Addition and Subtraction of Fractions

1. Illustration of basic concepts, see pictures in text. Also use this website
   http://www.coolmath.com/prealgebra/01-p2-fractions/index.html

2. Standard algorithms, including: $\dfrac{a}{b} + \dfrac{c}{d} = \dfrac{a \cdot d + b \cdot c}{b \cdot d}$

   Section 5.2 has three different methods for finding a LCM; the least common denominator is the least common multiple of the denominators. Use the Venn Diagram method as shown in the 5.2 lecture notes.

3. Properties of addition
   Closure
   Commutative
   Associative
   Identity is $\dfrac{0}{b}$

4. Mental math and estimation

Multiplication and Division of Fractions

1. Illustration of multiplication, see pictures in text.

2. Standard algorithms
   $\dfrac{a}{b} \cdot \dfrac{c}{d} = \dfrac{a \cdot c}{b \cdot d}$ and $\dfrac{a}{b} \div \dfrac{c}{d} = \dfrac{a}{b} \cdot \dfrac{d}{c} = \dfrac{a \cdot d}{b \cdot c}$

3. Properties of multiplication
   Closure
   Commutative
   Associative
   Identity is $\dfrac{1}{1}$
   New <u>property</u>: Multiplicative Inverse (reciprocal)
   For every nonzero fraction $\dfrac{a}{b}$, there is a <u>unique</u> fraction $\dfrac{b}{a}$,
   such that, $\dfrac{a}{b} \cdot \dfrac{b}{a} = 1$

4. Mental math and estimation

In teaching any new concept in mathematics, one needs to teach the student to:

      a. Understand the concept – use pictures and discuss similarities and differences to concepts that the students already understand.

      b. Learn an algorithm [step-by-step process].

      c. Relate the algorithm to the pictures in understanding the concept.

      d. Practice enough to be able to remember the algorithm and use it easily.

Chapter 6 – Read this journal article about learning math concepts vs. learning procedures: http://www.sci.sdsu.edu/CRMSE/IMAP/pubs/Reflections_on_Fractions.pdf .

[While reading this article, use the "back button" to go from a video clip back to the article. If you can't view the video clips in the article above, you can download a free version of QuickTime from this link.]

Here is a link for other similar articles for college students who are studying to be elementary teachers: http://www.sci.sdsu.edu/CRMSE/IMAP/pubs.html

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Tell me and I forget...
Show me and I remember...
Involve me and I understand.

Inquiry-based learning allows students to discover concepts through a guided set of exercises.