ANNEXURE - I

ACHIEVEMENT TEST IN MATHEMATICS

Class : IX

Time : 90 minutes  Marks : 50

Name :

Sex : Male/ Female

School :

Place :

Literacy of Parents : 0-10 / +2 / Degree

Annual Pay of Parents : 0-10,000 / 10,000 & (Above)

I. Choose the best answer from the answers given below: Each carries one mark.

25 * 1 = 25

1. \((a + b)^2 - (a - b)^2 = \)
   \(a) 4ab \quad b) a^2 + b^2 \quad c) a^2 - b^2 \quad d) 2(a^2 + b^2)\)

2. In \(x^2 - x - 2\), the coefficient of \(x^2\) is \(-\)
   \(a) -1 \quad b) 1 \quad c) -2 \quad d) 2\)

3. \(a^2 - 4 = \)
   \(a) a + 2 \quad b) a - 2 \quad c) a^2 + 2^2 \quad d) (a + 2)(a - 2)\)
4. Factorise: \( 81x^2 - 25y^2 = \ldots \)
   \( a) (9x + 5y)(9x - 5y) \ b)(9x - 5y)^2 \ c)81x - 25y^2 \ d)Nothing \)

5. Factorise: \( a^3 - b^3 = \ldots \)
   \( a) a^3 - b^3 \ b) (a + b)^3 \ c)(a + b)(a - b)(a^2 - ab + b^2) \)
   \( d)(a - b)(a^2 + ab + b^2) \)

6. If one factor of \( x^2 + 5x + 6 \) is \( x + 2 \) then the other factor is \( \ldots \)
   \( a) (x + 1) \ b)(x + 3) \ c) (x + b) \ d)Nothing \)

7. If \( (x - 2)\& (3x - 4) \) are the factors of \( px^2 - 10x + q \) then the values of \( p\&q \) is \( \ldots \)
   \( a) -3,8 \ b) 3,8 \ c)8,3 \ d)3,-8 \)

8. If the value of \( x \& y \) are 2\&3 respectively then value of \( 4x - 3y \) is \( \ldots \)
   \( a) -1 \ b) 3 \ c)6 \ d)1 \)

9. If \( (a + b) = 10, ab = 20 \) then value of \( a^2 + b^2 \) is \( \ldots \)
   \( a)60 \ b) 140 \ c) -60 \ d) -140 \)

10. \( \frac{\sin \theta}{\cos \theta} = \ldots \)
    \( a)cot \theta \ b) cosec \theta \ c)sec \theta \ d)tan \theta \)

11. For which value \( cosec \theta = 2? \ldots \)
    \( a)30^\circ \ b)45^\circ \ c) 60^\circ \ d) 90^\circ \)

12. In \( \Delta PQR \) if \( \angle Q = 90^\circ, PR = 13cm, PQ = 5cm \) then \( QR = \ldots \)
    \( a)12 \text{ cm} \ b)8 \text{ cm} \ c)18 \text{ cm} \ d)13 \text{ cm} \)
13. In picture if $\angle Q = 90^\circ$, $\angle P = \theta$ then $\csc \theta = \ldots \ldots$

$$\frac{PR}{QR} a), \frac{QR}{PR} b), \frac{PQ}{QR} c), \frac{QR}{PQ} d)$$

![](image1.png)

14. In picture $\tan D = \ldots \ldots$

$$\frac{25}{24} a), \frac{25}{7} b), \frac{24}{7} c), \frac{24}{25} d)$$

![](image2.png)

15. $\cos(90^\circ - \theta) = \ldots \ldots$

a) $\sin \theta$  b) $\cos \theta$  c) $\sec \theta$  d) $\tan \theta$

16. The biggest side in a right angle triangle is $\ldots \ldots$

a) Opposite side  b) adjacent side  c) hypotenuse  d) right angle

17. $1 + \tan^2 \theta = \ldots \ldots$

a) $\sec^2 \theta$  b) $\cos^2 \theta$  c) $\tan^2 \theta$  d) $\csc^2 \theta$

18. $\sin(90^\circ - \theta) = \ldots \ldots$

a) $\sec \theta$  b) $\cos \theta$  c) $\tan \theta$  d) $\cosec \theta$

19. $\sin^2 \theta + \cos^2 \theta = \ldots \ldots$

a) 1  b) - 1  c) $1/2$  d) 2

20. If $\sin(90^\circ - \theta) = \cos 30^\circ$ then value of $\theta$ is $\ldots \ldots$

a) $30^\circ$  b) $45^\circ$  c) $60^\circ$  d) $90^\circ$

21. If $\cos \theta = 1/2$ then value of $\theta$ is $\ldots \ldots$

a) $30^\circ$  b) $45^\circ$  c) $60^\circ$  d) $90^\circ$
22. The average mean of 3, 5, 7, 9, 11 and 13 is \( \underline{\text{-- -- -- --}} \)
   
   a) 9  b) 6  c) 8  d) 10.5

23. The median value of 5, 6, 7, 8, 9, 10, 11 is \( \underline{\text{-- -- -- --}} \)
   
   a) 4\(^{\text{th}}\) term  b) \( \frac{1}{2} (4\(^{\text{th}}\) + 5\(^{\text{th}}\)) \) term  c) 3\(^{\text{rd}}\) term  d) 5\(^{\text{th}}\) term

24. The mid value in the set of arranged order \( \underline{\text{-- -- -- --}} \)
   
   a) mean  b) median  c) mode  d) range

25. The mode of the following data 5, 5, 5, 5, 5, 1, 2, 2, 3, 3, 3, 4 is \( \underline{\text{-- -- -- --}} \)
   
   a) 1  b) 2  c) 3  d) 5

II. Write ‘Yes’ or ‘No’ in the fill in the blanks: Each carries one mark.

\[ 25 \times 1 = 25 \]

26. \( (2x + \frac{3}{x}) \) is a polynomial. \( \underline{\text{-- -- -- --}} \)

27. \( (\sqrt{2}x^2 + 3x^3 + 1) \) is a second degree polynomial. \( \underline{\text{-- -- -- --}} \)

28. \( (5xy) \) is a binomial. \( \underline{\text{-- -- -- --}} \)

29. \( (2x + 3y + 5z) \) is a trinomial. \( \underline{\text{-- -- -- --}} \)

30. The coefficient of \( x \) in the product \( (x + 3)(x + 5) \) is 8. \( \underline{\text{-- -- --}} \)

31. The value of \( 103^2 \) is \( \underline{10609} \) \( \underline{\text{-- -- --}} \)

32. The coefficient of \( x^1 \) in the product \( (x + a)(x + b)(x + c) \) is \( (abc) \). \( \underline{\text{-- -- -- --}} \)

33. \( (9, -1) \) lies in the II quadrant \( \underline{\text{-- -- -- --}} \)

34. \( (1, 0) \) lies on the \( y \) - axis. \( \underline{\text{-- -- -- --}} \)

35. \( (-3, 1) \) lies to the right of \( y \) - axis. \( \underline{\text{-- -- -- --}} \)
36. \((1,-1)\) lies below the \(x\) – axis. – – – – – –

37. \((0,0)\) is the point of intersection of the coordinate axes. – – –

38. \((\sqrt{2} - \sqrt{3}, -1)\) lies in the II quadrant. – – – – –

39. \((0, -3)\) lies to the left of \(x\) – axis. – – – – –

40. \((5,0)\) lies below the \(x\) – axis. – – – – –

41. Any two points on a line parallel to \(x\) – axis have equal \(x\) – coordinates. – – – – –

42. If \((a, b)\) and \((c, d)\) are two points on a line parallel to \(y\) – axis, then \(a = c\) – – – – –

43. The equation of the line having slope \(\frac{1}{2}\) and \(y\) – intercept \(-3\) is \(y = \frac{1}{2}x + (-3)\). – – – – –

44. The distance between the two points \((2,0)\) & \((4,3)\) is \(\sqrt{13}\). – – –

45. The value of mode is the class corresponding to maximum frequency. – – – – –

46. The value of range is the highest value – lowest value. – – –

47. The median of the following data 14, 12, 10, 9, 11 is 10. – – –

48. If the marks in five subjects are 72, 73, 75, 82 & 74 then the average mean is 82. – – – –

49. 3, 4, 10, 12, 17, 55, 60 It is in descending order. – – – – –

50. 30, 30, 29, 28, 26, 25, 12 It is in ascending order. – – – – –

******************

v
## ACHIEVEMENT TEST - SCORING KEY

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Answer</th>
<th>Item No.</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>a</td>
<td>26</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>b</td>
<td>27</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>d</td>
<td>28</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>a</td>
<td>29</td>
<td>Yes</td>
</tr>
<tr>
<td>5</td>
<td>d</td>
<td>30</td>
<td>Yes</td>
</tr>
<tr>
<td>6</td>
<td>b</td>
<td>31</td>
<td>Yes</td>
</tr>
<tr>
<td>7</td>
<td>b</td>
<td>32</td>
<td>No</td>
</tr>
<tr>
<td>8</td>
<td>a</td>
<td>33</td>
<td>No</td>
</tr>
<tr>
<td>9</td>
<td>a</td>
<td>34</td>
<td>No</td>
</tr>
<tr>
<td>10</td>
<td>d</td>
<td>35</td>
<td>No</td>
</tr>
<tr>
<td>11</td>
<td>a</td>
<td>36</td>
<td>Yes</td>
</tr>
<tr>
<td>12</td>
<td>a</td>
<td>37</td>
<td>Yes</td>
</tr>
<tr>
<td>13</td>
<td>a</td>
<td>38</td>
<td>No</td>
</tr>
<tr>
<td>14</td>
<td>c</td>
<td>39</td>
<td>No</td>
</tr>
<tr>
<td>15</td>
<td>a</td>
<td>40</td>
<td>No</td>
</tr>
<tr>
<td>16</td>
<td>c</td>
<td>41</td>
<td>No</td>
</tr>
<tr>
<td>17</td>
<td>a</td>
<td>42</td>
<td>Yes</td>
</tr>
<tr>
<td>18</td>
<td>b</td>
<td>43</td>
<td>Yes</td>
</tr>
<tr>
<td>19</td>
<td>a</td>
<td>44</td>
<td>Yes</td>
</tr>
<tr>
<td>20</td>
<td>a</td>
<td>45</td>
<td>Yes</td>
</tr>
<tr>
<td>21</td>
<td>c</td>
<td>46</td>
<td>Yes</td>
</tr>
<tr>
<td>22</td>
<td>c</td>
<td>47</td>
<td>No</td>
</tr>
<tr>
<td>23</td>
<td>a</td>
<td>48</td>
<td>No</td>
</tr>
<tr>
<td>24</td>
<td>b</td>
<td>49</td>
<td>No</td>
</tr>
<tr>
<td>25</td>
<td>d</td>
<td>50</td>
<td>No</td>
</tr>
</tbody>
</table>
ANNEXURE-II

SCALE OF ATTITUDE TOWARDS MIND MAP TEACHING

Class : IX

Time : 45 minutes Marks : 50

Name :

Sex : Male/ Female

School :

Place :

Literacy of Parents : 0-10 / +2 / Degree

Annual Pay of Parents : 0-10,000 / 10,000 & (Above)

NOTE

Choose one answer and (√) from the given below statements that are in three rating scale Agree, Nothing to say, Disagree.
<table>
<thead>
<tr>
<th>S.No</th>
<th>Statements</th>
<th>Agree</th>
<th>Nothing to say</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mind map increases the activities of the students’ brain.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Mind map helps the student to take the content of the lesson interiorly with convergent thinking.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Mind map helps the student to take the content of the lesson interiorly and helps to differentiate convergent and divergent ideas.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Mind map develops the previous knowledge of the student.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Mind map helps the student to recall the previous ideas connected with the new content of the lesson.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Mind map helps the student to know the importance of the new content of the lesson and learn with understanding.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Mind map helps the student to learn the new content of the lesson with speed and accurate.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Mind map helps the student to keep the content of the lesson for long time in mind.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Mind map changes the student as self thinker.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Mind map helps the student to integrate the content of the lesson with daily life.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Mind map stabilizes students’ learning state without distraction.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
12 Mind map creates good relationship between student and teacher.

13 Mind map motivates the students’ learning.

14 Mind map helps the student to observe the content of the lesson with positive deep ideology.

15 Mind map develops the students’ tolerance nature.

16 Mind map helps the student to learn desirably.

17 Mind map increases the students’ learning self-confidence.

18 Mind map helps the student to know how to reveal the ideas to feel happiness.

19 Mind map helps the students to share their ideas with many groups.

20 Mind map helps the student to find and appreciate his own abilities.

21 Mind map develops the student in analyzing the main points of the lesson logically.

22 Mind map develops the skills of finding out the specific and general instructional objectives of the content.

23 Mind map develops the student to write short notes from the content.

24 Mind map develops the skills of planning management in student.

25 Mind map develops in student the skills of synthesizing the related ideas together.
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>Mind map develops the skills of revealing the short notes in mind with easy, brief and logic manner by drawing pictures.</td>
</tr>
<tr>
<td>27</td>
<td>Mind map develops the skills of drawing apt pictures for the main points of the content which were analyzed.</td>
</tr>
<tr>
<td>28</td>
<td>Mind map develops the skills to attain master learning.</td>
</tr>
<tr>
<td>29</td>
<td>Mind map develops in student the skills of time management without wasting time.</td>
</tr>
<tr>
<td>30</td>
<td>Mind map develops in student the skills of giving feedback for their own revealed content by recalling it.</td>
</tr>
<tr>
<td>31</td>
<td>Mind map is a tool which reveals the students’ creativity.</td>
</tr>
<tr>
<td>32</td>
<td>Mind map develops the students’ imagining capacity to create newness.</td>
</tr>
<tr>
<td>33</td>
<td>Mind map helps to create mind map of students’ self interest.</td>
</tr>
<tr>
<td>34</td>
<td>Mind map helps the student to recognize the new thinking that generate in their mind.</td>
</tr>
<tr>
<td>35</td>
<td>Mind map helps the student to reveal their ideas in multi dimensions.</td>
</tr>
<tr>
<td>36</td>
<td>Mind map helps the student to reveal the many pages content in a single page with many colors and shapes in a attractive manner.</td>
</tr>
<tr>
<td>37</td>
<td>Mind map helps the student to change as great creator from being a book warm alone.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>38</td>
<td>Mind map reduce learning by heart, instead correct or wrong without any fear it develops continuous thinking.</td>
</tr>
<tr>
<td>39</td>
<td>Mind map helps the student to activate all the five senses and learn the content in an energetic manner.</td>
</tr>
<tr>
<td>40</td>
<td>Mind map helps the student to have confidence in their success without any fear of examination, since mind map is a practical exercise.</td>
</tr>
<tr>
<td>41</td>
<td>Mind map helps the student to function by having the problem of the content as a central idea.</td>
</tr>
<tr>
<td>42</td>
<td>Mind map helps the student to find out the related and unrelated solutions to the problem.</td>
</tr>
<tr>
<td>43</td>
<td>Mind map helps the student to neglect the unrelated solutions and to analyze the related solutions with the questions like who, what, where, when and why?</td>
</tr>
<tr>
<td>44</td>
<td>Mind map helps the student to find out and use the solutions in a surprising manner.</td>
</tr>
<tr>
<td>45</td>
<td>Mind map helps the student to reveal the analyzed solutions with the important words, step by step and in a very clear form.</td>
</tr>
<tr>
<td>46</td>
<td>Mind map forms the student as word, color and shape integrating manager.</td>
</tr>
<tr>
<td>47</td>
<td>Mind map forms in student, the laboratory mood and circumstances.</td>
</tr>
<tr>
<td></td>
<td>Description</td>
</tr>
<tr>
<td>---</td>
<td>-------------</td>
</tr>
<tr>
<td>48</td>
<td>Mind map helps the student to generalize the solution, found out for a problem to many problems of the same type.</td>
</tr>
<tr>
<td>49</td>
<td>Mind map develops in student the arguing skills with colleagues about their ideas.</td>
</tr>
<tr>
<td>50</td>
<td>Mind map creates a habit of finding the solutions to the problem in their life situations with positive attitude.</td>
</tr>
</tbody>
</table>
ANNEXURE – III

PROBLEM SOLVING ABILITY TEST – PSAT-D

L.N.Dubey (Jabalpur)

Class : IX

Time : 40 minutes Marks : 20

Name :

Sex : Male/ Female

School :

Place :

Literacy of Parents : 0-10 / +2 / Degree

Annual Pay of Parents : 0-10,000 / 10,000 & (Above)

Note

1. Answer the following 20 questions.

2. Answer each, choosing the best from the four options.

3. Write the answer in the box given.
<table>
<thead>
<tr>
<th>S.NO.</th>
<th>STATEMENT</th>
<th>RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rajeev has 35 notes of 100 rupees denomination in serial. If 12965 is the number of first note, what will be number of last note?</td>
<td>(1)13999  (2)13000  (3)12999  (4)13001</td>
</tr>
<tr>
<td>2</td>
<td>There are four married sons of a husband and wife in a family. Each son has 4 children. Then how many members are there in the family?</td>
<td>(1) 16   (2) 20   (3) 24   (4) 26</td>
</tr>
<tr>
<td>3</td>
<td>Write two such numbers which are having their total as 30 and difference as 20?</td>
<td>(1)15:15  (2)28:10  (3)25:5  (4)28:2</td>
</tr>
<tr>
<td>4</td>
<td>One person is 4 years elder than her wife. His wife is 10 times older than her daughter. Her daughter will be of 6 years old after 2 years, and then what is the present age of the person?</td>
<td>(1)40years  (2)44 years  (3)48years  (4)42years</td>
</tr>
<tr>
<td>5</td>
<td>There are two taps in a tank. One tap fills that tank in 10 hours and the other tap empties it in 8 hours. If both the taps are opened simultaneously, then in how many hours the tank will be filled completely?</td>
<td>(1)In 10 hours  (2)In 13 hours  (3)In 18 hours  (4)will never fill.</td>
</tr>
</tbody>
</table>
6. A soldier from his camp goes 6 km straight in the north. Then after going 6 km straight in the east goes 6 km in the south. From there turning to right goes 5 km. Now how many km away he is from his camp?

(1) 21 km. (2) 16 km. (3) 1 km. (4) 11 km.

7. There is a difference of 40 between 6 times and 8 times of a number then what is that number?

(1) 240 (2) 320 (3) 40 (4) 20

8. Smt. Shakuntla said to her daughter Sudha that I was of your age when you were born. If the present age of Smt. Shakuntla is 40 years, then what would have been the age of Sudha 4 years before?

(1) 14 years (2) 16 years (3) 20 years (4) 24 years

9. Adding twice of any number in that number and subtracting half of that number comes 50, and then what will be that number?

(1) 50 (2) 40 (3) 30 (4) 20

10. A fish is 20 m long. Its length of head is equal to that of tail. The length of the tail would have been equal to its body if the length of the head had been twice. What will be the length of the body of the fish?

(1) 6 m (2) 8 m (3) 30 m (4) 10 m

11. Age of Madhu is 24 years. She was twice the age of Sharad before 6 years when she was of the age of marriage then what was the age of Sharad at that time?

(1) 9 years (2) 10 years (3) 12 years (4) 14 years
<table>
<thead>
<tr>
<th>Question</th>
<th>Description</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>The cost of white-washing of four walls of the room comes to Rs. 100/-. What will be the cost of white-washing a room of exactly twice the length, breadth, and height of this room?</td>
<td>(1) Rs.200/-  (2) Rs. 400/-  (3) Rs. 800/-  (4) Rs. 1200/-</td>
</tr>
<tr>
<td>13</td>
<td>A number with itself is added. Same number is subtracted from the total, and then the remainder is multiplied with the same number. If the product is 100 what will be that number?</td>
<td>(1) 100  (2) 50  (3) 20  (4) 10</td>
</tr>
<tr>
<td>14</td>
<td>‘A’ gains 10% more profit than ‘B’ then what percent of loss occurs to ‘B’ than ‘A’?</td>
<td>(1) 10% loss  (2) Neither profit  (3) 9 1/11% loss  (4) can not say nor loss</td>
</tr>
<tr>
<td>15</td>
<td>A six digit number is formed by repeating three digit numbers. For example 538538 or 235235. By which number this so formed number can be divided completely?</td>
<td>(1) 8  (2) 11  (3) 14  (4) 18</td>
</tr>
<tr>
<td>16</td>
<td>A student of std. IX had to obtain 40% marks for passing in mathematics. He got 10 marks and failed by 10 marks, then how many marks he obtained in that paper?</td>
<td>(1) 25  (2) 50  (3) 75  (4) 100</td>
</tr>
<tr>
<td>17</td>
<td>Think of a number. After dividing it by 4 add 9 in the quotient. If answer comes 15, then what will be that number?</td>
<td>(1) 20  (2) 24  (3) 36  (4) 48</td>
</tr>
</tbody>
</table>
18. A milk seller has 5 ltrs. milk in 10 liters cane. He mixed 1 ltr. water for each liter of milk. Then tell what the ratio of milk and water is?

(1) 75:25  (2) 50:50  (3) 1/3 : 2/3  (4) 25:75

19. Kalpana, Sadhana, Rahul and Ashish have to deliver speech in the class. In how many ways the teacher can arrange their turn?

(1) 4  (2) 8  (3) 12  (4) 16

20. Every person shook hands with each other after the end of the party. How many persons were there in the party if 28 times in all hands were shaken?

(1) 14  (2) 18  (3) 8  (4) 10
<table>
<thead>
<tr>
<th>Item No.</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>13</td>
<td>4</td>
</tr>
<tr>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>17</td>
<td>2</td>
</tr>
<tr>
<td>18</td>
<td>2</td>
</tr>
<tr>
<td>19</td>
<td>4</td>
</tr>
<tr>
<td>20</td>
<td>3</td>
</tr>
</tbody>
</table>
Teacher: Sr. P.Poorana Sheela

Class: IX

Subject: Mathematics

The mind map of the units taken for the present study is shown in fig.1

---

Fig.1 showing the mind map for Units taken for Study-IX Mathematics
LESSON PLAN – 1

Class: IX

Subject: Mathematics

Unit I: Algebra

Topic: Polynomials

Duration: 90 minutes

General Objectives: Students will acquire knowledge, understand, apply and develop skills in Polynomial expressions.

Specific Objectives: To understands the addition, subtraction of polynomial expressions and to understand the exponent rules of multiplication.

Resource Materials: Mind map models, LCD projector, Paper, water colors, sketch, pencil to draw mind map, text book, and black board and color chalks.

Motivation: The teacher motivates the students by saying the history of Algebra that, the word algebra is derived from the Arabic word al- jabr. She also adds, in Arabic language al means ‘the’ and ‘jabr’ means ‘reunion of broken parts’. She too continues that Indian Mathematicians like Aryabhatta, Brahmagupta, Mahavir, Sridhara, Bhaskara II have developed this subject very much and the Greek Mathematician Diophantus has developed this subject to a great extent and hence we call him the father of Algebra. Teacher slowly enters into that day’s topic. She asks some questions like:

1) Do you know how to add 9 & 3?
2) How will you subtract the number 7 from 16?
3) What is the value of 5*8?
4) Can I say x, y, z as variables?

Teacher continues that, in the same way as we do for numbers, we deal with algebraic expressions which is mixed with both numbers and variables.

Presentation:

Teaching Activity: Teacher teaches the topic using mind map teaching strategy. Teacher explains the monomial, binomial and trinomial based on terms by mind map shown in fig.2
Fig. 2 showing the mind map for monomial, binomial and trinomial based on terms.

Teacher explains what is meant by highest degree and exponents. She continues to explain from mind map shown in Fig. 3, based on degree the polynomials are named as linear polynomial, quadratic polynomial, cubic polynomial and bi-quadratic polynomial.

Fig. 3 showing the mind map of highest degree.
Teacher explains addition, subtraction and multiplication of polynomial expressions by teaching the students about like terms and coefficient of polynomials through mind maps shown in fig.4, fig.5 & fig.6 with some examples. More over teacher explains the exponent rule with some examples. While explaining she asks some questions from the previous knowledge to motivate the students and make interest to enter into better learning. She also grasps the entry behavior of the student so that she can present the topic with the simplest methodology and expect the terminal behavior to be good.

Fig.4 showing the mind map for coefficient of polynomials

Fig.5 showing the mind map for like terms
Fig. 6 showing the addition, subtraction and multiplication of polynomials
**Expected Outcome:** The student draw mind maps of her own for any polynomial expressions, to add, subtract and to multiply with full understanding. Student develops skills of brain storming, note taking, creativity and problem solving. Student feels happy to see her own creation and self-appreciation takes place. Student gets confident to solve any problem in any situation. Student understands the importance of basic operations like +, -, *, / which are very much needed for life situations too.

**Review:** Teacher asks some questions as below from the chart shown in fig.7

Are the following polynomials or not?

![Chart](image)

*Fig.7 showing the chart of some questions

**Independent Practice in Groups:** Students are asked to draw mind maps of their own for some following problems in groups.

1) Find the sum of the polynomial expression

\[(x^3+3x-1) + (2x^2-4x+5)\]

2) Find the subtraction of the polynomial expression

\[(x^3 +5x^2 -10x+6) - (2x^3 -3x-4)\]

3) Find the multiplication of the polynomial expression

\[(2x^2-6x+3)(3x^2-4x+9)\]
Summary: Teacher summarizes ‘the addition, subtraction and multiplication of polynomial expressions by the mind map shown in fig.8. Some oral questions are asked to master the topic.

Fig.8 showing the mind map of the summary of whole topic

Assignment:

Find the product of \((x + y) (2x^2-3xy-2y^2)\)

**************
LESSON PLAN-2

Class: IX

Subject: Mathematics

Unit I: Algebra

Topic: Algebraic Identity

Duration: 90 minutes

General Objectives: To acquire knowledge in algebraic identities

Specific Objectives: To understand the multiplication of two or three linear polynomials and to develop skills in drawing mind maps for the algebraic identities.


Motivation: Teacher motivates the student by the power point presentation of the previous class topic. The power point presentation is shown in fig.9

Fig.9 showing the power point presentation of polynomials
Presentation:

Teaching Activity:

The teacher teaches the topic using mind map teaching strategy. In order to teach the graphical representation of the algebraic identity, teacher recalls the previous knowledge of the student by asking some questions from rectangle. Teacher explains algebraic identity is mostly connected with the side and area of the square and length and breadth and the area of the rectangle. She begins with the graphical representation of an algebraic identity \((a + b)^2 = a^2 + 2ab + b^2\) shown in fig.10.

\[
\begin{array}{c}
\text{A} & \quad \text{(a+b)} & \quad \text{B} \\
\text{C} & \quad \text{D} \\
\end{array}
\]

\[
\begin{array}{c}
\text{A} & \quad \text{a} & \quad \text{G} & \quad \text{b} & \quad \text{B} \\
\text{E} & \quad \text{ab} & \quad \text{F} & \quad \text{ab} & \quad \text{a} \\
\text{C} & \quad \text{a} & \quad \text{H} & \quad \text{b} & \quad \text{D} \\
\end{array}
\]

Fig.10 showing the algebraic identity \((a + b)^2 = a^2 + 2ab + b^2\)

Teacher defines the algebraic identity as an algebraic equation which is satisfied by all numbers.

Teacher teaches and makes clear the exponent rule in addition, subtraction and multiplication through mind map shown in fig.11.

\[
\begin{array}{c}
\text{Addition} \\
2x+7x=9x \\
4xy+9xy=13xy \\
2x^2+3x^2=5x^2 \\
6y^3+8y^3=14y^3 \\
\end{array}
\]

\[
\begin{array}{c}
\text{Subtraction} \\
-2x-7x=-9x \\
4xy-9xy=-5xy \\
-2x^2+3x^2=x^2 \\
6y^3-8y^3=2y^3 \\
\end{array}
\]

\[
\begin{array}{c}
\text{Multiplication} \\
2x*7x=14x^2 \\
4xy*5xy=20x^2y^2 \\
2x^3*3x^2=6x^5 \\
6y^3*8y^3=48y^6 \\
\end{array}
\]

Fig.11 showing the mind map of exponents in addition, subtraction and multiplication
Teacher derives some algebraic identities and applies in some of the examples and makes it clear. This was shown as the mind map in the fig. 12.
Expected Outcome: The student will grasps the meaning of algebraic identity and enjoys the graphical representation and mind map drawn by the teacher. She tries to solve any algebraic identity by her own. She develops self-appreciation, creativity, brain storming, convergent thinking as well as divergent thinking towards the central theme. Student masters the topic by drawing more mind maps for different identities.

Review: Teacher asks some questions to make thorough the topic.

1) In \((a-b)^3\), how many linear polynomial should be multiplied?

2) What is the coefficient of \(x^3\) in \(x^3+x^2+x+6\)?

3) \((a-b)^2 = (a+b)^2 - \underline{\text{_________}}\)

Independent Practice in Groups: Students sit in groups and solve different problems using mind map. The following problems are solved:

1) If \(a^2+b^2=8\); \(a+b=2\), find \(a^3+b^3\) and \(a^4+b^4\)

2) If the values of \(a-b=4\) and \(ab=2\), find \(a^3-b^3\)

Summary: Teacher summarizes the whole topic step by step and makes clear the content of the topic algebraic identity. Once again she repeats how to multiply two or more polynomials to get another polynomial. She stress about the associative, distributive property and exponent rule, so that student will give proper attention while multiplying the linear polynomial expressions.

Assignment:

Students are asked to solve some of the following expressions:

1) Using product formula, find \((x+9)(x+3)\)

2) Find \((102)^2\), \((98)^2\)

3) If \((a+b)=10\) and \(ab=20\), find \(a^2+b^2\) and \((a-b)^2\)

***************
LESSON PLAN – 3

Class: IX

Subject: Mathematics

Unit I: Algebra

Topic: Factorization

Duration: 90 minutes

General Objectives: To learn to write a polynomial as a product of two or more polynomials.

Specific Objectives: To acquire knowledge about factors and to understand in quadratic polynomial has two factors and cubic polynomial has three factors.


Motivation: Teacher asks some questions from the previous day class. 1) Which formula is used to solve this problem: If a+b = 10 and ab = 20, find a² + b² and (a-b)². 2) a² + 2ab + b² = ?

Presentation:

Teaching Activity: Teacher teaches the topic using mind map teaching strategy. She explains factorization is nothing but the process of writing a polynomial as a product of two or more polynomials. Each simpler polynomial in the product is called a factor of a given polynomial. The mind map of steps in factorization is shown in fig.13

![Mind Map of Factorization Steps](image-url)

Fig.13 showing the steps in factorization

xxx
Teacher teaches the process of factorization with some examples through mind map shown in fig.14.

Using the above concepts of taking common factors and grouping techniques and the standard algebraic identities teacher factorizes some polynomials and resolve into factors. Teacher teaches specially for quadratic expressions in the for \( x^2 + bx + c \) we are able to find factors by this procedure. \( x^2 + bx + c = x^2 + (p+q) x + pq = (x^2 + px) + (qx + pq) = x(x+p) + q(x+p) = (x+p)(x+q) \). It was taught through mind map shown in fig.15.
**Expected Outcome:** Student learns how to factorize algebraic expressions and find factors using factorization formulae, algebraic identities and grouping technique. She enjoys art of drawing mind maps in finding the factors. She does problems by herself. She master the topic by practicing with different polynomial expressions.

**Review:** Teacher does some more problems to make the student for better understanding. She asks questions like:

1) What is the common factor of 8k-16l?
2) How will you group mn-2p-pn+2m?
3) What are the factors for p² - 18pq +81q²?
4) Factorize x² - 15x + 54

**Independent practice in groups:** Students are asked to sit in groups and solve the following problems:

1) Factorize 16x⁴y² - 25
2) Factorize 125a³ + 64b³
3) Factorize x² - x – 132

**Summary:** Teacher summarizes the whole portion in simplest manner. In factorization, according to the form of the polynomial expression either factorization formulae or grouping technique is used. Where as in factorization of the quadratic expressions the coefficient of x variable and the constant are taken into account and grouping technique is used further.

**Assignment:** Students are asked to do the following problems:

1) Factorize 4x² + 20xy + 25y² - 10x – 25y
2) Resolve into factors 9x² + 24 xy + 15 y²
LESSON PLAN – 4

Class: IX

Subject: Mathematics

Unit I: Algebra

Topic: Division of polynomials

Duration: 90 minutes

General Objectives: To acquire knowledge in the process of division of polynomial \( f(x) \) by a polynomial \( g(x) \).

Specific Objectives: To know about the dividend, divisor, quotient and remainder. To understand the long division method and divisor factorization method are the methods used for finding the quotient and remainder. And to apply the methods in different problems and develops the skills of analyzing, computing and problem solving.

Resource Materials: dolls to distribute for 5 students, Lcd projector, paper, pencil to draw mind maps, black board and color chalks.

Motivation: Teacher asks five students to come forward. She gave them 11 dolls and asks to divide them as two for each. Students divide it according to it and gave 1 to the teacher. Through that incident teacher teaches what is dividend, divisor, quotient and remainder. She continues, in the same way we are going to divide a polynomial by a polynomial.

Presentation: Teacher teaches the topic using mind map teaching strategy. Teacher teaches both the methods of division ie. The long division method and divisor factorization method through Lcd projector. Through the mind map shown in fig.16, teacher teaches the main theme division of polynomials. She explains the position of dividend & divisor. Then she explains the procedure to find the first, second and third term in the quotient. She proceeds to explain how to get the remainder too. At the end she derives the equation \( f(x) = q(x)g(x) + r(x) \) where either \( r(x)=0 \) or \( \deg(r(x)) < \deg(g(x)) \) and explains the connection between \( f(x) \), \( g(x) \), \( q(x) \) and \( r(x) \). Also she quote the degree of dividend should be always equal or less than the degree of the divisor.
Fig. 16 showing the mind map of division of polynomials
**Expected Outcome:** Student will learn the process of division of a polynomial by a polynomial with full understanding. She understands the long division method and divisor factorization method. She feels happy to know about the relationship between the dividend, divisor, quotient and remainder and verify in her own work. She develops the skills of drawing mind maps for some problems.

**Review:** Teacher asks some questions to make clear the topic of that day.

1) If \(2x^3 + 3x^2 + 5x + 2 = (2x^2 + x + 4)(x+1) + (-2)\) what is the dividend, divisor, quotient and remainder?

2) Say true or false: The degree of divisor is always greater than the degree of dividend

**Independent Practice in Groups:** Students are asked to sit in groups and solve some of the problems individually.

1) Find the quotient and the remainder when \(4x^3 - 3x^2 + x - 7\) is divided by \(2x+1\)

**Summary:** Teacher summarizes the whole topic in a nutshell. She once again says the conditions of dividend, divisor, quotient and remainder. She also said about long division method and divisor factorization method step by step.

**Assignment:** Students are asked to solve the following problems as homework:

1) Find the quotient and the remainder when \(15 + x^4 - 8x^2\) is divided by

   i) \((x+1)(x+2)\)    ii) \((x-2)^2\)

***************
LESSON PLAN – 5

Class: IX

Subject: Mathematics

Unit II: Algebraic Geometry

Topics: The Cartesian coordinate system, Slope of a line and equation of a line.

Duration: 90 minutes

General Objectives: To know the properties of some figures drawn in a plane and to learn the slope and equation of a straight line.

Specific Objectives: 1) To acquire knowledge that every point in a plane is represented as an ordered pair of real numbers. 2) To understand the derivation of finding slope and equation of line.

Resource Materials: Graph sheets, scale, pencil to draw mind maps, rubber, water color and sketches, black board, color chalks, text book and mind map models and lcd projector.

Motivation: Teacher motivates the students by asking questions from the previous knowledge. From fig.17 teacher asks some questions.

Fig.17 showing the axes and quadrants
See the above picture and say

1) What are the two axes? 2) How many quadrants are there? 3) Name the plane of the quadrants
4) Which quadrant contains only positive points? 5) (-7, 8) belongs to which quadrant?

**Presentation:** Teacher teaches the topic using mind map teaching strategy.

**Teaching Activity:** Teacher explains Cartesian coordinate system containing axes, quadrants
horizontal and vertical distance, line parallel to X & Y axes with mind map shown in fig.18.
Teacher defines the slope of a line is \((y_2 - y_1)/ (x_2 - x_1)\) When she explains the slope she gave thorough knowledge about rising line in which the slope is positive and falling line in which the slope is negative. The slope is zero for the line parallel to x-axis and it is undefined for the line parallel to the y-axis. She derives the equation of a line with the slope and y-intercept. She also explains the equation of the straight line is nothing but it is the algebraic equation connecting the variables x and y.

**Expected Outcome:** Student will find the slope and equation of a line of their own through mind maps. Student will understand the beauty of graphical diagrams and make interest to draw equation of a line for different points. She also grasps the application of these straight lines in air ways etc. She learns the horizontal and vertical distance by which the coordinates are defined. Student learns the art of drawing mind maps.

**Review:** Teacher asks the following questions to make clear the topic.

1) Say true or false: \((9, 1)\) lies in the II quadrant. 2) Any two points on a line parallel to x-axis have equal 3) Find horizontal and vertical distance between \((1, 4)\) and \((3, 5)\)

**Independent Practice in groups:** Students sit in different groups and solve some problems by drawing mind maps.

1) Find the slope of the line joining the two points \((4, -1)\) and \((-5, 2)\)

2) Find the equation of the line whose slope and y- intercept are -3 and -7

**Summary:** Teacher concludes the class by summarizing the whole portion taught that day. She repeats how the equation of a line is found out using the slope and intercepts of the line are given.

**Assignment:** The students are asked to work out the following problems as home work.

I Find the slope and y-intercept of the line whose equation is

i) \(3x+2y=4\)

ii) \(2x=y\)

iii) \(x-y-3=0\)

iv) \(5x-4y=8\)
LESSON PLAN – 6

Class: IX

Subject: Mathematics

Unit II: Algebraic Geometry

Topic: The Distance between any two points.

Duration: 90 minutes

General Objectives: To know the formula to find the distance between two points.

Specific Objectives: 1) To acquire knowledge in computing and finding square and square root. 2) To understand by finding the length of the sides of triangle or quadrilateral, it is easy to say which type of triangle or quadrilateral it is.

Resource Materials: Geo board, students for demonstration, scale, pencil to draw mind maps, rubber, water color and sketches, black board, color chalks, text book and mind map models and lcd projector.

Motivation: Teacher motivates the students by asking some questions from the previous class. She shows Geo board and asks the student to put rubber bands there. Then she asks the distance between two points. She also asks questions from their transport. Whether they come by walk or cycle or by bus? Then she motivated that their home is starting point and school is ending point. The distance you travel is the distance between two points. This is what we are going to see today.

Presentation:

Teaching Activity: Teacher teaches the topic using mind map teaching strategy. Teacher derives the distance formula by using the concept of horizontal and vertical distance. Through mind map shown in fig. 19 derivation of distance formula is explained by the teacher. The distance between the two points \( P_1 \) & \( P_2 \) is found out using the horizontal distance, vertical distance and Pythagoras theorem. Teacher also explains how three points in the plane form a right angle triangle, equilateral triangle and isosceles triangle. More over from four points we find parallelogram, rectangle, square and rhombus.
**Expected Outcome:** Student will find the distance between two points by their own through mind maps. Student will understand the beauty of graphical diagrams and make interest to draw mind maps for different points. She also grasps the application of distance formula in different situation. Student learns the art of drawing mind maps.

**Review:** Teacher asks the following questions to make clear the topic.

1) Say true or false: In (9, 1) 9 is the horizontal distance. 2) Find the distance between (1, 4) and (3, 5). 3) Examine whether the points P (7, 1), Q (-4, -1) and R (4, 5) are the vertices of a right triangle.

**Independent Practice in groups:** Students sit in different groups and solve some problems by drawing mind maps.

1) Find the distance between the two points (4, -1) and (-5, 2)

2) Show that the points (3, -2), (2, 5) and (8, -7) form an isosceles triangle.

**Summary:** Teacher concludes the class by summarizing the whole portion taught that day. She repeats how the distance formula is found out using the horizontal distance, vertical distance and Pythagoras theorem. Through mind map shown in fig. 20. She summarizes the whole unit algebraic identity.
Assignment: The students are asked to work out the following problems as home work.

Show that the points (1,2), (2,-1), (5, 3) and (4,6) taken in order form a parallelogram. Is it a rectangle? Justify.
Lesson Plan – 7

Class: IX

Subject: Mathematics

Unit III: Trigonometry

Topic: Trigonometric ratios

Duration: 90 minutes

General Objectives: To acquire knowledge in trigonometric ratios.

Specific Objectives: 1) To acquire knowledge in trigonometric ratios of certain angles. 2) To understand to find the trigonometric ratios using the given sides of the right angle triangle.

Resource Materials: Geo board, students for demonstration, scale, pencil to draw mind maps, rubber, water color and sketches, black board, color chalks, text book and mind map models and lcd projector.

Motivation: Teacher motivates the students by asking some questions from the previous class. She shows Geo board and asks the student to put rubber bands there to form right angle. Then she asks which is hypotenuse and what Pythagoras theorem is.

Presentation:

Teaching Activity: Teacher teaches the topic using mind map teaching strategy. Teacher begins as an introduction the angles and their measures. She explains from the vertex of the point, drawing initial and terminal arm, the angle is formed. Teacher derives the formula of trigonometric ratios by using the sides of the right angle triangle. Teacher gives trigonometric ratios as sinθ = length of opposite side / length of hypotenuse side; cosθ = length of adjacent side / length of hypotenuse side; tanθ = length of opposite side / length of adjacent side; cosecθ = length of hypotenuse side/ length of opposite side; secθ = length of hypotenuse side/ length of adjacent side; cotθ = length of adjacent side/ length of opposite side; Teacher also explains how three sides in a right angle triangle play very important role in finding the trigonometric ratios of certain angles like 0°, 30°, 45°, 60°, and 90°.

Expected Outcome: Student will learn all the six formula for trigonometric ratios. She understands the relationship between the ratios. She learns to find the value of trigonometric ratios for certain angles. She gets practice in computation and problem solving skills. She acquires knowledge in the application of trigonometric ratios in space. She develops self appreciation by admiring their problem solving skill.
Review: Teacher review the topic with the help of a mind map of trigonometric ratios shown in fig. 21.

![Mind Map of Trigonometric Ratios](image)

Fig. 21 showing the mind map of trigonometric ratios

From the fig. 21,

1) What is the value of sin 60°?

2) What is the value of sin 45°?

3) Can you draw mind map for other values of trigonometric ratios?

4) What is cosine 30°?

Independent Practice in groups: Students sit in different groups and solve some problems by drawing mind maps.

1) If sinθ = 7/25, find the other trigonometric ratios.

2) If cosθ = 3/5, find the other trigonometric ratios.

3) If cosecθ = 2, find the value of cotθ+[sinθ/(1+cosθ)]
**Summary:** Teacher concludes the class by summarizing the whole portion taught that day. She repeats how the trigonometric ratios are found out using the formula. Also she adds Pythagoras theorem plays very important role in finding the value of trigonometric values. Through mind map shown in fig. 21. She once again summarizes the value of trigonometric ratios for certain angles.

**Assignment:** The students are asked to work out the following problems as home work.

1) From the right angle triangle shown below in fig.22 find all the six trigonometric ratios.

![Fig. 22 showing right angle triangle](image)

Fig. 22 showing right angle triangle
LESSON PLAN – 8

Class: IX

Subject: Mathematics

Unit III: Trigonometry

Topics: Trigonometric identities and Trigonometric ratios for complementary angles

Duration: 90 minutes

General Objectives: To acquire knowledge in trigonometric identities and trigonometric ratios for complementary angles.

Specific Objectives: To derive fundamental trigonometric identities and to compute values for trigonometric ratios of complementary angles.

Resource Materials: Paper, scale, pencil to draw mind maps, rubber, water color and sketches, black board, color chalks, geo board, text book and mind map models and lcd projector.

Motivation: Teacher motivates the students by asking some questions from the previous class. She shows Geo board and asks the student to put rubber bands there to form a straight line starting from the origin of the plane to the I quadrant. Then she asks the student to put the rubber band from any point of the line towards the x-axis to form a vertical line. She asks what the figure we have now is. Students are motivated to say it is a right angle triangle.

Presentation: Teacher teaches the topic using mind map teaching strategy.

Teaching Activity: Teacher begins as an introduction to the right angle formed by them. Teacher asks the students to say the name of the triangle. It is said as right angle triangle OPQ. Teacher explains let us take \( \angle O = \theta \), OP as \( r \), OQ as \( x \) and PQ as \( y \). Now she derive \( \sin \theta \) from the fig. 23 shown below.

```
```

![Fig. 23 showing the right angle triangle](image)
Teacher derives $\sin \theta = y/r$, $\cos \theta = x/r$, and by Pythagoras theorem, $r^2 = x^2 + y^2$; $1 = (x^2 + y^2)/r^2$; Therefore $1 = (x^2/r^2) + (y^2/r^2)$; hence we write $1 = \sin^2 \theta + \cos^2 \theta$ which is the trigonometric identity leads to drive the other eight identities. These identities in mind map are shown in fig.24. More over teacher teaches the trigonometric ratios of complementary angles.

**Expected Outcome:** Student will learn all the nine trigonometric identities. She understands the relationship between the identities. She learns to find the value of trigonometric ratios for complementary angles too. She gets practice in computation and problem solving skills. She acquires knowledge in the application of trigonometric identities in space. She develops self appreciation by admiring their problem solving skill.

**Review:** Teacher asks the following questions to make clear the topic.

1) Say true or false: $\sin (90^\circ - \theta) = \cos \theta$
2) Prove that $\sin^4 \theta + \cos^4 \theta = 1 - 2\sin^2 \theta \cos^2 \theta$
3) Evaluate $\sin 36^\circ / \cos 54^\circ$

**Independent Practice in groups:** Students sit in different groups and solve some problems by drawing mind maps.

1) Find $x$ if $\sin 60^\circ = \cos x^\circ$
2) $\csc x^\circ \cos 54^\circ = 1$
Summary: Teacher concludes the class by summarizing the whole portion taught that day. She repeats how we use Pythagoras theorem in the situations. Through mind map shown in fig.25. She summarizes the whole unit trigonometry.
Assignment: The students are asked to work out the following problems as home work.

1) Evaluate \( \sin 20^\circ \tan 60^\circ \sec 70^\circ \)

2) Simplify: \( \tan 33^\circ / \cot 57^\circ + 1/2(\sin 42^\circ / \cos 48^\circ) + 3/2 (\sec 51^\circ / \cosec 39^\circ) \)

3) Find \( x \) if \( \tan x^\circ \tan 35^\circ = 1 \)

*******************************
LESSON PLAN – 9

Class: IX

Subject: Mathematics

Unit IV: Handling data

Topic: Measures of central tendency- Arithmetic mean

Duration: 90 minutes

General Objectives: Students will acquire knowledge, understand, apply and develop skills in Arithmetic mean.

Specific Objectives: To understands the addition, subtraction, multiplication, division and summation of numbers.

Resource Materials: Mind map models, LCD projector, Paper, water colors, sketch, pencil to draw mind map, text book, and black board and color chalks, oil bottles of different grams.

Motivation: The teacher motivates the students by saying the meaning of statistics and data. She shows 3 oil bottles of 500gm, 200gm and 200gm and asks what is the average gram of oil if it is shared for 3 persons in a equal manner? She too continues about primary data and secondary data. Teacher slowly enters into that day’s topic. She asks some questions like:

1) Do you know how to add 35 & 3?

2) How will you subtract the number 17 from 16?

3) What is the value of 2*8?

Presentation:

Teaching Activity: Teacher teaches the topic using mind map teaching strategy. Teacher explains how to form frequency table for ungrouped data. She derives the formula for finding the average or arithmetic mean. By the mind map shown in fig.26 She calculates mean of the data. 9, 11, 13, 15, 17 & 19. And Computes the A.M for the following data with direct method and short cut method

<table>
<thead>
<tr>
<th>x</th>
<th>10</th>
<th>11</th>
<th>13</th>
<th>15</th>
<th>16</th>
<th>19</th>
</tr>
</thead>
<tbody>
<tr>
<td>f</td>
<td>4</td>
<td>5</td>
<td>8</td>
<td>6</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>
Fig. 26 showing the mind map of measures of central tendency—arithmetic mean

**Expected Outcome:** Student learns the art of computing and calculating arithmetic mean for different data. She practices mind map in her work. She understands the average in life situation.
and feels happy to do more problems to compute arithmetic mean. She develops self-appreciation and problem solving skills.

**Review:** Teacher asks the following questions to make clear the topic.

1) What is the mean of 78, 89, 90, 56 & 68?

2) What are the formulae for computing arithmetic mean?

3) If frequency not given which formula will you use?

**Independent Practice in groups:** Students sit in different groups and solve some problems by drawing mind maps.

Calculate the A.M. for the following data:

<table>
<thead>
<tr>
<th>Marks</th>
<th>80</th>
<th>85</th>
<th>90</th>
<th>95</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Students</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

**Summary:** Teacher concludes the class by summarizing the whole portion taught that day. She repeats how we use the three formulae to compute arithmetic mean.

**Assignment:** The students are asked to work out the following problems as home work.

Calculate A.M. for the following data.

<table>
<thead>
<tr>
<th>Class Interval</th>
<th>0-10</th>
<th>10-20</th>
<th>20-30</th>
<th>30-40</th>
<th>40-50</th>
<th>50-60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marks</td>
<td>12</td>
<td>18</td>
<td>27</td>
<td>20</td>
<td>17</td>
<td>6</td>
</tr>
</tbody>
</table>

**********************
LESSON PLAN – 10

Class: IX

Subject: Mathematics

Unit IV: Handling data

Topics: Measures of central tendency- Median & Mode

Duration: 90 minutes

General Objectives: Students will acquire knowledge, understand, apply and develop skills in median and mode.

Specific Objectives: To understands the addition, subtraction, multiplication, division of numbers and to understand even and odd number of terms and middle terms.

Resource Materials: Mind map models, LCD projector, Paper, water colors, sketch, pencil to draw mind map, text book, and black board and color chalks, color sticks.

Motivation: The teacher motivates the students by showing color sticks and she asks some questions like:

1) How many colors are there?

2) Which color is more in number?

3) If I arrange these sticks according to the height which color is in the middle?

Presentation:

Teaching Activity: Teacher teaches the topic using mind map teaching strategy. Teacher explains how to form frequency table for ungrouped data. She explains the formula for finding the median and mode. She teaches cumulative frequency (c.f). By mind map shown in fig.27 She calculates median of the data. 29, 23, 25, 29, 30, 25 and 28; Also she explains the median of 26, 25, 29, 23, 25, 29, 30, 25, 28 and 30; And Calculates the median for the following data:

<table>
<thead>
<tr>
<th>Variable x</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency f</td>
<td>3</td>
<td>6</td>
<td>10</td>
<td>8</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
**Expected Outcome:** Student learns the art of computing and calculating median and mode for different data. She practices mind map in her work. She understands the average in life situation and feels happy to do more problems to compute arithmetic mean. She develops self-appreciation and problem solving skills.

**Review:** Teacher asks the following questions to make clear the topic.

1) What is the median of 78, 89, 90, 56 & 68 ?

2) What are the formulae for computing median and mode?

3) If frequency is given which will be median?

**Independent Practice in groups:** Students sit in different groups and solve some problems by drawing mind maps.

Find the mode from the following data:

<table>
<thead>
<tr>
<th>Wage</th>
<th>45</th>
<th>50</th>
<th>55</th>
<th>60</th>
<th>65</th>
<th>70</th>
<th>75</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Employees</td>
<td>12</td>
<td>11</td>
<td>14</td>
<td>13</td>
<td>12</td>
<td>10</td>
<td>9</td>
</tr>
</tbody>
</table>

**Summary:** Teacher concludes the class by summarizing the whole portion taught that day. She repeats how we use the three formulae to compute median and two ways to find mode. She too summarizes the whole unit of Measures of central tendency by the mind map shown in fig. 28.
Fig. 28 showing the mind map of measures of central tendency
Assignment: The students are asked to work out the following problems as home work.

Find median for the marks of 40 students.

<table>
<thead>
<tr>
<th>Marks</th>
<th>24</th>
<th>20</th>
<th>35</th>
<th>52</th>
<th>50</th>
<th>48</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of students</td>
<td>4</td>
<td>7</td>
<td>3</td>
<td>9</td>
<td>5</td>
<td>12</td>
</tr>
</tbody>
</table>

**************************