

# CENTIPEDE MATH®

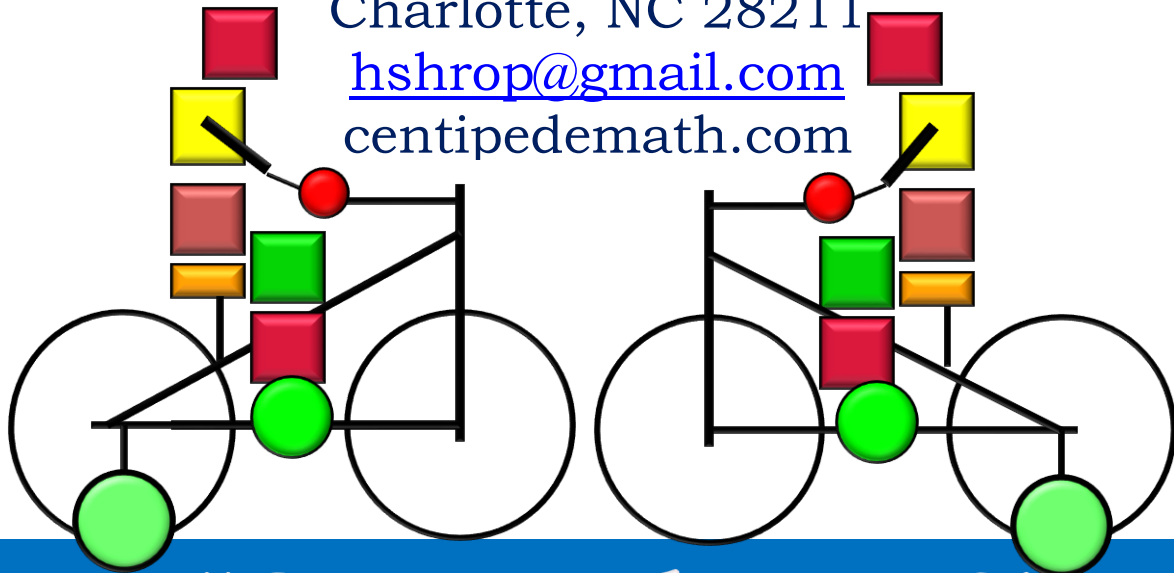
*“makes math easy”*

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*“Can you do easy?”*

**M**y name is Harvey Lewis Shropshire. I have an M. Ed. with a concentration in Special Education and a Ph.D. in Theology. I am the creator of Centipede Math and the owner of its trademark. I design strategies for PreK-5th graders who struggle with math.



Does math look like a foreign language to your child?

## **INTRODUCTION**

Centipede Math is not a curriculum but a resource for teaching students who struggle with math. Its consultants are math teachers who currently teach in both private and public schools.

The students enrolled in my class were 3rd-5th graders identified with IQs ranging from 62-68. After being introduced to Centipede Math, most of my students scored on grade level in math on the Woodcock-Johnson IV Tests of Achievement. As a result, the school incorporated it into its math curriculum.

What separates Centipede Math from its competitors? It teaches students to teach the brain with their hands and eyes. It uses fewer materials. It can replace Cuisenaire Rods, Montessori math boards, fraction tiles, etc.

I am confident that Centipede Math can be a resource for teaching math for students who struggle with math. I look forward to talking with you.

# WHAT ABOUT CENTIPEDE MATH?

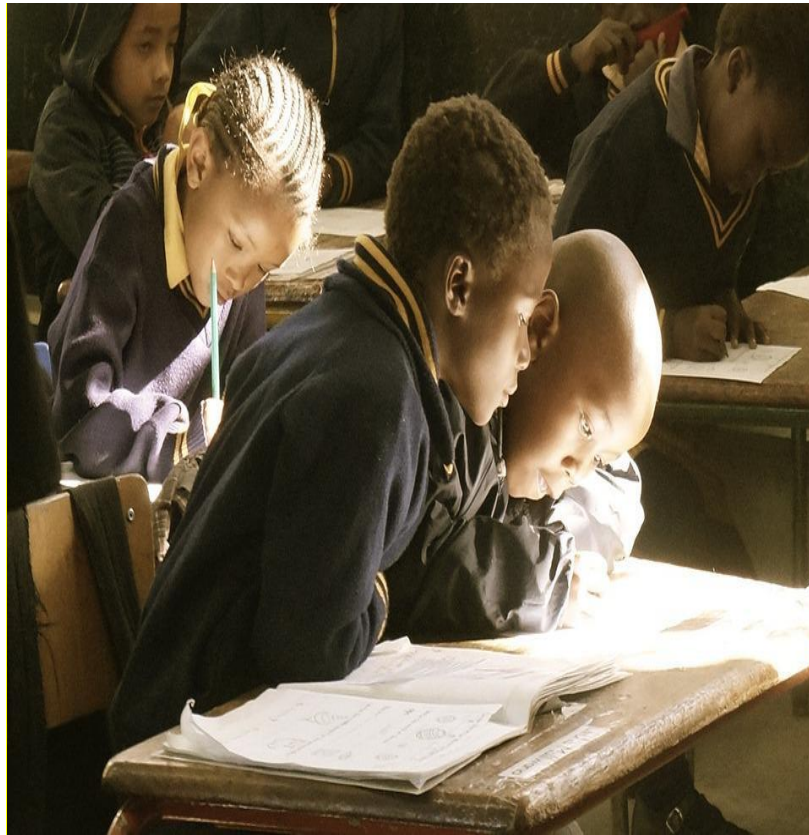


**C**entipede Math provides the students with math challenges the necessary strategies to compensate for the lack of skills needed for their learning style. The methods help the students who have difficulty remembering math facts and learning how to *compute and solve* problems.

**I** was a Supplemental Educational Service (SES) provider at Title 1 schools for the federal program NCLB in 4 counties throughout North Carolina for four years. Centipede Math made a significant difference in many students within the Charlotte-Mecklenburg Community and surrounding counties.



Centipede Math aims to assist students who struggle with math to meet their curriculum goals in math.





Centipede Math gained the attention of professors at the University of North Carolina at Charlotte, Johnson C. Smith University, principals, classroom teachers, parents, and educational consultants. They support its use as a resource in both public and private classrooms.

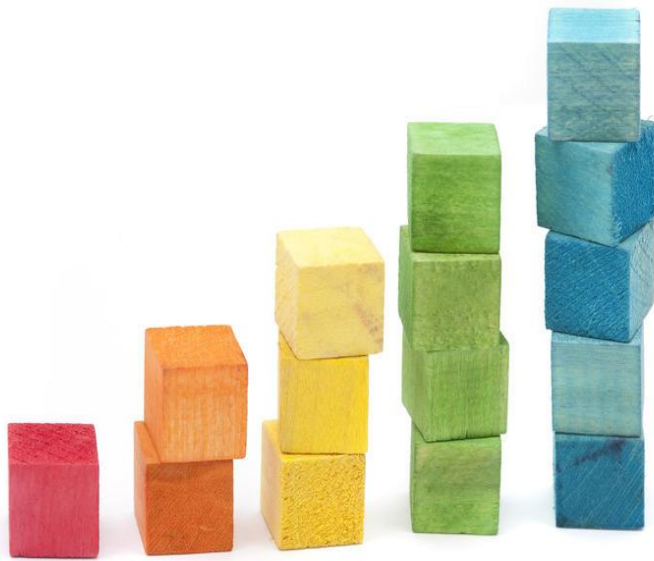




**R**esearch shows that students who struggle with math have barriers that interfere with learning math:

- Inability to understand the abstract nature of math
- Inability to be consistent in the calculation
- Inability to master basic math facts
- Inability to understand math concepts

**C**entipede Math animated, PowerPoint lessons, manuals, teaching materials, boards, and workbooks assist both teachers and students in learning the strategies. Both large and small groups benefit from using Centipede Math.







**I**f you desire smiles of success on your child's face, Centipede Math is a resource that teaches math in the way your child needs to learn.

## A BRIEF DESCRIPTION OF STRATEGIES

Centipede Math believes that if a math strategy is research-based, designed to compensate for cognitive skills lacking in performing math successfully, complements learning style, comparable to the rationale of a child, and is developmentally specific, students can learn math. Centipede Math builds on many strategies.

However, two fundamental strategies are essential in the initial stage of learning Centipede Math: *Group* and the *Centipede*.

# GROUP

## *What is a group?*

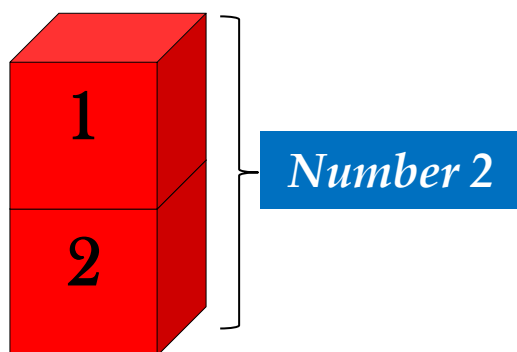
A group is a mathematical configuration of a prescribed quantity used to solve basic math. Groups of blocks help students conceptualize a group. One block is not a group because a *group* “is 2 or more blocks stacked together.”

## *Why Group?*

A group makes abstract ideas concrete. It helps the students by modeling mathematical concepts to assist them in understanding the concept.

## *Group Models*

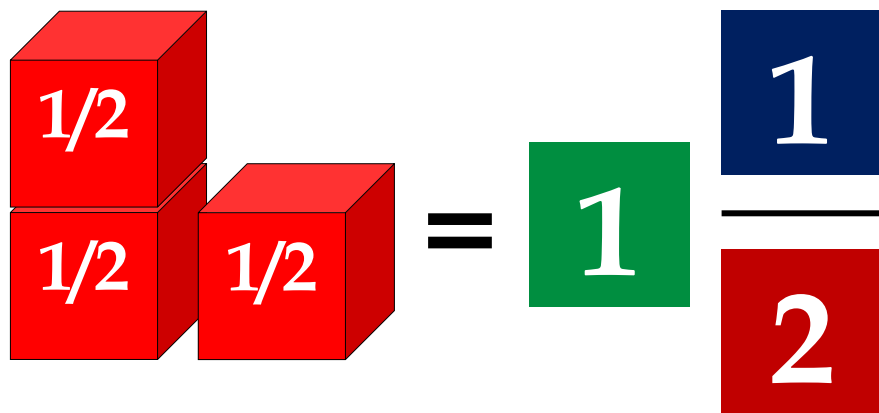
This group model represents *quantitatively* one group with two blocks, not one group of 2:



What makes it a quantity is two blocks, not 2. The student associates the two blocks with their abstract representation. As a result, groups allow the students to see numbers *quantitatively*.

Seeing numbers quantitatively helps the students to model mathematical concepts. Also, one group with two blocks makes Number 2.

This model represents, quantitatively, one group with 2/2s with 1/2 leftover or 3/2s. Centipede Math Fraction Blocks come with all fraction boards and manuals. (The quantity is inherent in the fraction: 2/3rds; 4/5ths; 1/2, etc.)





Group Fractions allow the students to see *quantitatively* what makes the fraction 1 and  $1/2$ . Also, the students can see that 3 halves make the improper fraction  $3/2$ s.

### *Patternization*

The grouping process is called *patternization*. It is a hands-on method by which students group mathematical expressions into a group model:



## *Patternization in Division*

In solving 3 divided 2, traditionally a teacher asks: “How many times can 2 go into 3?” What does *go into* mean? The language is too vague. How do you show *go into*?

According to Centipede Math, the teacher instructs the students to first convert the problem into a word problem by asking, “What is this problem asking you to find out?”

The students respond, “How many groups with 2 blocks can you *take away* from one group with 3 blocks?”

The act of taking away allows the students to see the problem quantitatively.

Next, the students count each block and take away one group with 2 blocks from the one group with 3 blocks.

However, after the students finished solving the problem in a traditional classroom, the teacher asked, “What is the answer?”

The students responded, “One and remainder one.”

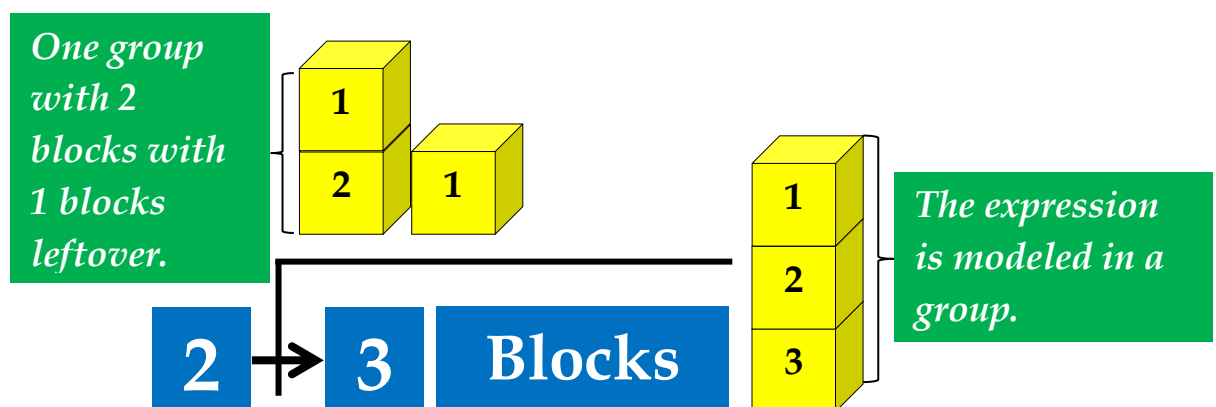
What do *one and remainder one* mean?  
What does it say about the problem?

Unlike the traditional teacher, the Centipede teacher asks, “How many groups with two blocks can you *take away* from one group with three blocks?”

The students respond, “You can *take away* one group with 2 blocks with one block leftover from one group with 3 blocks.”

The answer allows the students to see that a given quantity in the division process remains the same despite how quantity is adjusted.

In other words, grouping in division teaches a student that a *certain quantity* remains the same regardless of how the amount is adjusted or reconfigured:



Centipede Math believes that a *group* is a perfect model to teach math to students who struggle with math. It bridges the gap between the abstract and the concrete.

By manipulating a group, according to a given operation, students see how the fundamentals operate: addition, multiplication, subtraction, and division.

*How does group help students learn about the fundamentals of math?*

- Shows, quantitatively, how addition is the act of *joining together* disjointed subgroups per place value.



- Shows, quantitatively, how multiplication is both the act of *grouping* and *joining together* multiple subgroups of the same amount per place value.
- Shows, quantitatively, how subtraction is the act of *taking away* a subgroup from a whole group per place value.
- Shows, quantitatively, how division is the act of *taking away* a prescribed amount of subgroups of equal amount from one whole group per place value.

- Shows, quantitatively, how a whole number becomes a fraction by *taking away* some of its parts from the total amount of equal parts of which the whole consists.

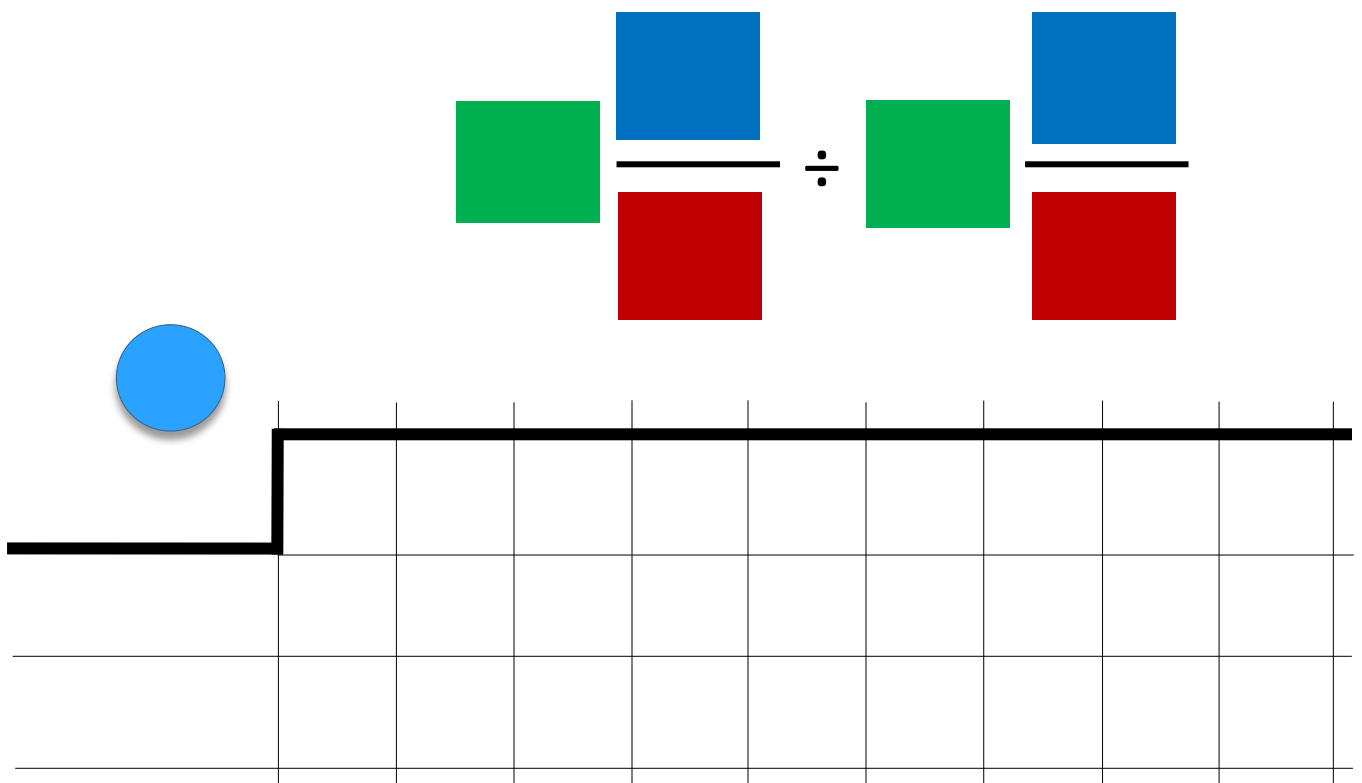
Group lessons are as follow: Group Addition, Multiplication, Subtraction, Division, and Fractions.

## THE CENTIPEDE

The Centipede is the second strategy. It is a grid of different models that a student draws to assist in retrieving math facts and solving problems. It represents an *eternal memory* for students who struggle with math.

It helps students with two essential factors for solving math problems: the retrieval of math facts and following multi-task operations in solving math problems.

### *Fraction Centipede*



The Centipede lessons are as follow:  
Addition, Multiplication, Subtraction,  
Division, and Fractions.

## *Intervention*

*Centipede Math* incorporates the CRA strategy. It consists of three stages: concrete, representational, and abstract. Each phase builds on the previous instruction to assist students in conceptualizing the fundamentals of basic math.

The *Concrete Method* uses *groups* to incorporate hands-on activities in solving math problems.

The *Representational Method* uses the *Centipede Grid* for tallies to represent numbers and circles to represent steps of an algorithm.

The *Abstract Method* uses the *Centipede* to introduce numbers and operational symbols to indicate addition, multiplication, subtraction, division, and fractions.

Materials:

- Boards for all four operations and Fractions
- Fraction Blocks
- Charts for all four operations and fractions
- Workbooks
- Animated Manuals for teachers



