Building Fact Fluency

A TOOLKIT FOR ADDITION & SUBTRACTION

Implementing *Building Fact Fluency* in Remote, Hybrid, and Distance Learning

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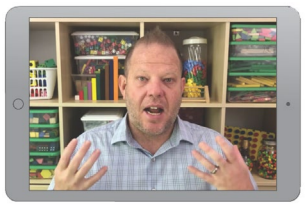


Building Fact Fluency is designed to foster robust conversation among students in a classroom and encourage teachers to listen in as students think and talk about mathematics. Given the realities of COVID-19, however, in-person teaching with students huddled around game boards and teachers crouching down to eavesdrop on students' turn-and-talks on the rug may have to wait for a while. While these realities break our hearts—we live for joyful communities of children learning together in person—we are buoyed by what we've learned working with our field-testing teachers and in experiments with students online to figure out how to adapt this resource for distance learning, both synchronously and asynchronously. Our guiding principles remain the same for distance learning as for in-person learning. We want to: provide robust opportunities for students to make sense of the operations and become fluent, build mathematical communities in which teachers and students learn together, and grow confident mathematicians. We have been watching closely and collaborating with teachers, and we are convinced that *Building Fact Fluency* will make an excellent resource for remote or hybrid learning, for many reasons:

- **It is structured AND flexible.** We designed this toolkit to provide routines and structures, but also preserve teacher flexibility and autonomy. Given this time of tremendous uncertainty, we think teachers and students alike will find great comfort and security in the routines, along with plenty of variety across the contexts and activities. At the same time, we hope teachers will appreciate the flexibility and teacher discretion built into the kit. For example, we've provided a recommended sequence, but have built in tremendous flexibility about pacing. In addition, the materials themselves are so flexible and varied that, whether teaching synchronously or asynchronously, in person or remote, shortened days or hybrid models, or a constant flux among these possibilities, teachers will be able to create daily or weekly schedules using these materials that will engage students across the year, in all formats, and provide some much-needed consistency.

- **Differentiation is baked right in.** The standards included in this toolkit span the full K–2 grade band, and there is rich material in here for students at any stage in the progression, whether they're exploring concepts for the first time, beginning to notice patterns, or synthesizing their work with addition and subtraction into fluency. Wherever possible, we give choice about what size numbers and what problem types to use for practice. Teachers can pass along most of this choice to students, so each student can be appropriately challenged. Students who select different numbers can have even more productive conversations with one another because they can notice patterns across the numbers. (For example, if a group of students discuss a story problem in which some students solved 8 + 2 and others solved 18 + 2 or 38 + 2, every one of those students can contribute to a conversation about what they notice across those problems.) Number size doesn't matter in this case; number relationships and connections are at the forefront of the mathematical discussion.

- **It's invitational—all year long.** We need to continually invite students into math with high expectations, such that all students are successful and challenged. In *Building Fact Fluency,* each new context is a new invitation to students, providing new entry points and on-ramps into the math. These frequent invitations are particularly important during the disruptions of COVID-19. Even if a student disengages for a bit, (which is so easy to do remotely), or has their schooling interrupted due to health, economic, or family reasons, the next new context offers a new square one, and the student can re-enter the work of the class. In addition, the variety of the tasks within a Lesson String provides multiple access points and lots of student choice, and given the inconsistencies in students' schooling last year, these multiple access points become even more important than ever. Finally, the interleaved structure of *Building Fact Fluency* will give students multiple passes through important concepts, so students arriving partway through this complex year can join right in with the class.

- **The major work of the grades.** The *Building Fact Fluency* toolkit is centered on the major work of the grades, especially in K–1, and may be much easier to implement remotely than many curricula because of the use of multimedia and games. Therefore, teachers struggling to plan and teach all subjects remotely can feel reassured by *Building Fact Fluency*'s focus on the most substantive and important standards. If K–1 teachers use *Building Fact Fluency* plus #CountingCollectionsAtHome and rich geometry explorations such as *Which One Doesn't Belong?* and virtual pattern block work, they will have done a really robust job with the expected standards under very difficult circumstances, and students will still build tremendous number sense! Second grade teachers can use *Building Fact Fluency* to catch those first-grade standards that may have been missed last year, even as they extend students' understanding

into multidigit addition and subtraction, while solidifying single-digit fluency. In other words, K-2 students can have access to current grade-level standards as well as do a little just-in-time catching up, all in the same resource at the same time.

- **Highly efficient intervention or small-group work for older students.** *Building Fact Fluency* was written to provide meaningful and accessible opportunities for students to make sense of addition and subtraction, with fact fluency emerging as one of the outcomes. Teachers working with older students who have not yet had sufficient opportunity to build understanding of the operations and also need to work on their number combinations can meet both goals with this one resource. In our field testing, we saw how the high engagement factor of the materials, the very intentional absence of common barriers to entry (e.g., large text loads, speed testing, procedural instruction, or an over-emphasis on memorization), and the richness of the mathematics drew students right in—the very same students who find endless worksheets of fact practice alienating and boring. Given that scheduling intervention, Title, and special educational services is more challenging than ever in a distance environment (and it's *always* challenging under more normal circumstances!), we are excited to provide an accessible resource that can support teachers and students in such an effective and efficient way.

Adapting the Building Fact Fluency *Lesson Strings*

This toolkit was designed to be curriculum–neutral, and it's also platform–neutral. Users have permission to share tasks with students via whatever platform they are using: Google classroom, Seesaw, Padlet, Flipgrid, the whiteboard apps, Zoom, Bluejeans, Screencastify, and so on. We just ask that you keep the materials within the password-protected security you set for your classroom, rather than posting anything on the World Wide Web, and of course, please don't share the materials with colleagues who are not verified users (see "Copyright and Permissions" at the end of this document for specific requirements). Therefore, within your preferred, protected platforms, feel free to experiment to find what works, whether you're teaching synchronously, asynchronously, or a blend. Teachers are resourceful and ingenious, and we know you'll discover new and better ways to implement the toolkit in your setting. We hope you'll exchange ideas in the Facebook community or on Twitter using #BuildingFactFluency, so we can all help one another learn how to do this better! The following thoughts are to get us started thinking about the possibilities.

Every component in the *Building Fact Fluency* toolkit can be taught remotely. The toolkit is centered on seven strategies, each taught through three different contexts, to create twenty-one contexts total. Within each context, we've included a variety of interconnected activities, called a Lesson String. Below, we'll summarize each component of a Lesson String and talk about how it can be adapted for a variety of settings.

Image Talks

The *Building Fact Fluency* Image Talks are a series of photographs of everyday objects that activate students' thinking about the context and launch each Lesson String. They are designed to be invitational, to welcome students' informal and home language and lived experience into the classroom as students begin to mathematize everyday objects.

Image Talks can be facilitated remotely via any platform that allows you to share your screen so students can see the image, or you can hold up the flipbook to your webcam if you are teaching the first Image Talk in a Lesson String. Image Talks make for lovely synchronous small groups in which students can unmute their microphones and talk naturally about what they notice and wonder while you display the images. You can either annotate students' strategies on the picture through whatever annotation tool you like, or you can set up a phone or tablet as a document camera (or use a document camera, if you have one available) and annotate printouts of the pictures. You could also facilitate a large-group conversation remotely the same way, but by using breakout rooms so students have opportunities to talk.

If you're teaching asynchronously, you can share the series of pictures via any platform you like and ask students to respond in writing, annotation, or via voice (using something like Padlet, Flipgrid, Seesaw, Explain Everything, Voice Memos, voice-to-text, a parent's email, etc.). It might work well to record a small synchronous group discussing the Image Talk photos ahead of time and include the video in your slide deck, so you can ask students watching independently to describe their strategies, then listen to classmates, and afterward share if they'd like to add on, revise their thinking, agree or disagree, restate someone's thinking, and so on. That's one way to teach students that we learn by listening and responding to one another's ideas in this class, even if we're distanced

and asynchronous. It's important to rotate around your class for these recordings, so everyone gets a chance to be positioned as a mathematical thinker.

Anchor Problems

The Anchor Problems are designed to be the first problem-solving task within the context. These are problems with openness, and you'll want to launch the problems so all students can access them. This launch might involve a synchronous session, or a recording of you introducing the problem and reading it aloud to students (if applicable). You want to give just enough information to get them started, but not so much that you dictate how students should approach the problem. Once students are working, they need opportunities to draw or represent their thinking on paper. One method that works well is to share the problem with students electronically, have them work on loose paper, and ask them to submit a photograph of their work, perhaps with a description of what they did using platforms such as Seesaw, Explain Everything, Flipgrid, etc.

The power of the Anchor Problem often lies in the discussion, so it's important to think about ways students can share ideas and learn from one another in virtual settings. You might think about selecting a few pieces of student work and sharing them out, asynchronously, and asking students to respond. You might share the students' audio/video explanations, or you might share images of their work via a slide deck or whiteboard app and draw students' attention to connections you want to make or representations or strategies you want to highlight. If you can make only part of this lesson synchronous, it might make sense to launch the problem asynchronously, give students time to submit their work, choose student work to share on your own time, and then facilitate discussion either in small synchronous groups, whole-class synchronous groups with breakout rooms, or whole-class discussions after problem solving. That way you can have students discuss, respond to, and extend the ideas they see in their peers' work, and they will have opportunities to learn from one another.

If you're teaching in a hybrid model with some remote learning and some in-person learning, an Image Talk followed by an Anchor Problem would

Anchor Problem 1:

Annie sold ☐ glasses of lemonade on Monday. On Tuesday, she sold double the number of glasses she sold on Monday. How many glasses of lemonade did Annie sell on Tuesday?

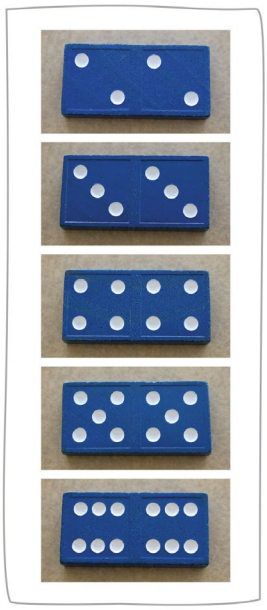
[2] [4] [8]

Anchor Problem 2:

Annie has some glasses of lemonade. Some glasses have pink lemonade, and some glasses have yellow lemonade. There are the same number of glasses of each. How many glasses of lemonade could Annie have?

be a good choice for an in-person learning day. Students could then work through the rest of the Lesson String remotely over the next week or two, building on the foundation you created in person.

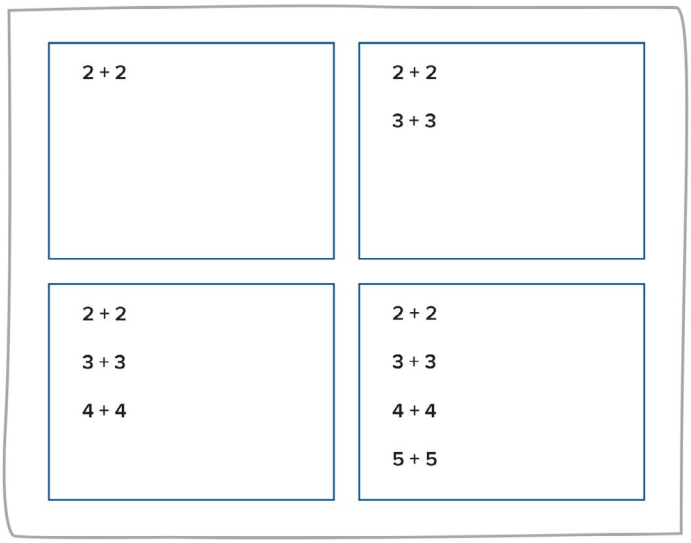
Tool Talks



Tool Talks are similar to Image Talks, but now the photographs are of a mathematical tool, such as linking cubes, ten-frames, or dice. There are three to six images in each Tool Talk and they can be facilitated much like an Image Talk. For example, students could flip through the images asynchronously and talk out loud into a recording platform about how many they saw, how they saw them, and what patterns they noticed. Rotating through your class and recording small groups engaged in the Tool Talk can give you a stimulating video to send out to students. After they watch, you can ask them if a classmate made them notice something that they hadn't seen on their own?

Number Talks

Number Talks follow Image and Tool Talks. Students are still working on the same strategy, but with fully decontextualized "naked" numerals instead of images. The website contains the Number Talks as visual slides, so you could facilitate them similarly to Image and Tool Talks. You could also offer them asynchronously in a Google Form or ask students to talk through each problem mentally using one of the voice or video sharing platforms. Number Talks in *Building Fact Fluency* always involve a series of three to four related problems, so it's helpful to ask students what patterns they noticed across the problems as an exit ticket, especially if you're working asynchronously. This question gives students a chance to step out of solving, look for mathematical structure, and make connections. Again, they can type, voice-to-type, audio/video record, or submit photos of their responses.

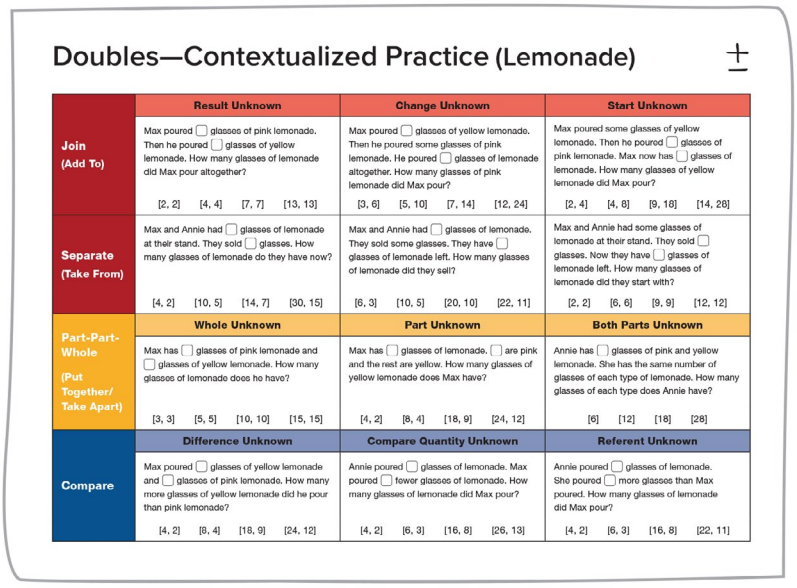


Contextualized Practice Problems

Contextualized Practice Problems are problems of every problem type, situated within the context. For example, within the Toy Cars Lesson String, the Contextualized Practice Problems provide twelve different story problems about toy cars that involve joining, separating, parts and wholes, and comparisons, with unknowns in all positions. You choose which few problems students should do (we'd never expect students to solve all the problems in a given Lesson String in any particular year), and students select which numbers to use in the problem.

You can use these problems in a number of ways, such as longer problem-based lessons, like the Anchor Problems, or as independent practice. How you facilitate them remotely depends on whether you want to go more in-depth or not. For example, you could save them for synchronous sessions with rich discussions, or you could assign two or three problems every Monday, with the expectation that students solve them independently by the end of each week. They make for excellent artifacts to have a conference around, so if you're having 1:1 or small group remote check-ins with students, you can ask them to talk about their work in a Contextualized Practice Problem. In all cases, you can share the problem electronically (it's available in both English and Spanish), and students can work on any paper if they don't have printers at home, or you can mail pages home. Students can also solve the problems digitally using draw features, especially if they're working on tablets, or they can use tools from their surroundings and photograph those.

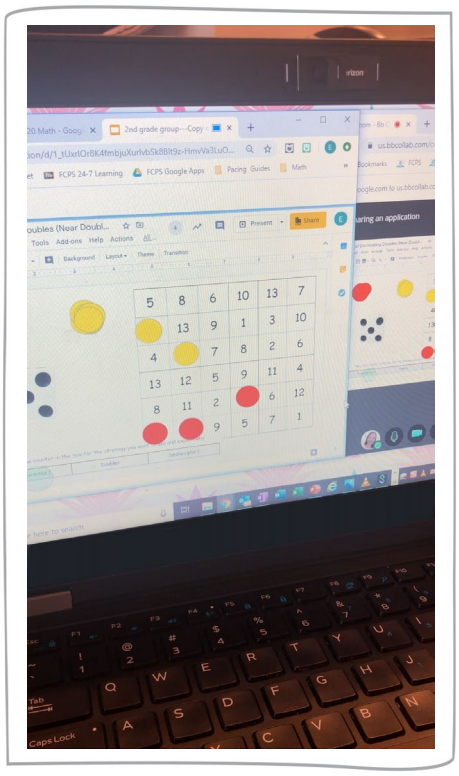
Even if you're working asynchronously, you can still make Contextualized Practice Problems an opportunity for students to talk through their thinking, (which is just as important during remote instruction—perhaps more so!), by asking students to choose a problem and narrate their solutions via video or audio annotation, showing their thinking in representations, gestures, or with tools from their surroundings. If students can post those videos on a platform like Flipgrid, you can ask students to take a gallery walk and respond to one another's thinking, perhaps partnering them up so everyone receives and gives some comments. You can also hold discussions or make a short video to synthesize, similar to Anchor Problems, described above.



Doubles—Contextualized Practice (Lemonade)

Join (Add To)	**Result Unknown** Max poured ☐ glasses of pink lemonade. Then he poured ☐ glasses of yellow lemonade. How many glasses of lemonade did Max pour altogether? [2, 2] [4, 4] [7, 7] [13, 13]	**Change Unknown** Max poured ☐ glasses of yellow lemonade. Then he poured some glasses of pink lemonade. He poured ☐ glasses of lemonade altogether. How many glasses of pink lemonade did Max pour? [3, 6] [5, 10] [7, 14] [12, 24]	**Start Unknown** Max poured some glasses of yellow lemonade. Then he poured ☐ glasses of pink lemonade. Max now has ☐ glasses of lemonade. How many glasses of yellow lemonade did Max pour? [2, 4] [4, 8] [9, 18] [14, 28]
Separate (Take From)	Max and Annie had ☐ glasses of lemonade at their stand. They sold ☐ glasses. How many glasses of lemonade do they have now? [4, 2] [10, 5] [14, 7] [30, 15]	Max and Annie had ☐ glasses of lemonade. They sold some glasses. They have ☐ glasses of lemonade left. How many glasses of lemonade did they sell? [6, 3] [10, 5] [20, 10] [22, 11]	Max and Annie had some glasses of lemonade at their stand. They sold ☐ glasses. Now they have ☐ glasses of lemonade left. How many glasses of lemonade did they start with? [2, 2] [6, 6] [9, 9] [12, 12]
Part-Part-Whole (Put Together/ Take Apart)	**Whole Unknown** Max has ☐ glasses of pink lemonade and ☐ glasses of yellow lemonade. How many glasses of lemonade does he have? [3, 3] [5, 5] [10, 10] [15, 15]	**Part Unknown** Max has ☐ glasses of lemonade. ☐ are pink and the rest are yellow. How many glasses of yellow lemonade does Max have? [4, 2] [8, 4] [18, 9] [24, 12]	**Both Parts Unknown** Annie has ☐ glasses of pink and yellow lemonade. She has the same number of glasses of each type of lemonade. How many glasses of each type does Annie have? [6] [12] [18] [28]
Compare	**Difference Unknown** Max poured ☐ glasses of yellow lemonade and ☐ glasses of pink lemonade. How many more glasses of yellow lemonade did he pour than pink lemonade? [4, 2] [8, 4] [18, 9] [24, 12]	**Compare Quantity Unknown** Annie poured ☐ glasses of lemonade. Max poured ☐ fewer glasses of lemonade. How many glasses of lemonade did Max pour? [4, 2] [6, 3] [16, 8] [26, 13]	**Referent Unknown** Annie poured ☐ glasses of lemonade. She poured ☐ more glasses than Max poured. How many glasses of lemonade did Max pour? [4, 2] [6, 3] [16, 8] [22, 11]

Games



Games are an essential part of the *Building Fact Fluency* toolkit, providing decontextualized practice in engaging, strategic games. Our field test teachers used the games a variety of ways during COVID-19 distance learning. One possibility is to send materials home and ask students to play siblings, family, friends, relatives via FaceTime or Zoom, etc. We will post virtual decks of the frame cards on the website and share links to high quality virtual dice, so students can play with just a gameboard, a device, and objects from around the house they can use as markers (pasta, beans, coins, pebbles, etc.).

Another option is to play the games virtually, using a platform like Google slides. We show an example of this adaptation on the website, with more detailed information. Some teachers found that having partners of students play live in breakout rooms simulated an important element of classroom game play; teachers could bounce around and listen in on students' thinking while they were engrossed in the game. Games also worked especially well in synchronous small groups.

3-Act Math Tasks

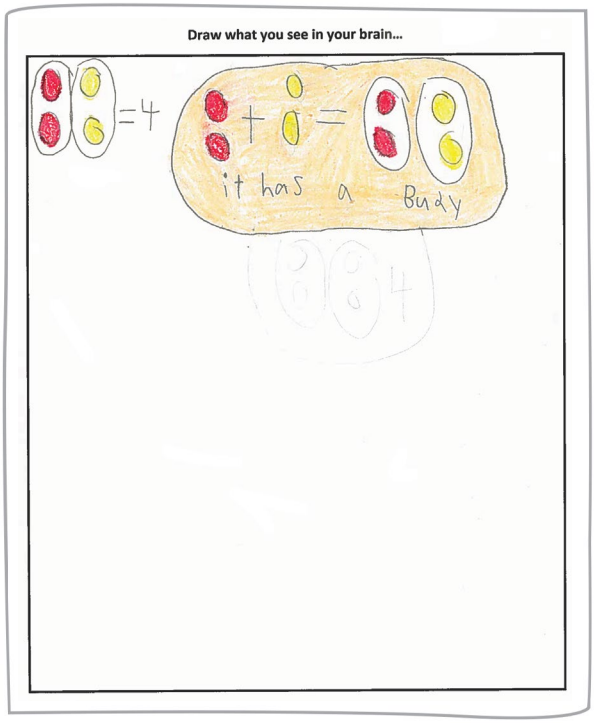
3-Act Math Tasks are rich, problem-based lessons that involve mathematical modeling. On the website, you can see Graham talk about how to facilitate 3-Act Math Tasks in a remote setting, both synchronously via a platform like Zoom, or asynchronously, in which case the task is spread over the course of a week. For example, teachers can send home Act 1 on Monday, asking students to notice and wonder into a Google Form or talk in small groups. Teachers can drip out information throughout the week and reveal Act 3 on Friday.

That said, if you have synchronous or in-person time with students, 3-Act Math Tasks are a wonderful way to engage in joyful problem solving and build classroom community.

Formative Assessment: Metacognitive Reflection and Journaling

There are a variety of assessment strategies in the *Building Fact Fluency* toolkit, including observations, conferences and interviews, looking at student work, and journaling and reflection. These strategies can all be used remotely, including reflection and journaling. For example, you can use any of the following sample journal prompts during any of the Doubles contexts. Students could draw, write, or record responses. They could submit them to you, talk about them in small groups, take an interactive gallery walk via a platform like Jamboard, or meet with you individually for quick conferences to talk about how their addition and subtraction work is coming along. For further ideas, see Chapter 4 of the *Facilitator's Guide*.

Goal	Sample Journal Prompts
Storytelling	Draw a picture that is the answer for a story problem that has a double. What is the story? What is the question?
Building	Choose a math tool in the classroom to represent a doubles fact. Draw a picture of what you built with your tools.
Drawing and Using Symbols	What is a challenging doubles fact? Draw a picture that might help a friend learn that fact.
Seeing	When you hear the word *doubles*, what comes to mind? Draw a picture of what's in your brain.
Describing	Tell a friend what a doubles fact is and which doubles facts you like most.
Discussing Why	Why do doubles facts give us even numbers?



Learning Together

Stepping back for a second, we hope that you will remember that schools and teachers are building the plane while flying it when it comes to widespread distance learning. This is an incredibly difficult challenge. Above all else, please be patient with yourself and focus on your well-being and the well-being of your students. We hope that this resource will be a source of support, positive math experiences, and community for you and your students, especially during this time, and we look forward to learning from you as you figure out what works best in your setting and model. Please share your successes and struggles with us in the *Building Fact Fluency* Facebook group and using #BuildingFactFluency on Twitter.

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