

## Intervention Taxonomy Brief: Number Rockets

The goal of this brief is to provide educators with information they can use to evaluate the appropriateness of **Number Rockets** for a specific student or group of students who require supplemental and intensive intervention. The brief also may be used to guide decisions about the selection or purchase of a new intervention. We envision that the brief may allow users to examine the extent to which the program aligns to the Taxonomy of Intervention Intensity, a framework used by educators to categorize interventions along key dimensions. The information included in this brief is organized along the seven dimensions of the Taxonomy of Intervention Intensity and can assist educators in answering the following questions:

- Does evidence suggest that this intervention is expected to lead to improved outcomes in the identified area of need (**strength**)?
- Will the group size, duration, structure, and frequency provide sufficient opportunities for students to respond and receive corrective feedback (**dosage**)?
- Does the intervention match the student’s identified needs (**alignment**)?
- Does the intervention assist the student in generalizing target skills to general education or other tasks (**attention to transfer**)?
- Does the intervention include elements of explicit instruction (**comprehensiveness**)?
- Does the student have opportunities to develop the behavior skills necessary to be successful (**behavioral support**)?
- Can the intervention be individualized with a data-based process to meet student needs (**individualization**)?

To learn more about the Taxonomy of Intervention Intensity and find resources to support implementation, visit <https://intensiveintervention.org/taxonomy-intervention-intensity>.

### Program Summary

Number Rockets is a tutoring intervention for first-grade students identified as at risk for mathematics difficulty. The program is based on the concrete-representational-abstract model, which relies on concrete objects to promote conceptual learning. Tutors deliver the program to small groups of two to four students three times per week in 40-minute sessions, with 30 minutes of mathematics instruction and activities followed by 10 minutes of practice to build arithmetic fluency. The 63 program lessons cover 17 topics, and the topics include worksheets and manipulatives (e.g., Base-10 blocks for place-value instruction). Topics span identifying and writing numbers; understanding less than, greater than, and equal signs; sequencing numbers; skip counting; place value; identifying operations; writing number sentences; addition and subtraction facts; two-digit addition and subtraction; and missing addends. During the final 10 minutes of each tutoring session, students complete a fluency game designed to develop automatic retrieval of mathematical facts, and students are taught efficient counting strategies as backups to automatic retrieval. Student behavior is monitored throughout each session. At varied intervals, students are awarded points for

on-task behavior, and after a predetermined number of points has been earned, students trade points for prizes.

### Exhibit 1. Program Information

Features of program implementation	Program recommendations
Grade level(s)	1
Group size	1–4
Intervention length	63 lessons
Frequency	Three times per week
Session duration	40 minutes
Cost	Book 1, manual: \$29.00 Book 2, supplemental materials: \$35.00 Flash cards: \$16.00
Training	For information on professional development opportunities and costs, contact <a href="mailto:FuchsTutoring@air.org">FuchsTutoring@air.org</a> .

### Evidence of Taxonomy of Intervention Intensity Dimensions

The following section presents definitions for the Taxonomy of Intervention Intensity dimensions and a summary of intervention-specific evidence for each dimension. The evidence comes from the intervention’s vendor or developer. It is accurate as reported to the National Center on Intensive Intervention (NCII); it was not independently verified by NCII. Additional program evidence can be found on the [NCII Tools Chart](#) and might appear on the [What Works Clearinghouse](#). For specific questions about the content, contact the publisher at [lynn.a.davies@vanderbilt.edu](mailto:lynn.a.davies@vanderbilt.edu) or visit [https://frg.vkcsites.org/what-are-interventions/math\\_intervention\\_manuals/](https://frg.vkcsites.org/what-are-interventions/math_intervention_manuals/).

#### Taxonomy Dimension: Strength

*Strength tells us how well the program works for students with intensive intervention needs, expressed in terms of effect sizes. Effect sizes greater than 0.25 indicate an intervention has value in improving outcomes. Effect sizes of 0.35 to 0.40 are moderate, and effect sizes of 0.50 or larger are strong (preferred).*

Exhibit 2 provides the effect sizes for students in need of intensive intervention organized by domain and subdomain. These effect size data are calculated on low-achieving participants, those falling at or below the 20th percentile on pretest measures of achievement. If available, additional effect sizes for disaggregated data can be found on the NCII Tools Chart.

**Exhibit 2. Number Rockets Effect Sizes for Students ≤20th Percentile by Domain and Subdomain**

Domain	Subdomain	Outcome measures	Effect size <sup>a</sup>
Mathematics	<ul style="list-style-type: none"> <li>▪ Math Concepts</li> <li>▪ Math Computation</li> </ul>	CBM Computation	0.39
Mathematics	<ul style="list-style-type: none"> <li>▪ Math Concepts</li> <li>▪ Math Computation</li> </ul>	Fact Retrieval Addition	0.08
Mathematics	<ul style="list-style-type: none"> <li>▪ Math Concepts</li> <li>▪ Math Computation</li> </ul>	Woodcock Johnson Calculation	0.34
Mathematics	<ul style="list-style-type: none"> <li>▪ Math Concepts</li> <li>▪ Math Computation</li> </ul>	Story Problems	0.43
Mathematics	<ul style="list-style-type: none"> <li>▪ Math Concepts</li> <li>▪ Math Computation</li> </ul>	First-grade Concepts/Applications	0.07
Mathematics	<ul style="list-style-type: none"> <li>▪ Math Concepts</li> <li>▪ Math Computation</li> </ul>	Woodcock Johnson Applied Problems	0.38
Mathematics	<ul style="list-style-type: none"> <li>▪ Math Concepts</li> <li>▪ Math Computation</li> </ul>	Fact Retrieval Subtraction	0.22

<sup>a</sup> To ensure comparability of effect size across studies, NCII uses a standard formula to calculate effect sizes across all studies and outcome measures—Hedges g, corrected for small-sample bias.

\*  $p \leq .05$ .

**Taxonomy Dimension: Dosage**

*Dosage is the number of opportunities a student has to respond or practice and receive corrective feedback. Dosage may be impacted by the size of the instructional group, the number of minutes each session lasts, the number of student-teacher interactions built into lessons, and the number of sessions provided per week.*

Assuming a group size of four students, each student in the group has an estimated 88.23 opportunities to respond and receive corrective feedback.

**Taxonomy Dimension: Alignment**

*Alignment (Exhibit 3) focuses on how well the program (a) addresses the target student’s full set of academic skill deficits, (b) does not address skills the target student has already mastered (extraneous skills for that student), and (c) incorporates a meaningful focus on grade appropriate curricular standards.*

### Exhibit 3. Alignment With Content Areas Addressed '

Instructional grade level(s)	Content area addressed	Skill strands
Grade 1	Mathematics	<ul style="list-style-type: none"><li>▪ Understanding Less Than, Greater Than, and Equal Signs</li><li>▪ Sequencing Numbers</li><li>▪ Skip Counting; Place Value</li><li>▪ Identifying Operations</li><li>▪ Writing Number Sentences</li><li>▪ Addition and Subtraction Facts</li><li>▪ Two-Digit Addition and Subtraction</li><li>▪ Missing Addends</li></ul>

#### **Taxonomy Dimension: Teaching to Promote Transfer**

*Attention to transfer is the extent to which an intervention is designed to help students (a) transfer the skills they learn to other formats and contexts and (b) realize connections between mastered and related skills.*

For solving arithmetic problems (one of the main instructional targets), three activities are designed to explicitly teach for transfer: providing students instruction in understanding part-whole number concepts and families as applied to each number set, as well as key number properties (e.g., inverse for addition and subtraction); teaching efficient counting strategies for adding and subtracting; and mixed presentation of problems across formats (vertical and horizontal problem displays) and modes (oral and written responses). This robust set of instructional activities promotes transfer.

**Activity 1.** To provide explicit instruction in part-whole number concepts and families as applied to each number set, an example activity is practice in using blocks to compose and decompose the number 7 into its constituent parts and generating corresponding number sentences within families.

**Activity 2:** To provide explicit instruction on the inverse property for addition and subtraction, an example activity is using blocks, a number line, and word problems to represent number sentences within families and build insight into the relationship between addition and subtraction.

**Activity 3.** Teaching efficient counting strategies for adding and subtracting comes in two ways: (a) Systematic instruction and practice in counting strategies and (b) the Meet or Beat Your Score (MOBYS) activity, in which children have 60 seconds to answer flash cards. In the first six lessons, cards are restricted to  $n \pm 1$ ,  $n \pm 0$ , and  $n \pm 2$ ; after efficient addition and subtraction counting strategies are taught, all combinations of addends and minuends up to 18 are included. Children are taught to “know the answer right off the bat” (retrieve from memory) if confident; otherwise, they must use the taught counting strategies. Children are to aim to answer each problem correctly because, as soon as an error occurs, the tutor requires them to use the taught counting strategy to produce the correct response. To discourage guessing or careless application of counting strategies, seconds elapse as children execute the counting strategy as many times as needed to produce the correct answer. In this way, careful but quick responding increases the

number of correct responses. Children have a chance to meet or beat the first score, and the day's higher score is graphed.

**Activity 4.** Mixing of the presentation of problems across formats (vertical and horizontal problem displays) and modes (oral and written responses) is incorporated within word problem and arithmetic activities.

### **Taxonomy Dimension: Comprehensiveness**

*Comprehensiveness is the number of explicit instruction principles the intervention incorporates (e.g., providing explanations in simple, direct language; modeling efficient solution strategies instead of expecting students to discover strategies on their own; providing practice so that students use the strategies to generate many correct responses; and incorporating systematic cumulative review). Additional information can be found within the NCII [Explicit Instruction course content materials](#).*

#### ***Dimension: Provide Explanations in Direct, Simple Language***

**Activity 1.** Each lesson is scripted to provide tutors direct, simple language within the program's explanations. Tutors review and practice scripted explanations. They do not read or memorize scripts.

**Activity 2.** Throughout the program, students receive practice using direct and simple language to explain solution strategies as they solve problems.

#### ***Dimension: Model Efficient Solution Strategies***

**Activity 1.** Throughout the program, each time a new problem type is introduced, the tutor models the program's efficient solution strategy for solving that problem type. Each problem type and its solution strategy are thoroughly described in the relevant lesson in the manual. Problem types address identifying and writing numbers; using less than, greater than, and equal signs; sequencing numbers, skip counting; explaining place value; identifying operations; writing number sentences; addition and subtraction facts; completing two-digit addition and subtraction problems; and finding missing addends.

**Activity 2.** Throughout the program, students receive ongoing practice applying the taught strategies, and each problem type gradually increases in complexity.

#### ***Dimension: Ensure That Students Have the Necessary Background Knowledge and Skills to Succeed***

The program is designed systematically so that (a) problem types are introduced only after the prerequisite skills are taught and (b) activities build fluency with foundational skills to ease students' cognitive load.

**Activity 1.** Number line activities that build number concepts precede the teaching of counting strategies.

**Activity 2.** The MOBYS activity builds simple arithmetic problem solving, which is foundational to and addressed before two-digit addition and subtraction and before finding missing addends.

***Dimension: Incorporating Systematic Review, With Problem Sets That Mix Problem Types (Interleaved Practice)***

**Activity 1.** The program is designed systematically so that each session provides students with supervised independent practice that cumulatively reviews previously taught problem types while mixing problem types across problem sheets. This builds student skill in distinguishing among problem types and supports the retention of previously taught material. Independent practice is timed.

**Activity 2.** Corrective feedback is provided for incorrect responses on each independent practice sheet.

**Taxonomy Dimension: Behavioral Support**

*Behavioral support addresses the extent to which the program incorporates (a) self-regulation and executive function components and (b) behavioral principles to minimize undesired behavior. Additional information can be found within the [NCII behavioral support course content](#).*

**Activity 1.** *Number Rockets* includes a self-regulation system to encourage students to work hard and accurately, listen carefully, and follow directions. The tutor sets a timer to beep three times per lesson at random intervals. When the timer beeps, the tutor checks if all students are on task. If so, the tutor awards a checkmark. When children accumulate a predesignated number of checkmarks, they buy a prize from “Number Rockets Store” store or save their money for a bigger prize. This self-regulation system is implemented throughout each session.

**Activity 2.** Interweaved throughout the program is growth mindset instruction to help students understand that they can improve performance when they work hard.