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LETTER WRITTEN TO PRINCIPALS

Ref.: EO (A)/KVS (CHER)/2005-06/  

E. Thirunavukkarasu  
Education Officer  

Sir / Madam,  

Sub: Submission of Annual Exam marks for review reg.  

The undersigned has taken up the task of analyzing the Annual Examination results of the students of class VIII 2005-06 academic sessions. You may send the marks scored by the students in Mathematics and Science converted into percentage with in 10 days from the date of receipt of this letter.  

The format to be used for sending the required information is as follows:  

| Sl. No. | Name of the student | Marked scored in Marks out of 100 the Annual Examination |  

Yours faithfully,  

To  

Mrs. / Mr. ____________________________  
Kendriya Vidyalaya  
______________.
APPENDIX NO.2

STUDENTS’ INFORMATION BANK QUESTIONNAIRE

Note: Fill in the columns with relevant information. Feel free to write your views and opinions against each column. The information/views/opinions given by you shall be analyzed and used for the benefits of your fellow students.

1. Name:
2. Class & Section:
3. Name of school:
4. Purpose of school education (State briefly in two or three points)
5. The difference between reading and studying
6. Study activities that you carry out at home
7. What are study skills and what skills of study you know about?
8. What are study strategies and techniques and what study strategies and techniques you follow?
9. What is meant by study habits? List out your study habits.
10. List out the sequence of activities that you do while studying.
11. Five study related problems that you have.
12. What is the source of your knowledge in knowing about study techniques/habits/skills
13. Why do you students need to know about study techniques/skills.
14. Your signature with date
PRE-TEST / I TERM TEST
SCIENCE / CLASS IX
MAX. MARKS: 60; TIME: 1.30 HRS

Note: All Pre-Test / I Term Test
Note: Each question carries one mark

1. What is the physical state of water at 100° C?
2. What produces more severe burns, boiling water or steam?
3. Matter is made up of ____________________.
4. In which state any two particles have maximum attraction?
5. Evaporation causes ____________________.
6. Give a reason to justify why iron almaira is solid at room temperature.
7. Why naphthalene balls disappear with time without leaving any solid?
8. Give the reason why we get the smell of perfume sitting several meters away?
9. Convert 293K into Celsius scale.
10. Convert 25° into Kelvin scale.
11. Why can not we compress iron rod like sponge?
12. Does the shape of a liquid remain the same?
13. Why does ice being a solid float on water?
14. When a solid melts, its temperature remains the same. Where does its heat energy go?
15. Suggest a method to liquefy atmospheric gases.
16. What is meant by pure substance?
17. What is a suspension?
18. Give an example for an emulsion.
19. Which is a pure substance: Mercury or Milk?
20. Which is a solution: Air or Sea water?
21. Identify the element and the compound from among soil, sodium, calcium carbonate, and sugar solution.
22. What is a chemical change?
23. Why does iron get rust when exposed to air?
24. Which is a physical change: burning of candle or freezing of water?
25. What do you observe on churning the milk?
26. Which separation technique you will follow for the separation of oil from water?
27. Name the solvent and solute we use in the making of tea.
28. Which salt has the highest solubility at 293 K?
29. Which is a homogeneous mixture: soda water or soil?
30. Elements react to form ________________.
31. Calculate the mass of 0.5 mole of nitrogen gas/
32. The number of atoms in an element = ________________.
33. Give an example for a polyatomic ion.
34. Give the names of elements present in calcium carbonate.
35. Covert in to mole 12g of oxygen gas.
36. Formula for sodium sulphate is ________________.
37. A chemical formula of a compound shows its ________________ and ________________.
38. What is an atom?
39. The Avogadro constant is defined as the number of atoms in exactly ________.
40. Write down the name of the compound represented by the formula Al2(SO4)3
41. Give the symbols of Potassium and zinc.
42. What is a molecule?
43. Why we are not able to see an atom.
44. Which postulate of Dalton's atomic theory can explain the law of definite proportions?
45. Define the atomic mass unit.
46. What is the physical state of water at 100° C?
47. What produces more severe burns, boiling water or steam?
48. Matter is made up of ________________.
49. In which state the attraction between the particles are maximum?
50. Evaporation causes ________________.
51. Give a reason to justify why iron almairah is solid at room temperature.
52. Why naphthalene balls disappear with time without leaving any solid?
53. Give the reason why we get the smell of perfume sitting several meters away?
54. Convert 293K into Celsius scale.
55. Convert 25° into Kelvin scale.
56. Why cannot we compress iron rod like sponge?
57. Does the shape of a liquid remain the same?
58. Why does ice being a solid float on water?
59. When a solid melts, its temperature remains the same. Where does its heat energy go?
60. Suggest a method to liquefy atmospheric gases.
POST-TEST QUESTION PAPER - SCIENCE

POST-TEST / I TERM TEST
SCIENCE / CLASS IX
MAX. MARKS: 60; TIME: 1.30 HRS

Note: Each question carries one mark excepting those where marks are shown.

1. The fundamental organizational unit of life is the ________________.
2. State one difference between plant cells and animal cells.
3. What would happen if the plasma membrane ruptures?
4. What is osmosis? (2 marks)
5. Name any two parts of a compound microscope.
6. Do the temporary mounts of peels of onion have similar structures or different structures?
7. Cells were first discovered by ________________.
8. Leeuwenhoek discovered ________________ in pond water.
9. The fluid substance of the cells is called ________________.
10. Amoeba is called unicellular because ________________.
11. Do all the plant cells look alike?
12. Name one basic function that a living cell can perform?
13. Name any two features of a cell. (2 marks)
14. What is the main difference between animals and plants in the pattern of growth?
15. The growth of the stem increases due to ________________.
16. Give two characteristics of meristematic cell.
17. Name the permanent tissues which allow flexibility in plants.
18. ________________ is the type of permanent tissue which makes the plant hard and stiff.
19. In some plants living in dry habitats the epidermis may be thick. Why?
20. What are guard cells? (2 marks)
21. ________________ is a thick waxy coating of epidermis seen in desert plants.
22. Give two functions of xylemparenchym (2 marks)
23. Basement membrane is seen only in ______________.
24. Where can we find areolar connective? (2 marks)
25. Binomial nomenclature is made up of two words, which are they? (2 marks)
26. Based on which feature plants and animals are categorized in to two?
27. Who is the author of "Origin of Species"?
28. State how classification is connected with evolution? (2 marks)
29. ___________ is the basic unit of classification.
30. Organisms with out a definite nucleus come under _____________ kingdom.
31. Give two examples for Protista. (2 marks)
32. ____________ have cell walls made of a tough complex sugar called chitin.
33. Lichens are the symbolic association between ____________ and ___________. (2 marks)
34. Which group of organisms is called the amphibians of plant kingdom?
35. What is called motion?
36. Displacement per unit is called ______________.
37. Define acceleration.
38. Give the SI unit of speed.
39. How can we obtain the average speed of an object? (2 marks)
40. What is the type of motion exhibited by the free falling body?
41. Distinguish between uniform circular motion and linear motion. (2 marks)
42. Draw a graph to show the uniform accelerated motion. (2 marks)
43. The area of a velocity-time graph gives __________.
44. 'Meters per second' is the unit of ____ and ___. (2 marks)
45. Give any two equations of motion for the motion of an object moving at uniform acceleration. (2 marks)
46. Who is the father of 5 kingdom classification?
1 Define rational number. (2 marks)
2 State True/False
(i) Every whole number is a rational number. (2 marks)
(ii) Every rational number is an integer. (2 marks)
3 Find any two rational numbers between 3 and 4. (1 mark)
4 Every point on the number line represents a unique ________. (1 mark)
5 In the case of an irrational number, it's decimal expression is ________ & __________. (2 marks)
6 Find an irrational number between 1/7 and 2/7. (2 marks)
7 Divide 8/15 by 2/3. (1 mark)
8 Rationalize the denominator of 1/7. (2 marks)
9 Let a>0 be a real number and p and q be rational numbers then
   (i) $a^p \cdot a^q = \underline{_________}$
   (ii) $a^p \cdot b^p = \underline{_________}$ (2 marks)
10 The constant polynomial '0' is called ________. (1 mark)
11 A polynomial of degree 2 is called ________. (1 mark)
12 Write the coefficient of $x^2$ in $2-x^2+x^3$. (1 mark)
13 Check whether 2 and 2 are zeroes of the polynomial $x+2$. (1 mark)
14 The zero has no sign. (True/False). (1 mark)
15 State remainder theorem. (2 marks)
16 Find the value of k, if (x-1) is a factor of $p(x)$ in
   $P(x)=x^2+x+k$. (2 marks)
17 Factorize $3x^2-x-4$. (2 marks)
18. In the identity \((x+y+z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2zx\), \((x+y+z)^2\) is called \(\ldots\) and \(x^2 + y^2 + z^2 + 2xy + 2yz + 2zx\) is called \(\ldots\). (2 marks)

19. Complete the identity \(x^3 + y^3 + z^3 - 3xyz = \ldots\). (1 mark)

20. Factorize \(27y^3 + 125z^3\). (2 marks)

21. State the factor theorem. (2 marks)

22. Draw a Cartesian plane to show
   (i) Origin
   (ii) Positive Direction
   (iii) Negative Direction
   (iv) The Quadrants. (2 marks)

23. The x co-ordinate in a Cartesian plane is called \(\ldots\) & the y co-ordinate is called \(\ldots\). (2 marks)

24. In which Quadrants do each of the points (2, 4) and (3, -1) lie? (2 marks)

25. What is a linear equation? (2 marks)

26. Write \(x = -5\) as an equation in two variable. (2 marks)

27. Express \(x = 3y\) in the form of a linear equation and identify the values of \(a, b\& c\). (2 marks)

28. Write any two solutions for the equation, \(x + y = 9\) (2 marks)

29. Write the linear equation that is used to convert Fahrenheit to Celsius. (1 mark)

30. Give the Geometric representation of \(y = 3\) as an equation
   (i) In one variable
   (ii) In two variables. (2 marks)

31. A linear equation in two variables has \(\ldots\) solutions. (1 mark)

32. Solve the equation \(2x + 1 = x - 3\) and represent the solutions on
   (i) Number line
   (ii) The Cartesian Plane (4 marks)

33. The co-ordinates of the origin are \(\ldots\). (1 mark)
34 Find the value of k, if \( x = 2, \ y = 1 \) is the solution of equation \( 2x + 3y = k \) 
(2 marks)

35 An equation of the type \( \quad \) represents a line passing through the origin. 
(1 mark)

36 The Graph \( y = a \) is a straight-line \( \quad \) to the \( x \)-axis. 
(1 mark)

***************
# POST-TEST QUESTION PAPER - MATHEMATICS

**SECTION A**
Each question carries one mark.

1. If the complement of an angle is equal to the supplement of thrice of it, then the measure of the angle is
   - 1) 30°
   - 2) 45°
   - 3) 60°
   - 4) 75°

2. The Formulae for each interior angle of a regular polygon of n sides is
   - 1) \( \frac{(n-2) \times 180°}{n} \)
   - 2) \( \frac{(n+2) \times 180°}{n} \)
   - 3) \( \frac{(n-3) \times 180°}{n} \)
   - 4) \( \frac{(n+3) \times 180°}{n} \)

3. The line segment joining the mid points of any two sides of a triangle is parallel to the third side and
   - 1) equal to it
   - 2) equal to twice of it
   - 3) equal to half of it
   - 4) None

4. In the given figure, \( \triangle ABC \) is equivalent then measure of \( \angle BEC \)
   - 1) 90°
   - 2) 120°
   - 3) 45°
   - 4) 110°

5. In the given figure, \( O \) is the center of a circle, \( AB \) is the Diameter and \( AP=BP \), then \( \angle POA \) is
   - 1) 30°
   - 2) 45°
   - 3) 60°
   - 4) 90°
<table>
<thead>
<tr>
<th></th>
<th>In figure, A, B, C, D are four angles in the parallelogram ABCD, then measure of ( \angle ABD + \angle BDC ) is</th>
</tr>
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<tbody>
<tr>
<td>1) 72°</td>
<td>2) 90°</td>
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<tr>
<th></th>
<th>‘P’ is a side of equilateral triangle, then area of this equilateral triangle</th>
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<tbody>
<tr>
<td>1) ((\sqrt{3}/2))*(P^2)</td>
<td>2) ((\sqrt{3}/4))*(P^2)</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th></th>
<th>In a Parallelogram ABCD, ( \angle D = 105° ), then values of ( \angle A ) and ( \angle C ) are</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) 90°, 90°</td>
<td>2) 75°, 75°</td>
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</tbody>
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<tr>
<th></th>
<th>Two triangles are Congruent if two angles and included side of one triangle are equal to two angles and included side of other triangle, then congruence rule is</th>
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<tr>
<td>1) SAS</td>
<td>2) SSS</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th></th>
<th>Angles ( x°, y° ) are linear pair and ( x° - 2y° = 60° ) then value of ( x° )</th>
</tr>
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<tbody>
<tr>
<td>1) 30°</td>
<td>2) 80°</td>
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### SECTION B

Each question carries one mark.

<table>
<thead>
<tr>
<th></th>
<th>In geometry there are three undefined terms, namely</th>
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<tr>
<th></th>
<th>In ( \triangle ABC ), ( \angle A - \angle B = 15° ), ( \angle B - \angle C = 30° ), then A, B, C are</th>
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<tr>
<th></th>
<th>An exterior angle of a triangle is 110° and one of the interiors opposite angle is 30° then other two angles are</th>
<th></th>
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<table>
<thead>
<tr>
<th></th>
<th>If two parallel lines are intersected by a transversal then each pair of corresponding angles are</th>
<th></th>
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</thead>
</table>

|   | If two triangles \( \triangle ABC \) & \( \triangle PQR \) are congruent under the correspondence \( A \leftrightarrow P \), \( B \leftrightarrow Q \) and \( C \leftrightarrow R \) then symbolically it is represented as | |

XII
16 Two figures are congruent, if they are of the same _____ and same
          ____________.

17 The quadrilateral formed by joining the mid points of the sides of a quadrilateral,
in order, is a ________________.

18 In any triangle, the side opposite to ________________ is longer.

19 Lines which are ________________ to the same line are parallel to each other.

20 Write Euclid’s third postulate.

Section C
Each question carries one mark.

21 In the given figure, find the value of \( x \).

22 The angles of a \( \triangle \) are arranged in ascending order of magnitude. If difference
between two consecutive angles is 10°, find all the three angles.

23 In the given figure, \( AB \) divides \( \angle DAC \) in the ratio 1:3 and \( AB=DB \); Determine the
value of \( x^\circ \).

24 In figure, if \( PQ \parallel ST \), \( \angle PQR=110^\circ \) and \( \angle RST=130^\circ \); find \( \angle QRS \)

25 In an isosceles triangle \( ABC \), with \( AB=AC \), the bisectors of \( \angle B \) and \( \angle C \) intersect
each other at ‘O’. Join A to O. Show that \( OB=OC \)
26. PQRS is a rhombus with $\angle PQR=58^\circ$. Determine $\angle PRS$.

27. In figure, PQRS is a parallelogram. Find the values of $x$ and $y$.

28. The angles of a quadrilateral are in the ratio 3:5:9:13. Find all the angles of the quadrilateral.

29. In the figure, OA and OB are two opposite rays. Find the value of $x^\circ$.

30. In $\triangle ABC$, D & E are the midpoints of AB and AC; DB=EC. Find $\angle A$.

SECTION D
Each question carries two marks.

31. In the given figure, lines XY and MN intersect at O. If $\angle POY=90^\circ$ and $a:b=2:3$, find $c$.

32. A $\triangle ABC$ is a right angled at A and AL $\perp$ BC. Prove that $\angle BAL = \angle ACB$.

33. The sides BA and DC of a quadrilateral ABCD are produced as in the figure. Prove that $a+b = x+y$.
<p>| | |</p>
<table>
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<th></th>
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<tbody>
<tr>
<td>34</td>
<td>State RHS congruence rule</td>
</tr>
<tr>
<td>35</td>
<td>A parallelogram is always a Trapezium. But converse is not true. Explain.</td>
</tr>
<tr>
<td>36</td>
<td>Define i) Ray ii) Parallel Lines.</td>
</tr>
<tr>
<td>37</td>
<td>In the figure, AB is a mirror; PQ is incident ray and QR the reflected ray. If ( \angle PQR = 100 ), find ( \angle PQA )</td>
</tr>
<tr>
<td>38</td>
<td>In the given figure, if ( AB \parallel CD ), ( \angle APQ = 50^\circ ) and ( \angle PRD = 127^\circ ) find ( x ) and ( y ).</td>
</tr>
<tr>
<td>39</td>
<td>Define Ortho Center and where does it exist in right-angled triangle.</td>
</tr>
<tr>
<td>40</td>
<td>Define 1) Triangle 2) Quadrilateral</td>
</tr>
<tr>
<td>41</td>
<td>If an angle of parallelogram is two-third of its adjacent angle, find the angles of the parallelogram.</td>
</tr>
<tr>
<td>42</td>
<td>If the diagonals of a rhombus are 9 cm and 12 cm, find its sides.</td>
</tr>
<tr>
<td>43</td>
<td>In a right-angled triangle, one acute is double the other. Prove that the hypotenuse is double the smallest side.</td>
</tr>
<tr>
<td>44</td>
<td>In the figure, it is given that ( AB = CF ), ( EF = BD ) and ( \angle AFE = \angle DBC ). Prove that ( \triangle AFE \cong \triangle CBD ).</td>
</tr>
<tr>
<td>45</td>
<td>Define Circumcenter and where does it exist in the obtuse angled triangle.</td>
</tr>
</tbody>
</table>

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XV
BIBLIOGRAPHY
The only person who is educated is the one who has learned how to learn... and SUCCEED

E. THIRUNAVUKKARASU
EDUCATION OFFICER
KENDRIYA VIDYALAYA SANGATHAN :: CHENNAI REGION
Dear students,

This booklet on “Study Techniques” has been written keeping your academic success in mind. The techniques given in this booklet are simple and easy to follow. You may read and understand the steps involved in each technique and select any one or two for your study.

To start with you may make an attempt to follow each of the technique for a few days as a trial period. Eventually you will be able to find some of the techniques useful to you and are to your liking. Follow those techniques seriously and sincerely. You will find appreciable improvement in your academic performance.

The four techniques given in the booklet have been consistently adopted by many and brought great academic achievement in their school years. Therefore, you can depend upon them.

My best wishes for your success!

E.T.ARASU
Education Officer.
Know the Definitions Related to Effective Study Techniques

What is called “Study”? 

- Any purposeful constructive activity that leads to gaining knowledge, experience, skills, positive attitudes, desirable change in behaviour is called study.
- Bernard Chibnall defines study as a process by which we deliberately set out to extend our learning. There is a conscious decision to do something, to pursue a particular question, to read a book, to prepare and write an essay, to draw a map or attend to a lesson.
- The term study is defined as an activity of giving one's time and attention to learning about something especially by reading, and examining very carefully, It can also be defined as the process of acquiring knowledge, skills, and attitudes.

What is a “Study Technique”? 

The depression ‘study Technique’ can be defined as a method consisting of a process of acquiring knowledge, skills and attitudes.

What are the activities that come under “Study”? 

If you are doing one or more of the activities listed below at any given time, you are said to be doing “Study”.

I. **First hand reading of lesson** - reading a lesson given in your textbook a day or two before your teacher starts teaching it.
II. **Visiting a library for collecting information** on topics of academic interest.
III. **Listening to talks/ lectures** of academic merit.
IV. **Working out / solving problems** related to your subjects of study.
V. **Preparing notes, essays articles etc.**
VI. **Drawing maps**, pictures, diagrams connected to school subjects.
VII. **Preparing charts, projects, models etc.**
Study Techniques: In the pages that follow you will find the description of four study techniques. The four techniques are as follows:

1. The R-4 cycle technique;
2. The percentage – drill technique;
3. The study across the curriculum-technique;
4. The cognitive ladder technique.

I. The R-4 Cycle Technique:- This is a study technique that involves four steps, namely Reading, Recollection, Recitation, and Writing. Let me give a brief description of each step.

Step 1: Reading – By reading, I mean either going through the study material silently for a period of at least 30 minutes at a stretch or reading it loudly.

You can do loud reading if your study room is surrounded by noisy distractions. While doing silent/loud reading, you may underline the difficult / important words/ definitions etc using a pencil or a marker pen.

Silent reading can be done by (a) going through the lesson word by word or (b) skimming or (c) scanning.
**Skimming:** It is a system of *speed reading* where the intent is to obtain just a general idea of content by scarifying comprehension for speed. This is the fastest method of speed reading.

**Scanning:** It is a technique of *rapid reading* where the reader quickly glances over one or more pages in search of a particular item of information, such as date, name, or number. This type of reading is often used with a telephone book or catalogue.

**Step 2:** In this step, you close the book under study and engage yourself in *recollecting what you read out in the first step*. Recollection is bringing back to mind the *mental images* of the lesson you read out loudly or silently. It is also to test the extent to which your have ‘take in’ the subject matter you have gone through. You should know that in the examination your ability to *recollect subject matter* and write the same on the answer script will help you score well.

**Step 3:** In this step, you write on a scrap book the subject matter studied and committed to your memory / what you have learnt in the preceding two steps. You should repeat this process till such time you are able to write all the important points that you have read.
STUDY TECHNIQUES

Step 4: The fourth and the last step is equivalent to teaching yourself. Subject matter well digested by mind and articulated well makes inroads into your long term memory. Therefore you need to keep trying this step till you are able to speak out all of what you have read. You should repeat this process till such time you are satisfied with the mastery level attained by you. Here you are at liberty to go back and forth in the process of following the four steps and to do the steps in any order.

Expected Benefits of R-4 Cycle Technique

1. You can memorize the subject matter easily.
2. What you have memorized and stored in Short-Term-Memory (STM) can be taken to Long-Term-Memory (LTM) by repeating the steps in R-4 Study cycle technique.
3. This technique helps you know the importance of understanding/comprehending the subject matter. The subject well understood is memorized easily. The subject NOT understood fully can not be taken to LTM.

NOTE: The next study technique called "The percentage - Drill Technique" will help you gain 100% understanding of the subject matter that you study.

The Summary of R-4 Cycle Technique:

Step 1: Read aloud or silently for half an hour
Step 2: Recollect what you have read in the first step. If you are not able to do that, repeat the first step. Try to recollect now. If you fail now also, keep doing reading and recollection till such time you are able to recollect all of what you studied in the first half an hour.
Step 3: Jot down the points from your memory; it should be the gist of what you are recollecting as a result of the first two steps
Step 4: Recite loudly. You may teach/articulate what you have read, recalled and written. Keep doing the four steps till you are able to recite (i.e., say loudly without seeing your textbook) what you have read in the first step
II. The Percentage – Drill technique:

In this technique the student allots nearly equal time to each of the four stages of learning, which are as follows:

Stage 1: The first hand study: This is reading of the study material at home before the teacher teaches in the class. In this stage you will be able to know the general outline of the lesson; also you will be able to identify difficult spots / portion of the lesson. There will be questions in your mind as the result of this study which you can raise during teaching and get clarification from your teacher. You may gain some general understanding of the lesson by doing first-hand study.

Stage 2: The classroom study: This is learning conscientiously in the classroom listening to the teacher seeking clarification etc. The purpose of going to school is well served if you utilize class room learning for gaining thorough understanding of the lesson.

Stage 3: The home work: This is studying at home soon after the lesson was taught partially or fully that day. This is time to test whether all your doubts you had during first hand study are cleared now or not. The beginning you made in the first step reached a stage of full circle now. You know the full lesson now. Also you are expected to have the total understanding of the lesson too at this stage. Suppose, you still have a few doubts in mind which do not allow you to understanding the lesson fully, go to the next step to know what to do.
Stage 4: The Discussion and Reference Sessions: This involves discussing the difficult part of the lesson with your friends or teachers or searching for clarification of doubts in library books and online sources. This you have to do to get 100% understanding of the subject matter. Do not leave any doubt in mind. Uncleared Doubts create gaps in knowledge. The brain accepts subject matter easily if it is free from doubts. Memorization is easy if the subject matter you learnt is free from doubts.

The idea of this technique is that at least 25% of learning and understanding can take place at every stage of study. The four stages of study help you to acquire 100% understanding.

EXPECTED BENEFITS OF PERCENTAGE DRILL TECHNIQUE

1. Helps in thorough understanding of the subject matter
2. Develops self-study practices
3. Develops skills in searching for knowledge from various sources like library, internet etc.
4. Develops the habits of group study and learning from one another
SUMMARY OF THE PERCENTAGE DRILL TECHNIQUE

Step 1: The First Hand Study - Studying the lesson before it is taught by the teacher

Step 2: While class learning - Learning the subject matter when it is taught in the class

Step 3: Review at Home - Revising the portion taught in step 2 at school the same day evening at home

Step 4: Discussion with friends or teachers or reference work - To get clarification for the doubts you have in the subject matter either you discuss it with your friends/teachers or search library or online sources
III. The Cognitive Ladder Technique

This technique involves the following steps of the cognitive domain, namely, knowledge, understanding, analysis, synthesis, and application / problem solving.

Using this technique, the student makes conscious efforts to understand, analyze and synthesize the material under study. This will help him in problem solving, memorizing and self quizzing.

The steps involved in this technique are to be crossed by the student one by one, so that he can attain mastery—level learning.

This technique helps the students to move from "receivers of knowledge" to "thinkers of knowledge and producers of knowledge". The details of the steps in the cognitive order Technique with suitable illustrations is given below:
The Cognitive Ladder

Creativity/
Crisis management

Problem-Solving

Application in
unknown situations

Synthesis

Application in
known situations

Analysis

Understanding

Knowledge
(Processed Information
Package)

Information

Higher order
Cognitive skills

Middle
Order
Cognitive skills

Lower
Order
Cognitive skills
The Cognitive Mind

The cognitive domain of the human brain is responsible for thinking, understanding, imagination and creativity. The cognitive mind becomes fully functional after 10 or 11 years of age in children. This does not mean that this remains non-functional before this age. In fact, ‘concepts formation’- one of the difficult functional outputs of the cognitive mind takes place even before 10 or 11 years of age. The lower order cognitive skills such on knowledge and understanding apart the elementary level of analysis and synthesis the middle order cognitive skills, simple application skills, and simple problem solving skills are exhibited by primary class children. Systematic development of these skills is required when the children reach the middle classes. Therefore, a thorough understanding of the processes involved in learning through cognitive order learning is a must for the students to gain 100% learning.

What is concept learning?

A concept is an abstract idea. Concept learning involves acquiring a thorough understanding of abstract ideas. Each concept in your subjects of study has sub-components. For example, ‘algebraic expression’ is a concept whose sub-components are ‘algebra’ (what?), ‘expression’ (what?), and algebraic expressions’ (definition?). Besides these components questions like what are numerical impressions, are algebraic expressions different from numerical expressions, what are algebraic equations, how do algebraic expressions differ from algebraic equations, and so on may need to be answered to bring about clarity in learning the concept ‘algebraic expression’.
**Information Process**: Information processing is defined by Claude E. Shannon as the conversion of latent (hidden) information into manifest hidden information. Information processing involves the following steps:

1. Understanding each piece of information
2. Categorization of information
3. Organization of information
4. Presentation of information in a logical sequence.

**Knowledge**: Knowledge is defined as information of which a person, organization or other entity is aware. The term knowledge is also used to mean the confident understanding of a subject, potentially with the ability to use it for a specific purpose.

**What is analysis?**
The term 'analysis' is defined as an investigation of the component parts of a whole and their relations in making up the whole. I use the term 'analysis' to refer to understanding the components that go into making something. For analogy, think of a TV set. The components of the picture tube, condensers, resistances, speakers etc. are put together to make a composite whole called TV. Similarly, any concept in Mathematics consists of micro-concepts/sub-concepts, the understanding, defining and elucidating of each micro concept falls under the domain of analysis. In class VII, for example the concept of 'rational number' is defined as follows:

"Any number that can be put in the form of p/q where p and q are integers and q is not equal to zero in a rational number."

Analysis of this concept includes the understanding and elucidation of

- Why it is said "that can be put in the form of"
- What does 'any number mean?'
- What are integers?
- Why 'q' should not be equal to zero?
- Why and what for is this new set of numbers called rational numbers?
- What is 'rational' about these rational numbers?

As a student, if you try to learn the definition of rational numbers without throwing light on the above question and many more questions related to them, you would not gain a thorough understanding of rational numbers. Given a permissive and receptive atmos
phere, you would come out with many questions as given above, the answers of which would be an appetizer to you for developing their analytical skills.

**Synthesis:**
Synthesis suggests the ability to put together separate ideas to form new wholes of a fabric, or establish new relationships. Synthesis involves putting together ideas and knowledge in a new and unique form. This is where innovations truly take place. A suitable analogy can be assembling the components of a TV set and making it work.

**Application:** Application is an act of using knowledge, its analysis and synthesis for solving problems the skills in the cognitive ladder are vertically connected, and the acquiring those skills at each level requires you to allow your mind to think and assimilate ideas. The repetitive manner in which the sequential cognitive skills practiced would train the mind to have higher level of thinking and learning.

**Problem-solving:** Problem solving as a skill is developed crossing various other skills on its way. The skills lying down below ‘problem-solving’ in the cognitive ladder can be compared to the floors of a building. You cannot reach the sixth floor without traversing the floors down below. Similarly, when problem solving is attempted in classes without making explicit efforts to pass through the levels of knowledge, understanding, analysis, synthesis and application, students fail miserably.

Often it is said that practise and drill in Mathematics, any other subject for that matter would help learn the subject better. Here again, by repeatedly working out problems, you may ‘memorize’ the steps, but it does not guarantee success when problems are differently worded or ‘twisted’. Following the cognitive order – moving from information to problem solving steps – in the class room will help you know the sequential mental processes involved in solving problems in Mathematics and other subjects. As you practice these steps regularly it will serve to boost your confidence in learning the subjects. Problem-solving is an act of using the skills application to find out solution to the problem on hand.
SUMMARY OF COGNITIVE ORDER TECHNIQUE

Step 1: Decide the subject portion to be mastered - Selecting the knowledge part to be mastered

Step 2: Understand the portion - this involves clarity of concepts learnt, and absence of any type of doubt regarding the subject matter you are studying

Step 3: Analysis - here you make efforts to understand each and every sub component of the concept. For example, the concept Rational Number has the following sub-components; whole number, natural number, integers, any number divided by zero results in what, numerator, denominator etc.

Step 4: Synthesis - here you make efforts to piece together various components of a concept and see how a new concept emerges.

Step 5: Application - here you make efforts to see the applicability of your knowledge, understanding of it, analysis and synthesis in practical or contrived situations.

Step 6: Problem solving: here you use the knowledge and skills acquired from the above stages logically for solving the problem on hand

Step 7: Creativity: As you keep training your mind to approach the subject matter of study following the sequential steps as given above, the mind develops the ability to generate ideas on its own. You gain newer insights as a result of this.
EXPECTED BENEFITS OF COGNITIVE ORDER LEARNING

1. Cognitive order learning is systematic
2. It helps learning by moving from simple to complex
3. It helps learning by moving from concrete to abstract
4. It helps in developing thinking skills
5. It makes the mind think logically and sequentially
6. It results in total learning
7. It involves the total cognitive processes and hence sharpens thinking and understanding
8. It helps develop problem solving skills
9. It incorporates both convergent and divergent thinking
10. It helps in developing critical and creative thinking

IV. The Intra Curricular Study

Here the student make a conscious effort to map the subject of study in terms of major topics, minor topics, under each major topic and minor topic, etc. and study and restudy. For example, your Mathematics subject has many topics, each topic has many sub-topics concepts, each sub-topic consists of many concepts; each concept has many sub-concepts. You need to commit to your memory the topics first. Then you should be able to recollect all the sub-topics under that. The next step is to tell clearly the concepts under each sub topic. And finally you should be able to remember each and every concept clearly. This requires constant efforts on your part to go though the text-book as often as you can and trying to understand the inter-connections between topics, sub-topics, and concepts and sub-concepts. Once the mind recognizes these connections, it would be easy for you to commit the subject mater to long term memory. The steps involved in intra-curricular study can be represented in the diagram given below:
The Steps involved IN INTRA CURRICULAR STUDY TECHNIQUE are as follows:

Step 1: **scan the entire text book:** know how many chapters are there; read the names and identify the logical sequence in which chapters are arranged

Step 2: **Scan chapter-wise:** identify the concepts in each chapter; also identify the logical sequence in which concepts are arranged

Step 3: **Scan each concept:** identify the sub-concepts in each concept; understand the synthesis of sub-concepts into concepts and the relation among the various concepts given in a chapter

Step 4: **Keep moving from the whole to the parts** and vice versa

Step 5: **Recollect concepts chapter-wise:** map them in your mind

Step 6: **Recollect chapters** and map the sequentially in your mind

Step 7: **Have the map of the entire text** in terms of the book as a Master Tree, the chapters as branches, the concepts in each chapter as sub-branches, and sub-concepts as leaves.

**BENEFITS OF INTRA CURRICULAR STUDY TECHNIQUE**

1. Develops interests self-study
2. Encourages self-exploratory learning
3. Improves memory
4. Helps making and establishing logical links among concepts, and chapters
5. Helps in developing mind images of the subject under study
6. Whole to part learning and vice versa is strengthened