

ADDING PARENTS *to* *the* EQUATION



**Understanding Your Child's
Elementary School Math**



**HILARY KREISBERG
MATTHEW L. BEYRANEVAND**

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*Note: The word *parents* is used throughout this study guide and the book *Adding Parents to the Equation*. Our use of the word *parents* includes guardians and caregivers.

How to Use This Study Guide

Who is this meant for?

This study guide is meant for parents/guardians and educators. While it will likely be used more by educators, I have written it in such a way where a group of parents can facilitate a book study using it without an educator present.

Why did you write it?

Twitter is an incredible resource and I want to thank Amy Burk (@EstabrookMath) for suggesting to create a guide that she and others could run a book study with parents/guardians using *Adding Parents to the Equation* as the central focus.

How can we use it?

There is absolutely no prescribed way to use this guide or the book. Please use this how you see fit. It's also important to note that the book itself dives into an array of content areas that span preschool through middle school. This means that when you conduct the book study, you might only focus on specific chapters that are relevant to the group, rather than the entire book. For example, if you are a parent of a kindergartner and are meeting with other parents of kindergartners, you might choose to focus on the Introduction and Chapters 1 - 4, which will be mostly relevant to your youngsters. Alternatively, you might conduct the study using the entire book so parents can see what is to come. Again, completely up to you!

This guide contains:

- Short summaries of each chapter;
- Discussion questions for each chapter;
- Additional activities to try with your youngsters;
- Opportunities to enact what you've read so you can come back together and discuss successes and areas for growth.

It is my hope that this guide serves you and your community in engaging in the important conversations around math, learning, mindset, and how to help parents around you understand the shifts in the way we teach and learn math today.

Look for me on Twitter at @Dr_Kreisberg or by using the hashtag #AddingParents so we can continue the learning together.

Warmly,
Dr. Hilary Kreisberg

Introduction

Suggestion: Engage in the discussion below *before reading the Introduction of Adding Parents to the Equation*. Though brief, the Introduction sets the stage for a valuable discussion around how parents feel today about the way their children are learning math. By relating with parents through the eyes of other parents, you will feel at ease about the way your child is learning math. In your book group, online chat, or informal learning community, be sure to establish a set of norms so you may engage in discussions that are lively - where there is mutual respect for opinions, perspectives, and ideas - and a brave space for all participants to share how they feel, even if it doesn't align with the status quo.

Discussion Questions:

1. The quote from the *Incredibles 2* movie on page ix states, "I don't know that way. Why would they change math? Math is math. MATH IS MATH!" As a group, watch the following clip from the *Incredibles 2* trailer, found here: <https://tinyurl.com/mathismath>.
 - a. How realistic is this scene for you?
 - b. How might the father's reaction impact the son's behaviors and future math efforts?
 - c. Do you agree or disagree that math is math and that it can never change? Why?
 - d. The father asks, "Why would they change math?" Why do you think educators have changed the way they teach math?

2. Write down three words that describe how you feel about the math your child brings home.

3. Now, look at Table I.1. on page x which shows, on average, how parents we surveyed feel about helping their children with math today.
 - a. How similarly or differently do you feel to the parents we surveyed?
 - b. Why do you feel the way you do?
 - c. What could your child's teachers do this year to help you feel supported, at ease, and confident?
 - d. How will you communicate your needs to your child's teachers?

Chapter 1

Suggestion: Please read Chapter 1 in *Adding Parents to the Equation* *before engaging in this discussion*. This chapter succinctly describes *why* we teach and learn math differently today, as compared to the past. Parents are just looking to understand and in our talks with parents, after reading this chapter alone, they felt more at ease with the shift.

Discussion Questions:

1. Read the introductory quote from the National Research Council (2016) on page 1.
 - a. What do they mean that our children will face new demands that school math should anticipate?
 - b. What math demands have you faced as an adult that you wish your math learning as a child could have better prepared you for?
2. According to the text and your experience, why has our teaching and learning of math changed since we were kids?
3. In what ways have technology and artificial intelligence contributed to the shift in how teachers need to teach math?
4. The authors state, “The traditional ways of learning no longer prepare students for the future that lies ahead of them (p. 2).” What do the authors mean?
5. Look at the “Did You Know?” box on page 5. What other practices have changed as a result of better technology or research? Make a list.
6. On pages 6-7, the authors describe the C-R-A approach as a sequence of stages in our learning development. These stages sometimes can occur at the same time, for example, drawing a picture while also writing a number sentence to build the connections between two stages. When your child is struggling with a concept that is presented in symbols (such as an addition or subtraction problem), how can you use your knowledge of this trajectory to help them?

Chapter 2

Suggestion: Please read Chapter 2 in *Adding Parents to the Equation* *before engaging in this discussion*. In our opinion, Chapter 2 is the most pivotal chapter of the book for parents to read and discuss. Chapter 2 is all about **mindset** and not children's mindset - but parents' mindsets. It is critical that parents engage in deep discussions around the benefits of a growth mindset and how developing their own growth mindset is just as critical as instilling one in their child(ren).

Discussion Questions:

1. Read the introductory quote by Carol Dweck on page 9.
 - a. Do you agree or disagree with this quote?
 - b. How much do you follow the quote for yourself?
2. How much time do you typically spend helping your child with homework? What is your goal when helping your child with homework?
3. What is the difference between a **fixed mindset** and a **growth mindset**?
4. Take the Mindset Questionnaire from Table 2.1. on page 10. Score your results using the Mindset Scoring Rubric from Table 2.2. on page 11.
 - a. In what ways do you exhibit a fixed mindset, if at all?
 - b. In what ways do you exhibit a growth mindset, if at all?
5. On page 13, the authors share how common a phrase "I'm not a math person" is, yet how uncommon it is to hear people boast, "I'm not a thinking person."
 - a. Have you ever said you are not a math person? What experiences have led you to feel you aren't a math person?
 - b. Have you ever said or implied in front of your child that you aren't good at math or that you aren't a math person? What are some implications of saying you are not a math person in front of your child?
6. Reread pages 14-17 about the core principles of our brain's plasticity. Highlight one sentence that helped you see something differently. Put a star next to one sentence that you want to remember. Share with the group:
 - a. what you highlighted: How similar or different are the sentences you highlighted?
 - b. what you starred: Why do you want to remember this?

Chapter 2 continued...

7. On page 19, the authors list 5 famous individuals who had to engage in a growth mindset to overcome setbacks. Did any surprise you? How could you use these individuals as examples for your child?
8. Why is it problematic to tell your child “you’re so smart” or to praise their intellect rather than their efforts and behaviors?
9. What is a **productive struggle**? How can you facilitate your child’s learning experience so they are comfortable with struggling and don’t fall down the destructive struggle path?
10. Look at the Homework Tips Chart (Table 2.5.) on pages 23-25. Which “don’t” will be the most challenging for you? Why? Engage in a discussion with others in this group to see if together you can come up with suggestions to help you.
11. In the summary, the authors list three mindset principles that they feel parents need to have to be able to foster a growth mindset at home. Which one had the most impact on you as you read? Why?
12. What is one thing you will do or say differently as a result of this chapter?

Additional Resources:

- Mindset Kit - has 10 lessons about **growth mindset** for parents and **videos** to watch! Check it out: <https://www.mindsetkit.org/growth-mindset-parents>
- Stanford Professor, Dr. Jo Boaler, has added a section to her useful resource YouCubed just for parents! There are articles and research behind **mindset**. Check it out: <https://www.youcubed.org/resource/parent-resources/>
- Read *Everyone Can Learn Math* by Alice Aspinall to your child (or have your child read it to you!) Engage in a discussion around how **everyone can learn math** and that it is not a genetic trait that we inherit. A short, but powerful picture book. See more here: <http://everyonecanlearnmath.com/>
- Mindset Works also offers tons of **videos** and advice on how to parent using a growth mindset. Check it out: <https://www.mindsetworks.com/parents/default>

Chapter 3

Suggestion: Please read Chapter 3 in *Adding Parents to the Equation* *before engaging in this discussion*. Chapter 3 walks parents through the preschool and early childhood topic of beginning numeracy. In this Chapter, parents learned about how our English language can be challenging when learning how to count and all about number sense.

Discussion Questions:

1. In the first part of the Chapter, the authors discuss how children who learn to speak Asian languages, such as Chinese or Japanese, often outperform children in math who learn to speak English as a first language.
 - a. What is different about the language of numbers in Chinese or Japanese as compared to English?
 - b. Why might some children say 81 is “eighteen?”
2. Look at Figure 3.1. on page 30. What are the three main aspects of numbers? How do you support these three aspects of numbers at home?
3. On page 31 you learned about **subitizing**. Now, as a group, you will experience subitizing. Show the following video from MathisVisual.com:
<https://tinyurl.com/subitizeactivity>.
 - a. How did you see the dots?
 - b. What is the value in children engaging in discussions around how they saw the dots?
 - c. What connections to math do you see?
4. One of the stages of counting is called **one-to-one correspondence**. Watch this video from Origo about one-to-one correspondence:
<https://tinyurl.com/1to1correspondence>.
 - a. What challenges might children face when trying to use one-to-one correspondence?
 - b. How can you help your child avoid those challenges?
 - c. What is important about this stage of counting?
5. On page 42, the authors offer an example of a bath time activity to support children’s counting. What other ways do you support your child’s counting at home?

Chapter 4

Suggestion: Please read Chapter 4 in *Adding Parents to the Equation* *before engaging in this discussion*. In this Chapter, the authors help parents better understand the “school” language that is often used both by teachers and children by way of the tools that are used in math class. Becoming more familiar with the educational jargon and tools can help improve communication between parents and teachers and parents and their children.

Discussion Questions:

1. On pages 45-47, the authors help parents to better understand the word “tools” as used by math teachers. They also introduce the word **manipulative**. What do these words now mean to you when speaking mathematically?
 - a. What are some tools you see your own child using in math?
 - b. Are any of those tools manipulatives? How do you know?
2. The first tool that is introduced is the **Unifix Cube**. The authors offer several activities for parents to try with their children.
 - a. Which activities have you tried? Which do you want to try?
 - b. Either using actual Unifix Cubes or a virtual manipulative site, such as Didax’s (<https://www.didax.com/apps/unifix/>), play around with the cubes. What other activities can you imagine your child enjoying that the authors didn’t list in the book?
3. Another tool that is introduced is **pattern blocks**. The authors offer several activities for parents to try with their children.
 - a. Which activities have you tried? Which do you want to try?
 - b. Either using actual pattern blocks or a virtual manipulative site, such as Didax’s (<http://www.didax.com/apps/pattern-blocks/>), play around with the blocks. What other activities can you imagine your child enjoying that the authors didn’t list in the book?
4. Base-ten blocks are also a pivotal tool that the authors discuss. Using actual base-ten blocks or a virtual manipulative site, such as Didax’s (<http://www.didax.com/apps/base-ten-blocks/index.html>), play around with the blocks. What other activities can you imagine your child enjoying that the authors didn’t list in the book?
5. What tools does your child use at school that are new to you?

Chapter 5

Suggestion: Please read Chapter 5 in *Adding Parents to the Equation* *before engaging in this discussion*. As the authors dive deeper into the content, Chapter 5 explores how many children today are learning to add and subtract whole numbers. In order to engage in a deep discussion, please be sure to solve the addition and subtraction tasks from the book ($67 + 109$ and $181 - 49$) using several of the strategies you've learned in this chapter. Feel free to use a virtual manipulative, such as those presented in the last chapter section of this study guide, to represent your strategies.

Discussion Questions:

1. Which addition or subtraction method did you find most easy to understand? What made it easier to understand than others?
2. Which of the addition methods were most confusing to you? What caused the confusion?
3. Which of the subtraction strategies were most confusing to you? What caused the confusion?
4. Of the strategies and models presented in this chapter, which have you seen your child use?
5. Do you agree or disagree with the following statement?
All addition and subtraction strategies that exist are presented in this chapter.
6. Look at Figure 5.4. on page 77. What are the authors trying to show? What is problematic about what is shown?
7. Now look at Figure 5.5. on page 78.
 - a. How would you solve that subtraction problem?
 - b. What would you say is the most efficient way to find the difference?
8. Without writing anything down, solve $78 + 29$. How did you do it? Discuss your different strategies and have someone record the strategies on a piece of paper for all to see. What is similar and different about each of your strategies?
9. Do the same activity as #8, but this time, solving $91 - 37$.

Chapter 6

Suggestion: Please read Chapter 6 in *Adding Parents to the Equation* *before engaging in this discussion*. Like Chapter 5, Chapter 6 explores how many children today are learning to multiply and divide whole numbers. The critical piece of this chapter is that the authors present a progression, or trajectory, of how people come to learn and connect the mathematical ideas behind multiplication and division.

Discussion Questions:

1. How do you define multiplication? Division? What in this chapter made you think differently about your definitions?
2. What, from the chapter, was most confusing to you about multiplication or division?
3. As a group, engage in one of the activities shown in Figures 6.9. and 6.10. on page 114. Using counters or the virtual manipulatives (refer to Chapter 4 section of the study guide), build an **array** and ask another person in your group to identify how many counters there are and to share how they knew. Then, build a new array and cover some of the counters. Ask that person to do the same task. What was more challenging about the second version?
4. Without writing anything down, solve 25×16 . How did you do it? Discuss your different strategies and have someone record the strategies on a piece of paper for all to see. What is similar and different about each of your strategies?
5. Do the same activity as #5, but this time, solving $375 \div 25$.
6. On page 117, Figure 6.12. shows a multiplication table. What patterns do you notice?
7. As a group, solve the two problems from #4 and #5 using **area models**. What was helpful? What was challenging?
8. Now solve the two problems from #4 and #5 using **partial products** and **partial quotients**. How does this strategy compare to the area model strategy?

Chapter 7

Suggestion: Please read Chapter 7 in *Adding Parents to the Equation* *before engaging in this discussion*. This chapter is all about **fractions**! Fractions can often be a source of fear for many people, perhaps even you. Use this chapter and book group to better understand the content. Ask questions, be vulnerable, and make mistakes so you can learn from them!

Discussion Questions:

1. Look carefully at Table 7.1. on page 132. Look at four different interpretations of the fraction $\frac{4}{5}$. (Note: 1st Edition reads “five” interpretations - this is an editing mistake, as we eliminated fractions as ratios from the table to keep it simpler and focus on elementary school only.)
 - a. Which interpretation do you use most often when thinking about fractions?
 - b. Which interpretation do you use least often when thinking about fractions?
2. Do you agree or disagree with the following statement? Why or why not?

The fraction $\frac{3}{4}$ is always greater than the fraction $\frac{1}{2}$.
3. On page 136, Figure 7.2. shows us three different models for working with fractions: an **area or regional model**, a **linear or number line model**, and a **set model**. Look at the corresponding visuals and examples.
 - a. What’s similar and different about each model?
 - b. Look at the ‘examples in your home’ section. Can you think of one more example in your home for each model?
4. Just like we learn in counting whole numbers that all numbers are made up of ones or units (e.g., $1 + 1 + 1 + 1 = 4$), when counting fractions, all fractions are also made up of units - specifically, **unit fractions** (e.g., $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{4}{4} = 1$).
 - a. Why is it important for students to learn about unit fractions?
 - b. Why do the authors suggest that when working with your child, you should call a fraction, such as three-fourths, “3 *one-fourths*”?
5. The authors present several ways to compare fractions. Use one or more of the methods to compare the following fractions (i.e. which fraction is greater):

$$\frac{4}{5} \text{ or } \frac{3}{4}$$

Chapter 7 continued...

Additional Resources:

- Graham Fletcher, a math specialist, has created a wonderful 7-minute video that helps teachers make sense of fractions from early childhood through elementary school. Parents would benefit from watching the video after reading Chapter 7 to solidify their understandings. Check it out: <https://vimeo.com/194878951>.
- Another resource used by many teachers is Fraction Talks. The key to this activity is thinking about how you see fractions in a picture or in real-life. Show your child a picture from the site and ask them to find a fractional amount of the picture, such as $\frac{1}{2}$ or $\frac{1}{4}$. Look at the “how to” section of the site to see other questions you can ask to help your child see the picture in many different ways. Showing your child that math is everywhere helps them to believe they are a mathematical thinker. Bathroom tiles are an easy way to do a fraction talk with your child. Look down at the floor tiles next time you use the bathroom and start talking math! Check it out: www.fractiontalks.com.
- Fraction language is everywhere - make sure to use it whenever you can around your youngster, no matter their age.
 - Examples:
 - “We have about $\frac{1}{2}$ a tank of gas left. See how the arrow is halfway between empty and full?”
 - “We are about one-third of the way there! How many thirds do we have to go? If we are one-third of the way there, are we more or less than halfway there?”
 - If you have a child who is learning an instrument, make use of the half notes, quarter notes, and more to discuss fractions.
 - “It’s a quarter to 1:00. What does that mean? Why would we say a quarter when talking about a clock?”
- Fraction Children’s Books:
 - *Fractions in Disguise: A Math Adventure* by Edward Einhorn
 - *Fraction Fun* by David A. Adler
 - *Jump, Kangaroo, Jump* by Stuart J. Murphy
 - *Eating Fractions* by Bruce McMillan

Chapter 8

Suggestion: Please read Chapter 8 in *Adding Parents to the Equation* *before engaging in this discussion*. Chapter 8 takes parents beyond elementary school math and helps them see how the work we are doing in elementary school serves as a foundation for later mathematics. This chapter might feel overwhelming for some parents, so we advise engaging in a group discussion about the connections to elementary learning rather than trying to understand the math (such as, binomials and trinomials).

Discussion Questions:

1. The introductory quote says, “Good mathematics is not about how many answers you know... It’s about how you behave when you don’t know.” What does this quote mean to you? How do you promote this quote in your parenting?
2. This chapter focuses heavily on *vertical alignment*, which just means that children are learning skills in a particular order so one idea builds on another. Look at Example 1 on pages 158-159. What connections do you see? How will children use the tool of **chips (counters)** to later understand adding and subtracting **integers** (positive and negative whole numbers)?
3. Look at Example 2 on pages 159-165. How does what a child learns in kindergarten connect to what they learn later in algebra?
4. Look at Example 3 on pages 165-167. How does the **area model** come back in middle school to build on what children learned in third and fourth grade about multiplication?
5. What are some things you learned in middle or high school that were challenging for you? How will you approach these topics with your child when the time comes?
6. In this chapter, the authors used a balance to show how middle school students will learn about balancing an equation. How could you use a balance at home to build toward these ideas? Using a balance as a tool, how could you show that $2 + 3 = 5$ or $21 + 22 = 43$?

Chapters 9 & 10

Suggestion: Please read Chapters 9 & 10 in *Adding Parents to the Equation* *before engaging in this discussion*. Math is not a school subject. It's important that parents understand that math doesn't start and stop at school - it continues into the home and everyday life. This is why Chapter 9 offers a lot of resources for doing math at home with your youngster. Be sure to make a concerted effort to do math every day with your child. Parents often set time at night to read before bed and we ask parents to think about adding math to your nightly or morning routine. Use the Top 10 Ways to Support Your Child at Home list from Chapter 10 to support this discussion.

Discussion Questions:

1. This chapter is segmented into age groups. Find your child(ren)'s age group and look at the suggested games and literature.
 - a. Pick one game you have not tried at home. Ask the group if anyone has played the game at home and to share their experiences.
 - b. Pick one book you have not read and either buy it or borrow it from your local library.
2. What is one message from this chapter that resonated with you? Share with the group what it was and why it moved you.
3. What do you already do at home to support your child's math learning? Share with the group 1-2 things you already do.
4. Survey the group: How many of us do math every night or morning with our children, just like we read before bed? If the group's results are less than 50%, engage in a discussion around how you can rethink your nighttime or morning routine to include more math.
5. In Chapter 10, the conclusion, the authors list their Top 10 pieces of advice to support your child at home in math. Which of the Top 10 statements is most important to you?

Additional Resources:

- Math Before Bed - a website and a book to support math talk at home. Check it out: <https://mathbeforebed.com>.
- Bedtime Math - a website for daily math activities. Check it out: <http://bedtimemath.org/>.