Mathematics Exam Syllabus 2024-2025

Grades 8 & 9

INTERNATIONAL STEM OLYMPIAD

1. **Number Systems:**
   - Rational and Irrational Numbers: Understanding properties and operations with rational and irrational numbers.
   - Expressions and Equations with Rational or Irrational Numbers: Extend operations and solve equations involving rational and irrational numbers.

   Phet Links:
   Arithmetic
   Number Line: Integers
   Number Play

   LabXchange Links:
   Exponents & Radicals
   Prime Factorizations

2. **Algebra:**
   - Solving linear equations and inequalities with one variable.
   - Systems of equations with two variables.
   - Factoring quadratic expressions.
   - Independent and Dependent Variables

   Phet Links:
   Expression Exchange
   Equality Explorer: Basics
   Equality Explorer: Two Variables
   Graphing Lines
   Graphing Quadratics
   Graphing Slope-Intercept

   LabXchange Links:
   Coordinates & Equations
   Quadratic Equations

3. **Geometry:**
   - Properties of angles and triangles (e.g., Pythagorean theorem, special triangles).
   - Similarity and congruence of figures.
   - Trigonometry basics (sine, cosine, tangent) for right-angled triangles.

   Phet Links:
   Area Builder
   Trig Tour

   LabXchange Links:
   Pythagoras' Theorem

4. **Coordinate Geometry:**
   - Plotting and analyzing points on the coordinate plane.
   - Calculating distance and midpoint between two points.

   Phet Links:
   Graphing Lines
   Number Line: Distance

   LabXchange Links:
   Coordinates & Equations

5. **Data Analysis and Probability:**
   - Advanced data interpretation from various types of graphs and charts.
   - Calculating probability for independent and dependent events.

   Phet Links:
   Plinko Probability

   LabXchange Links:
   Data Visualization
   Introduction to Statistics
   Probability
   Summary Statistics and Probability

6. **Functions:**
   - Understanding basic concepts of functions (domain, range, mapping).
   - Graphing linear and exponential functions.

   Phet Links:
   Function Builder
   Graphing Lines
   Graphing Slope-Intercept

7. **Statistics:**
   - Measures of central tendency and variability for large datasets.
   - Constructing and interpreting box-and-whisker plots.

   Phet Links:
   Mean: Share and Balance
   Plinko Probability

   LabXchange Links:
   Data Visualization
   Introduction to Statistics
   Summary Statistics and Probability

8. **Ratios, Proportions, and Percentages:**
   - Solving problems involving proportions and percentages.
   - Applications of percentage increase and decrease.

   Phet Links:
   Proportion Playground
   Unit Rates

   LabXchange Links:
   Sets & Venn Diagrams
   Probability

9. **Real Numbers and Operations:**
   - Understanding properties of real numbers (associative, commutative, distributive).
   - Solving problems involving mixed operations with real numbers.

   Phet Links:
   Number Play
   Arithmetic

   LabXchange Links:
   Summary Statistics and Probability

10. **Word Problems and Applications:**
    - Complex word problems involving multiple concepts and operations.
    - Applying mathematical skills to real-life scenarios and practical situations.

    Phet Links:
    Projectile Motion
    The Moving Man

    LabXchange Links:
    Reasoning, Planning and Solving Problems
    Time, Speed & Distance