



from  
**GRAHAM FLETCHER &  
TRACY JOHNSTON ZAGER**



# Building Fact Fluency

A TOOLKIT FOR ADDITION & SUBTRACTION



**ZANER-BLOSER.COM**  
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# Building Fact Fluency Through Conceptual Understanding

For years, teachers have been asking students to memorize their math facts, but somewhere between asking students to memorize their math facts in elementary school and then expecting students to use facts in practice, something isn't transferring.

It's for that reason math specialist Graham Fletcher and district math coach Tracy Johnston Zager created *Building Fact Fluency: A Toolkit for Addition & Subtraction*—a comprehensive, research-based toolkit designed to help students learn math facts by developing deep, conceptual understanding and engaging in purposeful practice.

**“Fact fluency is not an add-on—it's an integral part of learning arithmetic with deep understanding.”**

**— GRAHAM FLETCHER & TRACY JOHNSTON ZAGER**



**Graham Fletcher** is a math specialist who is continually advocating for best practice in elementary mathematics by seeking new and innovative ways to support students and teachers in their development of conceptual understanding.



**Tracy Johnston Zager** is a district math coach who loves to get teachers hooked on listening to kids' mathematical ideas. Tracy edits professional books and is the author of *Becoming the Math Teacher You Wish You'd Had: Ideas and Strategies from Vibrant Classrooms*.

# HOW It Works

With the *Building Fact Fluency* toolkit, students will be able to see how number facts connect to a wide variety of mathematical situations, problems, and contexts and build a foundation of strategies they can draw from efficiently and with confidence.

## Strategies and Contexts

The *Building Fact Fluency* toolkit is designed around multiple contextual themes that invite students to explore seven foundational and derived strategies. Each of the seven strategies is taught through three real-world contexts supported by a string of related activities, tasks, and games.

### 7 STRATEGIES, 21 REAL-WORLD CONTEXTS

#### Sums within 5

- Marbles
- Crayons
- Toy Cars

#### Plus and Minus 0, 1, 2

- Shells
- Bears
- Blocks

#### Doubles

- Lemonade
- Apples
- Eggs

#### Combinations for 10

- Markers
- Buttons
- Peppers

#### 10 and Some More

- Pizza Slices
- Markers
- Coins

#### Near Doubles

- Apples
- Eggs
- Chopsticks

#### Make-10 or Pretend-10

- Pizza Slices
- Markers
- Tennis Balls

## Lesson String

A Lesson String is a cluster of related activities, tasks, and games for each context. Over the course of a Lesson String, students will discuss vibrant images using both informal and mathematical language as they mathematize situations. See pages 2–3 for Lesson String details.

## WHO It's For

An ideal supplement to any curriculum or for any situation where students need additional fact fluency practice and review, *Building Fact Fluency* toolkit can be used for:

- ✓ K–2 classrooms
- ✓ Intervention
- ✓ English Language Learners
- ✓ Special Education
- ✓ After School, Summer School, and Tutoring



“Fluency builds from initial exploration and discussion of number concepts to using informal reasoning strategies based on meanings and properties of the operations to the eventual use of general methods as tools in solving problems.”

—National Council of Teachers of Mathematics, 2014

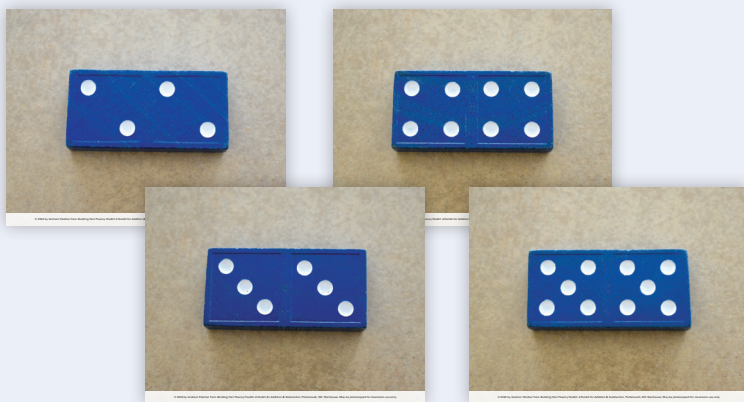
# SAMPLE Lesson String Sequence

The Lesson Strings for each context are designed to provide intentional exploration, practice, and review of key number strategies, moving from introducing the concept through an Image Talk to eventually connecting the strategy to an abstract number. Here's a brief overview of the Lemonade Lesson String, one of the 21 strings included in the toolkit.



## IMAGE TALKS

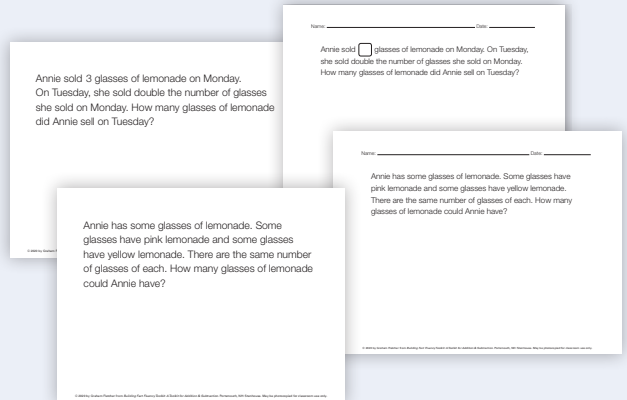
Short routines, similar to Number Talks, based on a photograph or series of photographs of everyday objects



## TRY IT OUT!

Visit [zaner-bloser.com/mathematics/building-fact-fluency/materials.php](https://zaner-bloser.com/mathematics/building-fact-fluency/materials.php)

1. Request a Sample of the Addition & Subtraction Toolkit.
2. Access the "Lemonade" Lesson String activities featured here.



## ANCHOR PROBLEMS

Rich, problem-based lessons that support students' reasoning about addition and subtraction (in English and Spanish)

## TOOL TALKS

A series of photographs that provide opportunities for students to connect the meaning-making they've been doing with the context to slightly more abstract math tools

# Lesson Strings . . .

- Align with research on how students develop fact fluency
- Build understanding of math relationships and encourage connections
- Can be used for whole-class or small-group instruction
- Supplement any math curriculum

2 + 2

3 + 3

4 + 4

5 + 5

**Doubles Contextualized Practice (Lemonade) ±**

	Small Unknowns	Change Unknowns	Start Unknowns
<b>Join</b> (Add It)	Max poured 2 glasses of pink lemonade. How many glasses of yellow lemonade did he pour to get 4 glasses of lemonade altogether?	Max poured 2 glasses of yellow lemonade. How many glasses of pink lemonade did he pour to get 4 glasses of lemonade altogether?	Max poured 2 glasses of pink lemonade. How many glasses of yellow lemonade did he pour to get 4 glasses of lemonade altogether?
<b>Separate</b> (Take Away)	Max and Annie had 4 glasses of lemonade. How many glasses of pink lemonade did they have left if they had 2 glasses of yellow lemonade?	Max and Annie had 4 glasses of lemonade. How many glasses of yellow lemonade did they have left if they had 2 glasses of pink lemonade?	Max and Annie had 4 glasses of lemonade. How many glasses of pink lemonade did they have left if they had 2 glasses of yellow lemonade?
<b>Part-Part-Whole</b> (Put Together, Take Apart)	Max has 2 glasses of pink lemonade and 2 glasses of yellow lemonade. How many glasses of lemonade does he have?	Max has 2 glasses of pink lemonade and 2 glasses of yellow lemonade. How many glasses of pink lemonade does he have?	Max has 2 glasses of pink lemonade and 2 glasses of yellow lemonade. How many glasses of yellow lemonade does he have?
<b>Compare</b>	Max poured 2 glasses of pink lemonade. Annie poured 4 glasses of yellow lemonade. How many more glasses of pink lemonade did Max pour?	Max poured 2 glasses of pink lemonade. Annie poured 4 glasses of yellow lemonade. How many more glasses of yellow lemonade did Annie pour?	Max poured 2 glasses of pink lemonade. Annie poured 4 glasses of yellow lemonade. How many more glasses of pink lemonade did Max pour?

Name \_\_\_\_\_ Date \_\_\_\_\_

Max poured  glasses of pink lemonade. Then he poured the same amount of yellow lemonade. How many glasses of lemonade did Max pour altogether?

[2] [4] [7] [13]

## NUMBER TALKS

Powerful, short, mental math routines in which students talk about the different ways they can mentally solve computation problems

## CONTEXTUALIZED PRACTICE PROBLEMS

Collections of story problems that provide ample opportunities for students to work deeply with the operations within each context and across all problem types, building connections with practice (in English and Spanish)

**Dominating Doubles (6-sided die)**

**Materials:**

- Two different color counters
- One 6-sided die
- A playing chip (such as a penny, pebble, or cube)

**Instructions:**

- Player A and B decide who will play which color.
- Player A rolls the die and chooses whether to double or halve the number rolled.
- Player A puts the playing chip on this move.
- Player A decides the move (double or halve) to the number on the die.
- Player A covers the result on the gameboard with a colored counter.
- Player A and B alternate turns until one player gets four in a row (across, down, or diagonally).

**Example Turn:**

- Player A rolls 4.
- Player A decides whether to take half of 4, and play 2, or to double 4, and play 8.
- Player A decides to double 4, so places a chip on "Double the Die" and chooses one of the 8s on the gameboard to cover with a colored counter.
- Play passes to Player B.

**(OPTIONAL) Example Recording:**

Player A might record the example turn as: 4 × 2 = 8. Or 2 × 4 = 8. If Player A had halved the die, they might write 4 ÷ 2 = 2, 4 ÷ 2 = 2, or 4 ÷ 2 = 2.

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Place the chip in the box for the move you want to make.

Double the Die	Halve the Die
4	8
2	4
4	10
3	12
8	1
4	3



## GAMES FOR PURPOSEFUL PRACTICE (29 games plus materials)

A set of highly-engaging games, including all the cards, playing counters, dice, and downloadable gameboards needed for whole-class number fact practice and fun (Available in Spanish online)

## 3-ACT MATH TASK VIDEOS (Bonus content for select contexts)

Problem-based lessons that give students opportunities to mathematize the world, engage in mathematical modeling, and understand the structure of story problems (in English and Spanish)

# Toolkit COMPONENTS

Provides multiple years of fact fluency lessons and practice!

## What's Inside

### Facilitator's Guide

The Facilitator's Guide offers a comprehensive overview of the toolkit, including detailed chapters describing the components, implementation tips, possible uses in different settings, and embedded assessment strategies.

### Image Talks Flipchart (For Small Groups)

This small-group resource includes 21 sets of colorful, engaging photographs of everyday objects that are used in the Image Talks routine—a visual, inviting warm-up designed to begin the strategy discussion.

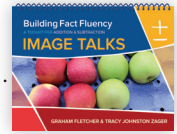
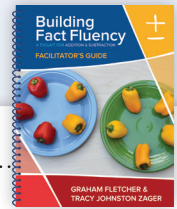
### Tool Talks Flipchart (For Small Groups)

The 21 sets of photos in the Tool Talks flipchart provide opportunities for small groups to connect meaning-making to slightly more abstract math tools such as a dice or dominoes.

### Games for Purposeful Practice (For Whole Class or Small Groups)

The toolkit contains 29 highly-engaging games and materials including:

- 29 different demonstration game boards
- 500 playing counters
- 13 card decks containing 5-, 10-, and double 10-frame cards
- 39 10-sided dice
- 39 6-sided dice



## What's Online

Each toolkit includes access to a robust Companion Website that includes a variety of downloadable, printable, and projectable resources for whole class and small-group use:

### Anchor Problems

32 problems provided in projectable and printable formats (in English and Spanish)

### Contextualized Practice Problems

243 story problems provided in both projectable and printable formats (in English and Spanish)

### Number Talks

31 powerful, short, mental math routines in which students share their thinking

### Image Talks

All 21 sets of photos in the Image Talks flipchart, plus an additional 28 sets

### Tool Talks

All 21 sets of the photos included in the Tool Talks flipchart, plus 24 additional sets

### Student Recording Sheets

Downloadable sheets for students to record their work and reflections (in English and Spanish)

### Game Boards

Printable versions of the demonstration game boards from the toolkit, plus additional games for extra practice (in English and Spanish)

### 3-Act Math Task Videos

Engaging, story-based problems (one per Strategy included, in English and Spanish)

### Professional Learning Videos

More than 25 videos containing lesson demonstrations, implementation tips, and assessment strategies, including:

- Observations and Interviews
- Looking at Student Work
- Journaling and Reflection
- Student Self-Assessment

