

## Fractons: Booklet 7 - Addition and Subtraction of Unlike Fractions

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To all of the mathematicians, from antiquity to the present, who discovered the principles of mathematics goes our heartfelt appreciation for your dedication.

Patterns in Arithmetic: Fractions - Booklet 7

Parent/Teacher Guide

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## Addition of Unlike Fractions: Manipulative

- Purpose** To add fractions with different denominators, manipulatively changing them so the units match. The basic concept behind adding fractions with uncommon denominators is that you cannot combine things that are expressed in different units. You cannot combine three dogs plus two cats to get five unless you rename the dogs to animals and the cats to animals. Then you can combine them into one group of five animals. Essentially you are regrouping to create common units. This basic idea is not difficult for students to grasp. We begin with common things like cats and dogs and then move to pattern blocks of adding greens and blues, then to fraction circles with fractional numbers added in. Most students enjoy this lesson. The full lesson will take four to five sessions.
- Prerequisites** Familiarity with pattern blocks, fraction circles, and mastery of the concept of the Changing Whole taught in Fractions: Booklet 2.
- Materials** Addition of Unlike Fractions: Manipulative - Worksheets 1 - 6, pages 4 - 9  
An assortment of objects such as apples, oranges, little toy cars or trucks, silverware, or bowls and cups, etc.  
Pattern blocks  
Fraction pieces - both circles and squares
- Note** Please note that the dialogues in most lessons are idealized, with a student giving all the correct answers. The dialogue you have with your student will be unique. What's most important is to listen to the student and figure out the model of the world she is presenting. From your understanding of what she says, continue to ask probing questions or statements, such as: **“How did you get that?” “Show me what you mean.” “Build a model of that.” “Tell me more so I can understand what you are saying.”**
- Warm Up** Play with the pattern blocks for a while. Tell the student that she can make designs and stacks now but not during the lesson.
- Lesson Part 1** Play a verbal game.  
**“Three cats plus two cats is five ...?”** “Cats.”  
**“Three cats plus two kittens is five ...?”** You will get various answers. Five cats, or five animals. Cats is the easier solution because only one quantity, kittens, needs to be renamed. If she says ‘animals’ ask her if kittens are also cats.  
**“Three puppies plus two dogs is five ...?”** “Dogs.”
- Note** Most students intuitively understand that in order to combine objects, they must be expressed in the same units. Kittens can be renamed as cats, puppies renamed to dogs. Think of other things that are like this where one thing is a subset of another thing. Example: two women plus three girls.
- Now set a group of three apples and a group of two apples on the table.