What Does Good Math Practice Look Like?

How to Improve Your Practice Game

i-Ready Classroom Mathematics

High-Quality Practice for the Mathematics Classroom

Students build their math muscle through practice. They need a variety of practice opportunities that reflect and build upon the rigor of the standards in order to develop and refine their mathematical understanding. Depending on where students are with their learning progression, practice needs to look different to support different learning outcomes.

Think about a basketball team. To get better, practice should incorporate a variety of drills to work on skills like dribbling, shooting, and layups—but practicing skills in isolation is unlikely to lead to a winning team. To be prepared for a game, practice needs to incorporate game-like situations to help players learn how to work the strategy and make decisions under pressure.

"You can practice shooting baskets eight hours a day, but if your technique is wrong, then all you've become is very good at shooting the wrong way. ***Get the fundamentals down and the level of everything you do will rise.****"*

—Michael Jordan

Math practice works similarly. Practice needs to reinforce students' ability to apply procedures accurately, efficiently, and flexibly. However, students also need practice with integrating concepts and techniques, as well as opportunities to support and justify their choices of appropriate procedures (NCTM, 2014).

Practice Should Match the Rigor of the Standards

Mathematical rigor has three components: conceptual understanding, procedural fluency, and application.

Conceptual Understanding

As students are building their conceptual understanding, practice opportunities should help them explore the concept and understand the "why" behind the mathematics.

→

Procedural Fluency

Once students have a solid understanding of the concept, they should practice how the math works, focusing on skills and procedures.

→

Application

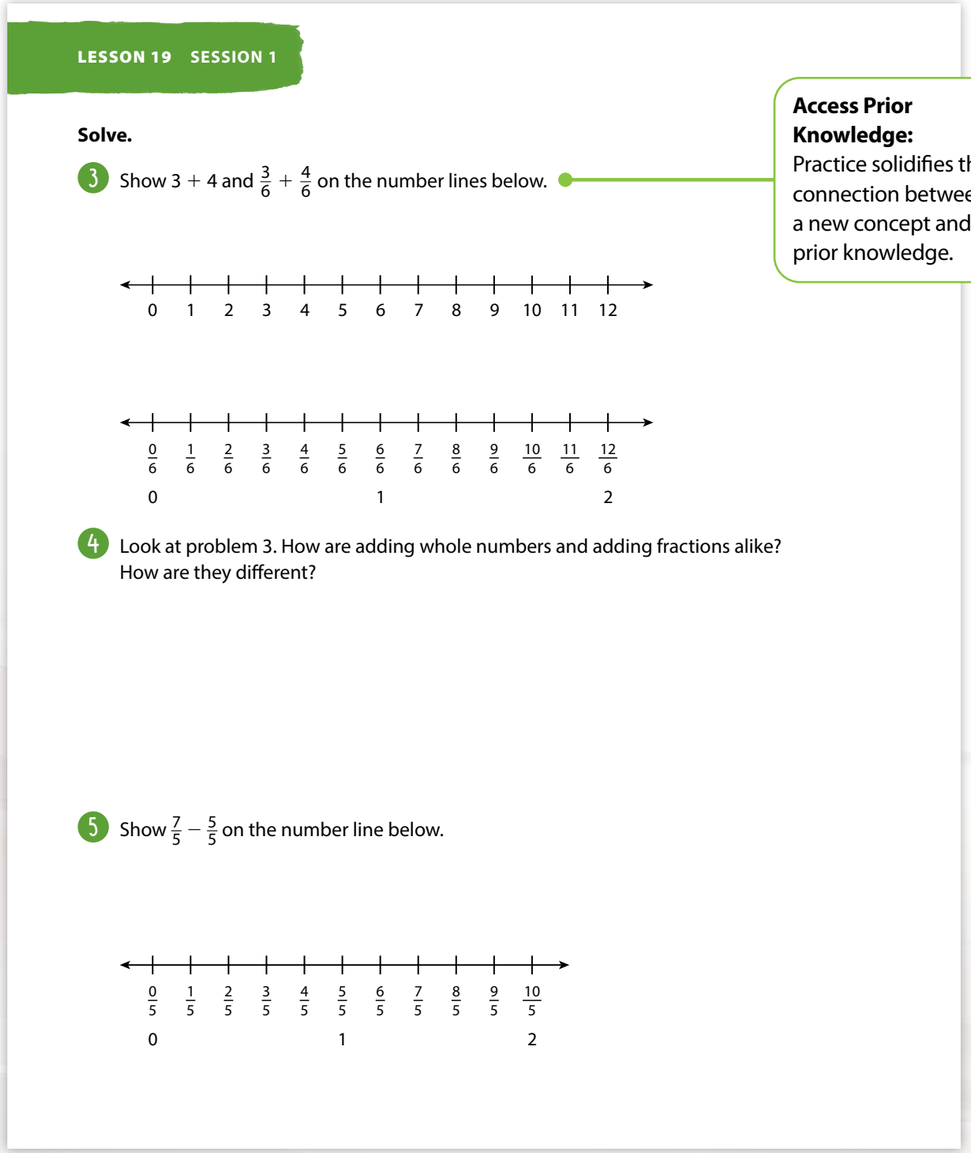
After students have mastered the skills and procedures related to the concept, they are ready to apply this understanding to a new problem.

Students need practice in all three aspects of rigor to ensure they have a thorough understanding of the mathematical concepts, and research shows that students need to build conceptual understanding before they are ready for procedural practice (NCTM, 2014). When students fully understand a concept, they can more easily retain the information and apply their knowledge in future situations.

"Fluency is not meant to come at the expense of understanding but is an outcome of a progression of learning and sufficient thoughtful practice." **(PARCC, 2017)**

Practice Looks Different along the Learning Progression

Students need practice opportunities that align with every step of their learning progression. For example, when students are just being introduced to a concept, they need practice that helps them make connections between the new concept and their prior knowledge (see example below). At this point, giving students a worksheet with 30 skill and procedure problems might overwhelm and confuse them. Without conceptual understanding, students who are given procedural problems too quickly may reinforce misconceptions and develop frustration. The key is to have the focus of the practice align with where students are on their learning journey.



LESSON 19 SESSION 1

Solve.

3 Show $3 + 4$ and $\frac{3}{6} + \frac{4}{6}$ on the number lines below.

0 1 2 3 4 5 6 7 8 9 10 11 12

$\frac{0}{6}$ $\frac{1}{6}$ $\frac{2}{6}$ $\frac{3}{6}$ $\frac{4}{6}$ $\frac{5}{6}$ $\frac{6}{6}$ $\frac{7}{6}$ $\frac{8}{6}$ $\frac{9}{6}$ $\frac{10}{6}$ $\frac{11}{6}$ $\frac{12}{6}$

0 1 2

4 Look at problem 3. How are adding whole numbers and adding fractions alike? How are they different?

5 Show $\frac{7}{5} - \frac{5}{5}$ on the number line below.

$\frac{0}{5}$ $\frac{1}{5}$ $\frac{2}{5}$ $\frac{3}{5}$ $\frac{4}{5}$ $\frac{5}{5}$ $\frac{6}{5}$ $\frac{7}{5}$ $\frac{8}{5}$ $\frac{9}{5}$ $\frac{10}{5}$

0 1 2

Access Prior Knowledge: Practice solidifies the connection between a new concept and prior knowledge.

Aligning Practice to the Learning Progression

So how does this work in the classroom? How can the focus of students' practice align with their learning progression? Below is one example of how this could work, but the path that students take to progress from conceptual understanding to procedural fluency is not necessarily discrete or linear. Additionally, the learning progression outlined below does not typically happen in one day. Students may need to revisit different states of learning over the course of multiple days while working with a concept.

State of Learning	What Learning Looks Like	What Practice Looks Like	Examples from *i-Ready Classroom Mathematics**
Introducing a Concept	Students are introduced to a new concept by connecting it to previously learned content.	Questions and student discourse help students access prior knowledge and review vocabulary terms that students will build upon.	Explore: Additional Practice
Exploring a Concept	Students investigate a rich task or model to build understanding.	Questions and student discourse help students solidify connections between different solution strategies.	Connect It
Developing a Concept	Students further enhance their understanding of the concept by exploring different representations or models and discovering how the representations of the concept describe it.	Questions and student discourse enhance students' understanding and connect it to procedures and skills.	Develop: Additional Practice
Applying and Refining a Concept	Students use their understanding to explore applications and implications of the concept.	Questions and student discourse have students apply their understanding to a new situation.	Refine Session
Develop Fluency	Students solidify their thinking about a concept.	Students engage in whole class fluency activities or work out problems independently with immediate and meaningful feedback.	Fluency and Skills Practice

*This list includes some of the many resources from *i-Ready Classroom Mathematics*. To see a full list of practice opportunities, see page 7.

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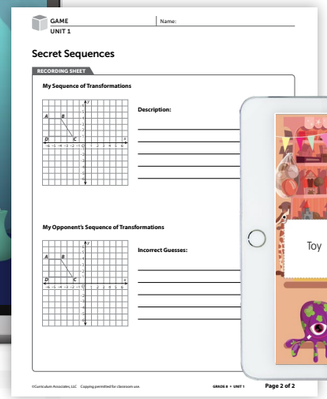
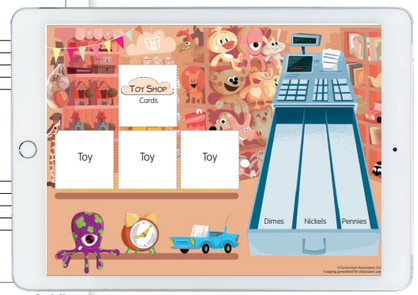
Practice Continues beyond Proficiency

For practice to be effective, it should be distributed across topics and over time. Once students have become proficient with a concept, they should practice recalling and using it across different types of problems and should revisit it after months—and even years—to retain their understanding (Taylor & Rohrer, 2010).

Learning Games



Unit Games



Grade Level Games (K–2)

Conclusion

The goal of practice is to prepare students to use math accurately, efficiently, and flexibly in a variety of situations encountered throughout life. Basic procedural practice is an important component in developing fluency, but it is not the only component. By using a more holistic approach to practice, students are supported throughout all stages of their learning, build a solid mathematical foundation, and can more readily retain and apply their understanding to new situations.

References

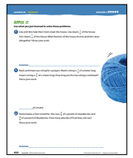
National Council of Teachers of Mathematics (NCTM). (2014). *Procedural fluency in mathematics: A position of the National Council of Teachers of Mathematics*. NCTM. Retrieved from https://www.nctm.org/Standards-and-Positions/Position-Statements/Procedural-Fluency-in-Mathematics/.

Partnership for Assessment of Readiness for College and Careers. (PARCC) (2017). *PARCC model content framework for mathematics, grades 3–11: Version 5.0.* PARCC. Retrieved from https://files.eric.ed.gov/fulltext/ED582070.pdf.

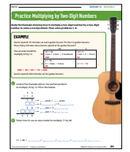
Taylor, K., & Rohrer, D. (2010). The effects of interleaved practice. *Applied Cognitive Psychology, 24*(6), 837–848.

i-Ready Classroom Mathematics Practice Opportunities

Lesson-Level Practice

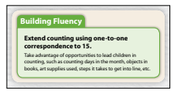


Connect It and Apply It Problems *(Student Worktext)*

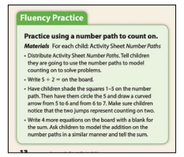


Additional Practice *(Student Worktext)*

Refine Sessions *(Student Worktext)*

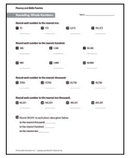


Building Fluency: Grade K *(Teacher's Guide)*

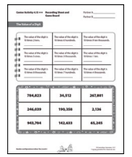


Fluency Practice: Grades K–1 *(Teacher's Guide)*

Develop Fluency Activities *(Teacher's Guide)*



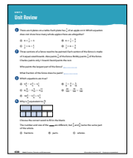
Fluency and Skills Practice *(Teacher Toolbox)*



Leveled Math Center Activities *(Teacher Toolbox)*

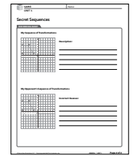
Assignable Interactive Practice *(Digital)*

Unit-Level Practice



Unit Review *(Student Worktext)*

Cumulative Practice *(Student Worktext)*

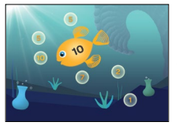


Unit Games *(Teacher Toolbox)*

Ongoing Practice

Grade Level Games: Grades K–2 *(Teacher Toolbox)*

Digital Math Tools *(Digital)*



Learning Games *(Digital)*

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