

Doing What Works

ED.gov

<http://dww.ed.gov>

The screenshot displays the 'Doing What Works' website interface. At the top, it features the ED.gov logo, the 'No Child Left Behind' banner, and a search bar. A navigation menu on the left lists categories such as 'English Language Learners', 'SEE WHAT'S COMING!', 'Cognition & Learning', 'Early Childhood Education', 'High School Reform', 'Literacy', 'Math & Science', and 'School Restructuring'. Below the menu are links for 'DWW Overview', 'ED Partner Office', 'Criteria & Methodology', 'FAQ', 'Glossary', 'Links', 'Technical Requirements', 'Site Map', and 'Contact Us'.

The main content area shows a video player with a blue play button. The video title is 'Vocabulary Teaching in Action' from 'Warfield Elementary'. The video content includes a green cartoon character and the text 'Jennifer grew up speaking English at'. The video player has a 'START' button and a 'REVIEW' button.

The video content shows a teacher sitting on a stool in a classroom, pointing to a whiteboard. The whiteboard has a table of words and their suffixes:

	-er	-est
adjective	quieter	quietest
quiet	quieter	quietest
silky	silier	siliest
crazy	crazier	craziest
strong	stronger	strongest

Below the video, there is a 'START' button and a 'REVIEW' button. The video player also has a 'Previous' and 'Next' navigation option.

Overview

- Major initiative of the U.S. Department of Education
- Builds on research reviews by IES, Practice Guides, National Math Panel
- Builds a bridge from research to action

ED.gov
Doing What Works

NoChild Left Behind

Search Go

Subscribe for Updates

FIND WHAT WORKS!

- Early Childhood Education
- English Language Learners
- Math and Science

SEE WHAT'S COMING!

- Cognition & Learning
- Early Childhood Education
- High School Reform
- Literacy
- School Restructuring

DWW Overview

ED Partner Offices

Criteria & Methodology

FAQ

Glossary

Links

Educators across the nation are helping students be proficient in math and reading by 2014.
We can help. Learn how.

Featured Content

English Language Learners
More than 10% of U.S. students are limited English proficient. There are a number of research-based practices to help teach primary grade English learners how to read effectively.
See how Teaching Literacy in English to K-5 English Learners can make a difference for your English learners.

Inside Classrooms
Selected Highlights

Take a look
Watch this guided tour of features found on this site!

English Language Learners
Eight strategies that Warfield's teachers use to increase students' vocabularies.

Guided Tour of the Site
Monitor Progress
Learn What Works
Conduct formative assessments to screen for reading problems and monitor progress.

Doing What Works

dww.ed.gov

Current Math Topics

- Math and Science
 - Encouraging Girls in Math and Science
 - National Math Panel Report: Critical Foundations for Algebra
 - National Math Panel Report: Major Topics of School Algebra

Other Topics

- Psychology of Learning
 - **How to Organize Your Teaching**
- School Improvement
 - **Turning Around Chronically Low-Performing Schools**
- Early Childhood Education
 - Preschool Language and Literacy
- English Language Learners
 - Literacy in English K-5

Doing What Works

Search

Go

[Subscribe for Updates](#)

FIND WHAT WORKS!

- Early Childhood Education
- English Language Learners
- Math and Science
- Psychology of Learning

SEE WHAT'S COMING!

- High School Reform
- Literacy
- School Restructuring

[DWW Overview](#)[ED Partner Offices](#)[Criteria & Methodology](#)[FAQ](#)[Glossary](#)[Links](#)

Educators across the nation are helping students be proficient in math and reading by 2014.

We can help. Learn how.



Featured Content



How to Organize Your Teaching

Teachers want their students to learn, to be able to apply their knowledge and skills in new contexts, and to remember what they learn over days, weeks, and months. Cognitive scientists, who study learning, have identified principles for reaching these goals.

Learn about teaching strategies to develop students' understanding of key concepts and help them retain this knowledge.

Inside Classrooms

Selected Highlights



Early Childhood Education

A Syracuse preschool teacher shares what she has learned and how she plans interactive reading lessons.

Take a look

Watch this guided tour of features found on this site!



Search:

Go

[Subscribe for Updates](#)

FIND WHAT WORKS!

Math and Science

- Critical Foundations for Algebra
- Encouraging Girls

[... See More Topics ...](#)[Math and Science Glossary](#)[Math and Science Links](#)[Contact Us](#)

Math and Science Education

[▶ Play](#)

National Math Panel: Critical Foundations for Algebra

In April 2006, the National Mathematics Advisory Panel was created to review the scientific evidence on mathematics teaching and learning, and to recommend ways to foster greater knowledge of and improved performance in mathematics among American students. The Panel set forth important messages for improving mathematics education to better prepare students for entry into algebra, including streamlining the mathematics curriculum to focus on a coherent set of critical foundation skills for pre-kindergarten to grade 8 students.

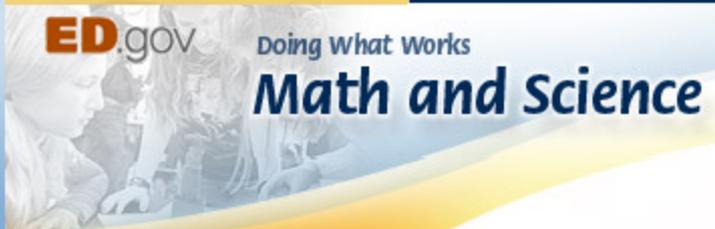
Select this topic to:

- ▶ Review the research base
- ▶ Understand the essentials
- ▶ Find recommended practices
- ▶ Access planning templates

[Return Home](#)

[US Department of Education](#)

[What Works Clearinghouse](#)



Search: [Go](#)

[Subscribe for Updates](#)

FIND WHAT WORKS!

- Math and Science
 - Critical Foundations for Algebra**
 - Mathematics Preparation for Algebra
 - Comprehensive Instruction
 - Mastery Framework

---- See More Topics ----

National Math Panel: Critical Foundations for Algebra



The National Mathematics Advisory Panel (NMP) Final Report and Reports of the Task Groups and Subcommittees

The National Mathematics Advisory Panel conducted a systematic and rigorous review of the best available scientific evidence for the teaching and learning of mathematics and provided recommendations that lay out concrete steps to improve mathematics education, with a specific focus on preparation for learning algebra. The Panel worked in task groups and subcommittees to address areas of mathematics teaching and learning including Conceptual Knowledge and Skills, Learning Processes, Instructional Practices, Teachers and Teacher Education, and Assessment. Five task groups carried out detailed syntheses of research evidence that addressed each group's major questions and met standards of methodological quality. Three subcommittees were charged with completion of a particular advisory function for the Panel. The research findings cited in these reports underpin the mathematics practices and content included on the Doing What Works website.

[Link to Research Review](#)

[Essential Concepts](#) [Recommended Practices](#) [Planning Templates](#)

These three comprehensive planning templates include the three practices for National Math Panel: Critical Foundations for Algebra. An overview describes how these planning templates can be used by a technical assistance provider or other support provider working with districts and schools on improving the mathematics program.

[Overview of Planning Templates](#)



Critical Foundations for Algebra

The National Mathematics Advisory Panel report offers recommendations for how we can best prepare elementary and middle school students for success in algebra, a gateway to mathematics in high school and beyond.

Mathematics Preparation for Algebra

- Follow a focused, coherent progression of mathematics
- Achieve proficiency with whole numbers, fractions, and aspects of geometry and measurement
- Build deep understanding
- Emphasize fractions and related concepts



Comprehensive Instruction

- Develop conceptual understanding, computational fluency, and problem-solving skills
- Achieve automaticity in computation
- Provide adequate practice
- Encourage effort and persistence



Mastery Framework

- Set benchmarks for key skills
- Use formative assessments
- Provide explicit instruction for struggling students
- Offer acceleration and enrichment for gifted students



Grade-Level Benchmarks for Critical Foundations*

PRE-K	
K	
1ST	
2ND	
3RD	● Add and subtract whole numbers
4TH	● Identify, represent, and compare fractions and decimals
5TH	● Multiply and divide whole numbers
	● Compare, add, and subtract fractions and decimals
	● Solve problems with perimeter and area
	● Multiply and divide fractions and decimals
6TH	● Use all operations on integers
	● Analyze properties and measures with 2- and 3-D shapes
	● Use all operations on positive and negative fractions
7TH	● Solve problems with percent, ratio, rate, and proportion
	● Relate similar triangles with slope of a line
8TH	

DOING WHAT WORKS
U.S. Department of Education

* For full report, including U.S. text for the benchmarks, please see: www.ed.gov/about/bdscomm/list/mathpanel/report/final-report.pdf

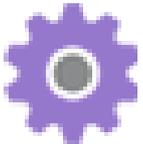
For each practice:



Learn What Works

Understand the research-based recommendation to teach vocabulary.

- Research base/Instructional presentations
- Expert interviews



See How it Works

Explore how actual schools are teaching vocabulary.

- School site videos and slideshows
- Interviews and sample materials from schools



Do What Works

Use a collection of tools and ideas to help you improve your practice.

- Tools and templates to implement practices

FIND WHAT WORKS!

- Math and Science
 - Critical Foundations for Algebra
 - Mathematics Preparation for Algebra
 - **Learn What Works**
 - See How It Works
 - Do What Works
 - Comprehensive Instruction
 - Mastery Framework

---- See More Topics ----

Math and Science Glossary

Math and Science Links

Contact Us

Mathematics Preparation for Algebra



Use the icons above to navigate within each practice

Learn What Works

Practice Overview

Prepare students for entry into algebra by developing a focused, coherent progression of key topics and skills, including fractions, leading to proficiency.

Students who develop a strong understanding of key mathematics concepts and procedural fluency, and can use these competencies to solve problems, are better prepared for entry into algebra. [more >>](#)

What the research has shown

The Mathematics Preparation for Algebra practice is based on research evidence cited in the National Mathematics Advisory Panel Final Report and, in particular, the Task Group reports on *Conceptual Knowledge and Skills* and *Learning Processes*. [more >>](#)

Browse Topics

- ◀ Practice Overview
- ▶ Practice Explanation
- ▶ Key Actions
- ▶ Research Evidence
- ▶ Expert Interviews

Presentation

Preparing Students for Success in Algebra

Use this multimedia overview to learn about the critical foundations needed to help all students become proficient in algebra. It describes the importance of using a focused, coherent progression of key mathematics skills and skills in the elementary and middle years. (8:37 min)

Start Presentation

Download Transcript & Details

Expert Interviews

Video

The Critical Foundations
 Francis (Skip) Fennell, Ph.D.,
 McDaniel College
 Member, National Mathematics Advisory Panel; Chair, Conceptual Knowledge and Skills Task Group; and Member, National Survey of Algebra I Teachers Subcommittee and Assessment Task Group
 Dr. Fennell discusses the critical foundations, provides a detailed explanation of each of the essential skills and examples, describes the progression of skill development, and talks about why it's important for students to understand how mathematics works. (8:49 min)

- ### Browse Topics
- ▶ Practice Overview
 - ▶ Practice Explanation
 - ▶ Key Actions
 - ▶ Research Evidence
 - ▶ Expert Interviews
 - ▶ Links

Preparing Students for Success in Algebra - Windows Internet Explorer
http://dww.littleplanetlearning.com/media/MathScience/MPR/AF/Learn/breeze/index.htm

Download This Clip

Whole Numbers Fractions Geometry

Preparing Students for Success in Algebra

Doing What Works
U.S. Department of Education

Outline Thumb Transcript Search

Transcript

Developing proficiency in fractions means: being able to represent and compare fractions, decimals, and percents, and understand the relationships among them. This includes being able to work with negative fractions and the ability to locate positive and negative fractions on a number line.

3 Minutes 30 Seconds Remaining

represent and compare

fractions
decimals
percents

$\frac{3}{5}$.6 60%

Slide 18 / 29 | Stopped 00:12 / 00:21

Done Internet 100%

FIND WHAT WORKS!

- Math and Science
 - National Math Panel: Critical Foundations for Algebra
 - Mathematics Preparation for Algebra
 - Learn What Works
 - **See How It Works**
 - Do What Works
 - Comprehensive Instruction
 - Mastery Framework

---- See More Topics ----

[Math and Science Glossary](#)

[Math and Science Links](#)

[Contact Us](#)

Mathematics Preparation for Algebra



Use the icons above to navigate within each practice



Three important concepts have been observed for this practice. Click on the tabs below to select a concept.

Focus on Key Topics

Number Sense

Fractions, Decimals, Percents

Focus on Key Topics

Learn from mathematics leaders in four different districts how they have focused standards, and designed assessments and benchmarks to address the mathematics topics and skills that prepare students for algebra. Review the power standards from one of those districts.



Using These Materials



Video

District Perspective on Focused Curriculum

Worthington Hooker School (CT)
The district's mathematics coordinator describes how and why New Haven has moved toward a

Site Profiles

Mountain Ridge Middle School (CO)

Northridge Elementary School

Details

Where: Highlands Ranch, Colorado
Type: Suburban
District: Douglas County
Grade Level: Elementary (K-6)
Demographics: 77% White, 10% Asian, 10% Hispanic, 2% Black
6% Free or Reduced-Price Lunch
(Colorado Department of Education, data from 2006-07 school year)
Contact: Elizabeth Morris, Principal

 [Link to Website](#)

Highlights

Douglas County Schools have developed K-12 Essential Learnings to focus on the most important "checkpoints" and ensure that students are mastering key topics and skills. The elementary school demonstrates these features:

- Understanding algebra as the generalization of arithmetic, and
- Using manipulatives and visual representations to teach conceptual understanding of fractions.

Summary of Approach

Practices covered:

- Mathematics Preparation for Algebra
- Comprehensive Instruction

Northridge is a year-round school and one of the most diverse school in the Douglas County district with the third largest case load of English learners among the 38 elementary schools. All schools in the district follow the same mathematics K-8 Essential Learnings and checkpoints (based on NCTM Focal Points and Colorado standards) but have flexibility in choosing curricular materials.



Return To
Concept

Site Profiles

[Mountain Ridge Middle School \(CO\)](#)

[K. J. Clark Middle School of Math, Science, and Technology \(AL\)](#)

[Northridge School](#)

[Twin Grove School](#)

[Madison School](#)

[KIPP DC \(DC\)](#)

[Claxton \(GA\)](#)

[Worthington School](#)

[Site Selection](#)

Site Selection Criteria

Schools profiled for the National Math Panel: Critical Foundations for Algebra must meet the following criteria:

- Schools must demonstrate student achievement in mathematics that meets the requirements of adequate yearly progress under No Child Left Behind.

In addition, the school must meet two of the following criteria:

1. **The pre-K-8 mathematics curriculum focuses on a limited number of key critical topics and prepares students for success in algebra.** This is measured through a review of the school/district scope and sequence for mathematics focusing on fluency with whole numbers, algorithms, problem solving, and fractions as well as aspects of measurement and geometry that prepare students for algebra.
2. **The student achievement in mathematics, as measured by valid and reliable instruments, shows higher levels of student performance at the advanced and proficient levels than state averages.** This is measured through a review of school/district achievement data as reported to the state department of education for purposes of meeting adequate yearly progress under No Child Left Behind.
3. **The school or district (depending on grade configuration) shows 50% or more students enrolled in algebra at the eighth-grade level and an increasing proportion enrolled and demonstrating success over the past 2-3 years.** A review of student achievement and enrollment data shows an increase in the proportion of students taking Algebra I at the eighth grade level.



Preparation for Algebra
 Worthington Hooker School (CT)
 Hear a seventh-grade teacher use a lesson example to describe the important skills, including number sense, to be mastered in the course that precedes algebra. (7:27 min)

[Download Video](#)
 Quicktime | 41 MB | 7:27 min

[Download Transcript & Details PDF](#) | 151 KB



SAMPLE MATERIAL

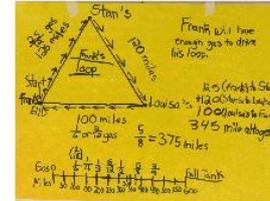
Frank's Fresh Farm Produce

Madison Eleme

Frank's Fresh Farm Produce—Madison Elementary School, Washington

Topic: National
 Practice: Math

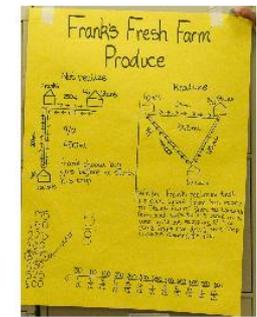
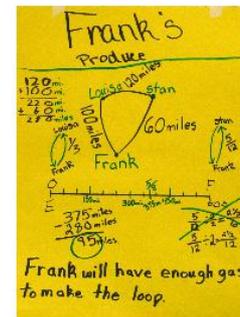
The first page of work on using a posters of the d



Using a Number Line to Teach Fractions
 Madison Elementary School (WA)
 Teachers demonstrate why an open number line has become an invaluable tool for students to use with addition and subtraction of whole numbers and fractions. (6:04 min)

[Start Presentation](#)

[Download Transcript & Details PDF](#) | 172 KB





Reviewing Student Work
 Madison Elementary School (WA)
 Listen to a roundtable discussion among principal and teachers as they use a protocol to review student work and determine next steps for instruction. Download the *Protocol for Reviewing Student Work* that is followed in the video. (7:46 min)

Download Video
 Quicktime | 55.5 MB | 7:46 min

Download Transcript & Details
 PDF | 175 KB

Doing What Works
 ED.gov

SAMPLE MATERIAL

Protocol for Reviewing Student Work
 Madison Elementary School, Washington

Protocol for Reviewing Student Work—Madison Elementary School, Washington

SPEED Collaborative Protocol

Step 1	Problem introduced. Participants listen and record thinking about the content of the problem. Participants should think about how they might go about solving the problem.	2 mins
Step 2	Begin looking at Student Sample #1 response to the problem. Move around the table sharing what math content does the student know and understand. Teachers can state the content and name the evidence in the sample.	2 mins
Step 3	Now move around the table sharing what math content is missing, or what misconceptions can be seen. Teachers can state the content and name the evidence in the sample.	2 mins
Step 4	Move to a collaborative discussion of possible strategies or types of intervention to use with the student. Possible resources can also be shared. Participants can personally record suggestions.	6 mins
Step 5	Now move to Student Sample #2 of the same problem. Repeat steps 2-4 for each new piece of student work presented.	10 min per student sample
Step 6	After all Student Samples are discussed, use a table whip around protocol, each participant is asked to give a strategy or intervention they are thinking that might be successful for one of the students. Also take this time to share instruction ideas and resources.	2-5 mins
Step 7	The facilitator brings the protocol to a close. The group processed the protocol for its effectiveness and other suggestions.	2 mins

Mathematics Preparation for Algebra



Do What Works
ED 2011

Use the icons above to navigate within each practice.

Practice Tools

These tools help you use the materials in the "Learn What" and "Do What" to tackle the hard work of school improvement. Each tool is a download that you can edit and adapt to serve your needs.

Learning Together About Mathematics Preparation for Algebra

Use this tool to guide district and school mathematics leaders about the implications of the National Mathematics Advisory Panel report and systematic implications for systemwide changes.



[Download Tool | WORD |](#)

Moving Toward the Focused Curriculum

Study how three different districts have moved toward a more focused curriculum and consider which of their approaches are useful for your district.



[Download Tool | WORD |](#)

Benchmark Review

Doing What Works
ED 2011

Benchmarks Review Grid

Use the grid below to determine the degree to which the benchmarks recommended in the National Mathematics Advisory Panel are currently addressed in the standards, mathematics curriculum, and assessments used to measure progress toward mastery. In columns 2, 3, and 4, indicate the specific standard, chapters in curriculum materials and/or units in a scope and sequence, and key points of assessment, including name of assessment and number of items. Remember that benchmarks are points of mastery so that the grade represented is an endpoint of proficiency that may be developed (and therefore represented in standards, curriculum, assessment) over several years.

Benchmarks	Representation in Standards	Topic Coverage in Core Curriculum	Assessment for Mastery
Fluency with Whole Numbers			
By the end of Grade 3, students should be proficient in the addition and subtraction of whole numbers.			
By the end of Grade 5, students should be proficient with multiplication and division of whole numbers.			
Fluency with Fractions			
By the end of Grade 4, students should be able to identify and represent fractions and decimals, and compare them on a number line or with other common representations of fractions and decimals.			
By the end of Grade 5, students should be proficient with comparing fractions and decimals and common percents, and with the addition and subtraction of fractions and decimals.			
By the end of Grade 6,			

AREA OF LEA RESPONSIBILITY	CURRENT STATUS			NEXT STEPS		DWW RESOURCES (LINKS TO SPECIFIC RESOURCES)
	Already in Place	Not Feasible/ Inappropriate	Potential Areas to Develop	LEA	State Support Team	
B. Setting Standards and Expectations for Achievement <ol style="list-style-type: none"> LEA articulates to all staff the same learning outcome expectations in critical foundations for algebra for all students. District-adopted mathematics standards and benchmarks, augmenting state standards as necessary, address mathematical proficiency for critical foundations for algebra at all grade levels. LEA communicates a coherent mathematical curriculum emphasizing foundational skills and expectations for all students for the learning of algebra. 						


2 Sec 1 2/6 At Ln Col REC TRK EXT OVR 

Topic Overview



LEARN about the practices.

SEE how other schools do it.

DO it at your school.

Do the practices - use tools to help you reflect on your school's mathematics program, support classroom teachers, and improve instruction.

Doing What Works

dww.ed.gov

Doing What Works

ED.gov

<http://dww.ed.gov>

The screenshot displays the 'Doing What Works' website interface. At the top, it features the ED.gov logo, the 'No Child Left Behind' banner, and a search bar. A navigation menu on the left lists categories such as 'English Language Learners', 'SEE WHAT'S COMING!', 'Cognition & Learning', 'Early Childhood Education', 'High School Reform', 'Literacy', 'Math & Science', and 'School Restructuring'. Below the menu are links for 'DWW Overview', 'ED Partner Office', 'Criteria & Methodology', 'FAQ', 'Glossary', 'Links', 'Technical Requirements', 'Site Map', and 'Contact Us'.

The main content area features a video player with a blue play button. The video is titled 'Vocabulary Teaching in Action' and is from 'Warfield Elementary'. The video content shows a teacher sitting on a stool, pointing to a whiteboard. The whiteboard has a table of words and their suffixes:

	know	er	est
adjective	er	-est	
quiet	queter	quietest	
silky	silier	siliest	
crazy	crazier	craziest	
strong			

Below the video, there is a 'START' button and a row of thumbnail images representing different lessons. The video player also includes a 'Previous | Next' navigation link.