

MASTERING THE FLUENCIES OF THE COMMON CORE

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WHY DO I NEED ALGEBRA ANYWAY??!

HOW IMPORTANT IS ALGEBRA TO A STUDENT'S CHANCE OF ATTENDING COLLEGE?

Students who take a **year of algebra** and follow with a **year of geometry** nearly **DOUBLE** their chances of going to college -- by doing that alone! Students who complete Algebra II are more than twice as likely to **GRADUATE** from college. (College Board and the National Math Panel)

FOUNDATIONS FOR SUCCESS IN ALGEBRA

Critical Foundations

1. Fluency with whole numbers
2. Fluency with fractions
3. Particular aspects of geometry & measurement

<http://www2.ed.gov/about/bdscomm/list/mathpanel/report/final-report.pdf>



HELP WANTED: PROJECTIONS OF JOBS AND EDUCATION REQUIREMENTS THROUGH 2018

By 2018, we will need 22 million new workers with college degrees—but will fall short of that number by at least 3 million postsecondary degrees . . . At a time when every job is precious, this shortfall will mean lost economic opportunity for millions of American workers

<http://cew.georgetown.edu/jobs2018/>



ASSISTING STUDENTS STRUGGLING WITH MATHEMATICS: RTI FOR ELEMENTARY AND MIDDLE SCHOOLS

1. Screening
2. Progress Monitoring
3. Content
4. Representation
5. Instruction
6. Problem Solving
7. Fact Fluency
8. Student Effort

<http://ies.ed.gov/ncee/wwc/PracticeGuide.aspx?sid=2>



MATHEMATICAL PRACTICES OF THE COMMON CORE

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| <ol style="list-style-type: none"> 1. Make sense of problems and persevere in solving them. 2. Reason abstractly & quantitatively 3. Construct viable arguments & critique the reasoning of others 4. Model with mathematics | <ol style="list-style-type: none"> 5. Use appropriate tools strategically 6. Attend to precision 7. Look for & make use of structure 8. Look for & express regularity in repeated reasoning |
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MAJOR WORK AND REQUIRED FLUENCIES IN K-8 OF THE COMMON CORE STATE STANDARDS FOR MATHEMATICS

Grade Band	Major Emphasis Areas of intensive focus, where students need fluent understanding and application of the core concepts	Required Fluencies Can students perform calculations and solve problems quickly and accurately.
K	Addition and subtraction--concepts, skills, and problem solving	Add/subtract within 5
1		Add/subtract within 10 ¹
2		Add/subtract within 20 Add/Subtract within 100 (pencil and paper)
3	Multiplication and division of whole numbers and fractions – concepts, skills, and problem solving	Multiply/divide within 100 ²
4		Add/subtract within 1000
5		Add/subtract within 1,000,000 Multi-digit multiplication
6	Ratios and proportional relationships; early expressions and equations	Multi-digit division Multi-digit decimal operations
7	Ratios and proportional relationships; arithmetic of rational numbers	Solve $px + q = r$, $p(x + q) = r$
8	Linear algebra	Solve simple 2x2 systems by inspection

1 By end of year, know from memory all sums of two one-digit numbers

2 By end of year, know from memory all products of two one-digit numbers

<http://engageny.org/wp-content/uploads/2011/07/CCSSFluencies.pdf>



High Leverage Teaching Practices

Deborah Ball, Ph.D, University of Michigan

<http://www.teachingworks.org>

1. Making content explicit through explanation, modeling, representations, and examples

2. Leading a whole-class discussion

In a whole-class discussion, the teacher and all of the students work on specific content together, using one another's ideas as resources. The purposes of a discussion are to build collective knowledge and capability in relation to specific instructional goals and to allow students to practice listening, speaking, and interpreting. In instructionally productive discussions, the teacher and a wide range of students contribute orally, listen actively, and respond to and learn from others' contributions.

3. Eliciting and interpreting individual students' thinking

Teachers pose questions or tasks that provoke or allow students to share their thinking about specific academic content in order to evaluate student understanding, guide instructional decisions, and surface ideas that will benefit other students. To do this effectively, a teacher draws out a student's thinking through carefully-chosen questions and tasks and considers and checks alternative interpretations of the student's ideas and methods.

4. Establishing norms and routines for classroom discourse central to the subject-matter domain

Each discipline has norms and routines that reflect the ways in which people in the field construct and share knowledge. These norms and routines vary across subjects but often include establishing hypotheses, providing evidence for claims, and showing one's thinking in detail. Teaching students what they are, why they are important, and how to use them is crucial to building understanding and capability in a given subject. Teachers may use explicit explanation, modeling, and repeated practice to do this.

5. Recognizing particular common patterns of student thinking in a subject-matter domain.

6. Identifying and implementing an instructional response to common patterns of student thinking

Specific instructional strategies are known to be effective in response to particular common patterns of student thinking. Teachers who are familiar with them can choose among them appropriately and use them to support, extend, or begin to change student thinking.

7. Teaching a lesson or segment of instruction

8. Implementing organizational routines, procedures, and strategies to support a learning environment

9. Setting up and managing small group work

10. Engaging in strategic relationship-building conversations with students

11. Setting long- and short-term learning goals for students referenced to external benchmarks

12. Appraising, choosing, and modifying tasks and texts for a specific learning goal

Teachers appraise and modify curriculum materials to determine their appropriateness for helping particular students work toward specific learning goals. This involves considering students' needs and assessing what questions and ideas particular materials will raise and the ways in which they are likely to challenge students. Teachers choose and modify material accordingly, sometimes deciding to use parts of a text or activity and not others, for example, or to combine material from more than one source.

13. Designing a sequence of lessons toward a specific learning goal

14. Selecting and using particular methods to check understanding and monitor student learning

15. Composing, selecting, interpreting, and using information from methods of summative assessment

16. Providing oral and written feedback to students on their work

17. Communicating about a student with a parent or guardian

18. Analyzing instruction for the purpose of improving it

19. Communicating with other professionals

Progress to Algebra in Grades K–8



*Indicates a cluster that is well thought of as part of a student's progress to algebra, but that is currently not designated as Major by one or both of the assessment consortia in their draft materials. Apart from the two asterisked exceptions, the clusters listed here are a subset of those designated as Major in both of the assessment consortia's draft documents.