**Connecticut Common Core Algebra 2 Curriculum**

**Professional Development Plan**

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| **Unit 3 Polynomials** | | |
| **Date:** | **Location:** | |
| **Presenters** | | |
| **Schedule for the day:**  **Start time:** 9 PM  **End time:** 12 PM   * + **Opening: 9:00 - 9:15 am**   + **Session 1: 9:20 - 10:00 am**   + **Session 2: 10:05 - 10:45 am**   + **Session 3: 10:55 - 11:35 am**   + **Closing: 11:45 - 12:00 noon** | | |
| **Opening Session**:  Overview of Unit 3 on Polynomials Functions. Students develop their understanding of: 1) the relationship between zeros of the polynomial function and the factors of the related polynomial; 2) the end behavior of the y-values of the function as x approaches positive or negative infinity; 3) the transformations of the graph of *y=f(x)* when it is reflected over the x- and y-axes and under what conditions will the function be odd or even, i.e. when *f(-x) =- f(x)* or when *f(-x) = f(x)*; 4) relative extrema of polynomial functions and how to interpret such values in the context of real-world problems; 5) operations involving polynomial expressions, including division of polynomials and the connection of division to the Division Algorithm, the Remainder Theorem, and the Factor Theorem; 6) factoring polynomials by various methods including the application of the Remainder Theorem and advanced polynomial identities;7) applications of polynomials in modeling real-world functions; and 8) the difference between exponential growth versus growth modeled by polynomial functions. **Power Point for Unit 3.**  Have each teacher write suggestions for improving the curriculum on 3x5 notecards to be handed in at the closing session. | | |
| **Workshop 1** | | **Presenter:** |
| **Activities:** 3.1.3 Odd and Even Functions  Participants explore the effect of the transformations f(-x), -f(x) and -f(-x) starting with linear functions, and then proceeding to quadratic and high degree polynomials, make conjectures about how to recognize odd and even functions from their defining equations. | | **Equipment and Materials**   1. **PowerPoint introducing activity** 2. Hard copies of Activity 3.1.3 and Teacher answer key for 3.1.3 for each participant 3. Two sheets of blank paper 4. Grapher, Desmos or other graphing utility 5. 3x5 notecards – 5 per person for suggestions |
| **Workshop 2** | | **Presenter:** |
| **Activities:** 3.3.5 Identities Galore: Summing It Up  Participants revisit the Chess Board/Rice Problem they explored in Algebra 1. They examine patterns starting with (x- 1) (x + 1), (x-1)(x2 + x+1), … and obtain (x – 1n) = xn+1 – 1 and use the identity to solve the chess board/rice problem. They then examine some other algebraic identities. Teachers will find students obtain a good algebraic workout | | **Equipment and Materials**   1. **PowerPoint introducing activity** 2. Hard copies of Activity 3.3.5 and the answer key for each participant 3. Two sheets of blank paper 4. Graphing calculator 5. 3x5 notecards – 5 per person for suggestions |
| **Workshop 3** | | **Presenter**: |
| **Activities 3.6.2a or b (+)** Explore Exponential vs Polynomial Functions Using Desmos or GeoGebra and Activity 3.6.3(+) Why Does Exponential Growth Always surpass Polynomial Growth?  Participants explore using technology the graphs of an exponential and a polynomial function and see that even if at first a polynomial function grows faster, if b > 1 eventually there will be a time when the exponential will grow faster and will continue from that point on to grow faster. They will then examine average rates of change and see that for a change of 1 in input the change in output for a polynomial function will approach one but the exponential will have an average rate of change = b where b > 1. | | **Equipment and Materials**   1. PowerPoint introducing activity 2. Hard copies of Activity 3.6.2a or b if using Geogebra, Activity 3.6.3(+) for each participant 3. Two sheets of blank paper 4. Access to GeoGebra (b version) or Desmos and a TI (a version) but can fall back on a TI 5. 3x5 notecards – 5 per person for suggestions |
| **Closing Session**  Project some assessments for units 1 – 3 on doc camera or overhead projector and discuss. Point out the assessment checklist so teachers can make equivalent substitutions if they wish. Also tell them about the test bank and midyear test bank.  Review of the investigations in Unit 3 that were not covered in the Workshops: investigations 1, 2, and 4. Show set of focus questions for Unit 3. **PowerPoint for Unit 3 closing.**  Review any comments from stickie notes about the curriculum. Ask for questions and input from teachers about their experiences during the day. | | |
| **Additional Comments** Remaining questions can be addressed in the afternoon session. | | |