

A critical review of Syllabus of Mathematics of class IX and X as outlined by West Bengal Board of Secondary Education (WBBSE) and Central Board of Secondary Education (CBSE)

Abstract: Mathematics education is a process by which a child enters into two basic regions of the mathematical world; into concepts and theories on one side and mathematical activity on the other. Such initiatives, fostered and made easier by curriculum, takes place within a well knit system of education. After NCF 2005, a change in the syllabi and text books and a change in classroom teaching and assessment is taking place slowly at different level of maturity in different states. In this context, the present paper focuses on to compare the syllabus of mathematics of class IX and X of Central Board of Secondary Education (CBSE) and West Bengal Board of Secondary Education (WBBSE) boards. It was found that in both CBSE and WBBSE the syllabus of class IX and X include arithmetic, algebra, geometry, coordinate geometry, mensuration, set theory (only in class IX, WBBSE), probability, statistics and trigonometry (only in class IX, WBBSE and CBSE). Contents and subunits of the syllabus of these different components are almost same. Yet, it was found that in CBSE Mathematics, more stress given to number system, probability, on the other hand WBBSE has stressed upon more arithmetic problems like profit loss, partnership business, simple and compound interest etc. These arithmetic problems like profit loss, partnership business, simple and compound interest etc. are taught at elementary level (upto class VIII) in CBSE Mathematics. In WBBSE, a detailed account of ratio and proportion and variations in algebra, in trigonometry measurement of angles in sexagesimal and circular method are noticeable and deferential. In geometry, CBSE has committed to disseminate from the very beginning of Euclidian geometry to lines and angles, properties and theorems on triangles, quadrilaterals, circles, similar triangles, Pythagoras theorem. It was found the syllabus of geometry in class IX is greater than that of class X, on the other hand, in WBBSE, class X syllabus has more extensive than that of class IX and overall integrated picture is more or less same. It will promising to be confident in looking forward to the practical implementation in the classroom generating lively potential youth to forthcoming world.

Key Words: Secondary Education, Mathematics, Syllabus, WBBSE, CBSE

Introduction

Mathematics is embedded deeply into the life and culture of people in the Indian subcontinent, attested by a long history of engagement with mathematics in art, craft, work and abstract disciplines of thought. This has also meant a tradition of socially embedded modes of education and learning in aspects of mathematics as well (Subramaniam and Ramanujam, R. 2012). Mathematics influences and gets influenced by the developmental process of a society. There is hardly a few field of activity or sector of development which is not influenced by mathematics in some form or another. Mathematics provides a broad guideline to streamline educational process and reflect the current needs and aspiration of society. In recent times, elementary education has emerged as an important segment of the total educational system expected to contribute significantly to the individual as well as the national development process. In order to be effective, school education needs to be continuously reviewed and updated. In fact school curriculum is

the root of the renewal process. Renewal takes place on the basis of feedback provided by researches conducted from time to time.

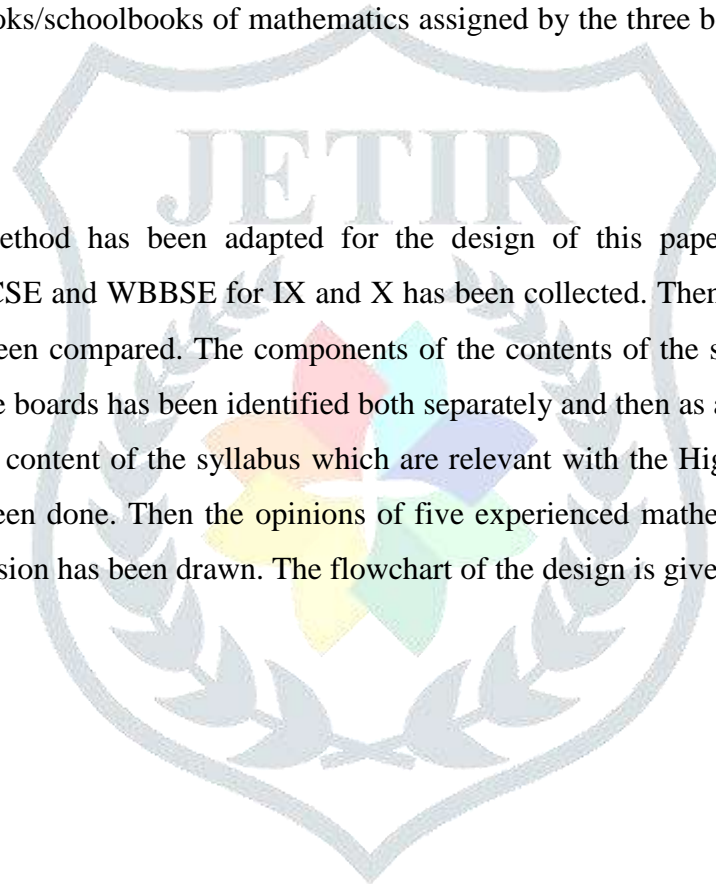
From such considerations and from the nearly universal tendency to deal with mathematics at the secondary level of education in India, this paper aims to review the Syllabus of Mathematics of class IX and X as outlined by West Bengal Board of Secondary Education (WBBSE) and Central Board of Secondary Education (CBSE).

Sources

The syllabus of mathematics of CBSE, ICSE and WBBSE of class VI-VIII has been taken from the Internet. Also, the textbooks/schoolbooks of mathematics assigned by the three boards have been taken into account.

Design

The content analysis method has been adapted for the design of this paper. Firstly the syllabus of mathematics of CBSE, ICSE and WBBSE for IX and X has been collected. Then the syllabus of each class of the three boards has been compared. The components of the contents of the syllabus of mathematics of class IX and X of all three boards has been identified both separately and then as a whole unit. Identification of the components of the content of the syllabus which are relevant with the Higher studies and which are useful in daily life has been done. Then the opinions of five experienced mathematics teachers have been taken and then the conclusion has been drawn. The flowchart of the design is given below:



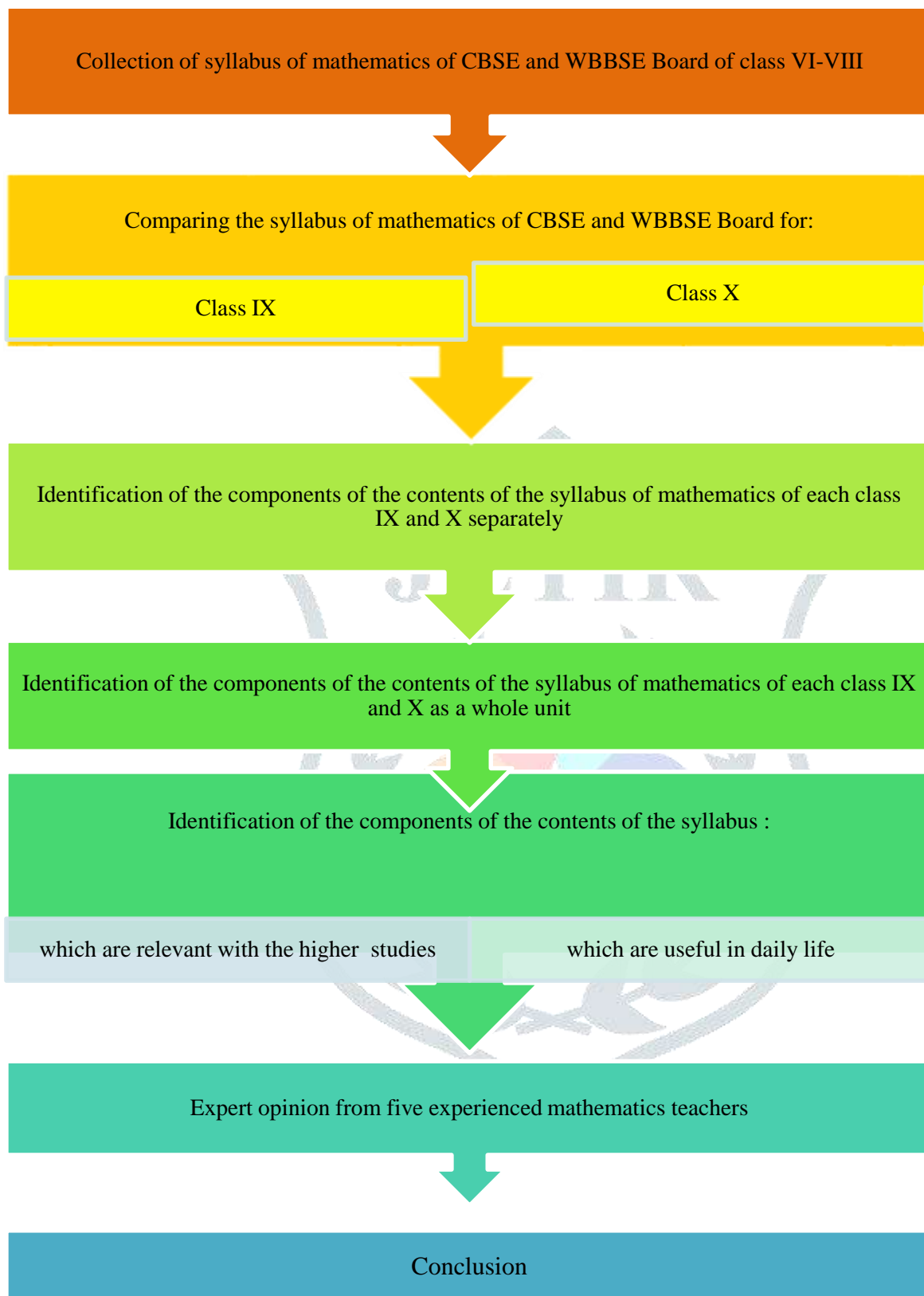


Figure 1: Flow Chart of the design of the study (Content Analysis)

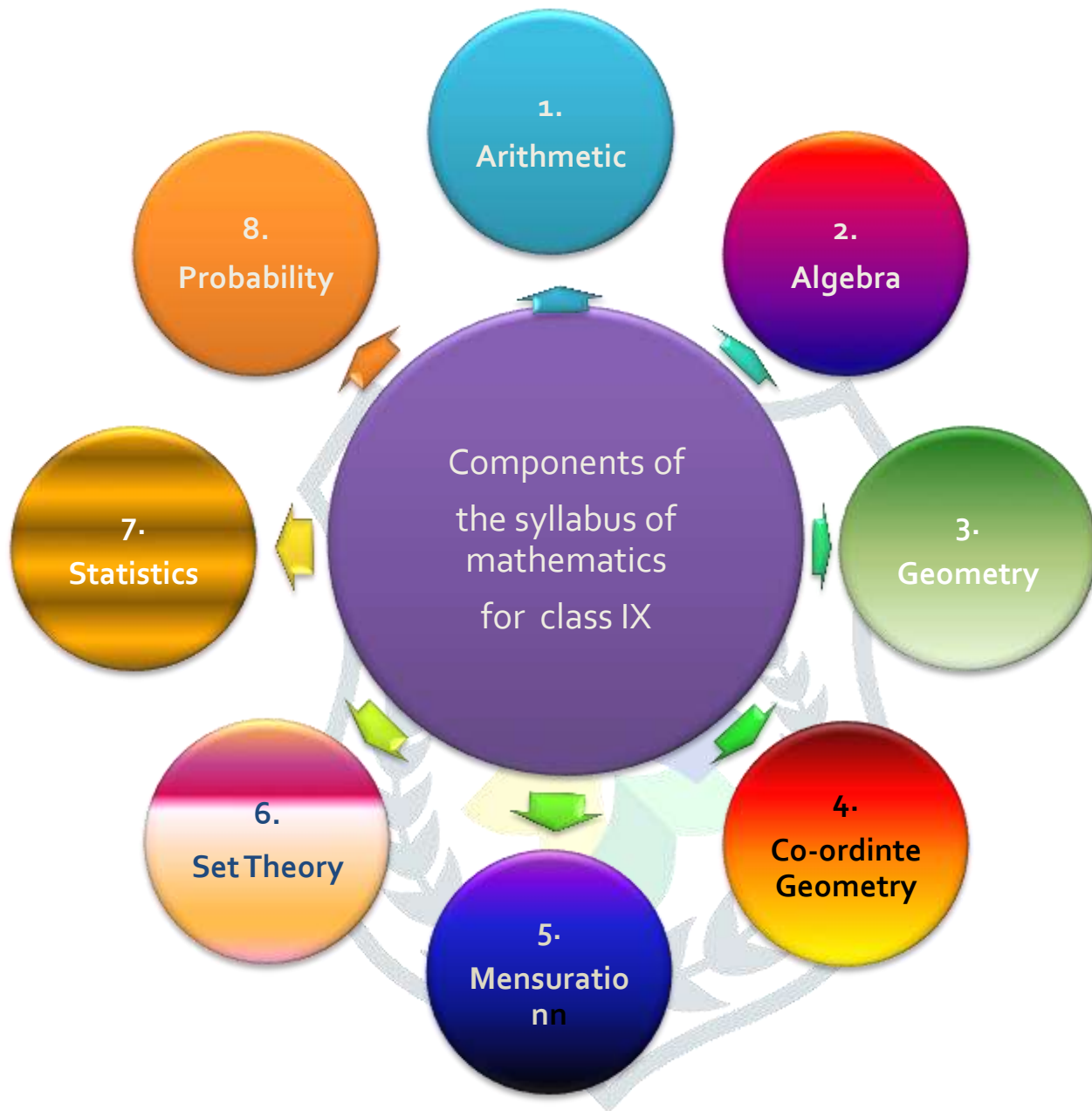


Figure 2: Identification of components of Mathematics in Class IX (as in WBBSE and CBSE)

The component 'Set Theory' of class IX as prescribed in WBBSE is not extended in class X. In class X also one more component is there namely 'Trigonometry'. Therefore all the 8 components in class X are as follows:

1. Arithmetic
2. Algebra

3. Geometry
4. Coordinate Geometry
5. Mensuration
6. Trigonometry
7. Statistics
8. Probability

Now, component wise and board wise discussion and comparison will be carried on for easy grasping.

Table1: Component – 1. Arithmetic in the Syllabus of Mathematics of Class IX and X as per in WBBSE and CBSE

Board / Class	WBBSE	CBSE
Class IX	<p>1.Numbers:</p> <p>(i)-Concept of Natural number s, whole Number, Integers, Rational numbers, Decimal numbers</p> <p>(ii). Conversion of rational to decimal and vice versa</p> <p>(iii).Representation of real numbers on number line</p> <p>(iv) Operations of real numbers</p> <p>(v) Axioms on real numbers and solution of simple practical problem using those axioms.</p> <p>2. Profit and loss :</p> <p>Concept , application</p>	<p>Numbers</p> <p>1. Review of representation of real numbers, Integers, Rational numbers, on number line. Representation of terminating / non- terminating recurring decimal on number line through successive magnification.</p> <p>2. Examples of non recurring /terminating decimals. Existence of irrational such as $\sqrt{2}$, $\sqrt{3}$ and their representation on number line.</p> <p>3. Existence of \sqrt{x} for a given positive real number x.</p> <p>4. Definition of nth root of a real number.</p> <p>5. Rationalization of real number of the type $1/(a + b\sqrt{x})$ and $1/(\sqrt{x} + \sqrt{y})$, where x, y are natural number and a, b are integers.</p>
Class X	<p>1.Quadratic Surd:</p> <p>(i) Concept of irrational numbers. (ii) Concept of Quadratic Surds. (iii) Concept of pure, mixed, like, unlike Quadratic Surds. (iv) Concept of rationalizing factors. (v) Concept of rationalizing factors of denominators. (vi) Concept of addition, subtraction,</p>	<p>Number System</p> <p>1. Real Numbers:</p> <p>Euclid ‘s division lemma, Fundamental theorem of Arithmetic – statements after reviewing work done earlier and after illustrating and motivating through examples ,</p>

	<p>multiplication and division of Quadratic Surds. (vii) Concept of Solution of real problems in Quadratic Surds.</p> <p>2. Simple Interest:</p> <p>(i) Concept of principal, interest, rate of interest in percent per annum, amount, time. (ii) Concept of the formula $I = prt/100$. (iii) Concept of solution of different real problems.</p> <p>3. Compound Interest (upto 3 years) and uniform rate of increase or decrease :</p> <p>(i) Concept of difference in Simple Interest and Compound Interest. (ii) Concept of formation of formula if the compound interest is given yearly, half yearly and quarterly. (iii) Concept of formation of formula of uniform rate of increase or decrease from the formula of Compound Interest. (iv) Concept of solution of different real problems.</p> <p>4. Partnership Business:</p> <p>(i) Concept about partnership business. (ii) Concept of simple and mixed partnership business. (iii) Concept about principal. (iv) Concept of distribution of dividend. (iv) Application of ratio in different real problems related to partnership business.</p>	<p>Proofs of results- irrationality of $\sqrt{2}$, $\sqrt{3}$, $\sqrt{5}$, decimal expansion of rational numbers in terms of terminating / non-terminating recurring decimals.</p>
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From the table 1, it can be said that, in the component arithmetic, a sequenced stress is given to the Number System in CBSE throughout IX and X gradually. In WBBSE, together with number system (not so much details as in CBSE) in class IX 'Profit and loss' are included and 'Simple Interest', 'Compound Interest' and 'Partnership Business' exist in class X. It may be noted that, 'Simple Interest', 'Compound Interest' are taught in class VIII of CBSE Mathematics. Therefore more emphasis to number system may be given to WBBSE Mathematics of IX and X.

Component 2: Algebra

Common to CBSE and WBBSE

Class IX

Polynomials: concept of polynomial and function , operations on polynomials, zero of a polynomial , Remainder theorem , factor theorem , zero polynomial and application of each of the mentioned concept .

Recall of algebraic expression and identities. Further verification of identities of the type $(x + y + z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2zx$, $(x + y)^3 =$

$x^3 + y^3 + 3xy(x + y)$, $(x - y)^3 = x^3 - y^3 - 3xy(x - y)$, $x^3 + y^3 = (x + y)(x^2 - xy + y^2)$, $x^3 - y^3 = (x - y)(x^2 + xy + y^2)$, $x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx)$ and their use in factorization of polynomials.

Linear Equation in two variables: Standard form of Linear Equation in two variables, examples, problems from real life with algebraic and graphical solution.

Quadratic equation in one variable

(i) Concept of Quadratic equation in one variable. (ii) Concept of Quadratic equation in one variable $ax^2 + bx + c = 0$ (where a, b, c are real numbers and $a \neq 0$). (iii) Solution of quadratic equation with help of factorization (roots are rational). (iv) Solution of quadratic equation by completing the square. (v) Concept of Sridhara Acharya's formula. (vi) Concept about nature of roots. (vii) Concept of construction of a quadratic equation in one variable if roots are known. (viii) Solution of real problems quadratic equation in one variable.

Class X

Quadratic Equations

(i) Standard form of Quadratic Equation, solution (only real roots) by factorization, by completing the square and by using quadratic formula. Relationship between discriminant and nature of roots.

(ii) Situational problems based on Quadratic Equations related to day to day activities to be incorporated.

Additional (specific, if any)

	CBSE	WBBSE
Class IX		<p>Logarithms: Concept, definition, properties and application.</p> <p>Laws of indices : Concept , laws and application, Equation and Identity on indices.</p>
Class X	<p>1.Polynomials:</p> <p>Zeros of a polynomial, Relationship between zeros and coefficients quadratic polynomials. Statement and simple problems on division algorithm for polynomials with real coefficients.</p> <p>2. Pair of Linear Equation in two</p>	<p>1. Ratio and Proportion:</p> <p>(i) Concept of Ratio and Proportion in algebra.</p> <p>(ii) Concept of different types of Ratio and Proportion.</p> <p>(iii) Concept of application of different proportional properties in the problems related to</p>

	<p>variables:</p> <p>(i) Pair of Linear Equation in two variables and graphical solution. Geometric representation of different possibilities of solution / inconsistency.</p> <p>(ii) Algebraic conditions for number of solutions, Solution of a Pair of Linear Equation in two variables algebraically – by substitution, by elimination and by cross multiplication method. Simple situational problems must be included. Simple problems on reducible to Linear Equations.</p> <p>3.Arithmetic Progressions:</p> <p>Motivation for studying Arithmetic Progressions, Derivation of nth term and sum of the first n terms of AP and their application in solving daily life problems.</p>	<p>proportion.</p> <p>2. Variations</p> <p>(i) Concept of simple variations, inverse variations and compound variations. (ii) Concept of Solution of different real problems involving with variations and inverse variations.</p>
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Figure 1: Comparison of the syllabus of Component 2. Algebra of class IX- X of CBSE and WBBSE

Therefore, from figure 3 it may be said that after the completion of class IX- X, all students of the two boards are expected to be familiar with:

1. Polynomial s
2. Linear equation of one and two variable/s along with their graphical representation ,solutions and application to daily life problems
3. Laws of Indices
4. Algebraic expression and identities with their different use in factorization
5. Quadratic equation in of one variable along with their practical application .

In addition, all students of CBSE will be able to handle with Arithmetic Progression (A.P.) and all students of **WBBSE** will be able to handle with ‘Variations’

Table 3: Comparison of the syllabus of Component ‘Geometry’ of class IX- X of CBSE and WBBSE

Component 3: Geometry

Common to CBSE and WBBSE boards	
Subunits	Boards with classes
<p>1. Properties of Parallelogram:</p> <p>Concept of quadrilateral, trapezium, parallelogram, rectangle, square and rhombus</p> <p>The diagonal divides a parallelogram into two congruent triangles.- (Proof)</p> <p>In a parallelogram opposite sides are equal and conversely. - (Motivate in CBSE), (Proof in WBBSE)</p> <p>In a parallelogram opposite angles are equal and conversely . - (Motivate in CBSE), (Proof in WBBSE)</p> <p>A quadrilateral is a parallelogram if a pair of its opposite sides is parallel and equal. - (Motivate in CBSE), (Proof in WBBSE)</p> <p>In a parallelogram, the diagonals bisect each other and conversely. - (Motivate in CBSE), (Proof in WBBSE)</p> <p>In a triangle, the line segment joining the mid points of any two sides is parallel to the third sides and its converse. - (Motivate in CBSE), (Proof in WBBSE)</p>	Common, class IX
<p>Theorems involving area :</p> <p>(i) Parallelogram on the same base and between the same parallel are equal in area – proof</p> <p>(ii) In a triangle and a parallelogram are on the same base and between the same parallels, the area of the triangle is half that of the parallelogram – proof</p> <p>(iii) Triangles on the same base and between the same parallels are equal in area – (Motivate in CBSE), (Proof in WBBSE)</p>	Common, class IX
<p>Theorems related to circle</p> <p>(i) In the same circle or in equal circles, equal chords intercept equal arcs and subtend equal angles at the centre (proof is not required).</p> <p>(ii) In the same circle or in equal circles, the chords which subtend equal angles at the centre are equal (proof is not required).</p> <p>(iii) One and only one circle can be drawn through three non-</p>	Common Class IX, CBSE Class X, WBBSE

<p>collinear points (proof is not required).</p> <p>(iv) If a line drawn from the centre of any circle bisects the chord, which is not a diameter, will be perpendicular on the chord- proof.</p> <p>(v) A perpendicular drawn from the centre of a circle on a chord, which is not a diameter, bisects the chord.</p> <p>(vi) Application of above statements.</p>	
<p>Theorems related to angles in a circle</p> <p>(i) Concept of angle subtended at the centre and in the circle.</p> <p>(ii) The angle subtended at the centre by the arc is twice that of an angle subtended at the circle – proof.</p> <p>(iii) In any circles angles in the same segment are equal – (Motivate in CBSE), (Proof in WBBSE).</p> <p>(iv) Angle in a semicircle is a right angle – proof.</p> <p>(v) If a straight line segment makes equal angles at the two points situated on the same side of it, then the four points are con cyclic (proof is not required).</p> <p>(vi) Application of these statements.</p>	<p>Common, Class X</p>
<p>Theorems related to cyclic quadrilateral</p> <p>(i) The opposite angles of cyclic quadrilateral are supplementary to each other – proof.</p> <p>(ii) If the opposite angles of a quadrilateral are supplementary to each other, then the vertices of quadrilateral are con cyclic - (poof is not required).</p>	<p>Common Class IX , CBSE Class X , WBBSE</p>
<p>Theorems related to Tangent to a circle</p> <p>(i) Concept of tangents and transversal of a circle.</p> <p>(ii) The tangent and the radius passing through the point of contact are perpendicular to each other – proof.</p> <p>(iii) It two tangents are drawn from an external point, then the two line segments joining external point and point of contact are equal and they make equal angles at the centre – proof.</p> <p>(iv) Concept of direct common tangents and transverse common tangents – proof. (v) If two circles touch each other, then two centres of two circles and point of contact are collinear – proof.</p>	<p>Common, Class X</p>

<p>(vi) Application of the above statements.</p>	
<p>Similarly</p> <p>(i) Concept of similar geometric figures. (ii) If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio (proof is not required).</p> <p>(iii) If a line divides two sides of a triangle in the same ratio, the line is parallel to third side (proof is not required).</p> <p>(iv) If in two triangles, the corresponding angles are equal, their corresponding sides are proportional and the two triangles are similar (proof is not required).</p> <p>(v) If corresponding sides of two triangles are proportional their corresponding angles are equal and the two triangles are similar (proof is not required).</p> <p>(v) If one angle of a triangle is equal to one angle of another triangle and the sides including these angles are proportional the two triangles are similar (proof is not required).</p> <p>(vi) If a perpendicular is drawn from the vertex of the right angle of a right triangle to the hypotenuse, the triangles on each side of the perpendicular are similar to the whole triangle and to each other (proof is not required).</p> <p>(vii) Application of the above statements.</p>	<p>Common, Class X</p>
<p>Pythagoras theorem:</p> <p>(i) Pythagoras theorem - proof.</p> <p>(ii) Converse of Pythagoras theorem - proof.</p> <p>(iii) Application of the above statements.</p>	<p>Common, Class X</p>
<p>Theorem on transversal and Mid Point : (i) The line segment joining the mid points of any two sides of a triangle is parallel to and half of the third side – proof</p> <p>(ii) The straight line drawn through the mid- point of a side of a triangle parallel to second side bisects the third side and the intercept thus obtained from the parallel straight line by two sides of the triangle is half of second side – proof</p> <p>(iii) If the lengths of the intercepts made by three or more parallel straight lines in a transversal are equal, then the lengths of the intercepts made by them on any other transversal will</p>	

<p>also be equal – verification.</p> <p>(iv) Application of the above theorem.</p> <p>Theorems on Concurrence</p> <p>(i) The perpendicular bisectors of the sides of a triangle are concurrent – proof. Concept of Circum-centre, Circum-radius, Circum- circle</p> <p>(ii) The perpendiculars on the sides of a triangle from its opposite vertices are concurrent – proof.</p> <p>(iii) The internal bisectors of the angles of a triangle are concurrent – proof. Concept of In-centre, in-radius, in- circle</p> <p>(iv) The medians of a triangle are concurrent – proof. Concept of centroid, (v) Application of the above theorem.</p> <p>7. Practical geometry- Construction</p> <p>Construction :</p> <p>(i) Construction of a parallelogram whose measurement of one angle is given and equal in area to a triangle and its application.</p> <p>(ii) Construction of a triangle equal in area to a quadrilateral and its application.</p>	<p>Additional in WBBSE Class IX</p>
<p>Practical geometry- Construction</p> <p>(i) Construction of Circumcircle of a given triangle.</p> <p>(ii) Construction of incircle of a given triangle.</p> <p>(iii) Construction of a circle about a given triangle (proof is not included in evaluation).</p> <p>Construction: Determination of mean proportional.</p> <p>(i) Determination of mean proportional of two line segments in geometric method. (ii) Construction of a square whose area is equal to a rectangle.</p> <p>(iii) Construction of a square whose area is equal to a triangle.</p>	<p>Additional in Class X, WBBSE</p>
<p>Introduction to Euclid’s Geometry: A brief history of Euclid’s Geometry, axioms, postulates, theorems, the five postulates of Euclid, relationship between axioms and theorems as for examples (Axiom)1. Given two distinct points, there exists one and only</p>	<p>Additional in CBSE, Class IX</p>

one line through them, (Theorem) 2. (Prove) Two distinct lines cannot have more than one point in common.

2. Lines and Angles:

(Motivate) If a ray stands on ray stands on a line, then, the sum of the two angles so formed is 180° ,

(Prove) If two lines intersect, vertically opposite angles are equal ,

(Motivate) Results on corresponding angles, alternative angles, interior angles when a transversal intersects two parallel.

(Motivate) Lines which are parallel to a given line are parallel.

(Prove) The sum of the angles of a triangle is triangle is 180° .

(Motivate) If a side of a triangle is produced, the exterior angle so formed is equal to the sum of the two interior opposite angles.

3. Triangles :

(Motivate) Two triangles are congruent if any two sides and the included angle of one triangle is equal to any two sides and the included angle of other triangle (SAS Congruence) ,

(Prove) Two triangles are congruent if any two angles and the included side of one triangle is equal to any two angles and the included side of other triangle (AS A Congruence) ,

(Motivate) Two triangles are congruent if three sides of one triangle is equal to three sides of other triangle (SSS Congruence) ,

(Motivate) Two right triangles are congruent if the hypotenuse and a side of one triangle is equal to the hypotenuse and a side of other triangle,

(Prove) The angles opposite to equal sides of a triangle are equal.

(Motivate) Triangle inequities and relations between angle and facing side inequities triangles.

Construction

Bisectors of line segments and angles of measure 60° , 90° , 45° etc., and equilateral triangles.

Construction of a triangle given its base, sum/difference of the other two sides and one base angle.

Construction of a triangle given its perimeter and base angles.

CBSE Class IX

Construction

Construction of a triangle similar to a given triangle.

From the above table, it can be said that after the completion of class IX- X, all students of the two boards are expected to be familiar with:

1. Elementary concept of Euclidean geometry
2. Lines and angles
3. Triangles and related theorem on angle and sides
4. Quadrilateral and their properties
5. Theorems on Concurrence
6. Theorem on transversal and Mid Point
7. Properties of Parallelogram and theorem on it
8. Theorems involving area
9. Theorems related to circle
10. Theorems related to angles in a circle
11. Theorems related to cyclic quadrilateral
12. Theorems related to Tangent to a circle
13. Similarly and theorem on it.
14. Pythagoras theorem
- 15: Construction

I. In Class IX(CBSE), students will have to learn (i) Bisectors of line segments and angles of measure 60° , 90° , 45° etc., and equilateral triangles.(ii) Construction of a triangle given its base, sum (difference) of the other two sides and one base angle. (iii) Construction of a triangle given its perimeter and base angles. In WBBSE, students will have to learn (i) Construction of a parallelogram whose measurement of one angle is given and equal in area to a triangle and its application. (ii) Construction of a triangle equal in area to a quadrilateral and its application.

II. In Class X(CBSE), all students have to learn construction of a triangle similar to a given triangle and in WBBSE, (i) Construction of Circumcircle of a given triangle. (ii) Construction of incircle of a given triangle. (iii) Construction of a circle about a given triangle (proof is not included in evaluation).

Determination of mean proportional: (i) Determination of mean proportional of two line segments in geometric method. (ii) Construction of a square whose area is equal to a rectangle. (iii) Construction of a square whose area is equal to a triangle.

Table 3: Comparison of the syllabus of Component ‘Coordinate Geometry’ of class IX- X of CBSE and WBBSE

Component 4: Coordinate Geometry		
Boards	WBSSE	CBSE
Class IX	Class IX	Class IX
And	1. Distance formula:	The Cartesian plane, coordinates of a point, names and terms associated with the coordinate plane, notations, plotting points in the plane,
Class IX	Concept of the formula of distance between two points on a Cartesian plane and its application.	Graph of linear equation as examples: focus on linear equation of the type as $ax + by + c = 0$ by writing it as $y = mx + c$ and linking with the chapter on linear equations in two variables.
	2. Concept of the determination of formula of coordinates of a point when a straight line segment is divided internally or externally in a given ratio.	Class X
	3. (i) Area of triangular region formed by three points (ii) Area of quadrilateral region formed by four points.(iii) Condition of co linearity of three points. (iv) Determination of centroid of a triangle.	Concept of Coordinate geometry, graphs of linear equations, distance formula . Section formula (internal division). Area of a triangle.

From table 3, it can be said that after the completion of class IX- X, all students of the two boards are expected to be familiar with: the Cartesian plane, coordinates of a point, names and terms associated with the coordinate plane, notations, plotting points in the plane. **Distance formula:** 1. Concept of the formula of distance between two points on a Cartesian plane and its application. 2. Concept of the determination of formula of coordinates of a point when a straight line segment is divided internally or externally in a given ratio. **3.** (i) Area of triangular region formed by three points. (ii) Area of quadrilateral region formed by four points.(iii) Condition of co linearity of three points.(iv) Determination of centroid of a triangle.

Component 5: Mensuration:

In Mensuration:, the subunits in the two boards in the whole syllabus of class IX- X are almost are same. Syllabus of Mensuration of both the boards of CBSE and WBBSE are as follows:

Class IX: CBSE:

1. Areas: Area of a triangle by Heron’s formula (without proof) and its application to find the area of a quadrilateral. 2. Surface Areas and volumes: Surface Areas and volumes of cubes, cuboids, spheres including hemispheres and right circular cylinder / cones.

Class IX: WBBSE

1. Determination of perimeter and area of a triangle and quadrilateral: (i) Determination of perimeter and area of a triangle, Concept of Heron's formula, Application in practical problem. (ii) Determination of perimeter and area of a rectangle, Square, Parallelogram, Rhombus, Trapezium and application in practical problem. 2. Circumference of Circle: Determination of Circumference of Circle, Concept of π , and solution of practical problems by using the formula of circumference of Circle. 3. Area of Circular Region: Concept of the formula of the area of a circular region, Concept of the formula of the area of Sector of a circle and solution of practical problems.

Class X: CBSE: Mensuration

Areas related to Circles: Motivate the area of a circle, area of sectors and segments of a circle. Problems based on areas and perimeter / circumference of the above said plane figures. (In calculating area of segment of a circle, problems should be restricted to central angle of 60° , 90° and 120° only. Plane figures involving triangles, simple quadrilaterals and circle should be taken.). **2. Surface Areas and Volumes:** (i) Problems on finding surface areas and volumes of combinations of any two of the following: cubes, cuboids, spheres, hemispheres and right circular cylinders / cones, frustum of a cone. (ii) Problems involving converting one type of metallic solid into another and other mixed problems. (Problems with combination of not more than two different solids be taken.

Class X: WBBSE: Mensuration

1. Rectangular Parallelepiped or Cuboid: (i) Concept of the things of the shape of Rectangular Parallelepiped which are seen in real life. (ii) Concept of number of surfaces, edges, vertices and diagonals. (iii) Concept of formula formation of total surface area. (iv) Concept of formation of formula of volume. (v) Concept of formation of formula of the length of diagonals. (vi) Concept of solution of different real problems. **2. Right Circular Cylinder:** (i) Concept of Right Circular Cylinders which are seen in real life. (ii) Concept of curved surface and plane surface area. (iii) Concept of formula formation of curved surface area. (iv) Concept of formula formation of total surface area. (v) Concept of formula of volume. (vi) Solutions of different real problems. **3. Sphere:** (i) Concept of a solid with the shape of a sphere and hemisphere which are seen in real life. (ii) Concept of surfaces of a sphere and hemisphere. (iii) Concept of surface area of a sphere. (iv) Concept of surface area and of total surface area of a hemisphere. (v) Concept of volumes of sphere and hemisphere. (vi) Solutions of different real problems. **4. Right Circular Cone:** (i) Concept of Right Circular Conical solids which are seen in real life. (ii) Concept of curved surface and plane surface of a right circular cone. (iii) Concept of curved surface and plane surface area of a right circular cone. (iv) Concept of total surface area of a right circular cone. (v) Concept of volume of a right circular cone. (vi) Solution of different real problems. **5. Problems related to different solid objects :** (i)

Solution of different real problems related to different solid objects. (Rectangular Parallelepiped, Right Circular Cylinder, Sphere, hemisphere, right circular cone).

Component 6: Set Theory

Set Theory, exists only in syllabus of Class IX of WBBSE.. Only ‘Concept of Set Theory’ (Not for Evaluation) I.e. preliminary ideas about set theory is included in the syllabus. It has no continuation in the Class X syllabus. Though Set Theory an important dimension of mathematics, in CBSE, it does not exist.

Component 7: Probability

In WBBSE, only ‘Concept of Probability Theory’ (Not for Evaluation) exists in Class IX, no continuation of that in Class X. But, in class IX of CBSE, with its history, Repeated experiments and observed frequency approach to probability, focus is given on empirical Probability and emphasized on a large amount of time to be devoted to group and individual activities to motivate the concept, the experiments to be drawn from real life situations and from examples used in the chapter on statistics. Also, classical definition of probability, simple problems on single events (not using set notation) is included in class X of CBSE.

Component 8: Statistics

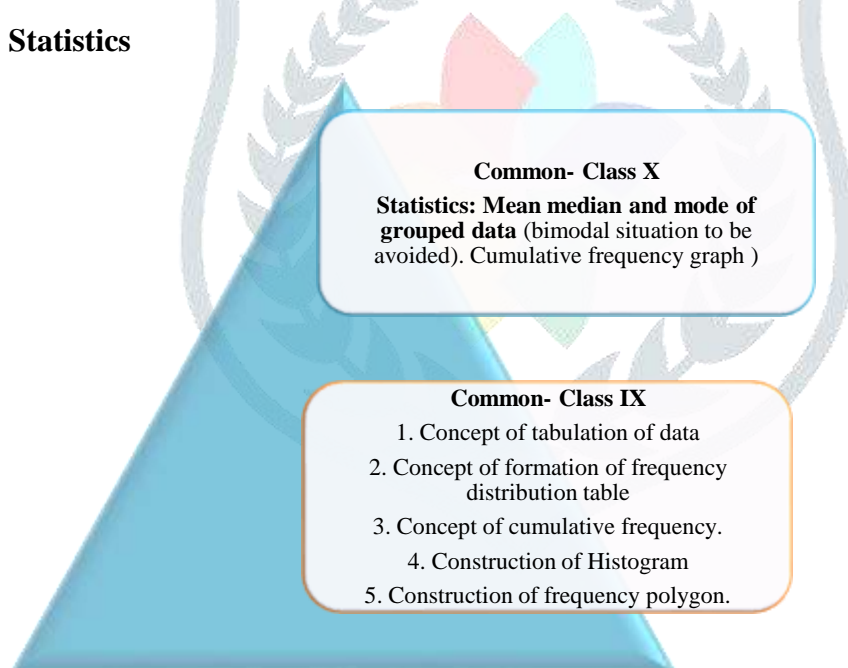


Figure 3: Syllabus of component Statistics of class I X- X of CBSE and WBBSE

Component Trigonometry (only for class X)

CBSE and WBBSE

Class X

1. Introduction to Trigonometry

Trigonometric ratios of an acute angle of a right triangle. Proof of their existence; motivate the ratios, whichever are defined at 0° and 90° . Values (with proofs) of the trigonometric ratios of 30° , 45° and 60° , Relationships between the ratios.

2. Trigonometric Identities:

Proof and application of the identity $\sin^2 A + \cos^2 A = 1$. Only simple identities to be given. Trigonometric ratios of complementary angles.

3. Heights and Distances

Simple and believable problems on height and distance. Problems should not involve more than two right triangles. Angles of elevation and depression should be only 30° , 45° and 60°

Figure 4: Syllabus of component Trigonometry of class X of CBSE and WBBSE

From, figure 4, it is clear about syllabus of trigonometry of two boards CBSE and WBBSE. In addition to the above mentioned syllabus, concept of measurement of angle is encompassed in WBBSE which include (i) Evolution, growth and explanation of necessities of trigonometry in reality. (ii) Concept of positive and negative angles (iii) Concept of measurement of angle. (iv) Concept of sexagesimal system and circular system, concept of their relations and application in different problems. This portion being essential, it may be integrated in CBSE.

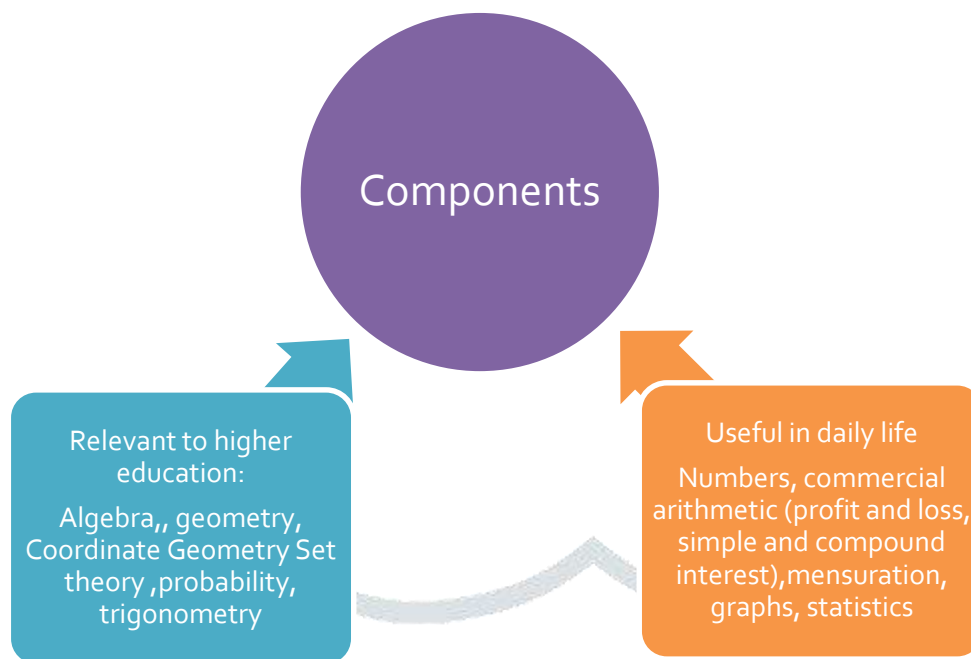


Figure 5: Identification of components which are relevant to higher education and useful in daily life

Conclusion

What should actually be taught in schools is surely one of the most fundamental questions in education. It is surprisingly difficult to answer, for at least three reasons (a) there is great variation from one classroom, school, or nation to another; (b) “official” descriptions of what is supposed to happen are frequently at variance with what actually does happen; and (c) the way in which a matter is taught and learned is often more important than the choice of the abstract “topic” itself. For the specific case of secondary school mathematics, it can be said that, over most of the world, this consists mainly of arithmetic, algebra, geometry, mensuration, coordinate geometry, trigonometry and in a few cases functions, statistics & with the possible inclusion of some probability. Syllabus of Mathematics at secondary level in two different boards being almost same, but their presentation is slight different in the respective textbooks. One thing which add CBSE curriculum more significant is its value added problem sum which pick up the pace to touch the hearts and engage the minds of our learners, to prepare them for life. In terms of scope of classroom interaction, opportunities for expression, the learning of life-long skills and the building of character through innovative and effective teaching approaches and strategies, CBSE overwhelm WBBSE. The Curriculum must to reach into the core of education - why we teach, what we teach and how we teach. Teachers, school leaders and Ministry of Education, all have important roles to play to make Teach Less, Learn More happen.

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