

## Intervention Name: Number Rockets

**Common Core State Standards Domain Areas:** (check all that apply)

Counting and Cardinality (K)	Operations and Algebraic Thinking (K-5)	Numbers and Operations in Base Ten (K-5)	Numbers and Operations – Fractions (3-5)	Measurement and Data (K-5)	Geometry (K-HS)	Ratios and Proportional Relationships (6-7)	The Number System (6-8)	Expressions and Equations (6-8)	Statistics and Probability (6-HS)	Functions (8-HS)	Number and Quantity (HS)	Algebra (HS)	Modeling (HS)
X	X	X											

**Setting:** (check all that apply)

**Focus Area:** (check all that apply)

Whole-class	Small-group	Individual	Acquisition	Fluency	Generalization
	X	X	X	X	X

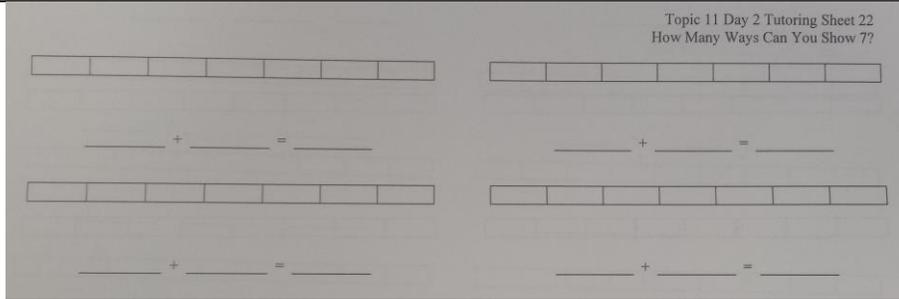
**Function of Intervention:** Number Rockets is a small-group tutoring program for first-grade students experiencing mathematics difficulty. With Number Rockets, students participate in lessons focused on 17 topics (with 1-6 days of tutoring per topic) to help improve understanding of first-grade mathematics concepts and skills.

**Brief Description:** The teacher tutors small-groups or individual students through lessons focused on 17 topics using the concrete-representational-abstract (CRA) teaching sequence:

- Identifying and writing numbers
- Identifying more and less objects
- Sequencing numbers
- Using <, >, and = signs
- Skip counting by 10s, 5s, and 2s
- Introduction to place value
- Place value (representing 10s and 1s)
- Identifying operations
- Writing addition and subtraction sentences
- Place value (identifying 10s and 1s place)
- Addition facts
- Subtraction facts
- Addition and subtraction facts review
- Place value review
- Two-digit addition
- Two-digit subtraction
- Missing addends

Each lesson lasts approximately 40 minutes. Teachers spend 30 minutes conducting a teacher-led lesson and 10 minutes establishing mathematics fluency through the use of a flash card activity.

The teacher-led lesson follows the CRA sequence. Students have multiple opportunities to use hands-on manipulatives (e.g., Base-10 blocks, counters, beans) to learn foundational mathematics concepts. Pictorial representations of the manipulatives help students transition from hands-on work to solving mathematics problems presented with numerals and signs (e.g.,  $11 - 5 = \underline{\quad}$ ).



During this part of a teacher-led lesson, the students use snap cubes of two different colors to find different ways to show addition with a sum of 7. Students (a) use the cubes, then (b) color in the boxes to match the cubes, then (c) write the corresponding math fact.

(Fuchs, Paulsen, & Fuchs, 2013)

With the flash card activity at the end of each lesson, students learn counting strategies for solving addition and subtraction facts. Teachers encourage students to say the answer (if known) and to use the counting strategy for solving unknown facts.

At the end of each tutoring session, the teacher administers a brief assessment. If mastery (i.e., 90% accuracy) is met, then the teacher moves onto the next topic in the sequence. Each topic has 3 to 6 days of lessons. Regardless of mastery, teachers move on to the next topic even if mastery is not achieved on the last day of a specific topic.

#### Procedures:

- **Duration:** Number Rockets should run for at least 16 weeks with 3 sessions each week. Due to the mastery criteria, some students will take longer to work through the Number Rockets topics. Each session lasts approximately 40 minutes.
- **Teacher training:** Teachers must read and become familiar with the Number Rockets materials. A script, accompanies each day of each topic. Teachers should read and become familiar with the scripts before implementing a lesson.
- **Instructional practices:** Teachers work with students in small groups or individually. Every Number Rockets session includes a teacher-led lesson that follows the CRA sequence. Teachers must prepare student materials and have appropriate manipulatives available for use during the session. Every Number Rockets session finishes with fluency practice. Teachers must prepare flash cards for use fluency practice.
- **Monitoring system:** To promote on-task behavior, students have the opportunity to earn points during a Number Rockets session. Students can earn points for being on-task when a timer beeps (at set intervals during the session) and by answering problems correctly on each session's brief assessment. When students earn 30 points, they can pick a prize out of a prize bag.

**Critical Components (i.e., that must be implemented for intervention to be successful):** Teachers must implement Number Rockets lessons with fidelity. Teachers must be prepared to lead each session, engage students in the materials, provided appropriate feedback, and measure mastery of topic materials.

**Critical Assumptions (i.e., with respect to prerequisite skills):** Students start Number Rockets with basic numeral recognition and counting skills. If students have difficulty with very basic number sense skills, Number Rockets may not be appropriate.

**Materials:** Teachers must purchase the Number Rockets manual (\$80) by emailing [pals@vanderbilt.edu](mailto:pals@vanderbilt.edu).

#### References:

- Fuchs, L. S., Compton, D. L., Fuchs, D., Paulsen, K., Bryant, J., & Hamlett, C. L. (2005). Responsiveness to intervention: Preventing and identifying mathematics disability. *Teaching Exceptional Children, 37* (4), 60-63.
- Fuchs, L. S., Compton, D. L., Fuchs, D., Paulsen, K., Bryant, J. D., & Hamlett, C. L. (2005). The prevention, identification, and cognitive determinants of math difficulty. *Journal of Educational Psychology, 97*, 493-515. doi:10.1037/0033-0663.97.3.493
- Fuchs, L. S., Fuchs, D., & Hollenbeck, K. N. (2007). Extending responsiveness to intervention to mathematics at first and third grades. *Learning Disabilities Research and Practice, 22*, 13-24.

- Fuchs, L. S., Paulsen, K., & Fuchs, D. (2013). *Number Rockets: First grade small group tutoring*. Nashville, TN: Vanderbilt University.
- Rolfhus, E., Gersten, R., Clarke, B., Decker, L. R., Wilkins, C., & Dimino, J. (2012). An evaluation of “Number Rockets”: A tier-2 intervention for grade 1 students at risk for difficulty in mathematics. Washington, D.C.: Institute of Education Sciences National Center for Education Evaluation and Regional Assistance.  
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