Algebra – 10th grade

- 1. Advanced Polynomial Operations
- Polynomials: Addition, subtraction, multiplication, and division (synthetic division).
- Example: Simplify (3x2−2x+5)+(x2+4x−1)(3x^2 - 2x + 5) + (x^2 + 4x - 1)(3x2−2x+5)+(x2+4x−1).
- Example: Divide x3+2x2−3x−6x+2\frac{x^3 + 2x^2 - 3x - 6}{x + 2}x+2x3+2x2−3x−6 using synthetic division.
- Factoring Polynomials: Factoring higher-degree polynomials.

- **Example: Factor x3−6x2+11x−6x^3 - 6x^2 + 11x - 6x3−6x2+11x−6.**
- **2. Quadratic Equations and Functions**
- **Quadratics: Solving quadratics by factoring, completing the square, and using the quadratic formula.**
- **Example: Solve x2+5x+6=0x^2 + 5x + 6 = 0x2+5x+6=0 by factoring.**
- **Example: Solve 2x2+4x−6=02x^2 + 4x - 6 = 02x2+4x−6=0 using the quadratic formula.**
- **Graphing Quadratic Functions: Identifying vertex, axis of symmetry, and roots.**

- Example: Graph f(x)=x2−4x+3f(x) = x^2 - 4x + 3f(x)=x2−4x+3, and find its vertex.
- 3. Rational Expressions and Equations
- Simplifying Rational Expressions: Reducing fractions and simplifying complex rational expressions.
- Example: Simplify x2−9x2+3x\frac{x^2 - 9}{x^2 + 3x}x2+3xx2−9.
- Solving Rational Equations: Finding values for variables that make rational equations true.
- Example: Solve 2x+3=5\frac{2}{x} + 3 = 5x2+3=5.

- **4. Exponential and Logarithmic Functions**
- **Exponential Functions: Solving exponential equations.**
- **Example: Solve 5x+1=1255^{x+1} = 1255x+1=125.**
- **Logarithmic Functions: Understanding the inverse of exponents and solving logarithmic equations.**
- **Example: Solve log⁡3(x)=4\log_3(x) = 4log3(x)=4.**
- **5. Systems of Equations and Matrices**

- **Systems of Equations: Solving systems of nonlinear equations (quadratics and lines).**
- **Example: Solve the system x2+y2=25x^2 + y^2 = 25x2+y2=25 and y=x+3y = x + 3y=x+3.**
- **Matrices: Introduction to matrix operations (addition, subtraction, and multiplication).**
- **Example: Add the matrices [1234]\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}[1324] and [5678]\begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}[5768].**
- **6. Radical Expressions**

- **Simplifying Radicals: Simplify square roots and cube roots, including expressions with variables.**

7. Assessment

- **Quiz: Covering advanced polynomial operations, solving quadratics, rational equations, and exponential/logarithmic functions.**
- **Homework: Solve 10 problems involving polynomials, quadratic equations, exponential equations, and matrices.**