

## Course Syllabus

**Course Title:** Discovery-Based Mathematics, Part 3

---

**Instructor:** Robin Bromley

---

**Email:** [courseadministrator@kdsi.org](mailto:courseadministrator@kdsi.org)

### **Grader Bio:**

Robin Bromley earned a Master of Philosophy degree and a Master's degree in English literature at Columbia University and her Bachelor of Arts degree from New York University. After nearly two decades in publishing and writing, she is currently teaching at LaGuardia Community College and Kean University. She has also taught at NYU and CUNY and served as assistant director of composition at Columbia College.

### **Course Description:**

This course explores the concepts of fractions and decimals. Paul Lawrence provides participants with activities that require students to master pattern recognition and operational procedures to compute fractions and decimals. The presenter demonstrates effective strategies for teaching addition and subtraction of fractions with same and compatible denominators as well as non-compatible and overlapping denominators. Educators will be able to utilize activities that combine creative practice with operational skills. They study teaching methodologies that promote student understanding of number sense, estimation strategies, and foundational understanding. All lessons reinforce the goal of teaching students to apply their knowledge of underlying concepts to determine the most appropriate and efficient problem-solving strategies.

### **\*Note: Requires Discovery-Based Math Manipulatives Kit (\$69)**

The supplemental kit includes a custom-tailored workbook to follow the online courses, as well as correlating handouts, Discovery Templates, a Self-Study Guide, and the patented "Communicator," along with many hands-on math manipulatives. (The materials are packaged in a convenient carrying case.)

### **Course Objective/Goals:**

After completing this course, educators will know:

- Reasons why constructivist, alternative strategies are essential elements to be implemented into all math classrooms
- How to use base-ten blocks, connecting cubes, geoboards, fraction tiles, pattern blocks, and rulers to teach conceptual understanding, fact mastery, and algorithmic understanding of all four arithmetic operations with whole numbers, fractions, and decimals
- Why all students need to experience concepts through concrete, iconic, and then symbolic stages of learning
- Techniques of how to transfer concrete understanding to fact and algorithmic mastery of traditional algorithms
- How to use response devices to monitor understanding, adjust lessons, and formulate questions that reflect students current level of understanding

- How to incorporate techniques that build foundational understanding, number sense, and estimation skills so that students can effectively know when to use mental math, paper and pencil, or estimation, and then a calculator to solve basic computational problems involving whole numbers fractions and decimals
- How to use inquiry based techniques to foster student understanding, self-esteem, and self-confidence

**Learning Outcomes:**

After completing this course, educators will be able to apply the following in their classrooms:

- Implement constructivist, alternative strategies into the math classroom
- Use base-ten blocks, connecting cubes, geoboards, fraction tiles, pattern blocks, and rulers to teach conceptual understanding, fact mastery, and algorithmic understanding of all four arithmetic operations with whole numbers, fractions, and decimals
- Help students through the concrete, to the iconic, and then to the symbolic stage of learning
- Help students transfer concrete understanding to fact and algorithmic mastery
- Use response devices to monitor understanding, adjust lessons, and formulate questions
- Incorporate techniques that build foundational understanding, number sense, and estimation skills so that students can effectively know when to use mental math, paper and pencil, or estimation, and then a calculator to solve basic computational problems involving whole numbers fractions and decimals
- Use inquiry based techniques to foster student understanding, self-esteem, and self-confidence

**Course Outline:****Seven Sections Students Will Be Focusing On:**

1. Addition and Subtraction of Fractions with Same and Compatible Denominators
2. Addition and Subtraction of Fractions with Non-Compatible and Overlapping Denominators
3. Multiplication of Fractions
4. Division of Fractions
5. Addition and Subtraction of Decimals
6. Multiplication and Division of Decimals: Part 1
7. Multiplication and Division of Decimals: Part 2

**All steps listed under each topic must be completed to receive credit for the course. No partial credit is given.**

**Plagiarism Policy**

KDS recognizes plagiarism as a serious academic offense. Plagiarism is the dishonest passing off of someone else's work as one's own and includes failing to cite sources for others' ideas, copying material from books or the Internet, and handing in work written by someone other than the participant. Plagiarism will result in a failing grade and may have additional consequences. For more information about plagiarism and guidelines for appropriate citation, consult [plagiarism.org](http://plagiarism.org).

**KDS Rubric for Letter Grade Courses: 3 Credits**

## Percentage of Course Credit

- Reflection questions 25%
- Quizzes 15%
- Midterm 25%
- Final 35%

A: 90 - 100 points

B: 80 - 89 points

C: 70 - 79 points

F: Fewer than 70 points

Component	Unsatisfactory	Basic	Proficient	Distinguished
<b>Quizzes</b>	(6 points) <u>Quizzes:</u> 0-40% correct	(9 points) <u>Quizzes:</u> 60% correct	(12 points) <u>Quizzes:</u> 80% correct	(15 points) <u>Quizzes:</u> 100% correct
<b>Reflection questions</b>	(10 points) <u>Reflection questions:</u> -Participant includes no content from the course in his or her responses -Participant does not address the questions posed	(15 points) <u>Reflection questions:</u> -Participant includes some content from the course, usually appropriate, in his or her responses -Participant answers the questions directly, not always fully	(20 points) <u>Reflection questions:</u> -Participant includes appropriate content from the course in his or her responses -Participant makes thoughtful comments in direct response to the questions	(25 points) <u>Reflection questions:</u> -Participant provides rich detail from the content of the course in his or her responses -Participant makes his or her responses to the questions personally meaningful
<b>Midterm</b>	(10 points)	(15 points)	(20 points)	(25 points)
<b>Final</b>	(20 points)	(25 points)	(30 points)	(35 points)

	<p><u>Requirements of Assignment:</u></p> <p>-The assignment is substantially incomplete</p>	<p><u>Requirements of Assignment :</u></p> <p>-Many requirements met, but a few pieces are missing, while others are underdeveloped—e.g., missing reflection or rubric or scant reflection and vague rubric</p>	<p><u>Requirements of Assignment:</u></p> <p>-Participant has fulfilled all the requirements of the assignment</p>	<p><u>Requirements of Assignment:</u></p> <p>-Participant has fulfilled all the requirements of the assignment with marked creativity, intelligence, and thoughtfulness</p>
	<p><u>Form:</u></p> <p>- Plentiful grammatical mistakes -Confusing content -Missing documentation of sources</p>	<p><u>Form:</u></p> <p>-Distracting grammatical errors -Confusing content -Inconsistent or missing documentation of sources</p>	<p><u>Form:</u></p> <p>-Participant has written a solid essay or lesson plan, including appropriate detail and in an interesting style</p>	<p><u>Form:</u></p> <p>-No grammatical errors -Eloquent expression -Proper citation of sources</p>
	<p><u>Content:</u></p> <p>-No main idea and/or main idea is irrelevant to the assignment -No apparent paragraph organization -No supporting evidence for supporting ideas -No evidence in the lesson plan—in objectives, activities, or assessments—that the learner comprehends the</p>	<p><u>Content:</u></p> <p>-The main idea is not clear in the opening paragraph -Relevance to main idea of supporting paragraphs is not always clear -Supporting ideas are only minimally illustrated by examples or quotes -The lesson plan does not show</p>	<p><u>Content:</u></p> <p>-Essay is organized around a thesis or main idea -Paragraphs are organized around ideas relevant to the main idea -Supporting ideas are evident, and usually include illustrating examples and/or quotes -The lesson plan shows evidence of understanding</p>	<p><u>Content:</u></p> <p>-Essay is organized around a thesis or main idea -Paragraphs are organized around ideas relevant to the main idea -Supporting points are illustrated with examples and/or quotes -Lesson plan shows evidence of a deep understanding of</p>

	course content	enough evidence that the learner understands the course content. Objectives and/or activities and/or assessments only vaguely apply to the course content	of the course content in its objectives, activities, and/or assessments	course content and participant uses that understanding to create opportunities for students to authentically show what they have learned
--	----------------	---	---	--

**KDS Pass/Fail Option: 3 credits**

Passing Requirements

- Grade of “C” or higher

**Texts and/or Other Materials:**

**PowerPoint presentations from resource tab and lecture transcriptions from the transcription tab:**

**Recommended Reading:**

**Bibliography:**

Concept to Classroom, “Constructivism as a Paradigm for Teaching and Learning,”

<http://www.thirteen.org/edonline/concept2class/constructivism/index.html>

Mathematics Education, “Constructivism in the Classroom,”

<http://mathforum.org/mathed/constructivism.html>

Marlow, Bruce A. and Page, Marilyn L., *Creating and Sustaining the Constructivist Classroom*, Corwin Press; 2nd edition, 2005

Covino, Jennifer K., “Math wars: old vs. new: modern day Hatfield vs. McCoy: when traditionalists debate constructivists about math education” Journal: *District Administration*, Publisher: Professional Media Group LLC, 2001, Available from Amazon.com

Collay, Michelle and Gagnon, George W., *Constructivist Learning Design: Key Questions for Teaching to Standards*, Corwin Press, 2006