power point programme for Mathematics teachers, the Opinionnaire covered the following areas:

- Content
- Presentation
- Benefits to students
- Benefits to teachers
Preparation of Opinionnaire and first try-out

50 statements were framed to elicit the views of teachers on a three point rating scale. The preliminary draft of Opinionnaire was framed and given to 20 Mathematic teachers, English teachers, computer teachers and Lecturers in education. After showing the power point programme individually, they were requested to give their opinion about the language and appropriateness of statements in the power point programme. Only those items were selected which were having 80% unanimity. 39 statements constituted the Opinionnaire after first try-out.

As the Table 4.16 has shown that if the discrimination index equal to or greater than 0.30 than the item discriminates otherwise not. So, the investigator selected the statements discrimination index of 0.30 or above.

Table 4.16: EBEL’S GUIDELINES (D.P)

<table>
<thead>
<tr>
<th>Discriminating powers</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>.40 and above</td>
<td>The item is functioning quote satisfactorily</td>
</tr>
<tr>
<td>Between 0.30-0.39</td>
<td>Little or no revision is required</td>
</tr>
<tr>
<td>Between .20-0.29</td>
<td>The item is marginal and needs revision</td>
</tr>
<tr>
<td>&lt;=.19</td>
<td>The item should be eliminated or completely revised</td>
</tr>
</tbody>
</table>

Table 4.17 DISTRIBUTION OF DISCRIMINATING POWERS (D.P) OF ITEMS OF FIRST DRAFT OF OPINIONNAIRE

<table>
<thead>
<tr>
<th>Discriminating powers</th>
<th>Items</th>
<th>frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>.40 and above</td>
<td>3, 4, 11, 13, 15, 17, 20, 21, 22, 23, 25, 31, 34, 35, 38, 39, 46, 17</td>
<td>17</td>
</tr>
<tr>
<td>Between 0.30-0.39</td>
<td>1, 2, 5, 6, 9, 37, 40, 41, 42, 43, 44, 45, 50</td>
<td>13</td>
</tr>
<tr>
<td>Between 0.20-0.29</td>
<td>26, 27, 28, 30, 32, 33, 36, 29, 47</td>
<td>09</td>
</tr>
<tr>
<td>&lt;=0.19</td>
<td>7, 8, 10, 14, 19, 12, 16, 18, 24, 25, 31</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>50</td>
</tr>
</tbody>
</table>
- SECOND TRY-OUT

The Opinionnaire was tested and tried out with a group of another 20 Mathematics teachers. Out of 40 statements, 10 were rated below the acceptability level, while 30 statements were selected for the final draft. The blue-print of the draft of Opinionnaire and distribution of discriminating powers is given in the Table 4.18.

**Table 4.18 DISTRIBUTION OF DISCRIMINATING POWERS (D.P) OF ITEM OF FINAL DRAFT OF OPINIONNAIRE**

<table>
<thead>
<tr>
<th>Discriminating powers</th>
<th>Items</th>
<th>frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>.40 and above</td>
<td>3,4,11,13,15,17,20,21,22,23,25,31,34,35,38,39,46,50</td>
<td>17</td>
</tr>
<tr>
<td>Between 0.30-0.39</td>
<td>1,2,5,6,9,37,40,41,42,43,44,45,50</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>

- **Final form of Opinionnaire**

After going through two try-outs the final form of Opinionnaire had 30 statements *(Appendix-E).*

- **Reliability of the Opinionnaire**

The reliability of the Opinionnaire was measured by the split half method. The coefficient of the reliability, as found by split-half method, was **0.91** which indicates that the Opinionnaire is highly reliable.

- **Validity**

The Opinionnaire was given to two Mathematics Teaching experts and they made few suggestions which were incorporated; it was widely accepted by the experts and response from teachers further established the validity of the Opinionnaire.

After the final draft was accepted, these Opinionnaires were filled up by the Mathematics teachers providing the required information in different columns. Teachers were required to provide answers to the questions. They had to tick the right column where their opinion was sought. They had to tick the one of these columns as per their choice.
4.5 DEVELOPMENT OF POWER POINT PROGRAMME

Power Point is one of the most powerful tools in disseminating information and to learn everything from the basic to the more advanced features of a topic for the students. Using power point in the classroom helps students learn best visually, more elaborately and intelligently. It also makes the lectures interesting and joyful as well as a kind of fun, which results in making the learning more memorable (Lepper and Hoddle, 1989).

The dictum a picture is worth a thousand words befits the power point presentation as it presents and enriches the learning content as well as facilitates the teaching learning process, making it more or less graphical and pictorial to quicken the learners grasp and response. From the students’ perspective class materials becomes a more legible and intelligible than hastily scribbled notes on overhead projector or chalkboard writing. Slide presentations are highly effective for enhancing classroom instruction, aiding students’ productivity in laboratory settings. Students’ response turns overwhelmingly positive; Electronic presentations help clarify, visualize, organize and summarize information (Lepper and Hoddle, 1989). The strength, merit and potential of that characterise power point programme make teaching and learning healthy, motivating and lasting. Power point programme involves various phases

1. Concept Phase

Beginning with a clear concept lays foundation for an effective Power Point programme. Hence, it is essential to be very clear about the concept to be taught and for developing and effective Power Point teaching programme.

2. Plan Approach Phase

The concept phase is crucial. It affects both design and production as well as the overall shape of the proposed Power Point teaching programme. It also affects inclusion or exclusion and choice of texts and graphics appropriated to the focus of the programme and it, enrichment for classroom instruction. It involves a clear plan approach incorporating the following points at the concept Stage:
• Aims and Objectives of the Power Point teaching programme
• Power Point teaching programme its length and duration
• Selection of the title
• Content outlines
• Outlines of proposed methodology
• Description of proposed application (format, media, etc.)
• Content budgeting (e.g. general, specific as per syllabus)
• Target audience (e.g. class or level of students)
• Budgeting expenditure (developing Power Point instructional units/materials)

Proper development, assimilation understanding of the concept stands behind every successful Power Point teaching programme apart from the requisite skills and resources.

3. Design Phase

Design is a complex area in the development of Power Point. It is often recommended to keep the design simple and adhere to its usability guidelines, whenever possible, that is the design elements must be consistently comprehensible to support user intuitiveness. Design features should adhere to usability standards.

• Actions addressed at the Design Stage
  - Designing the script
  - Short listing storyboard, content and screen elements
  - Media type, format, standards specifications.
  - Flowchart of components constructed.
  - Layout consistency (e.g. design, colour, etc.)
  - Graphics, animations, preparation.
  - Consistency in terminology was maintained (e.g. menus, commands).
  - Consistent titling/headers were done.
  - Font size readability.
  - Content layout sensitivity to screen size/view area.
Elements of a Good Script for a Power Point Teaching Programme

Following points need to be taken care of while the writing the script

- Attractive start
- Clarity of concept
- Objective-based content
- Known to unknown approach
- Easily understandable technique
- No ambiguity
- Smooth transition
- Reinforcement
- Smooth closure
- Simple language

4. Production phase

The production period is dependent on the concept and design processes; being harmonized through agreement in appropriate resourcing, scoping and development time, workflow issues, projected deliverables and outcomes in the light of objectives desired at the concept stage. It also includes mapping of milestones and minute monitoring activities, as well as a post-production period to gauge overall development for quality assurance, testing, and evaluation.

5. STEPS TAKEN FOR DEVELOPMENT OF POWER POINT PROGRAMME

- Selection of the topic
- Writing assumptions about students
- Content specifications
- Entering behaviour of the learner
- Writing the instructional objectives
- Development of the lesson plans
- Design of power point based presentations
- Data delivery
- Try out
- Validation of Power Point Programme
(i) Selection of the topic

The topic “Surface Areas and Volumes” as prescribed for mathematics students of class IX of CBSE syllabus was selected to develop the programme. The purpose of selecting this topic was that the software material on this topic could be developed in a simple, logical and systematic manner. The following criteria was kept in mind for the selection of the topic;

- It should be economical.
- It should be according to the age of the learners.
- The language of the programme should be familiar and understandable to the students.
- It should be motivational and highly informative.
- The programme used should capture the attention of the pupils.

(ii) Writing assumptions about students

The assumptions about the students for whom the power point programme was developed are

Class------------------1X
Average age--------14 Years
Gender----------Both boys and girls
Intelligence level--------Mixed
Medium---------------English

(iii) Content Specifications

The content selected from the class IX syllabus of mathematics of CBSE, New Delhi, published by NCERT, was analyzed and arranged sequentially. For example, Surface Areas to be discussed before discussing the Volumes of Solids. The topic “Surface Areas and Volumes” was divided into two units Surface Areas and Volumes. Content of each unit was further divided into five sub-units so that each sub-unit may be taught into 40 minutes duration. Care was taken to place each sub-unit into a logical and psychological sequence.
For each type of learning Matrix, analysis and sequence analysis were conducted, students are likely to learn more if the material is presented in a correct sequence. Planning for learning sequence was done in a logical order, one learning event preceding another to provide a meaningful context for what is to follow in terms of content – specifications to be achieved and realized through the programme.

**Table 4.19 Chapter-Wise Content Specification**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Units</th>
<th>Sub-units</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Surface Areas</td>
<td>1.1 Cuboids</td>
<td>Definition, Geometrical representation, Derivation of surface area, Derivation of lateral surface area, Solution of related problems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.2 Cube</td>
<td>Definition, Geometrical representation, Derivation of surface area, Derivation of lateral surface area, Solution of related problems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.3 Right Circular Cylinder</td>
<td>Definition, Geometrical representation, Derivation of surface area, Derivation of lateral surface area, Solution of related problems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.4 Right Circular Cone</td>
<td>Definition, Geometrical representation, Derivation of surface area, Derivation of lateral surface area, Solution of related problems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.5 Sphere</td>
<td>Definition, Geometrical representation, Derivation of surface area, Derivation of lateral surface area, Solution of related problems</td>
</tr>
</tbody>
</table>
(iv) Entering behaviour of the learner

A programme is developed with the specific content as well as its population in mind. The nature of the content pertaining to the Surface Areas and Volumes requires a certain level of entering behaviour. Thus, on the basis of content requirement the following assumptions have been made about the learner in the programme.

It is assumed that learner is able to:

- Define Square, Rectangle, Circle
- Differentiate between the Area of a Square and Area of a Rectangle
- Calculate the Area of a Rectangle if its length and breadth are given
- Calculate the Area of a Circle, having ‘r’ as a radius
- Calculate the Circumference of a Circle, having ‘r’ as a radius

(v) Writing the instructional objectives

Instructional objectives were written for each sub-unit, as placed in Table 4.2. Instructional objectives were developed in terms of the observable outcomes expected from the learners. These concepts and skills that needed to be learned by the students in a particular unit were identified sequenced.
<table>
<thead>
<tr>
<th>1.11</th>
<th>Recognize the object of Cuboidal shape from their surroundings.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.12</td>
<td>Draw the diagram of a Cuboid</td>
</tr>
<tr>
<td>1.13</td>
<td>Recall the formula for the computation of the Surface Area of a Cuboid</td>
</tr>
<tr>
<td>1.14</td>
<td>Recall the formula for the computation of the Lateral Surface Area of a Cuboid</td>
</tr>
<tr>
<td></td>
<td>Solve the problems related to the computation of the surface area/ Lateral</td>
</tr>
<tr>
<td>1.15</td>
<td>Surface area of a Cuboid through direct use of the deduced formula</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.21</th>
<th>Recognize the object of Cubical shape from their surroundings.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.22</td>
<td>Draw the diagram of a Cube</td>
</tr>
<tr>
<td>1.23</td>
<td>Recall the formula for the computation of the Surface Area of a Cube</td>
</tr>
<tr>
<td>1.24</td>
<td>Recall the formula for the computation of the Lateral Surface Area of a Cube</td>
</tr>
<tr>
<td></td>
<td>Differentiate between cube and cuboid</td>
</tr>
<tr>
<td>1.25</td>
<td>Solve the problems related to the computation of the surface area/ Lateral</td>
</tr>
<tr>
<td>1.26</td>
<td>Surface area of a Cube through direct use of the deduced formula</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.31</th>
<th>Recognize the object of Cylindrical shape from their surroundings.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.32</td>
<td>Draw the diagram of a Right Circular Cylinder</td>
</tr>
<tr>
<td>1.33</td>
<td>Recall the formula for the computation of the Surface Area of a Right Circular Cylinder</td>
</tr>
<tr>
<td>1.34</td>
<td>Recall the formula for the computation of the Curved Surface Area of a Right Circular Cylinder</td>
</tr>
<tr>
<td>1.35</td>
<td>Differentiate between Circle and Cylinder</td>
</tr>
<tr>
<td>1.36</td>
<td>Solve the problems related to the computation of the surface area/ Lateral</td>
</tr>
<tr>
<td></td>
<td>Surface area of Cube through a direct use of the deduced formula</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.41</th>
<th>Recognize the object of Conical shape from their surroundings.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.42</td>
<td>Draw the diagram of a Right Circular Cone</td>
</tr>
<tr>
<td>1.43</td>
<td>Recall the formula for the computation of the Surface Area of a Right Circular Cone</td>
</tr>
</tbody>
</table>

Table 4.2 Chapter-Wise Instructional Objectives

After the teaching is over, learners will be able to:
<table>
<thead>
<tr>
<th></th>
<th>Recall the formula for the computation of the curved Surface Area of a Right Circular Cone</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.45</td>
<td>Solve the problems related to the computation of the Surface Area/ Curved Surface area of a cone through direct use of the deduced formula</td>
</tr>
<tr>
<td>1.51</td>
<td>Recognize the object of Spherical shape from their surroundings.</td>
</tr>
<tr>
<td>1.52</td>
<td>Draw the diagram of a Sphere</td>
</tr>
<tr>
<td>1.53</td>
<td>Recall the formula for the computation of the Surface Area of a Right Sphere</td>
</tr>
<tr>
<td>1.54</td>
<td>Recall the formula for the computation of the curved Surface Area of a Sphere</td>
</tr>
<tr>
<td>1.55</td>
<td>Solve the problems related to the computation of the Surface Area/ Curved Surface area of a Sphere through direct use of the deduced formula</td>
</tr>
<tr>
<td>2.11</td>
<td>Recall the formula for the computation of the Volume of a Cuboid</td>
</tr>
<tr>
<td>2.12</td>
<td>Solve the problems related to the computation of the Volume of a Cuboid through direct use of the deduced formula</td>
</tr>
<tr>
<td>2.21</td>
<td>Recall the formula for the computation of the Volume of a Cube</td>
</tr>
<tr>
<td>2.22</td>
<td>Solve the problems related to the computation of the Volume of a Cube through direct use of the deduced formula</td>
</tr>
<tr>
<td>2.31</td>
<td>Recall the formula for the computation of the Volume of a Right Circular Cylinder</td>
</tr>
<tr>
<td>2.32</td>
<td>Solve the problems related to the computation of the Volume of a Right Circular Cylinder through direct use of the deduced formula</td>
</tr>
<tr>
<td>2.41</td>
<td>Recall the formula for the computation of the Volume of a Right Circular Cone</td>
</tr>
<tr>
<td>2.42</td>
<td>Solve the problems related to the computation of the Volume of a Right Circular Cone through direct use of the deduced formula</td>
</tr>
<tr>
<td>2.43</td>
<td>Understand relationship between the Volume of a cone and a Cylinder</td>
</tr>
<tr>
<td>2.51</td>
<td>Recall the formula for the computation of the Volume of a Sphere</td>
</tr>
<tr>
<td>2.52</td>
<td>Recall the formula for the computation of the Volume of a Hemi-Sphere</td>
</tr>
</tbody>
</table>
(vi) Development of the lesson plans

Lesson plan is actually a plan of action. It is the core, the heart of an effective teaching. It is a sort of theoretical chalking out of the details of the journey, which a teacher is going to perform in the classroom along with his students.

Like a dexterous craftsman a teacher should plan his tools and techniques which may help him in moulding his materials (Students) in a desired way. According to International Dictionary of Education, "Lesson plan is the outline of the important points of a lesson arranged in order in which they are to be presented to students by the teacher". “To every teacher I would say, ’Always plan out your lesson beforehand but do not be slave of it’. “ Stevenson, R.L.

In the present study, as many as forty lesson plans were developed covering all the ten sub-units of the selected topics to be taught in the classroom situation following the conventional method of teaching in the controlled group class vis-à-vis the ICT used Power-Point teaching method used in the matching experimental group class to determine merits of the two methods used for teaching the mathematical concept. These lesson plans constituted the educational material used in both traditional teaching and ICT used teaching (Appendix-G).

(vii) Design of power point based presentations

➢ Planning a Power Point Presentation

Planning a Power Point presentation is not simply important but is also very crucial as a learning and teaching tool in the light of the fast emerging communication technology. Each page in a PowerPoint presentation is called a slide and a series of slides are required to be prepared to promote and enrich the teaching – learning as an innovative technique. A slide should cover only the most important points about a topic. It is meant to enhance the overall effect of presentation. It, therefore, involves gathering information intelligently and very carefully.
Gathering Information

Information Gathering includes:

- Information Collection;
- Analysis and Filtering;
- Organization; and
- Verification;

The required content information collected from the textbook as per syllabus of class IX was enriched from web and library and was analyzed, filtered and organized to prepare relevant Power Point Teaching Programme for classroom transaction.

Filtering is a process of deciding which information is reliable and authentic and which is not. The filtered data keyed into computer for further processing, result in the outcome of a blueprint of the Power Point Teaching Programme which in turned gives a fair idea about how the Power Point Teaching Programme could be evolved in terms of the content, organized in a logical and sequential manner.

Once all the necessary information has been collected and organized, it is verified and authenticated as per specifications of the syllabus to facilitate necessary
modifications, corrections and decision-making for preparing a Power Point Slide Show entailing:

- The Title of the Slide Show;
- Type of pictures and text to be placed on each slide;
- Numbers of slides to be prepared; and
- Making a story board;

A **story board** is a visual layout of the pictures and text on each slide. In a the Power Point programme there are different types of slides:

- Title Slide
- Bulleted list Slides
- Text and Clip Art Slide

Having a rough idea of topic points helps in planning the order of slides. This can be changed as desired with just a few mouse clicks, to add, delete or rearrange slides in a presentation.

Power Point Teaching Programme would involved using various elements e.g. graphics, text, animation, etc. also.

![Elements of Power Point Programme](image)
Text plays an important role in development of Power Point Teaching Programme. The extent to which text are used in Power Point Teaching Programme depends upon factors like:

The nature of the Power Point Teaching Programme(Surface Areas and Volumes)
- The subject /content (specific title and portion of the lesson taken)
- The treatment of the subject /content (heavy graphics/light graphics/heavy text/light text)

Texts have been used in Power Point Teaching Programme for different purposes:
- Title texts
- Body texts

In general, the title texts are bigger in size and employ brighter colours than body texts.

Designing text involves two basic aspects of information, that is,
- Content matter being presented
- Display how the matter is being presented.

The three parameters that control the display design of texts are:
- Fonts
- Fonts colours
- Background

While the fonts affect the profile of the displayed texts, colours and background affect their overall appeal.

➢ Graphics

Graphics play an important role in Power Point Programme. ‘A picture is worth a thousand words’. One cannot underestimate the impact of visuals over plain text or audio in the context of a Power Point Programme. Graphics in Power Point represent a collective terminology that includes all kinds of still pictures. It Graphics used in Power Point are characterized by certain attributes which make the Power Point Teaching Programmes effective:
- Graphics be kept as simple and appealing.
- They fittingly capture the mood of the title.
- They be designed and selected suitably to fit the overall theme.
• They may be even used as background image or moving from one concept to another.

Types of graphics imagery used in Power Point Teaching Programme fall into different categories.
• Pictures (Autoshapes)
• Clip Art (drawing drawn And from clip art files)

Graphics are important companions to information, when suitably presented. In the Power Point teaching Programme

(viii) Data Delivery

The power point presentation programmes developed, by the researcher, on the CDS and pen-drive were presented to mathematics teachers for their comments and suggestions which were duly incorporated in the PPP.

(ix) Try - out of the Programme

After development, the power point presentation programme it was tried on a group of 30 students of class IX to obtain their first hand reactions and response which was found to be encouraging on their part.

(x) Validation of Power Point Programme

Validation (OR testing) is a painstaking procedure but an essential part of the total quality assurance process. The purpose of validation was to check if the programme could meet its specified objectives. Validation process required clear and testing responses of teachers to the Power Point presentation programme. Their post-test scores indicated that they were instructionally sound. Changes were made where need with respect to sequence, content, presentation and clarity in language. The suggestions of two mathematics teaching experts were also incorporated and Power Point Programme were again reviewed and the final draft of Power Point Programme was accepted and presented to the experimental group in the study.

(xi) Development of the PPP for this study

For this study, software was developed on MS Power Point by using text, picture, animation, sound and bright colours for simulation and using the most commonly used software ‘Computer CD-ROM technology’ as a medium for the ICT used teaching technology. The CD-ROM, entitled, “Surface Areas and Volumes,” was developed as a

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Power Point Programme, comprising the storyboard including text, instructional design and possible graphics, audio and video. In order to minimize the overload for children, concise information is used as deemed important by the experts. Power Point features such as slide, back ground colour, text selection, fonts with appropriate size, graphics, proper animation were used to finalize the package, covering total content in 40 lectures demonstrations.

The slides can switch back and forth with mouse click or such arrow keys on the key board and the developed package was enhanced in compact disc (CD). The Surface Areas and Volume of different solids like cube, cuboids etc. can be shown in animated form with they day - to - day examples. Thus the animated diagrams with different pleasant colour combinations and full with extra allied information were made available to the students.

Step wise, the development of the PPP for this studies follows

In the development of Power Point programme, the following steps were followed:

- **Starting Power Point:**
  1. The Power Point program was opened using
     - Choose Start, Programs, and
     - Microsoft PowerPoint
     Or
     Double-click the shortcut icon on the desktop. The Power Point dialog box appeared.
  2. In the Power Point dialog box, the investigator clicked the **Blank Presentation** option button.
     The New Slide dialog box appeared. It was asked to choose an Auto Layout format.
  3. Then the Title Slide layout was clicked. After clicking OK, a Title Slide appeared, ready for the investigator to work with. When the researcher was already working in Power Point and wanted to create a blank presentation, then the new button on the Standard Toolbar was clicked and these steps were followed:
     - The investigator clicked the File menu, and clicked **New**.
     - In the New presentation dialog box, clicked Blank Presentation, and
then clicked OK.

The Power point dialog box appeared only when the investigator first launched the programme. When the investigator was already working in Power Point and wanted to create a new blank presentation, then the new button on the Standard Toolbar was clicked and these steps were followed:

1. The investigator clicked the File menu and then clicked New.
2. In the New Presentation dialog box, clicked Blank Presentation, and then OK.

**Adding text to a slide**

The Title Slide layout contains text boxes for a title and a subtitle.

The investigator typed the Text into these boxes.

1. Clicked in the Title text box.
   A thick gray border appeared around the text box indicating that it was selected.
2. Typed a Title.
3. Clicked the subtitle text box and typed a subtitle.

So these steps helped in creating the first slide.

**Following steps were taken for Adding another slide**

1. The investigator clicked the New Slide button on the common tasks.
2. Then the Auto Layout dialog box appeared and from there a layout was chosen for the next slide.

**Moving from slide to slide**

After having created several slides for the presentation, the investigator followed these steps:

By clicking the upper double ▲—arrow button on the lower right corner of the Power Point window. The previous slide appeared.

To move to the next slide: ▼

1. Clicked the lower double ▼—arrow button on the lower right corner of the Power Point window.

**Switching to Outline View**

To switch to Outline View, the Outline View
the lower left hand in corner of the Power Point window was clicked.

**Steps followed by the investigator for adding a slide to the outline:**

The investigator added a new slide in Outline View the same way as done in the Slide View.

1. On the common Tasks, clicked New Slide dialogbox, clicked a slide layout, and then clicked OK. A new slide icon appears in the outline.

- **To add a new slide right after a slide title:**
  1. The investigator placed the cursor at the end of a slide title.
  2. Pressed the enter key. A new slide icon appeared in the outline.

- **Steps used by the investigator for adding text to the outline**

  the investigator wanted to add text to a slide that was created previously, she needed to click an insertion point in the outline and start typing.

If the investigator wanted to add text to a new slide, following steps needed to be perused:

1. Clicked on the desired slide number in the left column to display that slide.
2. To enter text, clicked once on a text box to get a flashing I-bar (Edit mode), then start typing text or click on the Outline tab in normal view and enter text next to the desired slide icon.

**Edit Text**

Click a title, subtitle or text placeholder and then click anywhere within the text. A text insertion point (thin vertical line) appears where you clicked. Use the Backspace key to delete text the the left of the insertion point or the Delete key to delete text to the right. Type any new text you want to add.

The text is entered at the cursor position.

- **Edit text**
- Click a title, subtitle or text placeholder and then click anywhere with in the text.
• A text insertion point (thin vertical line) appears to click. Use the backspace key to delete text left of the insertion point or delete key to delete text to the right. Type any new text.

• **Effect of Text**: (underline, superscript, subscript):
  1. Select the entire text to be changed.
  2. Choose **Format, Font**.
     The Font dialog box will appear.
  3. Click to check the box next to the desired effect.
  4. If desired, click the **Preview** button to view the effect.
  5. Click **OK**.

AUTOSHAPES
The investigator added different types shapes as Cube, Cuboid, Cylinder, Sphere using Drawing Toolbar.

**Adding ClipArt to Slides**
PowerPoint offers a number of different ways to add clip art and pictures to a presentation. Perhaps the easiest way to do so is to select a Slide Layout that contains a placeholder for content such as clip art and pictures.
Select **Format > Slide Layout** from the menu to bring up the Slide Layout task pane.
There are a number of different Content Layout slides available to choose from. To add a single picture or a piece of clip art, click on a simple layout such as **Content** or **Content and Title** from the task pane and the layout of current slide will change to match choice.
1. Choose **Insert, Picture, Clip Art** from the text menu.
2. In the **ClipArt Gallery** window, click on a specific category and scroll through the images.
3. Click on the desired image.
4. Click **Insert**.

**Moving and Sizing**

Text, graphics and object placeholders can be moved, copied, sized, and deleted. To move, copy, size, or delete a placeholder, the handles must be displayed. **Handles are the tiny boxes that appear around the placeholder border.**

**To Move a Text Object within the Slide:**
1. Clicked on the text to display the placeholder.
2. Place the mouse pointer on the border (not a handle) and the cursor becomes a 4-way arrow.
3. Clicked on and hold the left mouse button and drag the placeholder to the desired location.
4. Release the mouse and click outside the text to remove the handles and placeholder.

**To Adjust the Text Area (not changing the font):**
1. Clicked on text to display the placeholder.
2. Clicked and hold the left mouse button on a middle handle located either on the top or bottom border. (The cursor will become a 2-way arrow.)
3. Drag that border either up or down to change the vertical size (height).
4. Clicked and hold the left mouse button on left or right middle handle.
5. Drag to change the horizontal size (width).
6. Clicked and hold the left mouse button on a corner handle.
7. Drag to size the placeholder proportionally.
8. Text within the placeholder will adjust to the new borders.

**To Resize Graphics:**
1. Clicked on the picture to display the handles.
2. Clicked and hold the left mouse button and drag a top or bottom middle handle to change the vertical size (height).
3. Clicked and hold the left mouse button and drag a left or right middle handle to change the horizontal size (width).

**Note: To resize without distorting:** Hold the <Shift> key down and drag a corner handle to size the placeholder proportionally.

**To Move Graphics within the Slide:**
1. Clicked once in the center of the picture.
2. Clicked and hold the left mouse button and drag the clip art to desired location.
3. Release the mouse button.

**To Rotate an Object:**
1. Clicked on the object to display the placeholder handles.
2. Clicked and hold the left mouse button on the green handle located above the top border. (The cursor will become a circular arrow.)
3. Drag the mouse left or right to the desired degree of rotation.

**To Delete an Object:**
1. Clicked on the object to display the Placeholder handles.
2. If a text box, clicked on the border, NOT the text.
3. If a picture, clicked once inside the picture to display the placeholder handles.
4. Press the **Delete** key.

**Changing Background Colors and Templates Designs**

**Templates used for developing Power Point Programme**

A Templates also called a presentation design, it helped Background colors can be changed for individual slides or all slides. Template designs will only apply to all slides.
Use Slide Sorter view to change backgrounds and apply template designs.

**To Change the Background Color:**
1. Click on the desired slide.
2. Choose Format, Background… from the text menu.
3. Click on the down arrow for a list of colors.
4. Choose a color, then check Omit background graphics from master if using a design template so the design won’t override the background color.*
5. Click Apply or Apply All.

**Transitions & Timings**

Transitions are the movements when on slide changes to another.
1. Choose View, Slide Sorter.
2. Click on the desired slide.
3. Choose Slide Show, Slide Transition. The Transition dialog box will appear in the right column.
4. Click on an effect in the Apply to selected slides: window to preview and select the effect. That effect is now applied to the slide.
   (*To disable the transition, choose another effect or choose No Transition.*)
5. Choose a Speed from the drop-down box.
6. Click on the desired Advance method:
   - Only on Mouse Click
   - Automatically after # Seconds If choosing automatic, then enter the desired seconds that slide
Create an Animation Effect

The term animation in PowerPoint, applies to the movements of objects on the slide, rather than the slide ad.

An animation effect is the style in which objects like pictures and bulleted item appear on a slide. Animation effects, like transitions, should be used sparingly. Use the same type of animation effect throughout the presentation for consistency. In Slide Sorter view, slides containing animation effects are marked by an animation effect icon below and to the left of the miniature slide image.

1. Choose View, Slide Sorter.
2. Double-click the desired slide to bring it into Normal View.
3. Choose Slide Show, Custom Animation. The Custom Animation Window will appear in the right column.
4. Click once on the desired object to animate on the slide.
5. In the Custom Animation window, choose an effect for that object.
6. Modify the Start, Size, and Speed options for that effect.
7. Follow steps 4 - 6 to apply an effect to additional objects.
8. Click Play to preview the animation within the slide OR click Slide Show to preview the actual show.
Motion Path

Clicked Custom Animation,
Add Effect Button appear
1. Clicked Motion Paths2. In the next menu ,clicked D
3. In the last menu, Draw Freedom form.

Using the Slide Master

On the View menu, point to Master
, and then click Slide Master.

Slide Master

The slide that stores information about the
design template applied, including font styles,
placeholder sizes and positions, background design,
and color schemes.
The bullet styles and shapes are set
in the Slide Master.
The bullet style, size, and shape can be changed individually on each slide but to save time and keep the format consistent use the Slide Master. Changes made on the Slide Master affect all slides in a presentation.

**To Change Bullet Character:**
1. Choose **View, Master, Slide Master**.
2. Click on the bullet to change. The cursor will be positioned just to the right of the bullet.
3. Choose **Format, Bullet**. The Bullet dialog box will appear which formats the desired bullet, size, and color.
4. Choose one of the designs shown under the Bulleted or Numbered tabs OR click the Character or Picture buttons.
5. Click on the drop-down arrow to select the desired character set from the **Bullets From** list.
Several character sets are available which contain symbols and shapes (Wingdings, Monotype Sorts, etc.)
6. Click on the desired bullet character.
7. Click **OK**.
8. Choose **View, Normal** from the text menu to return to normal view or click on **Close**.

In the Slide Master, the **font sizes** can be changed

Select the text and then choose a font and font colors in the Formatting.

---

**Master**

**Title Master**
The slide that stores information from the design template
pertaining to styles on title slides, including placeholder sizes and positions, background design, and color schemes.

**Design Template**

A file that contains styles in a presentation, including the type and size of bullets fonts; and placeholder sizes and positions; background design and fill color schemes; and a slide master and optional title.

PowerPoint comes with a gallery of design templates to choose from, but one can also create a template of one's own and add it to the Slide Design task pane. Starting from a blank design, one can apply such elements as a background and color scheme, font style, layout (layout: The arrangement of elements, such as title and subtitle text, lists, pictures, tables, charts, AutoShapes, and movies, on a slide.), and art.

➢ **PowerPoint Views** –

*PowerPoint* provides three different ways to view a presentation:

1. **Normal View** displays a column on the left and the current slide on the right of the window. In the left column, choose either the Outline tab to view or edit text in an outline layout only or choose the Slides tab to view a miniature version of the slides. *This view also has a section for entering speaker’s notes at the bottom of the window.*
2. **Slide Sorter View** displays miniature versions of all slides in order. Use this view to move, copy, insert, and delete slides.
3. **Notes Page View** previews the speaker’s notes for each slide.
4. **Slide Show View** displays slides as an on-screen presentation starting with the CURRENTLY selected slide. Choose View, Slide Show or Slide Show, View Show to start the show from the FIRST slide.
To change views:

➢ Using Normal View

Use Normal view to enter all the basic text of the presentation. Normal view using the Slides tab displays slide text and graphics as it appears on the slide.

Slides may be reordered in the view by clicking and dragging a slide to the desired position. To add a new slide, choose Insert, New Slide from the text menu. The New Slide dialog box will appear in the right column. Select a layout or accept the default layout.

Transitions & Timings

Transitions control the way slides move on and off the screen. Use transitions sparingly—one or two types of transitions per presentation.

Transitions may be added to slides in all views, but the Slide Sorter view offers the quickest and easiest way. In Slide Sorter view, a transition icon appears below the miniature slide image containing transitions. Timings control the speed with which slides replace other slides. Setting the timing tells PowerPoint how long the slide will remain on the screen. Timings may be set individually for each slide or collectively for all slides.

Slides containing timings, however, may also be advanced manually. Timings display to the right of the transition icon in Slide Sorter view.

1. Choose View, Slide Sorter.

2. Click on the desired slide.

3. Choose Slide Show, Slide Transition. The Transition dialog box zzzclick on an effect in the Apply to selected slides: window to preview and select the effect. That effect is now applied to the slide. (*To disable the transition, choose another effect or choose No Transition.)
5. Choose a Speed from the drop-down box.
6. Click on the desired Advance method:
   - Only on Mouse Click
   - Automatically after # Seconds
7. If choosing automatic, then enter the desired seconds that slide should remain on screen before advancing to the next slide.
8. Choose a sound file to play on transition, if desired.
9. Click Play to preview the transitions/timings within the slide OR click Slide Show to preview the actual show.

**Showing a Presentation**

Slides may be shown one at a time driven by a mouse click or keyboard key, timed to be run automatically, and/or run continuously. When a slide show is presented, each slide will display on the entire screen without showing the PowerPoint program.

**To Display a Slide Show:**
1. Display the first slide to be shown.
2. Choose View, Slide Show or Slide Show, View Show

**To Show Only a Group of Slides:**
1. Display the first slide to be shown.
2. Choose Slide Show, Set Up Show.
3. Click on the circle in front of From to place a dot in the circle.
4. Type the slide numbers to be shown.
5. Click OK. When showing slide show, only those slides selected will be shown.

**To Run Continuously:**
1. Display the first slide.
2. Choose Slide Show, Set Up Show....
3. Click on Loop Continuously until ‘Esc’ to place an in the box.
4. Click OK.
5. Choose Slide Show, Slide Transition.
6. Click to place a □ in the box next to “Automatically after”.
7. Type the desired # of seconds for each slide to stay on the screen.
8. Click **Apply to All**.
9. Run **Slide Show**.
10. Press the <Esc> key to exit the presentation.

**To Advance Slides:**
1. Start the presentation.
2. **Click** the left mouse button **OR** press the <space bar>.
   - To move back one slide, press the right mouse button and select **Previous**.
   - To jump to a specific slide, **type** the slide number and **press** the <Enter> key.

† **Note:** During a presentation, the speaker may want the screen to be blank to focus attention on what is being said. **To blank a screen during a presentation:**
   - Press the **B** key. The slide will disappear.
   - Press the **B** key again. The slide will reappear.
3. Press the <Esc> key to exit the presentation at any time.

In the Slide Master, the **font sizes** can be changed

Select the text and then choose a font and font colors in the Formatting.

Choose a font by clicking on the down-pointing arrow

Choose a font color by clicking on the down-pointing arrow