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CCSSI CURRICULUM

High School: Mathematics Content List

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Subject	TOTAL TOPIC	TOTAL DURATION
High School - Number and Quantity	27	01.56.17
High School - Algebra	54	03.19.45
High School - Functions	12	00.53.18
High School - Geometry	137	06.34.46
High School - Statistics and Probability	4	00.17.22
Add-On Categories	35	02.11.29
Total	**269**	**15.12.57**

Mathematics

Topic Name	Duration

High School - Number and Quantity

- **The Real Number System**

- **Extend the properties of exponents to rational exponents**

1.	Exponent Rule (Power Rule)	00.01.50
2.	Exponents and Logarithms	00.04.09
3.	Working Rules for Logarithms	00.06.25

- **Use properties of rational and irrational numbers.**

1.	Properties of Real Numbers: Closure and Commutative	00.04.46
2.	Properties of Real Numbers: Associative Law and Existence of Identity	00.03.49
3.	Properties of Real Numbers: Existence of Inverse and Distributive Property	00.02.57

- **The Complex Number System**

- **Perform arithmetic operations with complex**

1.	Introduction to Complex Numbers	00.04.58
2.	Representation of Complex Numbers	00.04.58
3.	Addition and Subtraction of Complex Numbers	00.07.23

Mathematics

	Topic Name	Duration
4.	Addition and subtraction of complex numbers	00.00.00
5.	Multiplication of Complex Numbers	00.04.10
6.	Square Root of a Complex Number	00.04.35
7.	Division of Complex Numbers	00.04.48
8.	Cube Roots of Unity	00.04.41
9.	Complex roots of Quadratic equations	00.00.00
10.	Conjugate and Multiplicative Inverse of a Complex Number	00.05.07

- **Represent complex numbers and their operations on the complex plane**

1.	Complex Numbers in Trigonometric Form	00.04.53
2.	Complex Number in Polar Form	00.05.39
3.	Representation of Complex Numbers	00.04.58
4.	De Moivre's Theorem	00.05.21
5.	Application of De Moivre's Theorem	00.07.17

- **Vector and Matrix Quantities**

- **Represent and model with vector quantities.**

1.	Introduction to Vectors	00.02.40

Mathematics

Topic Name	Duration
• **Perform operations on vectors.**	
1. Addition of Vectors	00.04.57
2. Multiplication of a Vector with a Scalar	00.02.46
• **Perform operations on matrices and use matrices in applications.**	
1. Matrices	00.05.48
• **Suggested Topics**	
1. Direction Cosines and Direction Ratios	00.07.22
2. Vectors in 3D - space	00.00.00

High School - Algebra

• **Seeing Structure in Expressions**	
• **Interpret the structure of expressions**	
1. Algebraic Expressions	00.07.05
2. $(a + b)^2$	00.01.48
3. $(a + b)^3$	00.02.47
4. $(a + b + c)^2$	00.04.53
5. $a^2 - b^2$	00.02.39
6. Expansion of $(a + b)^2$	00.04.15

Topic Name		Duration
7.	$(a - b)^2$	00.02.13
8.	Factorization: $(a^3 + b^3)$ and $(a^3 - b^3)$	00.05.29

- **Arithmetic with Polynomials and Rational Expressions**

- **Perform arithmetic operations on polynomials**

1.	Introduction to Polynomials	00.06.21
2.	Like and Unlike Terms	00.02.34
3.	Degree of a Polynomial	00.02.34
4.	Monomial, Binomial, and Trinomial	00.03.02
5.	Multiplication of Polynomials	00.00.00
6.	Addition of Polynomials	00.00.00
7.	$a^2 - b^2$	00.02.39
8.	$(a - b)^2$	00.02.13

- **Understand the relationship between zeros and factors of polynomials**

1.	Zeroes of a Polynomial	00.10.02

- **Use polynomial identities to solve problems**

1.	Geometrical Meaning of the Zeroes of a Polynomial	00.08.53
2.	Relationship between Zeroes and Coefficients of a Polynomial	00.00.00

Mathematics

Topic Name		Duration
3.	Binomial Theorem: Introduction	00.05.13
4.	Binomial Theorem: Middle Term	00.05.14
5.	Properties of Binomial Coefficients	00.06.16

- **Creating Equations**

- **Create equations that describe numbers or relationships**

1.	Solving a Linear Equation in One Variable (Balancing Method)	00.04.08
2.	Solving System of Linear Inequalities in One Variable	00.05.10
3.	Compound Inequality	00.00.00
4.	Quadratic Functions	00.00.00
5.	Linear Inequality in Two Variables	00.05.12
6.	Linear Equation in Two Variables	00.04.48
7.	Linear Equations in Two Variables: Graphical Representation	00.03.14
8.	Solving a System of Linear Equations: Graphically	00.04.56
9.	Linear Inequality in Two Variables	00.00.00
10.	Plotting a linear Graph	00.00.00

Mathematics

Topic Name		Duration
•	**Reasoning with Equations and Inequalities**	
•	**Understand solving equations as a process of reasoning and explain the reasoning**	
1.	Equation and its Solution	00.05.27
•	**Solve equations and inequalities in one variable**	
1.	Solving a Linear Equation in One Variable (Balancing Method)	00.04.08
2.	Solving Linear Equations	00.00.00
3.	Solving a Linear Inequality in One Variable	00.05.08
4.	Solving System of Linear Inequalities in One Variable	00.05.10
5.	Properties of Inequalities	00.05.49
6.	Quadratic Equation	00.03.57
7.	Quadratic Polynomial: Completing the Square $(a - b)^2$	00.04.58
8.	Quadratic Polynomial: Completing the Square $(a + b)^2$	00.04.22
9.	Roots and Discriminant	00.06.23
10.	Roots of a Quadratic Equation: Illustration	00.06.42
•	**Solve systems of equations**	
1.	Solving a System of Linear Equations in Two Variables: Elimination Method	00.05.47
2.	Solving a System of Linear Equations in Two Variables: Cross Multiplication Method	00.05.47

Mathematics

Topic Name		Duration
3.	Pair of linear equations in two variables	00.00.00
4.	Equations Reducible to a Pair of Linear Equations in Two Variables	00.00.00
5.	Roots of a Quadratic Equation (Factorization)	00.04.51
•	**Represent and solve equations and inequalities graphically**	
1.	Linear Inequality in Two Variables	00.05.12
2.	System of Linear Inequalities in Two Variables	00.04.16
3.	Linear Equations in Two Variables: Graphical Representation	00.03.14
4.	Solving a System of Linear Equations: Graphically	00.04.56
5.	Linear Inequality in Two Variables	00.00.00
•	**Suggested Topics**	
1.	Difference of two cubes	00.00.00

High School - Functions

- **Interpreting Functions**

- **Understand the concept of a function and use function notation**

1.	Function	00.05.32

Mathematics

Topic Name		Duration
2.	General Term of an Arithmetic Progression	00.03.41
•	**Interpret functions that arise in applications in terms of the context**	
1.	Function	00.05.32
•	**Building Functions**	
•	**Build a function that models a relationship between two quantities**	
1.	Arithmetic Progression	00.05.16
2.	General Term of an Arithmetic Progression	00.03.41
•	**Linear, Quadratic, and Exponential Models**	
•	**Construct and compare linear, quadratic, and exponential models and solve problems**	
1.	Graphing Quadratic Function: Standard Form	00.05.34
2.	Graphing Quadratic Function: Vertex Form	00.04.31

Mathematics

Topic Name	Duration
• **Trigonometric Functions**	
• **Model periodic phenomena with trigonometric functions**	
1. Graph of the Sine Function	00.07.31
2. Graph of Cosine function	00.00.00
3. Graph of Sine function	00.00.00
• **Prove and apply trigonometric identities**	
1. Trigonometric Identities	00.05.38
• **Suggested Topics**	
1. Unit Circle	00.06.22

High School - Geometry

• **Congruence**	
• **Experiment with transformations in the plane**	
1. Reflection	00.03.17
2. Rotation	00.00.00
3. Translation of Axes	00.05.15
4. Construction: Rhombus and Kite	00.00.00

Mathematics

Topic Name		Duration
•	**Understand congruence in terms of rigid motions**	
1.	Congruent Figures	00.07.12
2.	Congruence of Triangles	00.08.47
3.	Congruence of Triangles - SAS Criterion	00.07.35
4.	Congruence of Triangles - SSS Criterion	00.04.37
5.	Congruent Triangles – RHS Criterion	00.06.26
•	**Prove geometric theorems**	
1.	Midpoint Theorem	00.04.30
2.	Converse of Pythagoras' Theorem	00.03.11
3.	Basic Proportionality Theorem	00.04.44
4.	Converse of the Midpoint Theorem	00.02.31
5.	Centroid Theorem	00.00.00
•	**Make geometric constructions**	
1.	Geometrical Shapes Using Set-squares	00.04.23
2.	Construction: Angle Bisector and an Angle of 30°	00.02.44
3.	Construction: Congruent Angle and Angles of Measure 60° and 120°	00.03.22
4.	Construction: Perpendicular to a Line	00.03.49
5.	Dividing a Line Segment into a Given Ratio (Internally)	00.05.39
6.	Dividing a Line Segment into a Given Ratio (Externally)	00.04.00
7.	Construction: Perpendicular Bisector of a Line segment	00.01.18

Mathematics

Topic Name		Duration
8.	Constructions: Line segment & Circle	00.02.23
9.	Construction: Parallel lines (Alternate Interior Angles Property)	00.03.11
10.	Construction: Equilateral Triangle	00.00.00
11.	Construction: Parallel Lines (Using Corresponding Angles Property)	00.02.47
12.	Construction: Rectangle and Square	00.00.00

- **Suggested Topics**

1.	Congruent and Similar Solids	00.00.00
2.	Proportional parts with parallel lines	00.00.00
3.	Triangle Angle Sum Theorem: Illustration	00.03.45
4.	Property of an Isosceles Triangle	00.03.24
5.	Arcs and Angles: Central Angle Theorem	00.05.00
6.	Alternate Segment Theorem	00.00.00
7.	Angle Bisector Theorem	00.00.00
8.	Triangle Inequality Theorem	00.04.57
9.	Parallelogram and its Properties	00.05.37
10.	Parallelogram - Properties	00.00.00
11.	Trapezoid	00.00.00
12.	Kite	00.00.00
13.	Inequalities in Triangles	00.00.00
14.	Triangle Inequality Theorem	00.04.57

Mathematics

Topic Name		Duration
15.	Special Segments Associated with a Triangle	00.08.25
16.	Angle Sum Property of a Quadrilateral	00.00.00
17.	Angle Bisector Theorem	00.00.00
18.	Types of Quadrilaterals	00.03.35
19.	Convex and Concave Quadrilaterals	00.03.15
20.	Condition for a Quadrilateral to be a Parallelogram	00.00.00
21.	Property of the Diagonals of a Rhombus	00.02.35
22.	Figures on the same base and between the same parallels	00.00.00
23.	Construction of a Quadrilateral: Given Four Sides and a Diagonal	00.06.14
24.	Construction of a Quadrilateral: Given Three Sides and Two diagonals	00.03.21
25.	Congruent Triangles – RHS Criterion	00.06.26
26.	Application of RHS Criterion for Congruence	00.01.45
27.	Application of ASA Criterion for Congruence of Triangles	00.03.27
28.	Application of SSS and SAS Criteria for Congruence of Triangles	00.04.42

- **Similarity, Right Triangles and Trigonometry**

- **Prove theorems involving similarity**

1.	Converse of Pythagoras' Theorem	00.03.11
2.	Similarity in Right Triangles: (Corollaries)	00.06.23

Topic Name		Duration
3.	Proportional Parts within Triangles	00.00.00
4.	Area and Perimeter of Similar Figures	00.00.00
5.	Similarity in Right Triangles	00.05.44
6.	Construction of a Triangle similar to a given Triangle as per given scale factor	00.08.21
7.	Criteria for Similarity of Triangles	00.04.00

- **Define trigonometric ratios and solve problems involving right triangles**

1.	Introduction to Trigonometry	00.02.56
2.	Definition of Sine and Cosine Ratios	00.03.49
3.	Introduction to Trigonometric Ratios	00.00.00
4.	Trigonometric Ratios	00.00.00
5.	Circular System of Measurement of an Angle	00.05.54
6.	Trigonometric Ratios of Complementary Angles	00.00.00
7.	Trigonometric Ratios of Sum of Angles: Polar Form	00.05.03
8.	Polar Coordinate System	00.03.45
9.	Trigonometric Ratios of Sum of Angles: Geometric Proof	00.04.10
10.	Application of Trigonometry (Height of Windmill)	00.05.01
11.	Application of Trigonometry (Height of Tower)	00.06.10
12.	Application of Trigonometry (Height of Balloon)	00.03.41
13.	Application of Trigonometry	00.00.00

Mathematics

Topic Name		Duration
•	**Suggested Topics**	
1.	Solving Triangles	00.00.00
•	**Circles**	
•	**Understand and apply theorems about circles**	
1.	Parts of a Circle	00.00.00
2.	Secants, Tangents and Angle Measures	00.00.00
3.	Bisector of a Chord from the Centre of a Circle	00.03.59
4.	Arcs and Angles: Central Angle Theorem	00.05.00
5.	Angles in a Semicircle	00.00.00
6.	Angle Subtended by a Chord at the Centre	00.00.00
7.	Equal Chords and Their Distances from the Centre	00.00.00
8.	Area of Parallelograms on the same base and between the same parallels	00.00.00
•	**Find arc lengths and areas of sectors of circles**	
1.	Area and the Perimeter of a Sector	00.04.00
2.	Bisector of a Chord from the Centre of a Circle	00.03.59
3.	Angle Subtended by an arc	00.00.00
•	**Suggested Topics**	
1.	Tangent	00.00.00

Mathematics

Topic Name		Duration
2.	Tangents to Circles	00.04.31
3.	Construction: Incircle	00.02.55
4.	Construction: Circumcircle	00.02.39
5.	Construction: Tangents to a Circle from a Point Exterior to the Circle	00.04.08
6.	Construction: Tangents through an external point	00.00.00
7.	Construction: Direct Common Tangent	00.03.45
8.	Construction: Indirect or Transverse Common Tangents	00.04.46
9.	Properties of a Circle	00.06.00

- **Expressing Geometric Properties with Equations**

- **Translate between the geometric description and the equation for a conic section**

1.	Conics an Overview	00.04.07
2.	Introduction to a Parabola	00.02.16
3.	Equation of a Parabola	00.04.16
4.	Introduction to a Hyperbola	00.02.58
5.	Equation of a Hyperbola	00.06.12
6.	Important Terms Associated with a Hyperbola	00.02.52
7.	Introduction to an Ellipse	00.02.23
8.	Equation of an Ellipse	00.06.34

	Topic Name	Duration
9.	Important Terms Associated with an Ellipse	00.01.52
10.	More about Ellipses	00.00.00
•	**Use coordinates to prove simple geometric theorems algebraically**	
1.	Cartesian Coordinate System	00.06.43
2.	Section Formula	00.00.00
3.	Collinearity of Three Points	00.00.00
4.	The Slope of a Straight Line	00.04.49
5.	Area of a Triangle	00.05.26
6.	Area of a Triangle (Coordinate Method)	00.00.00
7.	Comparing Areas of Triangles	00.00.00
8.	Areas of Similar Triangles	00.00.00
9.	Area of a Quadrilateral	00.00.00
10.	Derivation of Distance Formula 2-D	00.03.53
11.	Application of Distance Formula in 2-D	00.03.18
12.	Distance Formula in 3-D	00.04.49
13.	Application of Distance Formula in 3-D	00.06.13
•	**Suggested Topics**	
1.	Locus	00.04.46
2.	General Equation of a Line	00.00.00
3.	Various Forms of the Equation of a Line	00.00.00

Mathematics

Topic Name	Duration
• **Geometric Measurement and Dimension**	
• **Explain volume formulas and use them to solve problems**	
1. Volume of a Cylinder	00.04.25
2. Application of Mensuration - Cylinder	00.03.13
3. Volume of a Pyramid	00.03.50
4. Volume of a Cone	00.03.03
5. Volume of a Frustum	00.03.49
6. Volume of a Sphere	00.02.52
7. Application of Mensuration - Cylinder	00.03.13
8. Practical Application of Mensuration	00.05.17
• **Visualize relationships between two-dimensional and three dimensional objects**	
1. Visualizing Solid Shapes	00.03.47
• **Suggested Topics**	
1. Area of a Circle	00.02.44
2. Frustum of a cone	00.00.00
3. Area related to Circle	00.00.00
4. Definition of Pi (π)	00.03.14
5. Euler's Formula	00.00.00

Mathematics

Topic Name	Duration
• **Modeling with Geometry**	
• **Apply geometric concepts in modeling situations**	
1. Geometrical Shapes	00.04.56
2. Geometric figures and their dimensions	00.00.00

High School - Statistics and Probability

• **Conditional probability and the rules of probability**	
• **Suggested Topics**	
1. Introduction to Combinations	00.05.06
2. Introduction to Permutations	00.06.07
3. Permutations	00.06.09
• **Interpreting categorical and Quantitative data**	
• **Summarize, represent, and interpret data on a single count or measurement variable**	
1. Frequency polygon	00.00.00

Mathematics

Topic Name	Duration
Add-On Categories	
• **Polygons**	
1. Angles in a Polygon	00.03.59
2. Exterior Angles of a Polygon	00.03.56
3. Regular Polygons	00.00.00
4. Introduction to Polygons	00.04.36
• **SET THEORY**	
1. Cartesian Product of Sets	00.03.23
2. Introduction to Sets	00.05.53
3. Types of Sets	00.05.11
4. Power Set of a Set	00.04.37
5. Universal Set and Subsets	00.04.45
6. Venn Diagram	00.06.07
• **3 D GEOMETRY**	
1. Coordinate planes in three-dimensional space	00.02.59
2. Three Dimensional Shapes	00.03.15
3. Distance of a line from a point	00.00.00
4. Planes in 3D space	00.00.00
5. Shortest distance between 2 lines in space	00.00.00
6. Distance of a point from a plane	00.00.00

Mathematics

Topic Name		Duration
7.	Equations of Planes	00.00.00
8.	Co-planarity of Two Lines	00.00.00
9.	Plane and its Equation	00.08.39
10.	Equation of a Line in Space	00.00.00
•	**CALCULUS**	
1.	Continuity and Differentiation	00.04.10
2.	Definite Integration	00.06.59
3.	Working Rules of Differentiation	00.06.28
4.	Limit	00.04.49
5.	Introduction to Integration	00.05.23
6.	Concept of Derivative	00.05.34
7.	Laws of Differentiation (Sum and Difference)	00.05.11
8.	Laws of Differentiation (Product and Quotient)	00.04.55
9.	Rolle's Theorem	00.05.28
10.	Mean Value Theorem	00.04.18
11.	Critical Points and First Derivative Test	00.07.17
12.	Volume of Solids using the Method of Disk	00.00.00
13.	Area Under a Curve using Riemann Sum	00.00.00

Mathematics

Topic Name	Duration
• **Sequence and Series**	
1. Sum of the First 'n' Terms of an Arithmetic Progression	00.05.36
2. Geometric Series	00.08.01
TOTAL TOPIC IN HIGH SCHOOL MATHEMATICS – 269	**15.12.57**