Developing Multiplicative Thinking-
Sequence of Multiples with Dee Crescitelli
Welcome!

Your host

Dee Crescitelli
Director
Kentucky Center for Mathematics
cresciteld1@nku.edu
KCM Website

www.kentuckymathematics.org

Good News!
The KCM is hard at work to ensure Kentucky teachers have access to innovative professional development from home.

Through the newly launched KCM Virtual site, mathematics teachers from all grade levels will have access to live zoom meetings, video records and corresponding materials. Read more.

KCM Favorites - Apr. 20 - Apr. 24
Developing Multiplicative Thinking - Apr. 27 - May 1
Focus on Fractions - May 4 - May 8
Today’s Agenda

● Research- Progression of Mathematical Reasoning
● KY Academic Standards that build the sequences of multiples
● Foundation of Number Word Sequences
Progression of Mathematical Reasoning

The Development of Mathematical Reasoning

- Counting Strategies
- Additive Thinking
- Multiplicative Reasoning
- Proportional Reasoning
- Functional Reasoning

Spatial Reasoning
Algebraic Reasoning

PAM HARRIS
### Development of Reasoning

Students need to develop each level of reasoning so that they can build on it for the next level.

<table>
<thead>
<tr>
<th>Counting Strategies</th>
<th>Additive Thinking</th>
<th>Multiplicative Reasoning</th>
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<tr>
<td>It is important for students to develop counting strategies because counting is essential in the development of additive thinking.</td>
<td>Counting Strategies</td>
<td>Additive Thinking</td>
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<td>And additive thinking is essential for students to develop multiplicative reasoning so that they can use multiplicative strategies.</td>
<td>Counting Strategies</td>
<td>Additive Thinking</td>
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<td>Without multiplicative reasoning, it is impossible to develop proportional reasoning, which is the land of fractions, ratios, proportions, and percents.</td>
<td>Counting Strategies</td>
<td>Additive Thinking</td>
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![Diagram showing relationships between counting strategies, additive thinking, and multiplicative reasoning](image)
Standards

KY.2.NBT.2~ Forward/Backward Number Sequences

| KY.2.NBT.2 Count forwards and backwards within 1000; skip-count by 5s, 10s and 100s. | Students start at various numbers to skip-count. Some use tools such as base ten blocks, hundreds charts, number lines and money. |
| MP.8, MP. 1, MP. 6 | Coherence KY.1.NBT.1→KY.2.NBT.2 |

→ Count forwards and backwards within 1000; skip-count by 5s, 10s, and 100s.

KY.3.OA.9~ Identify Arithmetic Patterns

| KY.3.OA.9 Identify arithmetic patterns (including patterns in the addition table or multiplication table) and explain them using properties of operations. | Students observe 4 times a number is always even and explain why 4 times a number can be decomposed into two equal addends. |
| MP.3, MP.8 | Coherence KY.2.OA.3→KY.3.OA.9→KY.4.OA.5 |
Number Word Sequences

Learning number word sequences should continue beyond 1st grade.

Students need to learn:
• NWS of decuples, centuples, and 1000s
• NWS by 2s, 3s, 4s, etc, which become central to developing strategies for multiplication and division
Verbal Aspect is Important
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**
Skip-counting as Reasoning
Skip-counting as Reasoning
Activities to Build Facility with Sequences of Multiples

• Count Around

• Disappearing Sequences

Disappearing Sequences

On a scrap piece of paper, write the counting sequence that you want to practice. Make sure that you are accurate in your counting. For example, if you are working on counting by 2’s, you would write:

\[
2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24
\]

Say the sequence while touching each number as you say its name. Repeat this step until you can say the sequence without hesitation. Write the sequence on the back of the paper for later reference if you get stuck.

After counting through the sequence, scratch out one number so that you can no longer read it. Count again, touching each number as you say the sequence. When you get to the number that “disappeared” touch the place where it used to be.

\[
2, 4, 6, 8, 10, \text{[scratched out]}, 14, 16, 18, 20, 22, 24
\]

After counting, “scratch out” another number. Count again. Be sure to touch each number or space as you count.

\[
2, 4, 6, \text{[scratched out]}, 10, \text{[scratched out]}, 14, 16, 18, 20, 22, 24
\]
Disappearing Sequences

Other settings:
Loose Cards
numeral track
Activities to Build Facility with Sequences of Multiples

- Number Ladders
Activities to Build Facility with Sequences of Multiples

Activities to Build Facility with Sequences of Multiples

CARD GAMES:

- Junk Multiples
- Four Kings
- Quick Draw Multiples
Junk Multiples
# 4 Kings

(aka treasure Hunt)

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- Each row has 5 cards.
- The goal is to find the treasure.
- The treasure is located near the middle of the board.

*Note: The image contains a diagram with numbered cards and treasure icons.*

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*The numbers represent the points or values associated with each card.*
Quick Draw Multiples

How to Play Quick Draw Multiples

1) Shuffle deck.

2) Deal 15 cards to each player. Place these cards in a stack face down in front of each player. This is each player's draw pile.

3) The remaining ten cards are divided into 2 stacks of 5 and placed face down between players with enough space between the stacks to turn up and display cards to start the game. These are the starter piles.

4) Each player draws 3 cards from their own draw pile.

5) At the same time, each player flips over a card from the starter piles.

6) A play is made from a player's hand by placing the next multiple, either forwards or backwards, on top of one of the turned up cards in the middle. Both players may play at the same time and make a series of plays, but cards may only be played one at a time. Once a card is played from a player's hand, he/she picks up another card from the draw pile so that there are 3 cards in your hand at all times. No more than three cards may be in a player's hand at a time.

8. The first player that uses all cards from their individual draw pile wins.
Upcoming Sessions

APRIL 27 - MAY 1
2:00-2:30 PM EST

Developing Multiplicative Thinking!

Monday, April 27 - Foundations of Multiplicative Thinking

Tuesday, April 28 - Sequence of Multiples

Wednesday, April 29 - Structuring Numbers Multiplicatively

Thursday, April 30 - Developing Multiplication Strategies

Friday, May 1 - Monitoring and Assessing Multiplication
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