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FOR MATHEMATICS

Developing Multiplicative Thinking-

Structuring Number Multiplicatively with Lisa Riggs

Welcome!

Your host

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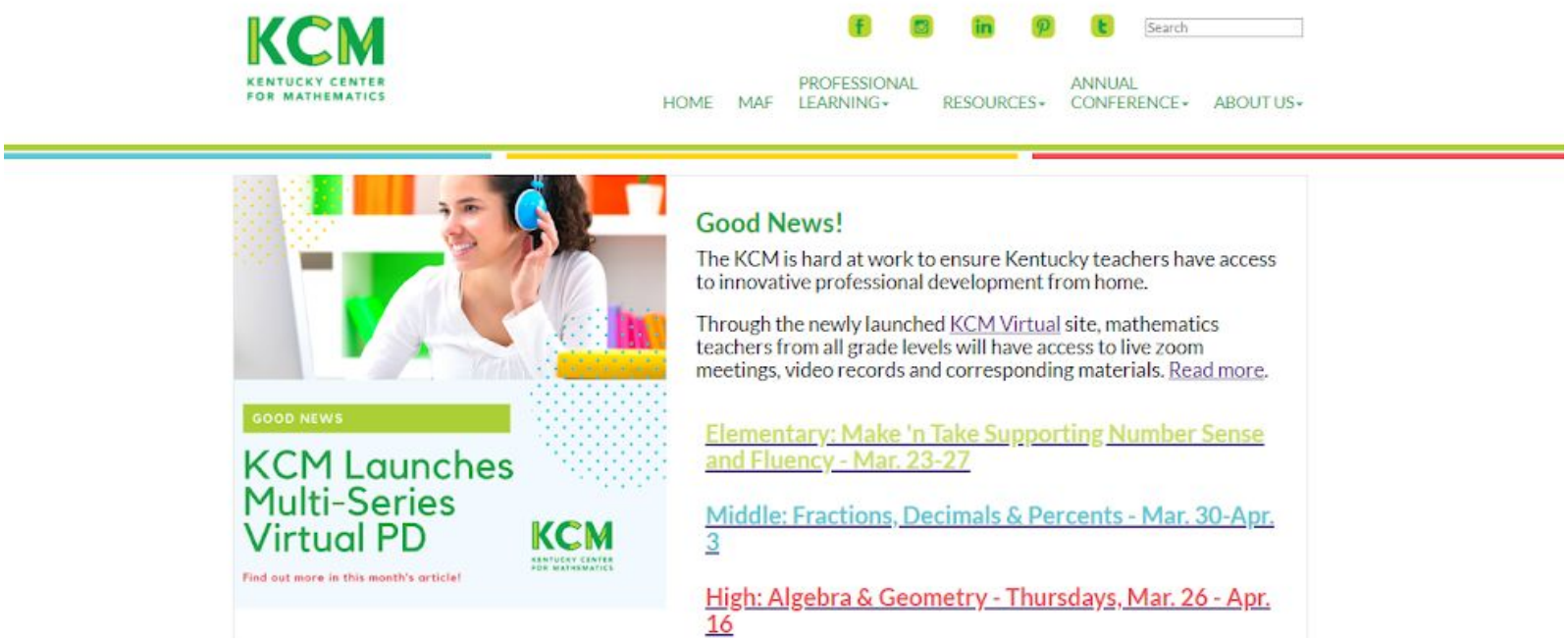
KCM Website

www.kentuckymathematics.org



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Today's Agenda

- Target standards
- What is multiplicative thinking?
- What is structuring?
- Some instructional settings

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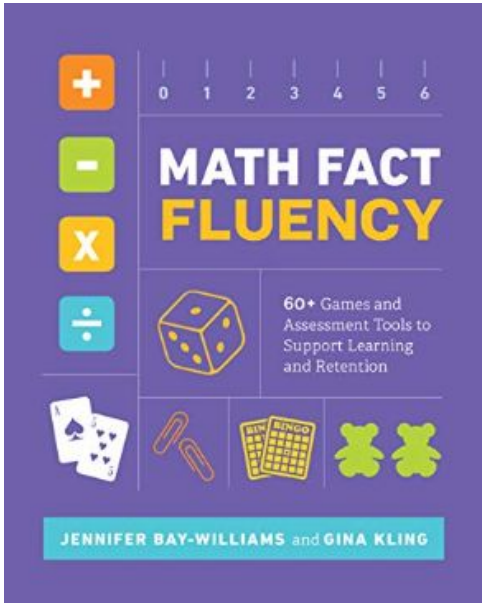
Standards

Operations and Algebraic Thinking	
Standards for Mathematical Practice	
MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. MP.4. Model with mathematics.	MP.5. Use appropriate tools strategically. MP.6. Attend to precision. MP.7. Look for and make use of structure. MP.8. Look for and express regularity in repeated reasoning.
Cluster: Represent and solve problems involving multiplication and division.	
Standards	**Clarifications**
KY.3.OA.1 Interpret and demonstrate products of whole numbers. **MP.2**, **MP.5**	Students use models for multiplication situations. For example, students interpret 5 x 7 as the total number of objects in 5 groups of 7 objects each. Coherence KY.2.OA.4→KY.3.OA.1→KY.4.OA.1
KY.3.OA.2 Interpret and demonstrate whole-number quotients of whole numbers, where objects are partitioned into equal shares. **MP.2**, **MP.5**	Students use models for division situations. For example, students interpret 56 ÷ 8 as the number of 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 object each. Coherence KY.3.OA.1→KY.3.OA.2→KY.5.NF.3
KY.3.OA.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays and measurement quantities, by using drawings and equations with a symbol for the unknown number to represent the problem. **MP.1**, **MP.4**	Students flexibly model or represent multiplication and division situations or context problems (involving products and quotients up to 100). Note: Drawings need not show detail, but accurately represent the quantities involved in the task. **See Table 2 in Appendix A.** Coherence KY.3.OA.3→KY.4.OA.2
KY.3.OA.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers. **MP.6**, **MP.7**	Students determine the unknown number that makes the equation true in each of the equations 8 x ? = 48, 5 = □ ÷ 3, 6 x 6 = ?. Coherence KY.3.OA.4→KY.4.MD.3
Attending to the Standards for Mathematical Practice	
Students recognize the numbers and symbols in an equation such as 5 x 8 = 40 are related to a context using groups or arrays (**MP.2**). For example, a student analyzes this equation and tells a story about walking 8 blocks round-trip to and from school each day, connecting to the equation by saying: 5 days x 8 blocks each day is 40 total blocks walked. To represent the problem, they show 5 jumps of 8 on an open number line or show five 8-unit long Cuisenaire Rods (**MP.5**). When reading story situations, students seek to make sense of the story and its quantities (**MP.1**). They do not just lift numbers out or use keywords. To help make sense of the problem, students decide to write an equation or use a number line. In other words they 'mathematize' the situation (**MP.4**). In missing value problems, students attend to what value is unknown and what operation is represented (**MP. 6**) and use this information to determine what value will result in both sides of the equations being equal (**MP. 7**).	

Moving toward Fluency with Multiplicative Thinking

As students come to know basic facts in any operation, they progress through three phases (Baroody, 2006):

- Phase 1: Counting
- Phase 2: Deriving
- Phase 3: Mastery



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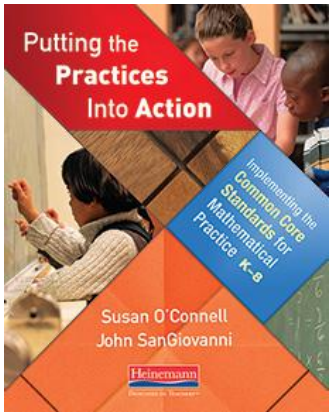
Student Mathematical Practice 7



Look for and Make Use of Structure

Mathematically proficient students:

- see the flexibility of numbers
- understand properties and relationships
- recognize patterns and functions

Many people see math as confusing and they are not always sure how answered are achieved however math is quite predictable. There is structure in math and people who see that structure find that math makes sense.

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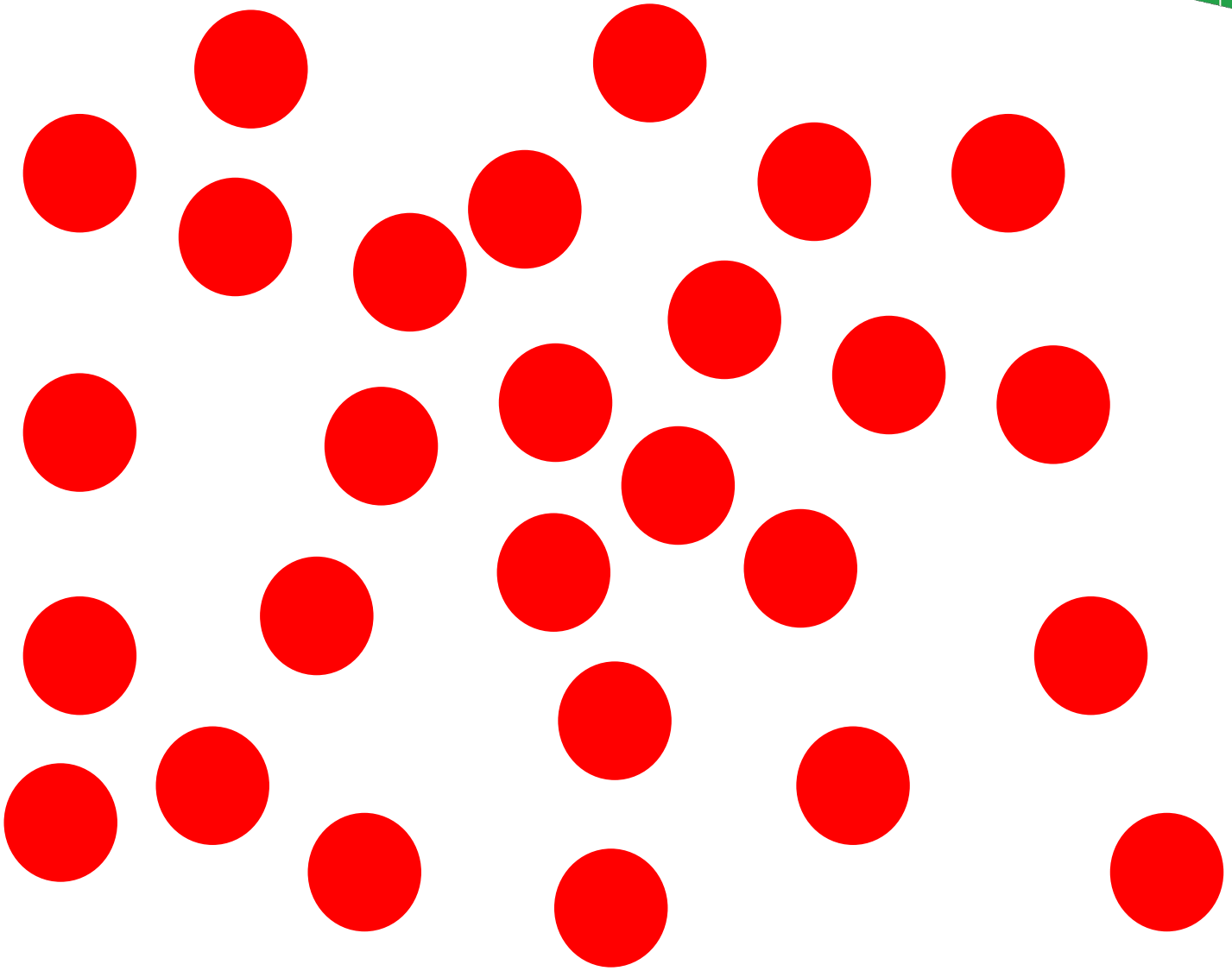

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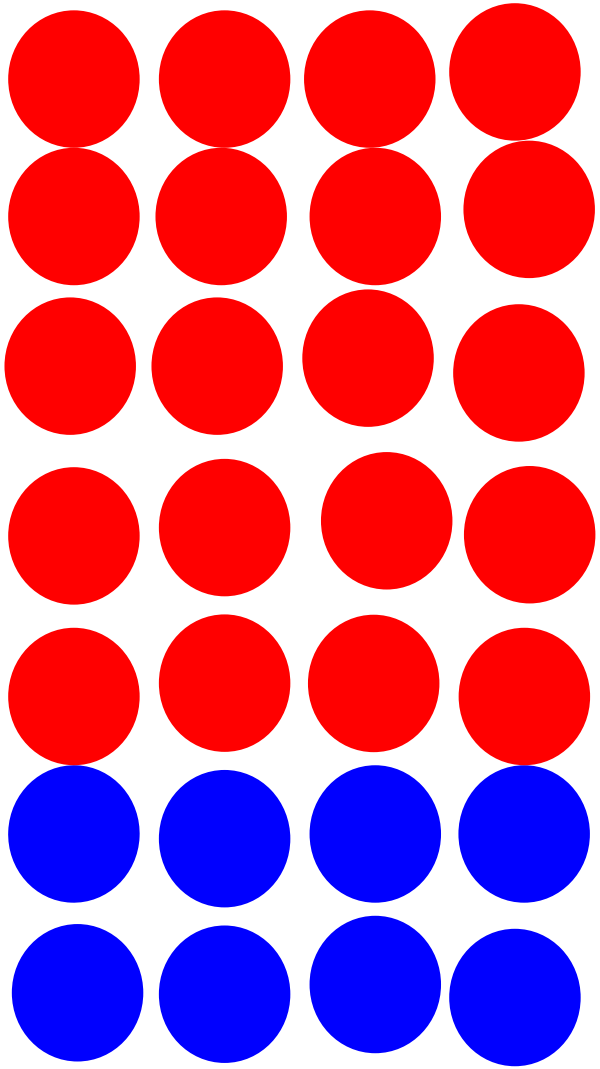

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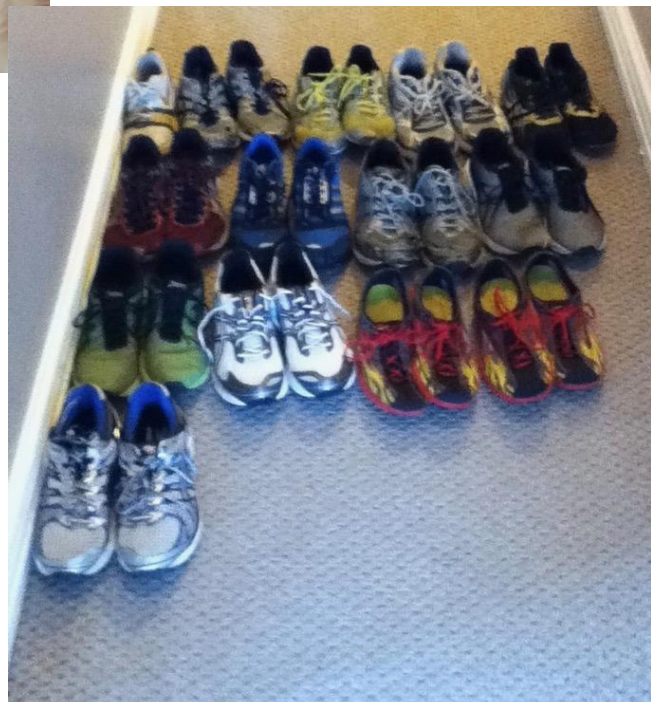
Things that come in groups of 2 ...



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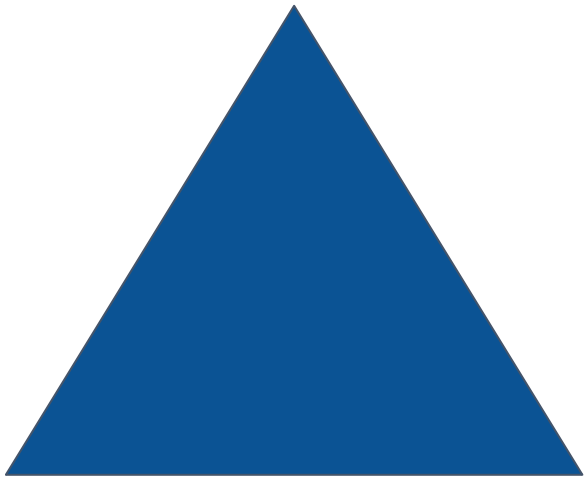
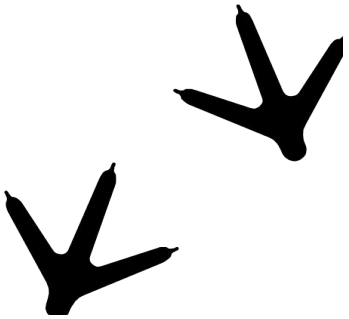
Things that come in groups of 3 ...





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Items at home that can add structure to multiplicative thinking

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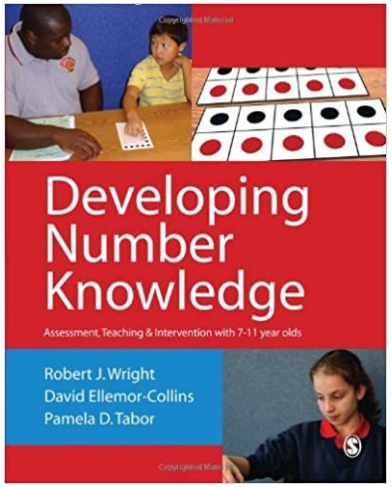
Snack time



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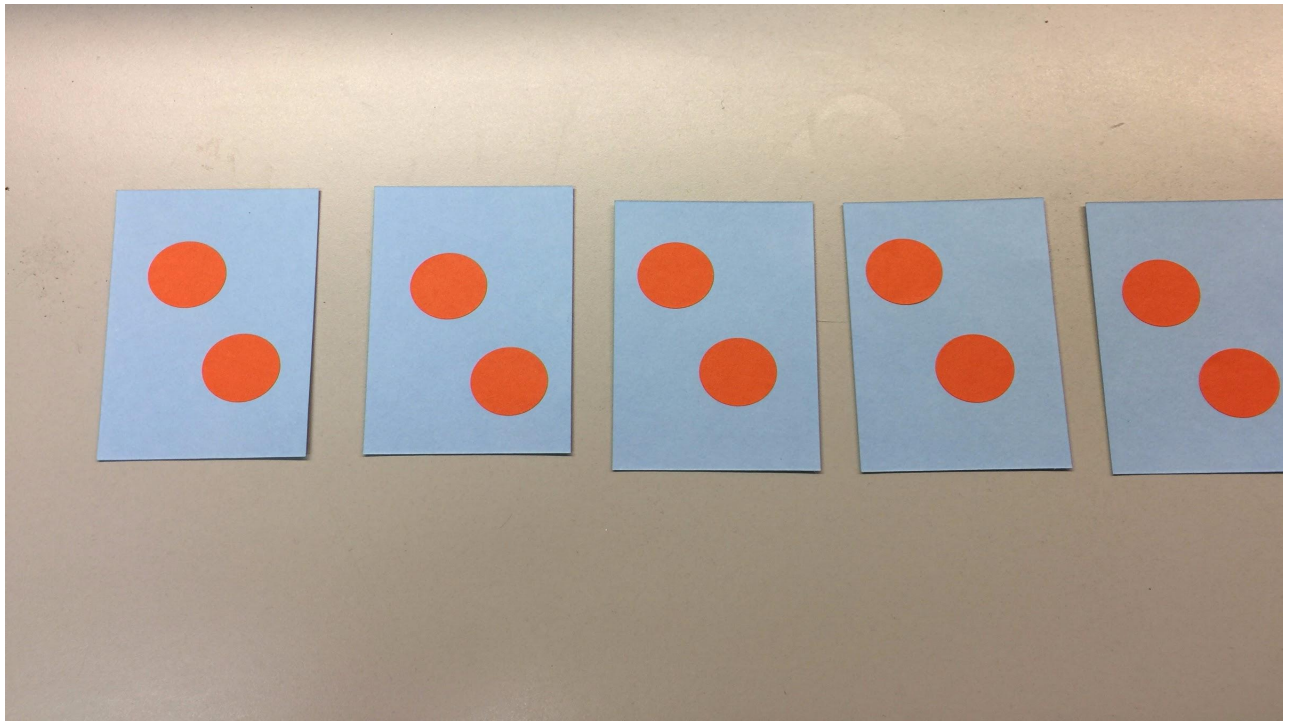
Dot cards



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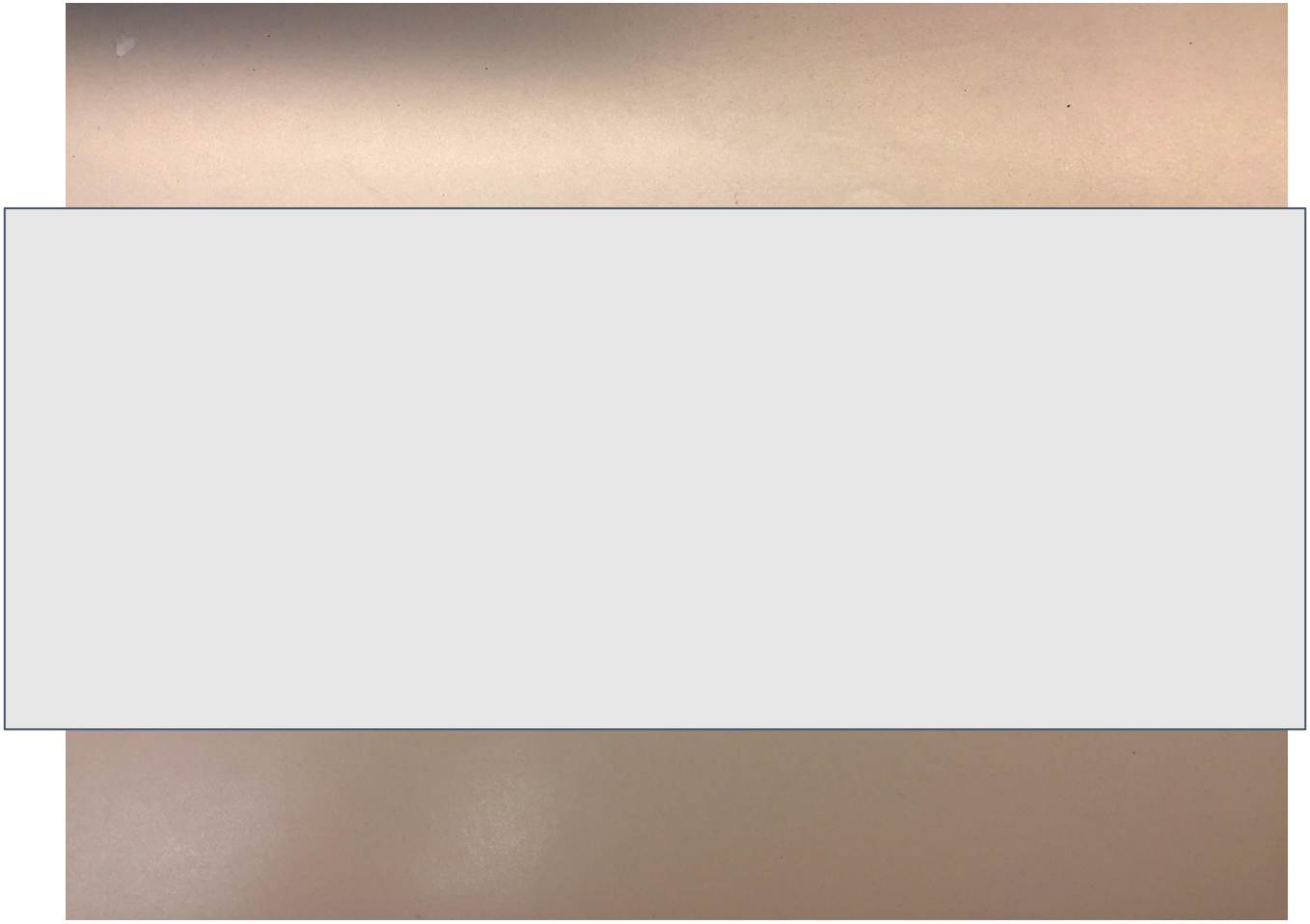

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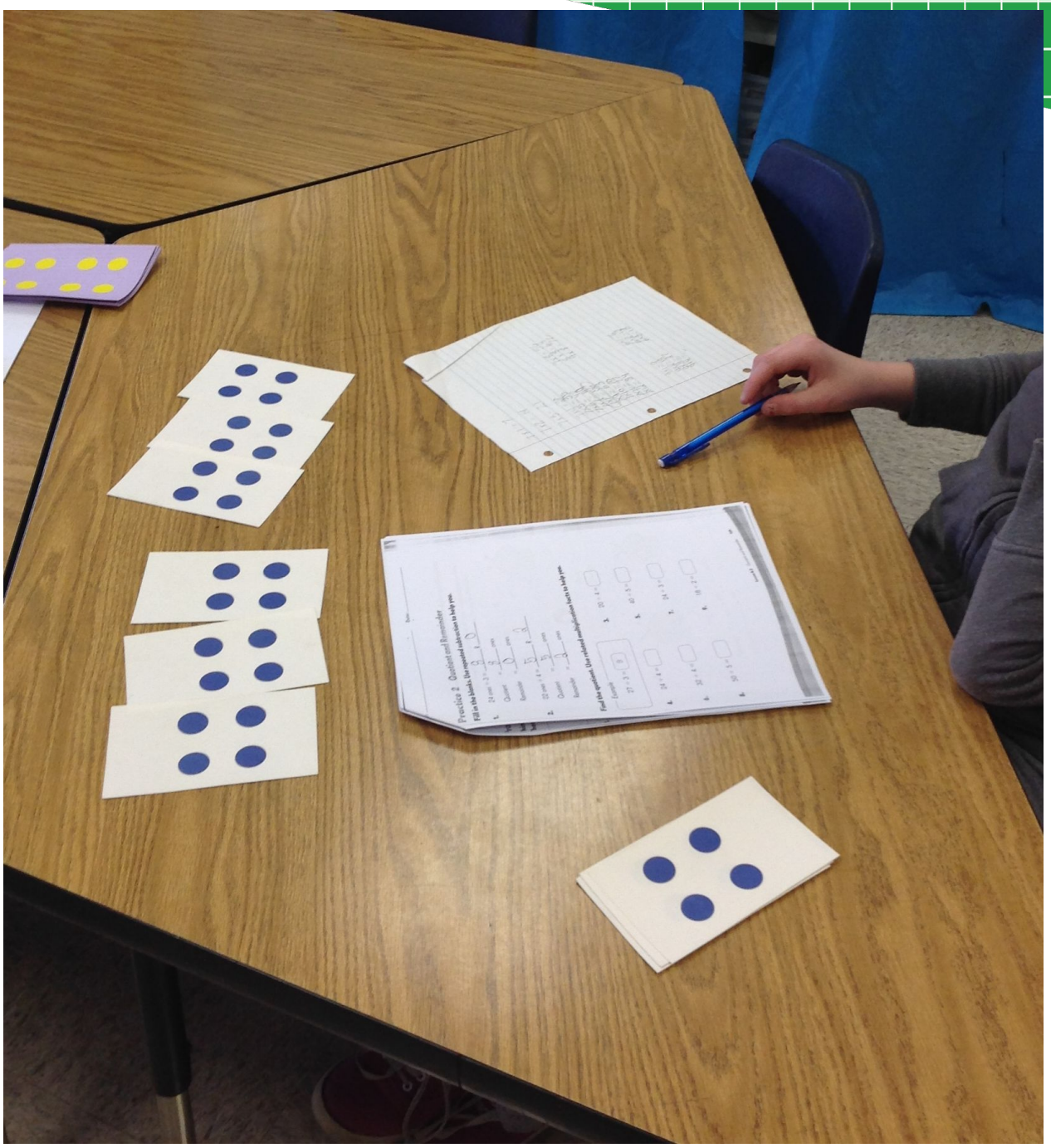

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What do you notice … what do you wonder ...

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What do you notice … what do you wonder ...

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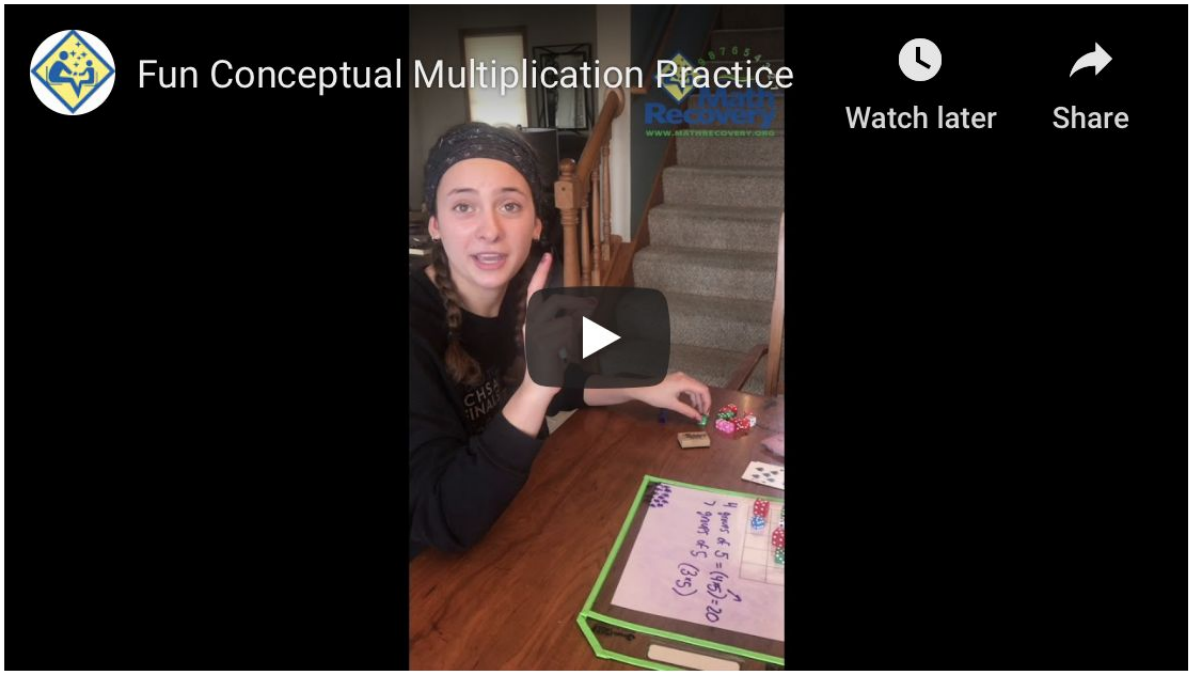
Conceptual Multiplication Fact practice



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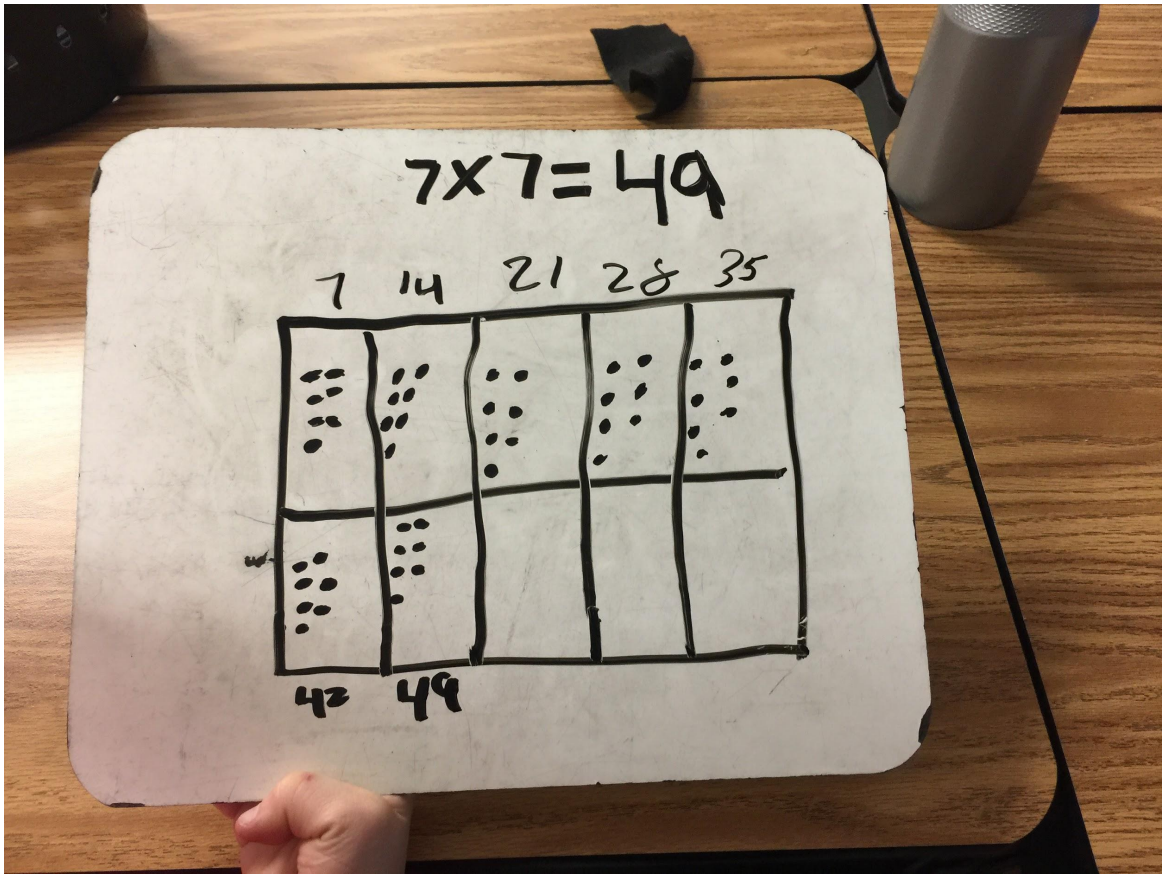

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Pop Drop Move It 4437.

Level	Activity	Task	Numbers	Level of support
1 Red	Skip counting with sticks	Skip count	2s & 5s	Visible dots
2 Blue	Move-It game with sticks	Repeated addition/ Multiplication	2s & 5s	Visible dots
3 Green	Move-It game with sticks	Repeated addition/ Multiplication	2s & 5s	Hidden dots
4 Purple	Move-it game with spinners	Multiplication	2s & 5s	Bare Number (sticks available)
5 Pink	Move-it game with sticks	Multiplication (Use known facts)	6s or 7s	Visible or Hidden dots
6 Orange	Missing Factor Move-it	Missing Factor/ Division	6s or 7s	Expression cards (sticks available)

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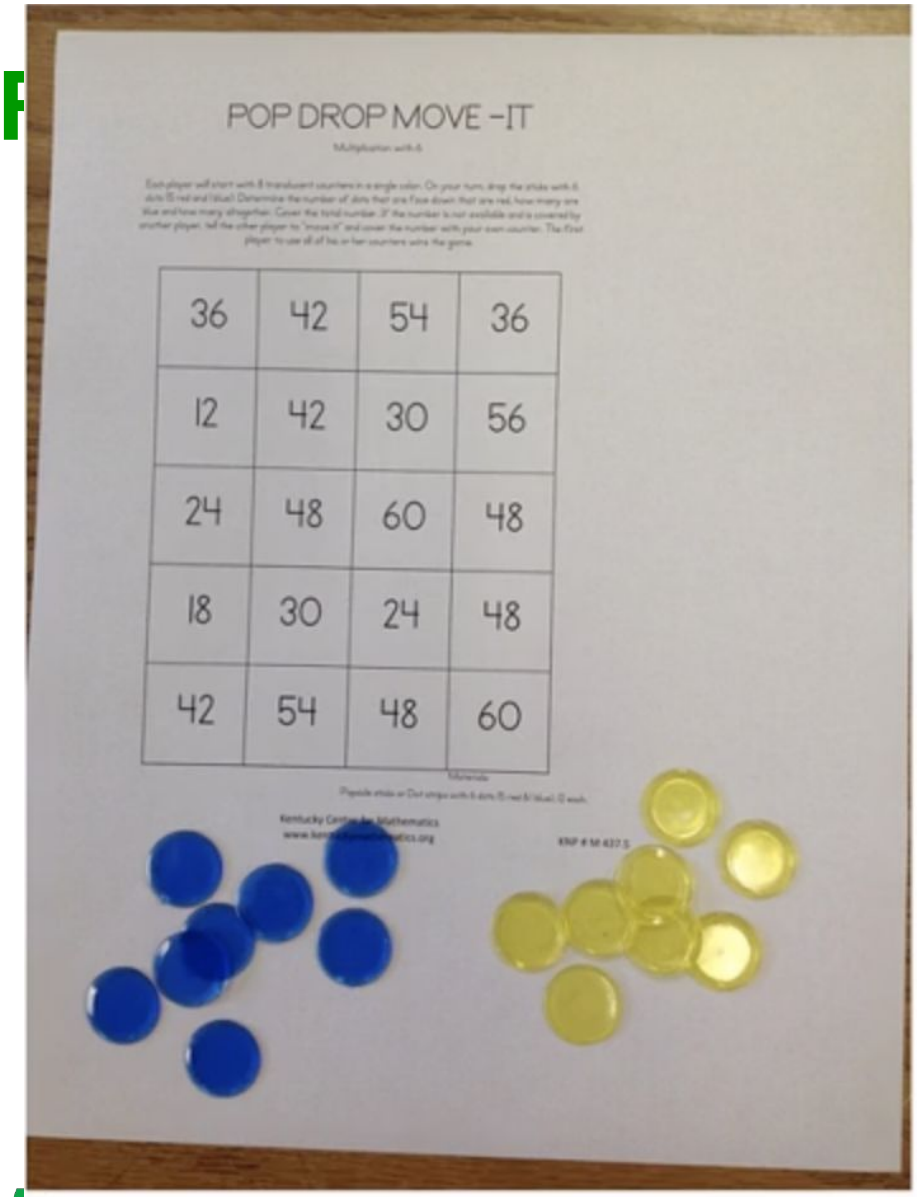

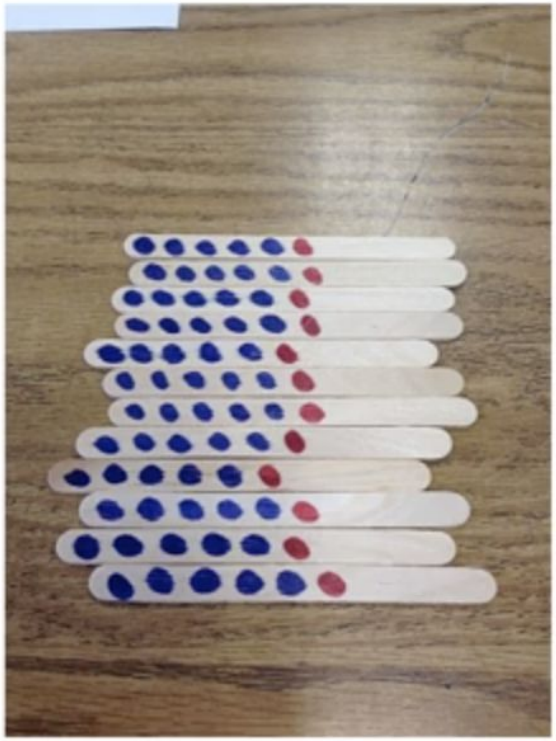

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Upcoming Sessions

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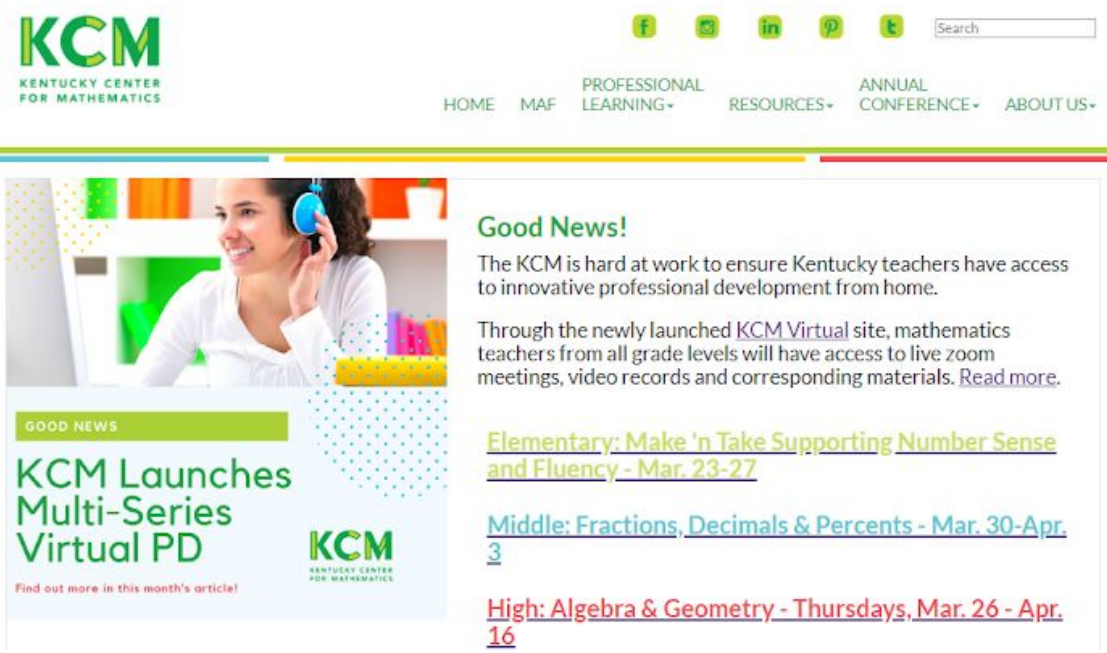

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KCM is here to support you!

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