

## Chapter 8

### Binomial theorem

#### Objectives:

- To identify the binomial coefficients.
- To apply binomial theorem for any positive integer  $n$ .
- To find general term, middle terms and independent terms of an expansion.

#### Previous knowledge testing:

- permutations and combinations.

#### Important spelling / vocabulary used:

- Coefficients, expansion, general term, middle terms.

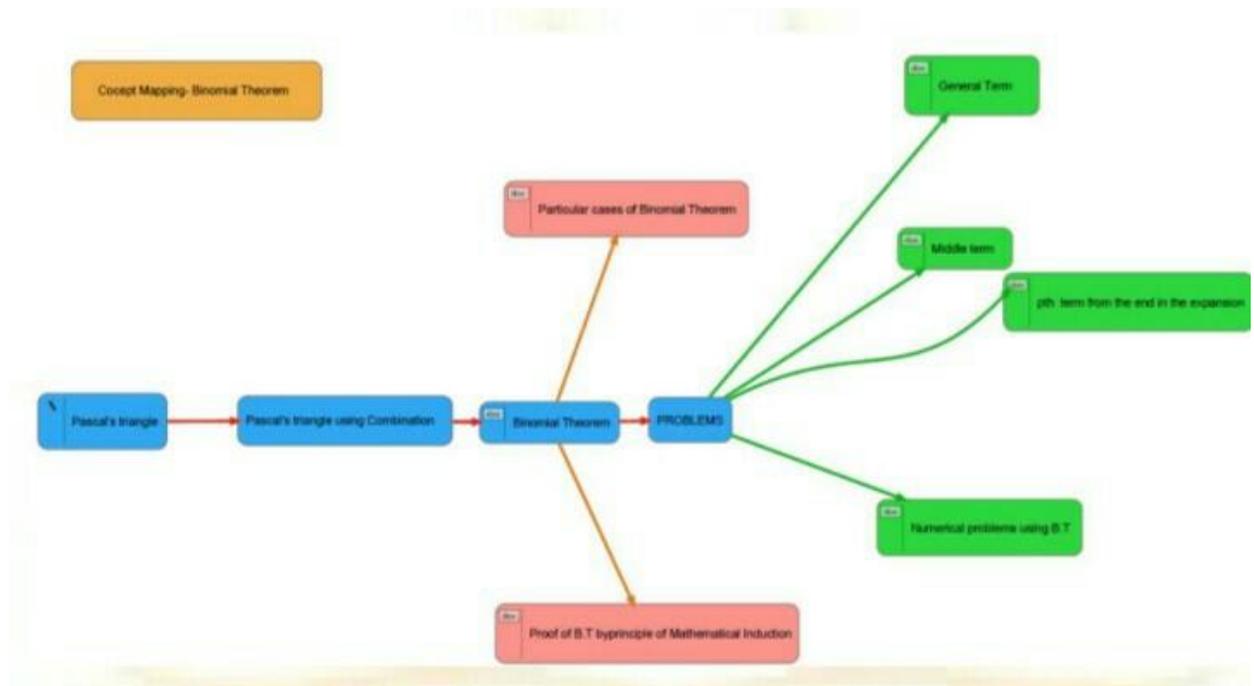
#### Links used:

- <https://youtu.be/ZwiN4iTXil8>

#### Procedure:

- introduction of the topic will be given from explaining how use PASCAL TRIANGLE for different combinations.
- Then explaining the statement of binomial theorem.

➤ Further topic will be explained using concept mapping.



## Recapitulation

- Quick Recap of the topic will be done by using concept mapping only and ERROR ANALYSIS will also be done to clear all doubts.

### ERROR ANALYSIS

ERRORS	REMEDIAL MEASURES
The 3 <sup>rd</sup> term of a binomial theorem using $T_{r+1}$ is taken as $T_3$ in which $r=3$	$T_3 = T_{2+1}$ where $r$ is 2.
Confusion between the term and coefficient of the term like the third term of the expansion $(x+y)^5$ and the coefficient of $x^3$	The third term of the expansion is $10x^3y^2$ and the coefficient of $x^3$ is $10y^2$

Learning outcomes:

- Students can apply Binomial theorem for any positive integer  $n$
- They are able to apply binomial theorem in evaluating the particular cases like  $(1+x)^n$ ,  $(X-xY)^n$ ,  $(1-x)^n$  etc.
- They are able to find the values of numbers like  $(98)^5$   $(100)^7$  ETC and develop computational skills
- Students can find General term, middle terms and independent terms of an expansion

### Resources

- Ncert book and extra marks

### Assessment

- class test will be conducted and Questions will give to solve.

### **QUESTION BANK**

#### BINOMIAL THEOREM

1. Evaluate  $(\sqrt{2}+1)^6 + (\sqrt{2}-1)^6$

2. If the coefficients of three successive terms in the expansion of  $(1+x)^n$  be 45, 120 and 210, find the value of  $n$ .
3. Find the sixth term in the expansion of  $(\sqrt{y} + 3\sqrt{x})^n$ , if the binomial coefficient of the third term from end is 45.
4. Evaluate  $(x^2 - \sqrt{1-x^2})^4 + (x^2 + \sqrt{1-x^2})^4$
5. Prove that  $(2n)! = 2^n (n)! [1 \cdot 3 \cdot 5 \dots (2n - 1)]$
6. If  $a = C(n, 2)$ , prove that  $C(a, 2) = 3 C((n+1), 4)$
7. Determine whether the expansion of  $(x^2 - \frac{2}{x})^{18}$  will contain a term containing  $x^{10}$  ?
8. Find the middle terms in the expansion of  $(3x - \frac{x^2}{6})^7$
9. Find the coefficients of  $x^5$ , in the expansion of the product  $(1 + 2x)^6 (1-x)^7$ .
10. If the coefficients of second, third and fourth terms in the expansion of  $(1 + x)^{2n}$  are in AP, show that  $2n^2 - 9n + 7 = 0$ .

## Chapter – 9

### Sequence and Series

Objectives:

Form a sequence

Obtain the series corresponding to a sequence

Find the sum of  $n$  terms of an arithmetic progression

Apply arithmetic mean in forming an arithmetic progression

Give a geometric progression

Calculate the general term of a geometric progression

Compute the sum to  $n$  terms of geometric progression

Find the geometric mean between two numbers

Derive the relation between A.M and G.M.

Deduce the sum to  $n$  terms of some special series.

Previous knowledge testing

Students will be asked

- Formula for  $n$ th term of an A.P.
- Formula for sum of  $n$  terms of an A.P.

Important spelling / vocabulary used:

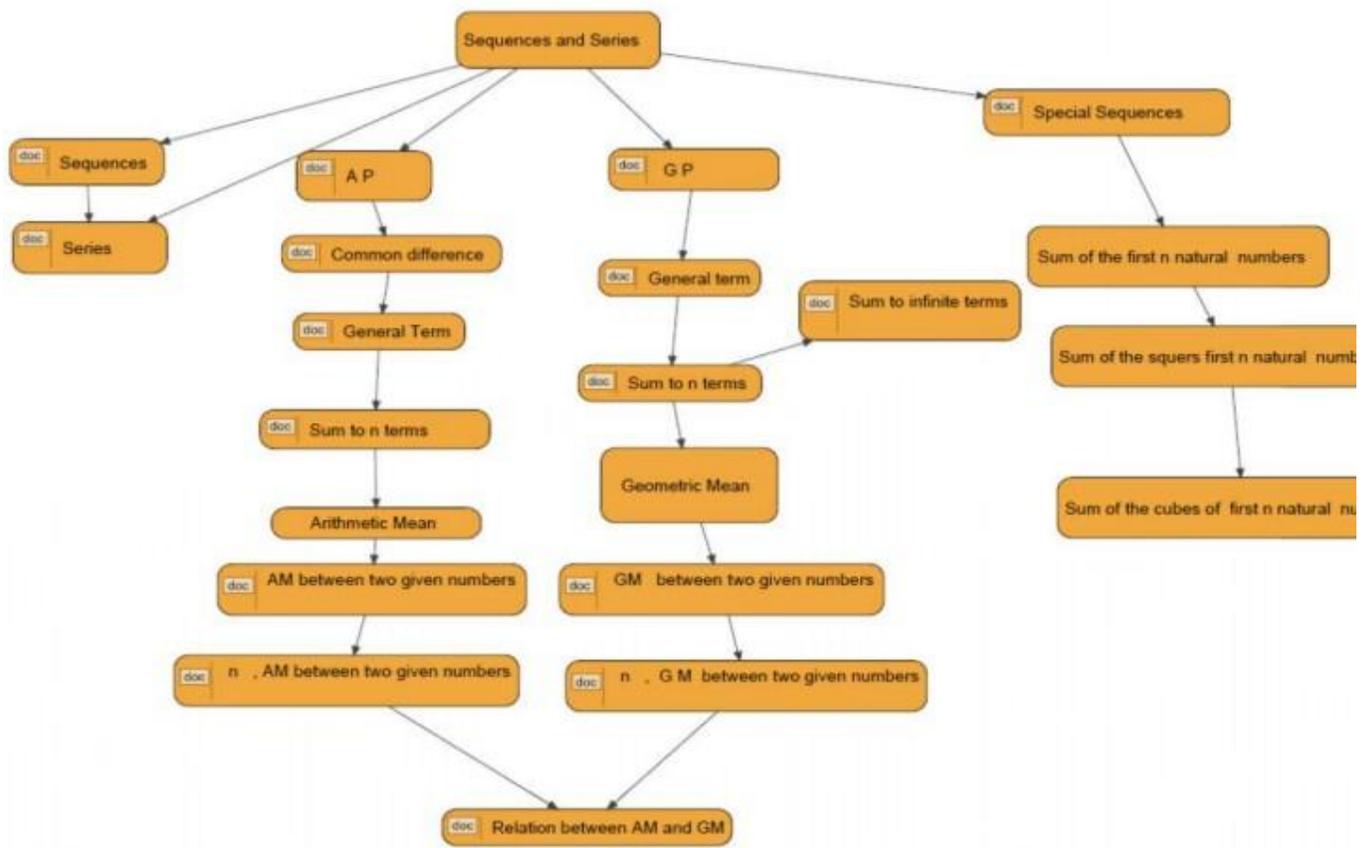
- Arithmetic progression, geometric progression, general terms.

Links used: [https://youtu.be/gua96ju\\_FBk](https://youtu.be/gua96ju_FBk)

Procedure:

- Topic will be explained using concept mapping.

## CONCEPT MAPPING



## Recapitulation

- Quick Recap of the topic will be done by using concept mapping only and ERROR ANALYSIS will also be done to clear all doubts.

## **ERROR ANALYSIS**

ERRORS	REMEDIAL MEASURES
Confusion in definition of sequences and series.	Definition should be explained through counter
Confusion in the number of terms of a GP	Concept should be explained through suitable

Condition for sum to infinite terms of a GP ( $ r  < 1$ ) is neglected while solving problems.	Emphasis should be given on the value of $ r $ while solving the problems.
While writing the $n$ th term in a special sequence, students generalize using the first term alone.	Students should verify for $n=2,3$ also while finding the $n$ th term and sum to $n$ terms. This can be rectified only practice.

### Learning outcomes

- describe the concept of a sequence (progression);
- define an A.P. and cite examples;
- find common difference and general term of a A.P;
- find the fourth quantity of an A.P. given any three of the quantities  $a$ ,  $d$ ,  $n$  and  $t_n$ ;
- calculate the common difference or any other term of the A.P. given any two terms of the A.P;
- derive the formula for the sum of 'n' terms of an A.P;

- calculate the fourth quantity of an A.P. given three of  $S$ ,  $n$ ,  $a$  and  $d$ ;
- insert A.M. between two numbers;
- solve problems of daily life using concept of an A.P.;
- state that a geometric progression is a sequence increasing or decreasing by a definite multiple of a non-zero number other than one;
- identify G.P.'s from a given set of progressions;
- find the common ratio and general term of a G.P.;
- Calculate the fourth quantity of a G.P when any three of the quantities  $t_n$ ,  $a$ ,  $r$  and  $n$  are given.
- calculate the common ratio and any term when two of the terms of the G.P. are given;
- write progression when the general term is given;
- derive the formula for sum of  $n$  terms of a G.P.;
- calculate the fourth quantity of a G.P. if any three of  $a$ ,  $r$ ,  $n$  and  $S$  are given;
- derive the formula for sum ( $S_\infty$ ) of infinite number of terms of a G.P. when  $r < 1$ ;
- find the third quantity when any two of  $S_\infty$ ,  $a$  and  $r$  are given;
- convert recurring decimals to fractions using G.P.;

- Insert G.M. between two numbers; and establish relationship between A.M. and G.M.

#### Activity:

- Cut the paper in half.
- Stack the halves, cut the stacks in half.
- Continue stacking and cutting the paper into strips.
- Then count the number of cuts and number of Pieces obtained from paper.

#### Resources

- Ncert book and extra marks

#### Assessment

- class test will be conducted and Questions will give to solve.

### **QUESTION BANK**

1. Write the first four terms of the sequence defined by  $a_n = 4n^2 + 3$
2. Find the number of integers between 100 and 1000 that are divisible by 7.
3. Find the 15th term from the end of the sequence 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40, 43, 46, 49, 52, 55, 58, 61, 64, 67, 70, 73, 76, 79, 82, 85, 88, 91, 94, 97, 100.

4.If the first term of an A.P is 2 and the sum of the first five terms is equal to one- fourth of the sum of the next five terms, find the sum of first 30 terms. Also find the 20th term.

5.If the 3rd , 6th and the last terms of a GP are 6,48 and 3072 respectively , find the first term and the number of terms in the GP.

6.Find the three numbers in G.P , whose sum is 19 and product is 216.

7.If pth , qth and rth terms of a G.P are a, b, c respectively. Show that .

8.Find the sum to n terms of the series :  $1 \times 2 \times 3 + 2 \times 3 \times 4 + 3 \times 4 \times 5 + \dots$  to n terms.

9.Find the sum of the series :  $1c^2 - 11^2 + \dots - 20^2$

10.Find the sum of the series :  $1^2 + 3^2 + 5^2 + \dots$  to n terms.

## Chapter – 10<sup>th</sup>

### Straight Lines

#### Objectives:

- To find the slope of lines.
- Angle between two lines Various forms of lines.
- Distance between the parallel lines.

#### Previous knowledge testing:

Students will be asked

- To give few examples of equations in one degree in the two variables.
- To write down the coefficient of X and Y in various linear equations in two variables.

Important spelling / vocabulary used:

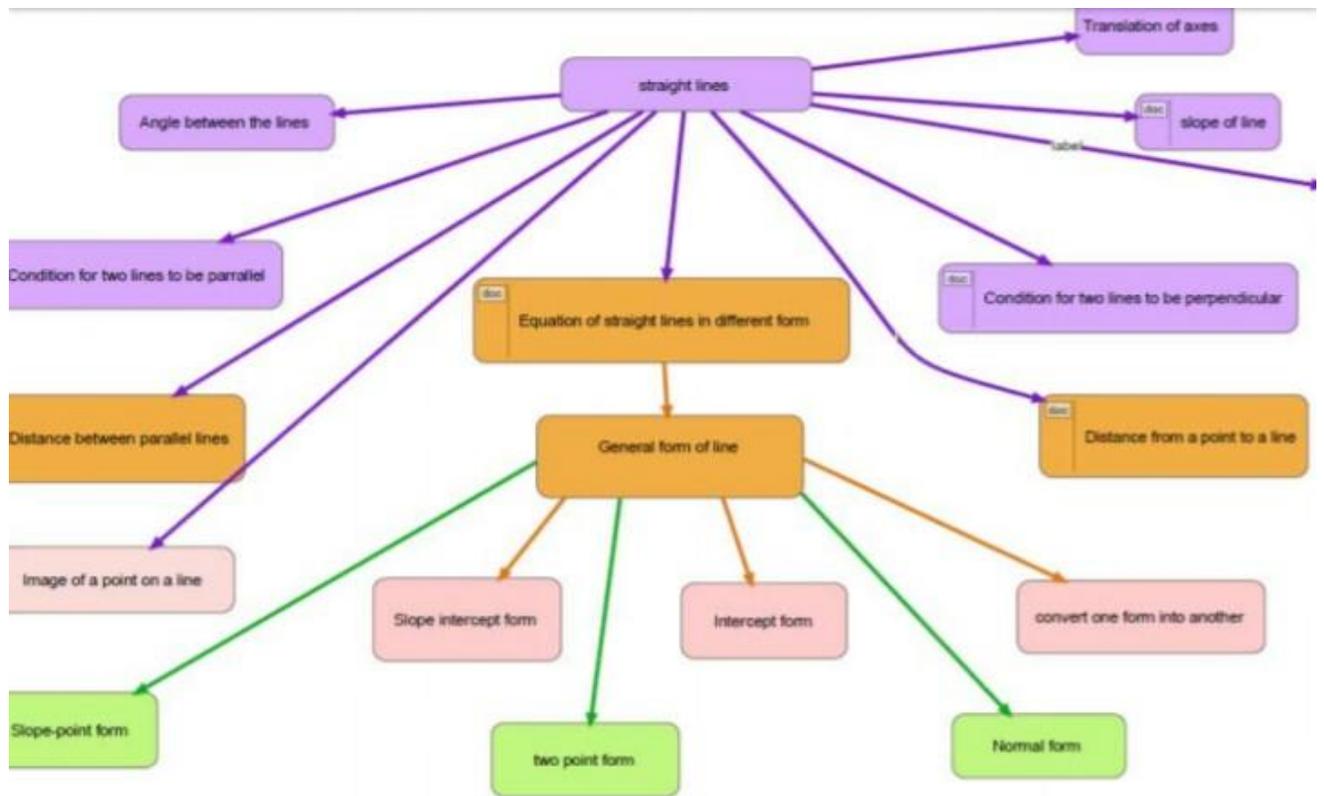
- Intercept, slope, Parallel Lines, perpendicular line.

Links used:

<https://www.youtube.com/playlist?list=PLr6TOxpiWwuHOyaJXre3pGv1A306G1J1s>

Procedure:

- Topic will be explained using concept mapping.



## Recapitulation

- Quick Recap of the topic will be done by using concept mapping only and ERROR ANALYSIS will also be done to clear all doubts.

## ERROR ANALYSIS

ERRORS	REMEDIAL MEASURES
--------	-------------------

The value of Area is calculated in –ve units	Modulus should be incorporated in finding areas.
While finding the length of the normal from 3 $x+4y+9=0$ , then $p=-9/5$	Perpendicular distance from the origin to the line cannot be –ve.

learning outcomes:

- Students are able to find out slope of a line when (i) Inclination was given, (ii) two points were given.
- They are able to find out the given lines are perpendicular or parallel from the given slopes.
- They are able to find out the angle between the lines when the slopes of the lines were given.
- They are able to find out various forms of the line and conversions from one form to another form.

- They are able to find out distance of a line from a given point not lying on the line.
- They are able to find out distance between the parallel lines.
- They are able to find out the coordinates of a point using translation of axes.

### Resources

- Ncert book and extra marks

### Assessment

- class test will be conducted and Questions will give to solve.

### **QUESTION BANK**

**Q.1.** The slope of a line is double of the slope of another line. If tangent of the angle between them is

$\frac{1}{3}$ , find the slope of the lines.

**Q.2.** Find the equation of the line that has y intercept 4 and is parallel to the line  $2x + 3y = 7$

**Q.3.** Find the equation of the line that has x intercept - 3 and is perpendicular to line  $3x+5y = 4$ .

**Q.4.** Prove that the lines  $7x + 2y + 5 = 0$  and  $14x+ 4y- 8 = 0$  are parallel to each other.

**Q.5.** Prove that the lines  $3x - 2y + 5 = 0$  and  $4x + 6y + 23 = 0$  are perpendicular.

**Q.6.** A line perpendicular to the line segment joining the points  $(1,0)$  and  $(2,3)$  divides it in the ratio

$1:n$ . Find the equation of the line.

**Q.7.** Find the equation of a line that cuts off equal intercepts on the coordinate axes and passes through the point  $(2, 3)$ .

**Q.8.** Find the equation of a line which passes through the point  $(3, -2)$  and is inclined at  $60^\circ$  to the line  $3x + y = K$ .

**Q.9.** Find equation of the line passing through the point  $(2,2)$  and cutting off intercepts on the axes

whose sum is 9.

**Q10.** A line such that its segment between the axis is bisected at the point  $(x_1, y_2)$ .

Art Integration:

- Students will be given a series of pictures made with straight line graphs.

For example:

- Rain from east, Rain from west, A text, A firework, window blinds.

## Chapter -11<sup>th</sup>

### Conic Sections

#### Objectives:

- To find radius and centre of circle.
- To find focus, vertex, length of latus rectum of the parabola, equation of the parabola.
- Standard equation of ellipse and hyperbola, their foci, vertices, eccentricity, length of major Axis, minor axis, length of latus rectum.

#### Previous knowledge testing:

- Students will be asked
- What is the distance formula?
- To find distance between p (1, 2) and q (3, 4).

#### Important spelling / vocabulary:

- Ellipse, hyperbola, parabola vertex, focus, directrix.

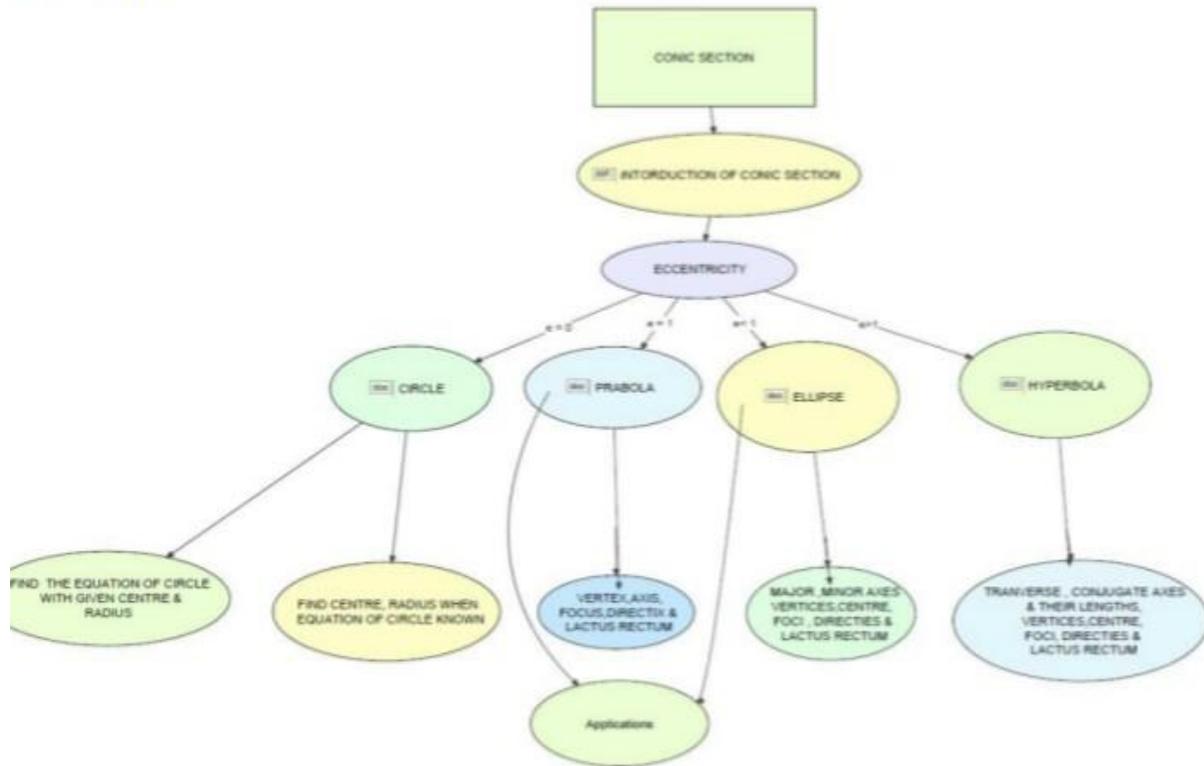
#### Links used:

<https://youtu.be/HLbsbGVBQCo>

Procedure:

- Topic will be explained using concept mapping.

**MAPS**



Recapitulation

- Quick Recap of the topic will be done by using concept mapping only and ERROR ANALYSIS will also be done to clear all doubts.

**ERROR ANALYSIS**

ERRORS	REMEDIAL MEASURES
--------	-------------------

<p>For the equation,  <math>3x^2 + 3y^2 + 6x + 8y + 5 = 0</math>, centre =  <math>(-3, -4)</math></p>	<p>Before writing the centre, the equation should be brought to the standard form.</p>
<p>While writing the coordinates of focus and vertices of a parabola, ellipse and hyperbola, x and y coordinates are interchanged.</p>	<p>Standard equations are to be identified properly from which the students can write the required coordinates correctly.</p>

learning out comes:

- Students are able to find out radius & centre of a circle when the equation of a circle is given and vice versa.
- They are able to find out focus, vertex and length of latus rectum of the parabola from its standard equation.
- They are able to find out equation of parabola when focus or vertex was given.

- They are able to find out from the standard equation of ellipse its foci, vertices, eccentricity, length of major axis, length of minor axis and length of latus rectum etc.
- They are able to find out from the standard equation of hyperbola its foci, vertices, eccentricity, length of major axis, length of minor axis and length of latus rectum etc.
- They are able to apply their knowledge and understanding in solving application problems of parabola and ellipse.

#### Resources

- Ncert book and extra marks

#### Assessment

- class test will be conducted and Questions will give to solve.

### **QUESTION BANK**

1. Find the equation of the circle with radius 5 whose centre lies on x-axis and passes through the point (2,3).
2. Find the equation of the circle passing through the points (2,3) and (-1,1) and whose centre is on the line  $x - 3y - 11 = 0$ .

3. Find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and the latus rectum of the ellipse

4. Find the equation of the ellipse with major axis along the x-axis and passing through the points

$$(4, 3) \text{ and } (-1, 4).$$

5. Find the equation of the ellipse, whose length of the major axis is 20 and foci are  $(0, \pm 5)$ .

6. Find the equation of the hyperbola with foci  $(0, \pm 3)$  and vertices  $(0, \pm \frac{5}{2})$

7. Find the equation of the hyperbola with vertices  $(\pm 7, 0)$  and  $e = \frac{4}{3}$ .

8. Find the equation of the hyperbola where foci are  $(0, \pm 12)$  and the length of the latus rectum is 36.

9. A beam is supported at its ends by supports which are 12 metres apart. Since the load is concentrated at its centre, there is a deflection of 3 cm at the centre and the deflected is in the shape of a parabola. How far from the centre is the deflection 1 cm.

Art integration:

- Students will be asked to draw circles of different radii, elliptical figures, tangents to circles.

## Chapter – 12<sup>th</sup>

### 3 -D Geometry

#### Objectives:

- To find out where the given point lies in the space.
- To identify the eight octants and three co-ordinate plane.
- To solve problems using distance formula, section formula.

#### Previous knowledge testing:

- What is the equation of x-axis and y-axis?
- Distance formula between two points in (x, y) plain.

#### Important spelling / vocabulary used:

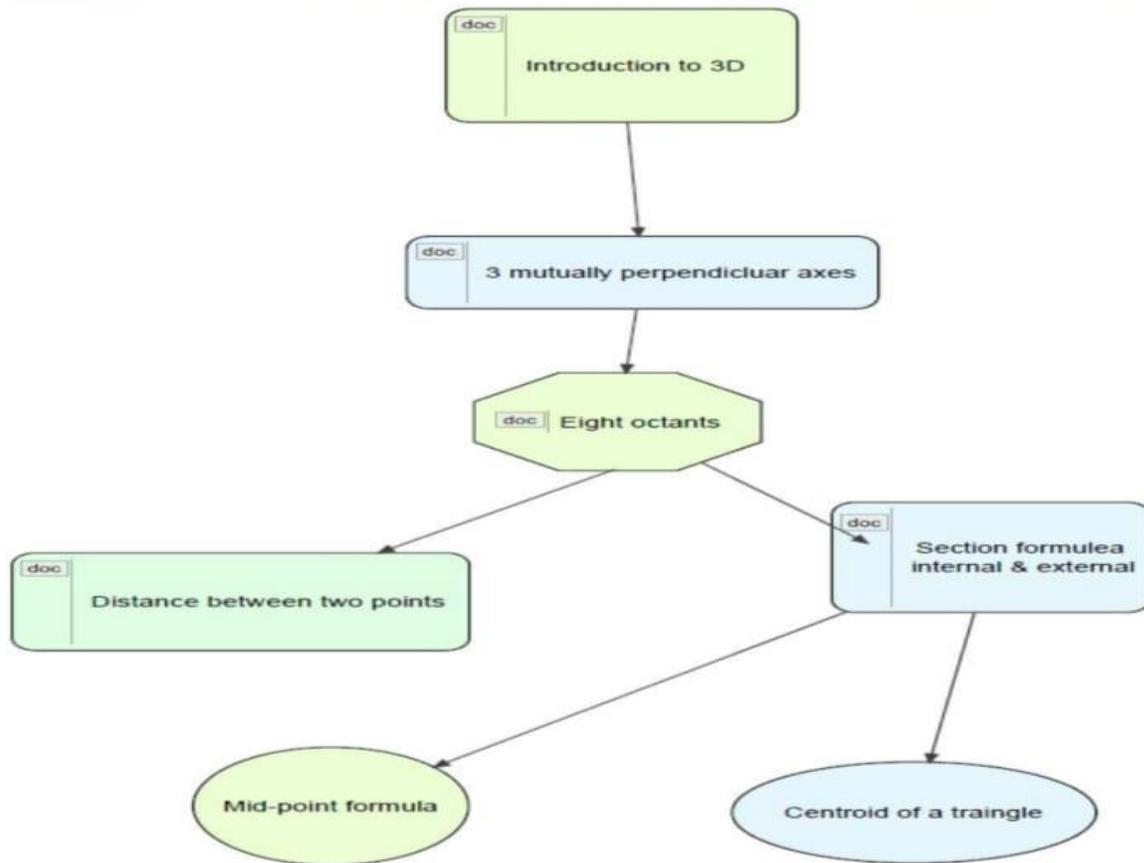
- Octants, plane co-ordinate plane, Abscissa.

#### Link used

[https://youtu.be/yPysmMXI\\_Is](https://youtu.be/yPysmMXI_Is)

#### Procedure:

- Topic will be explained using concept mapping.



## EXERCISES

1. Find the distance between the points  $P(1, -3, 4)$  and  $Q(-4, 1, 2)$ .

2. Find the locus of the set of the points  $P$  such that its distances from the points  $A(3, 4, 5)$  and  $B(1, 2, 3)$  are equal.

3. The centroid of a triangle  $ABC$  is at the point  $(1, 1, 1)$ . If the coordinates of  $A$  and  $B$  are  $(3, 5, 7)$  and  $(-1, -3, -5)$  respectively, find the coordinates of the point  $C$ .

4. The vertices of a parallelogram  $ABCD$  are  $A(3, -1, 2)$ ,  $B(1, 2, -4)$  and  $C(-1, 1, 2)$ . Find the coordinates of the fourth vertex  $D$ .

## Recapitulation

- Quick Recap of the topic will be done by using concept mapping only and ERROR ANALYSIS will also be done to clear all doubts.

### ERROR ANALYSIS

ERRORS	REMEDIAL MEASURES
(3,4,-5) lies in first octant	The concept of octants should be clear so that the child recognizes the correct octant.
The ratio -2:1 is taken as internal division.	The negative sign in the ratio indicates external division.

learning out comes:

- Students are able to find out, where the given point lies in the space.
- They are able to identify the eight octants and the three coordinate planes (xy, yz, zx).
- They are able to solve the problems using distance formula.
- They are able to solve the problems using section formula.

- They are able to solve the collinearity problems using distance formula of an expansion.

## Resources

- Ncert book and extra marks

## Assessment

- class test will be conducted and Questions will give to solve.

### **QUESTION BANK**

1. Find the ratio in which the line joining the points (2, 4, 16) and (3, 5, -4) is divided by the plane  $2x - 3y + z + 6 = 0$ . Also find the co-ordinates of the point of division.
2. Show that the points (-1, -6, 10), (1, -3, 4), (-5, -1, 1) and (-7, -4, 7) are the vertices of a rhombus.
3. Three vertices of a parallelogram ABCD are A (3, -4, 7) B (5, 3, -2) and C (1, 2, -3). Find the fourth vertex D.
4. Find the coordinates of the points which trisect the line segment AB, given A (2, 1, -3) and B (5, -8, 3).
5. Find the coordinates of the point P which is five-sixth of the way from A(2, 3, -4) to B(8, -3, 2).

6. The x co-ordinate of a point is 9. Find its other co-ordinates if this point lies on the line joining the points  $(7, 2, 1)$  and  $(10, 5, 7)$ .
7. Find lengths of the medians of the triangle with vertices A  $(0, 0, 6)$ , B  $(0, 4, 0)$  and  $(6, 0, 0)$ .
8. Determine the point in XY plane which is equidistant from the points A  $(1, -1, 0)$  B  $(2, 1, 2)$  and C  $(3, 2, -1)$ .
9. Find the locus of the point which is equidistant from the points A  $(0, 2, 3)$  and B  $(2, -2, 1)$ .
10. The Centroid of triangle ABC is at  $(1, 1, 1)$ . If co-ordinates of A and B are  $(3, -5, 7)$  and  $(-1, 7, -6)$  respectively, find coordinates of points C.

## Chapter – 13<sup>th</sup>

### Limits and Derivatives

#### Objectives:

- To apply the concept of one sided limits.
- To find the existence of limits.

- To apply first principle of derivatives.

Previous knowledge testing:

- Students will be asked
- How to find the gradient of linear functions?
- Sketch the graph of linear functions say
- $Y = X$                        $Y = -X$

Important spelling / vocabulary used:

- Limit, right hand limit, left hand limit, derivatives.

Link used

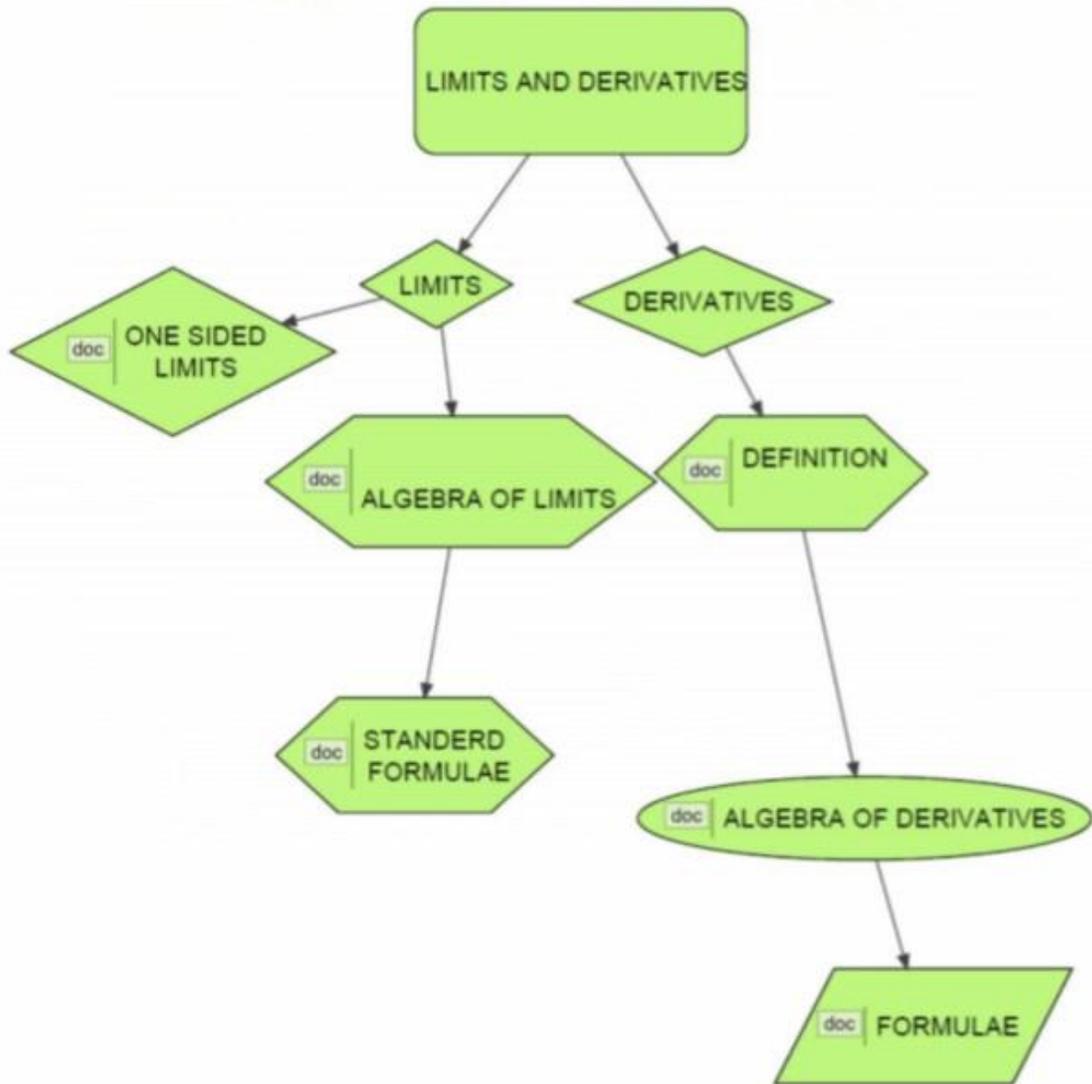
[https://www.youtube.com/playlist?list=PLAJfHGTj6RJ\\_iTX5AW6ITtR4NAV](https://www.youtube.com/playlist?list=PLAJfHGTj6RJ_iTX5AW6ITtR4NAV)

VsP1\_G

Procedure:

- Topic will be explained using concept mapping.

CONCEPT MAPPING



## Recapitulation

- Quick Recap of the topic will be done by using concept mapping only and ERROR ANALYSIS will also be done to clear all doubts.

### ERROR ANALYSIS

1. Mistakes while using LHL and RHL.	Clear explanation of LHL and RHL is a must.
2. $\frac{d(\frac{u}{v})}{dx} = \frac{d(u)d(v)}{dx dx}$	To Learn product rule of differentiation thoroughly and to use it properly.
	To Learn quotient rule of differentiation thoroughly and to use it properly.
4. $(\sin x)^2 = \sin$	Explanation of $\sin^2 x$ as $\sin x$ as $\sin x \sin x$ and $\sin$

### LEARNING OUTCOMES:

1. Students will imagine and observe the intuitive idea of limits through graphs.
2. Students will comprehend one sided limits both graphically and through the definition.
3. Students will apply the concept of one sided limits to find the existence of the limit.
4. They observe the nature of the function involving the limit.
5. They compare whether the function is a difference Quotient
6. After understanding the derivative, they apply limit of Difference Quotient to obtain the derivative.
7. They apply differentiation to find the slope of the tangent at any point on the curve.

#### Resources

- Ncert book and extra marks

#### Assessment

- class test will be conducted and Questions will give to solve.

### **QUESTION BANK**

EEVALUATE :

1.  $\lim_{x \rightarrow 2} \left( \frac{x^3 - 2x^2}{x^2 - 5x + 6} \right)$

2.  $\lim_{x \rightarrow 1} \left[ \frac{x-2}{x^2-x} - \frac{1}{x^3-3x^2+2x} \right]$

3.  $\lim_{x \rightarrow 0} \left\{ \frac{\sqrt{1+x}-1}{x} \right\}$

4.  $\lim_{x \rightarrow \frac{\pi}{2}} \frac{\tan 2x}{x}$

5.  $\lim_{x \rightarrow 3} \frac{x}{\{x\}}$

Differentiate the following with respect to x

6.  $\frac{\sin x + \cos x}{\sin x - \cos x}$

7.  $\frac{x^6 - \cos x}{\sin x}$

8.  $\frac{x}{1 + \tan x}$

9.  $x^2 \cos x$

Differentiate the following using first principles

10.  $\sqrt{\sin x}$

11.  $\operatorname{Cosec} 2x$

12.  $\tan x$

Chapter – 16<sup>th</sup>

Probability

Objectives:

- To find the total outcomes of the random experiments.
- To learn how to write down sample space 's' of the experiment.
- To learn about mutually exclusive and mutually exhaustive events.

Previous knowledge testing:

Students will be asked

- Symbols used for denoting Union of sets, intersection of sets, disjoint sets.
- Complement of a set.

Important spelling / vocabulary used:

- Mutually exclusive and exhaustive events.

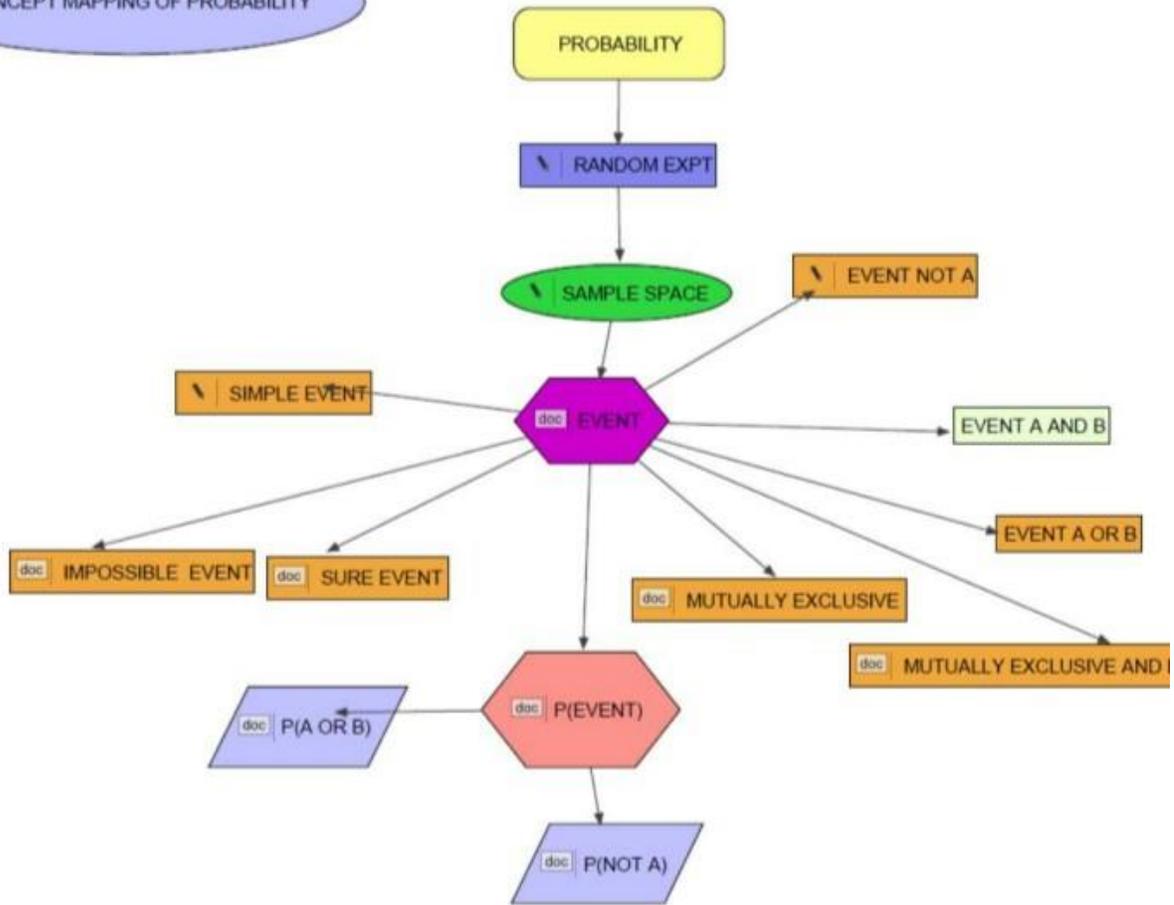
Link used

<https://youtu.be/CO95EP4vYI0>

Procedure:

- Topic will be explained as shown in concept mapping.

CONCEPT MAPPING OF PROBABILITY



## Recapitulation

- Quick Recap of the topic will be done by using concept mapping only and ERROR ANALYSIS will also be done to clear all doubts.

## ERROR ANALYSIS

ERRORS	REMEDIAL MEASURES
Misunderstanding the question	To read the question properly (without any hurry) and understand it.
In calculating $P(E)$	Emphasize more, on the definition by giving good number of examples.

## learning outcomes

- 1 Students will observe the outcomes of the random experiment.
- 2 They will relate the set of all possible outcomes to a set 'S' the sample space.
- 3 They are able to relate event E of S as the subset of S

4. They understand the measure of uncertainty through  $P(E)$ .
5. They will apply the concept of  $P(E)$  in many day to day situations.

## Resources

- Ncert book and extra marks

## Assessment

- class test will be conducted and Questions will give to solve.

## **QUESTION BANK**

### Probability

1. If two cards are drawn from a well shuffled pack, what is the probability that at least one of the two is heart?
2. What is the probability that a leap year will have 53 Sundays?
3. What is the probability of getting a total of 10 in a single throw of two dice
4. Two dice are rolled simultaneously. What is the probability that the numbers on them are different
5. At random all the letters of the word "ARTICLE" are arranged in all possible ways. What is the probability that the arrangement begins with vowel and ends with a consonant?

6. The letters of the word 'MISSISSIPI' are arranged in a row at random. What is the probability that all S's come together?
7. A five digit number without repetition is formed by the digits 1, 2, 3, 4, 5, 6, 7, 8. What is the probability that the number has even digits at both ends?
8. Three electric lamps are fitted in a room. 3 bulbs are chosen at random from 10 bulbs having 6 good bulbs. What is the probability that the room is lighted?
9. If  $P(A \cap B) = 0.65$ ,  $P(A \cap C) = 0.15$ , then find  $P(A^c) + P(B^c)$ .
10. If  $P(A) = 0.4$ ,  $P(B) = 0.5$ ,  $P(C) = 0.6$ ,  $P(A \cap B) = 0.2$ ,  $P(B \cap C) = 0.3$ ,  $P(C \cap A) = 0.25$ ,  $P(A \cap B \cap C) = 0.1$  then find  $P(A \cup B \cup C)$ .
11. A bag contains 5 black balls 4 white balls and 3 red balls. If a ball is selected at random what is the probability that it is a black or a red ball?
12. The probabilities of two events A and B are 0.25 and 0.40 respectively. The probability that both A and B occur is 0.15. What is the probability that neither A nor B occur?