

Northern Kentucky Algebra Community

Transitional Algebra Course Meeting Minutes

Kentucky Center for Mathematics

May 28, 2009

- I. Attendance.** There were 15 people in attendance, including high school mathematics teachers, curriculum specialists, university professors, and a Kentucky Center for Mathematics coach. Two of the teachers were interested enough to join us from Harrison County and Nancy Williams joined us from ECU (welcome!)
- II. Opening Remarks.** Mike Waters, mathematics education professor at NKU, opened the discussion with the following objective in mind: To identify the skills, concepts, and problem-solving associated with fractions that might appear in a transitional high school course. A second objective was to identify and collect appropriate materials that focus on this content area and to discuss the role of technology when teaching this content.
- III. Summary of Discussions.** A short introduction was given about the skills associated with performing fractional arithmetic, along with some preliminary results from a recent research study, indicating students' difficulties with the skills, concepts, and problem-solving associated with fractional arithmetic. A discussion ensued about the purpose and value of this project and its relationship to other projects. Teachers spoke about what materials are currently being used in transitional algebra courses and some materials were identified and collected. Both the content and pedagogy of algebraic fractions were discussed. The use of technology was discussed.
- IV. Notes:**
1. A long discussion was held addressing the reasons students have difficulty performing arithmetic on fractions:
 - a. Students have difficulty asking themselves appropriate questions on how to proceed. They are often unsure which rule to apply in a given situation. Often, however, they are able to correctly apply the rule.
 - b. There is a confidence (or self-efficacy) factor associated with performing operations on fractions. If students are met with success, they gain confidence, often leading to improved algebraic skills.
 - c. There is often a disconnection between doing arithmetic on numeric fractions and doing arithmetic on algebraic fractions. Students need to get "back in the habit" of doing arithmetic on numeric fractions in order to extend that knowledge to algebraic fractions.
 2. Particular skills related to algebraic fractions include:
 - a. Adding, subtracting, multiplying, and dividing fractions.
 - b. Finding common (and least common) denominators.
 - c. Conversion of fractions to and from decimal and percentage representation.
 - d. Comparing fractions.

3. Particular concepts related to algebraic fractions include:
 - a. Understanding fraction as number (*i.e.*, That fractions are made up of a numerator and denominator, but also have their own value as a number.)
 - b. Related to the above: Developing number sense with fractions.
 - c. Understanding fractions with different representations (*i.e.*, fraction circles, pattern blocks, etc.)
 - d. Understanding the connection between numeric and algebraic fractions.

4. Particular problem-solving ideas related to algebraic fractions:
 - a. “Real” real-world problems – Construction, business, science applications; being cognizant of where these students might be going after this course.
 - b. Understanding the skills and concepts associated with fractions in a problem-solving context.

5. Some effective approaches to teaching fractions:
 - a. Using “Candy Bars” (and other manipulatives) to develop conceptual understanding of fractions.
 - b. Making connections between the skills and concepts of fractions; being cognizant of the interplay between them.
 - c. Include “flashbacks” – items that are review from previous classes.

6. Discussion about technology use (in particular, use of calculators):
 - a. There was general agreement that ALL students should be able to perform basic skills concerning fractions without a calculator.
 - b. Many students use the calculator as a “crutch” and find it difficult to begin a problem involving fractions without a calculator with a “fraction button.”
 - c. There was some discussing and interest in looking at a “Pedagogical Computer Algebra System” as a supplement to help students better understand the skills of working with algebraic fractions.

7. Materials identified:
 - a. Materials from Marilyn Burns, indicating necessary skills and concepts related to numeric fractions.
 - b. Connected Mathematics materials.
 - c. *Thinking Mathematically* by Blitzer.
 - d. Bittinger, Ellenbogen texts.
 - e. *Mathematical Ideas* by Miller, Heeren, Hornsby.
 - f. Dale/Seymour publications (A,B,C, workbooks)
 - g. Creative Publications “Punchlines”.
 - h. Materials from Singapore.

V. Next steps

1. Further develop the website at www.nkyalgebra.org under the link “Transitional HS.” If interested, please take the time to register on the forum (link on the left).
2. Begin developing a unit on fractions for the course.
3. If interested in organizing materials this summer (5-6 days) and trying out units in your classroom (5-6 days) this coming fall, there are stipends available for teachers to work with Mike Waters and Ted Hodgson at NKU. Please let us know of your interest by June 3, 2009.
4. Develop next topic and working group meeting.