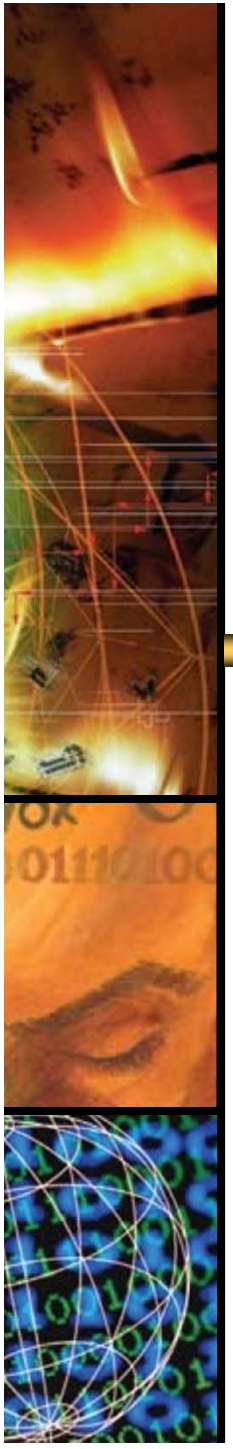
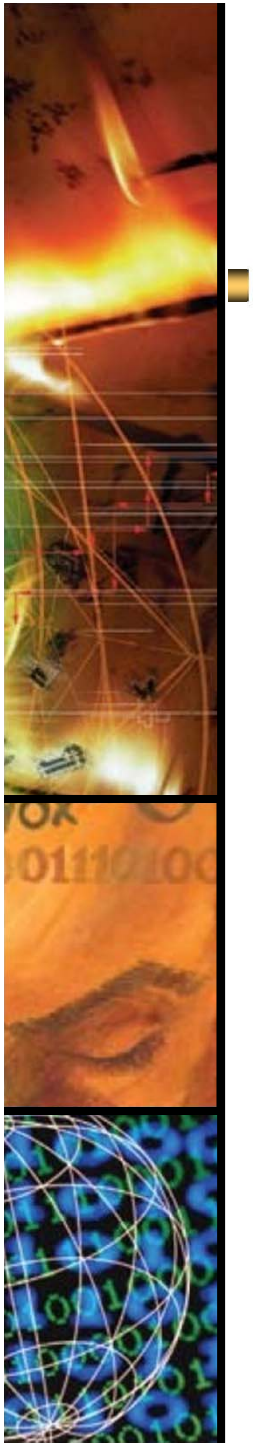


Broadening the Conversation: Issues and Concerns

Diane J. Briars
djbmath@comcast.net

Assessment of Mathematical Proficiencies in the Age of the Common Core
MSRI, April 5, 2013



Most suspects in Atlanta cheating scandal surrender

Defendants in Atlanta's school cheating scandal Starlette Mitchell, left, and Angela Williamson, right, turn themselves in at the Fulton County Jail accompanied by attorney Gerald Griggs, Tuesday, April 2, 2013, in Atlanta. Thirty-five defendants are named in a 65-count indictment that alleges a broad conspiracy involving cheating on standardized tests in Atlanta Public Schools. / **AP PHOTO/DAVID GOLDMAN**

post-gazette.com
Pittsburgh Post-Gazette

Why I won't let my son take the PSSA

March 31, 2013 12:10 am
By Kathy M. Newman /

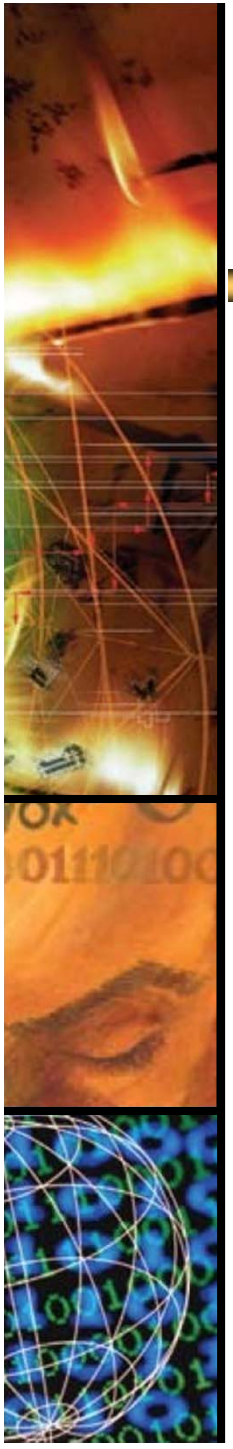
I am an English professor. So you can imagine how my pride was hurt when my 9-year-old son Jacob started bringing home low scores on his practice reading tests for the Pennsylvania System of School Assessment.

My husband and I have been helping Jacob with his test-prep reading homework every weeknight this year, and it has been a grim slog. At times I have found myself getting angry when Jacob has fidgeted, or when he has had trouble focusing. Sometimes I have gotten angry when he simply hasn't been able to answer the questions.

Then one day this March it dawned on me. I am getting angry at my son about a test. A test that I do not like. A "high-stakes" test that will put so much pressure on Jacob that it probably will not reflect his true abilities. I also realized something else: Jacob does not love to read.

After doing some research and talking with other parents, my husband and I decided to "opt out" Jacob from the PSSA tests. We are opting him out because we do not like what high-stakes tests are doing to Jacob, to our family, to his teachers, to his school and, ultimately, to our entire education system.

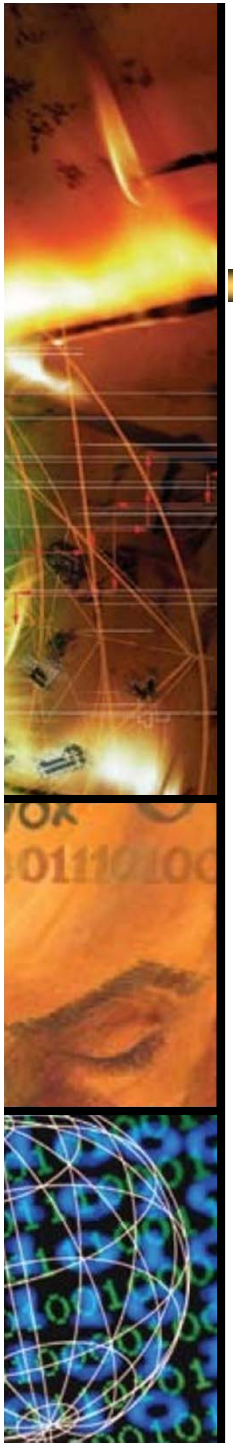
Diane J. Briars, April 2013



Issue #1: Transforming High-Stakes Testing Culture

Move to:

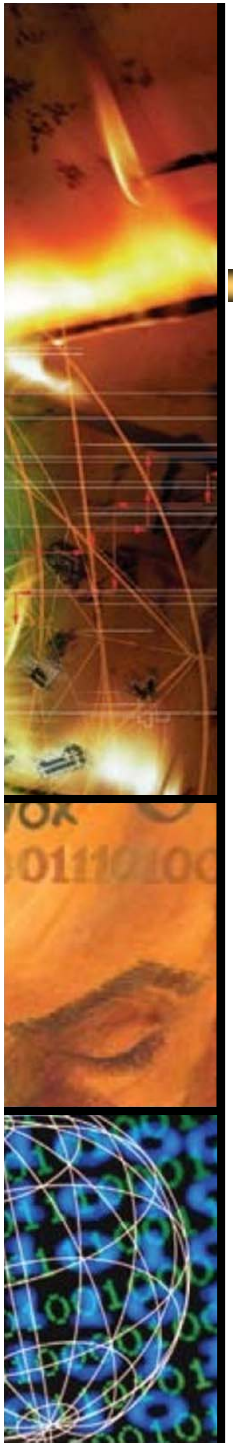
- **Tests worth teaching to**
- **Good instruction is the most effective test-prep**
- Interpreting and using test results appropriately
- Multifaceted teacher, administrator, school evaluation systems.



Effective Test-Prep: Ongoing Review and Practice

Providing students with periodic opportunities to practice using concepts and skills, along with feedback about their performance, helps students solidify their knowledge and promotes retention, reflection, generalization, and transfer of knowledge and skill.

IES Practice Guide, 2007



What about Test-Prep as instruction?

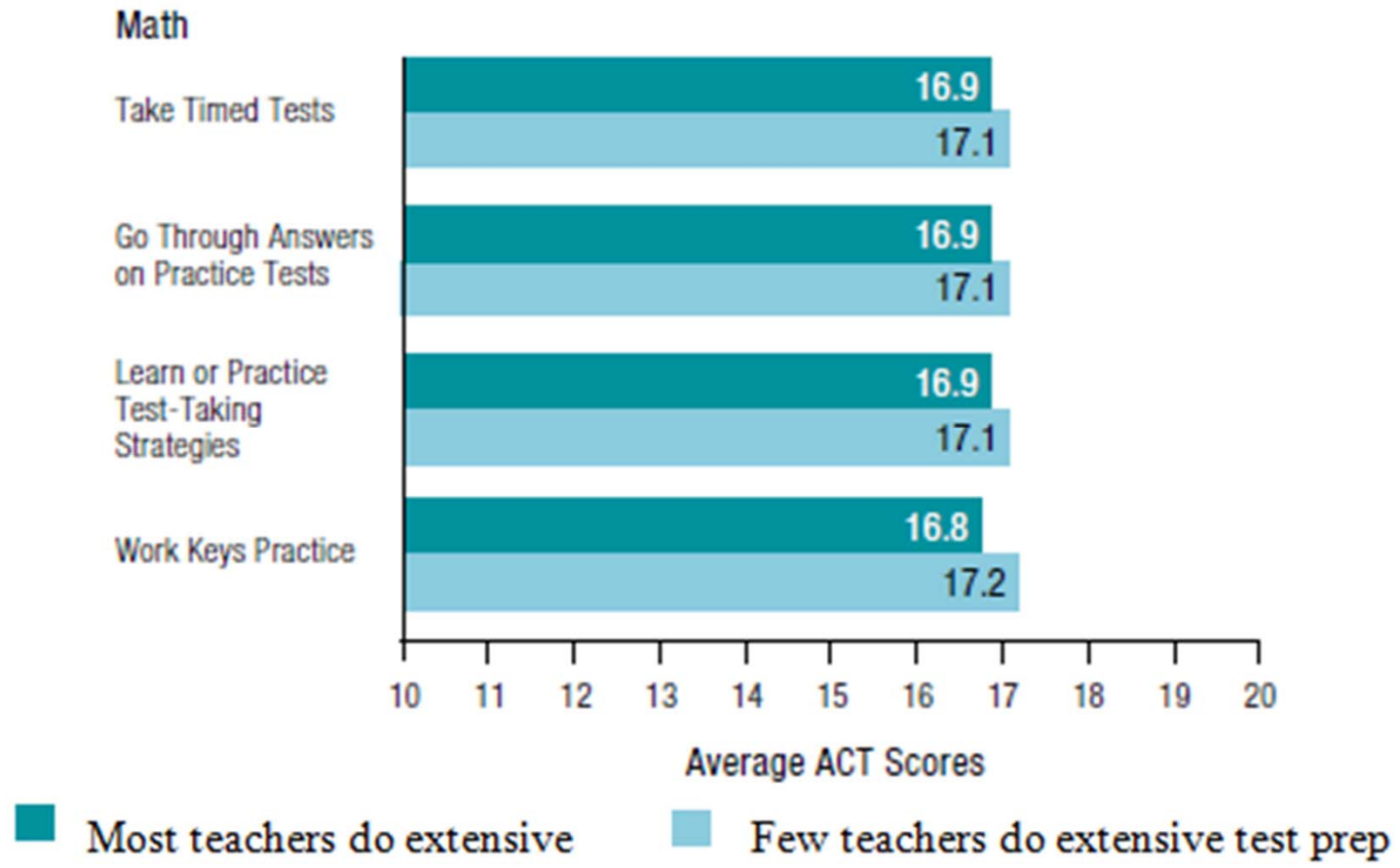
Too often, teachers are putting regular instruction "on hold" to spend class time practicing test questions. While on the surface this may appear to make sense, research indicates just the opposite—

test scores are lower in schools where teachers spend large amounts of time on test prep.

(Allensworth, Correa, & Ponisciak, 2008)

Intensive Test Prep Produces the Same or Lower Scores as Little or No Test Prep

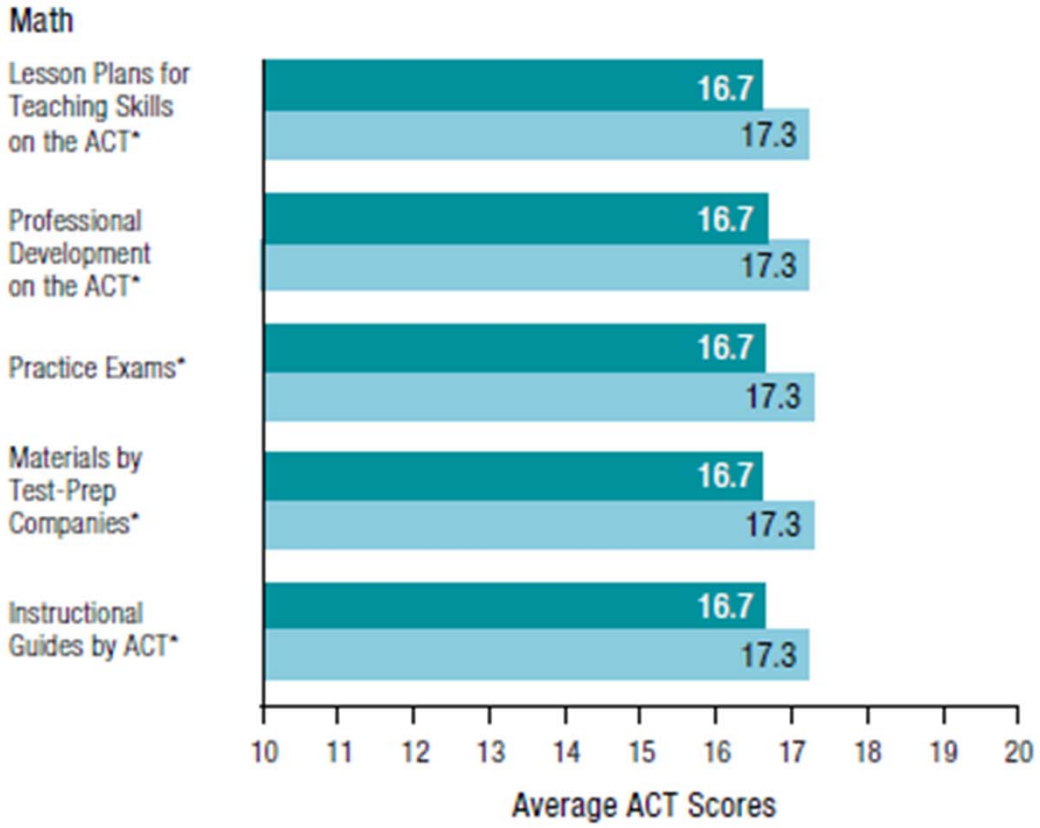
All Test-Prep



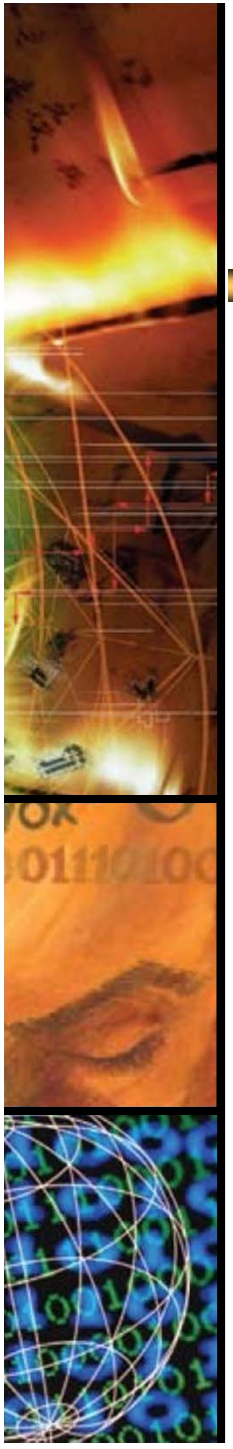
(Allensworth, Correa, & Ponisciak, 2008)

Intensive Test Prep Produces the Same or Lower Scores as Little or No Test Prep

ACT Test-Prep Materials



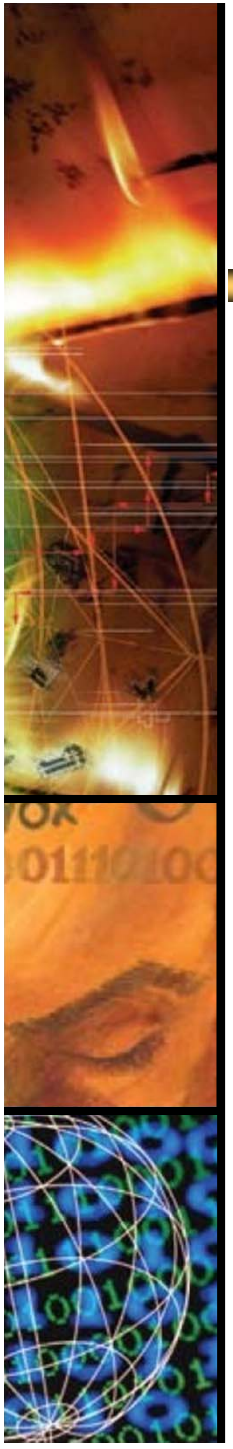
(Allensworth, Correa, & Ponisciak, 2008)



Good Instruction is the Best Test-Prep

- Students acquire conceptual knowledge as well as skills to enable them to organize their knowledge, transfer knowledge to new situations, and acquire new knowledge.
- Students engage with challenging tasks that involve active meaning-making.
- Students know what is expected

Hiebert & Grouws, 2007



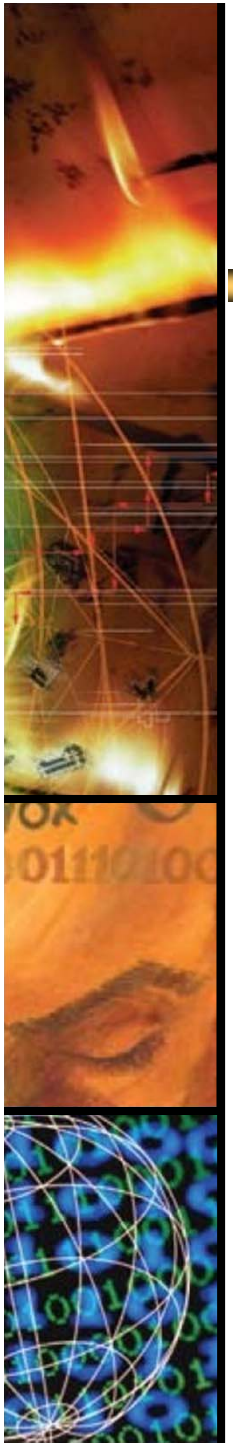
Boundary to Dissolve: Research and Practice

- Research results from a wide range of fields, including cognitive and social science, policy research.

Promoting Productive Struggle

..\..\..\Videos\Carol Dweck The Effect of Praise on Mindsets.mp4

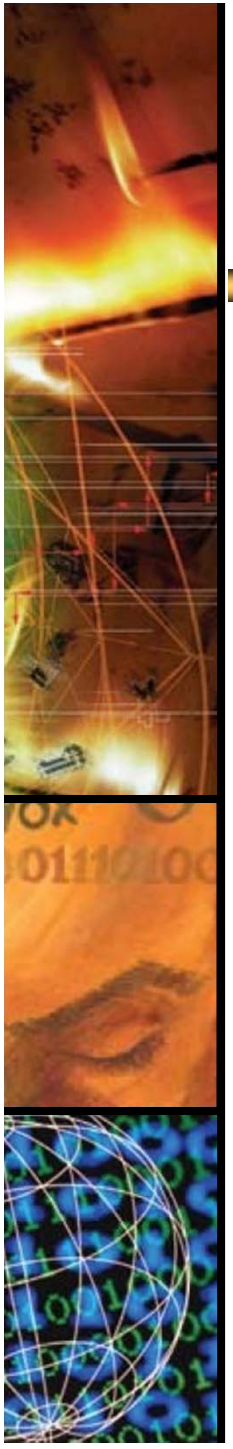
Diane J. Briars, April 2013



Students' Beliefs about Their Intelligence Affect Their Academic Achievement

- Fixed mindset:
  - Avoid learning situations if they might make mistakes
  - Try to hide, rather than fix, mistakes or deficiencies
  - Decrease effort when confronted with challenge
- Growth mindset:
  - Work to correct mistakes and deficiencies
  - View effort as positive; increase effort when challenged

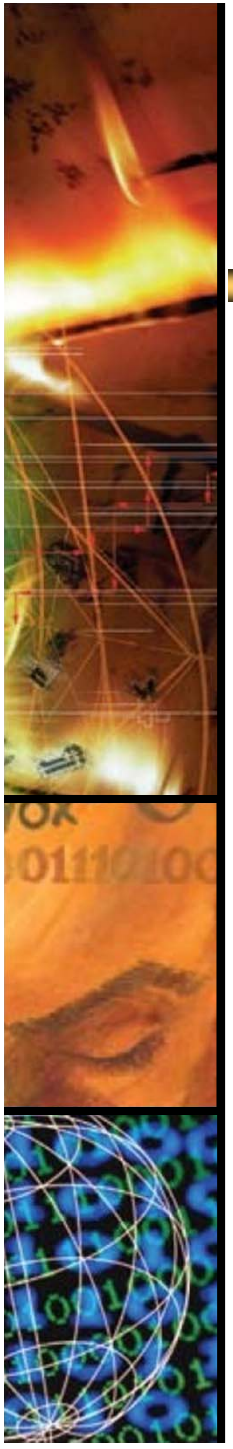
Dweck, 2007



Students' Beliefs about Their Intelligence Affect Their Academic Achievement

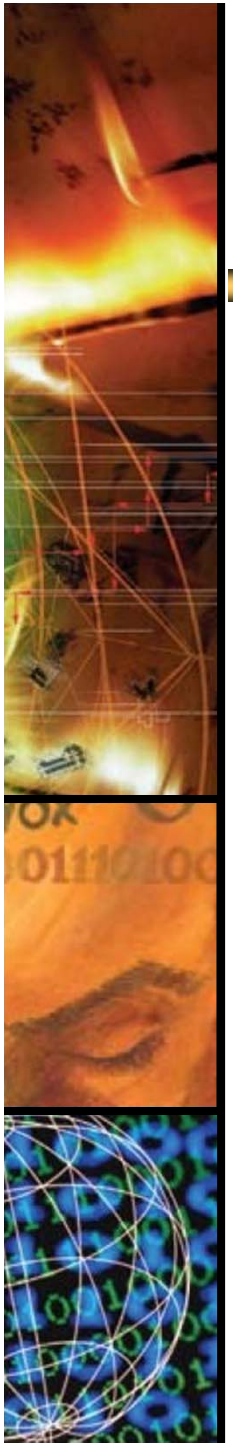
When confronted with challenging school transitions or courses, students with growth mindsets outperform those with fixed mindsets, even when they enter with equal skills and knowledge.

Dweck, 2007



Students Can Develop Growth Mindsets

- Teacher praise influences mindsets
  - Fixed: Praise refers to intelligence
  - Growth: Praise refers to effort, engagement, perseverance
- Explicit instruction about the brain, its function, and that intellectual development is the result of effort and learning has increased students' achievement in middle school mathematics.
- Reading stories of struggle by successful individuals can promote a growth mindset



“Effort Praise” Promotes Growth Mindsets

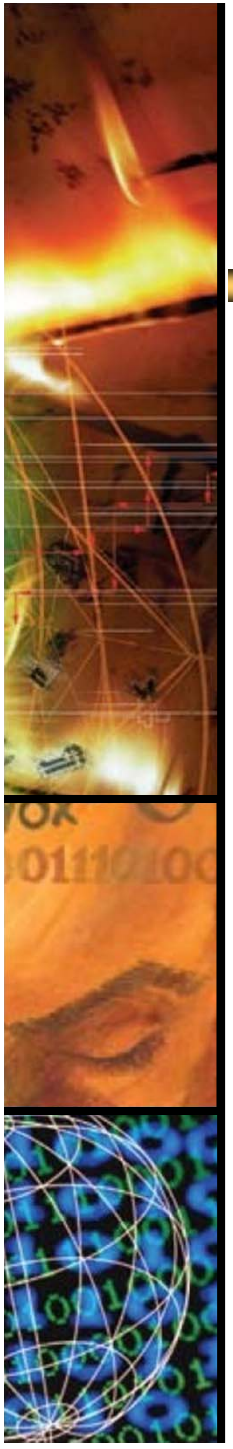
“You really studied for your English test, and your improvement shows it. You read the material over several times, outlined it, and tested yourself on it. That really worked!”

“I like the way you tried all kinds of strategies on that math problem until you finally got it.”

“It was a long, hard assignment, but you stuck to it and got it done. You stayed at your desk, kept up your concentration, and kept working. That's great!”

“I like that you took on that challenging project for your science class. It will take a lot of work—doing the research, designing the machine, buying the parts, and building it. You're going to learn a lot of great things.”

Dweck, 2007

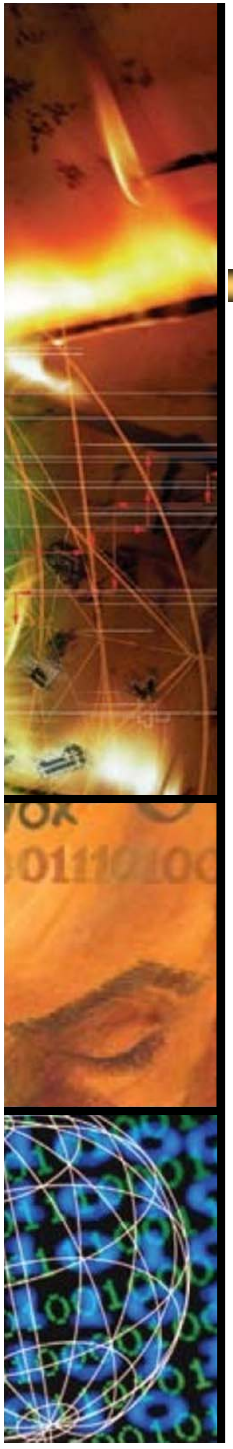


"Effort Praise" Promotes Growth Mindsets

What about a student who gets an *A* without trying?

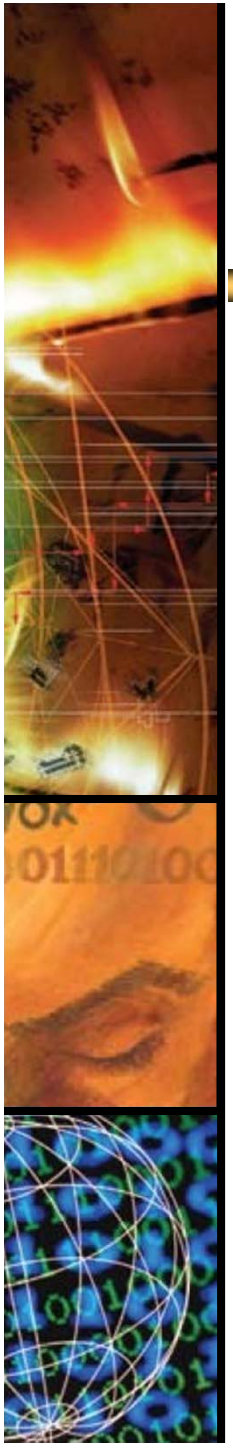
- "*All right, that was too easy for you. Let's do something more challenging that you can learn from.*"
- What about a student who works hard and *doesn't* do well?
- "*I liked the effort you put in. Let's work together some more and figure out what you don't understand.*"

Dweck, 2007



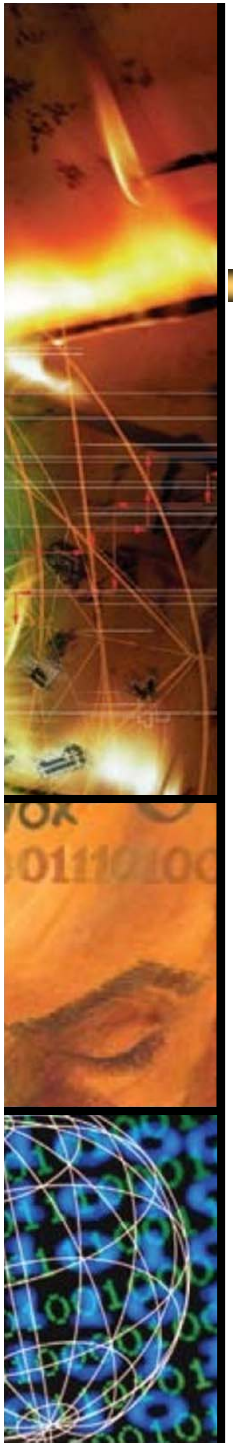
Boundary to Dissolve: Research and Practice

- Research results from a wide range of fields, including cognitive and social science, policy research.
- Research studies as a source of assessment tasks



Issue #2

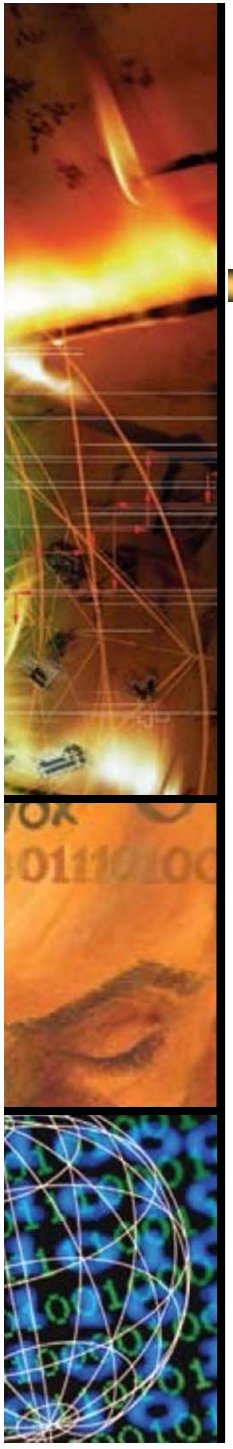
Promoting and supporting high quality classroom assessment



What Is Proficiency?

6.G. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

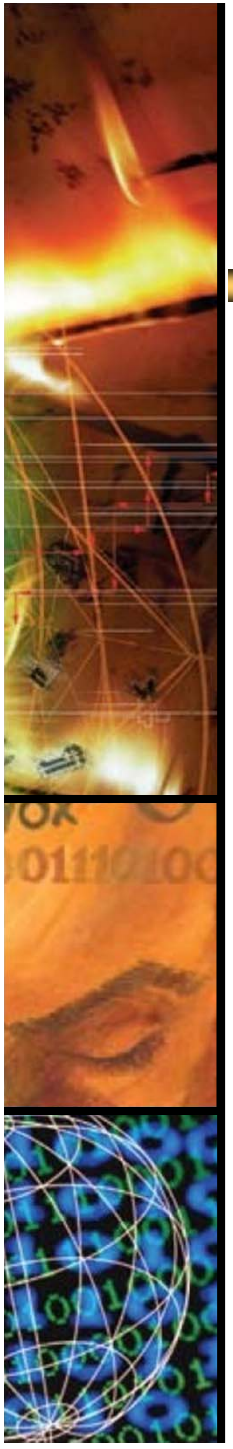
What assessment tasks would you use to assess students' proficiency with this standard?



What Is Proficiency?

6.G. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

- Compute area of different figures?
- Explain the relationship between the areas of different figures?
- Find a missing side of a rectangle or base/height of a triangle, given the area and another side?



What Is Proficiency?

6.G. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

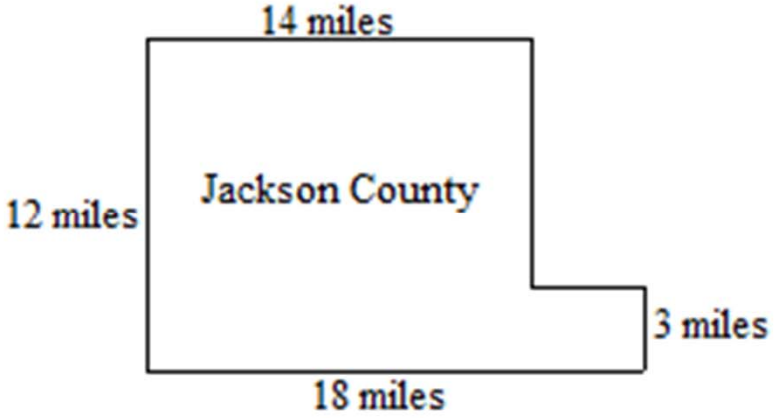
- What applications?
- "A rectangular carpet is 12 feet long and 9 feet wide. What is the area of the carpet in square feet?"

County Concerns

1. The Jackson County Executive Board is considering a proposal to conduct aerial spraying of insecticides to control the mosquito population. An agricultural organization supports the plan because mosquitoes cause crop damage. An environmental group opposes the plan because of possible food contamination and other medical risks.

Here are some facts about the case:

- A map of Jackson County is shown at the right. All county boundaries are on a North-South line or an East-West line.
- The estimated annual cost of aerial spraying is $29 per acre.
- There are 640 acres in 1 square mile.
- Plan supporters cite a study stating that for every $1 spent on insecticides, farmers would gain $4 through increased agricultural production.



a. What is the area of Jackson County in square miles? In acres?

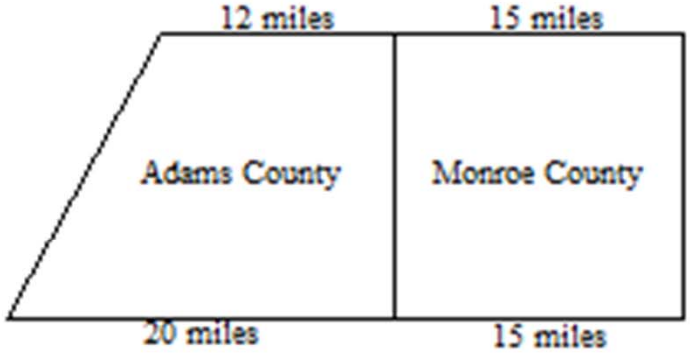
b. What would the cost to Jackson County for the proposed spraying program?

c. According to plan supporters, how much money would the farmers gain from the spraying program?

Diane J. Briars, April 2013

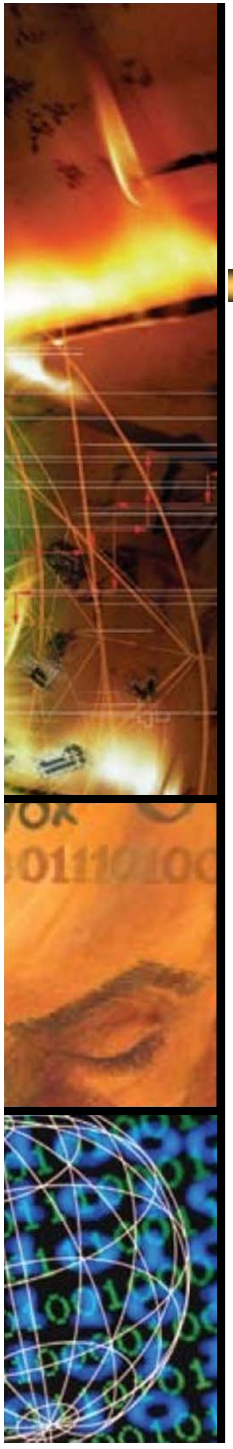
County Concerns

2. The Sheriff of Adams County and the Sheriff of Monroe County are having an argument. Each of them believes that their own county is larger than the other county. Who is right? Write an explanation that would settle the argument.



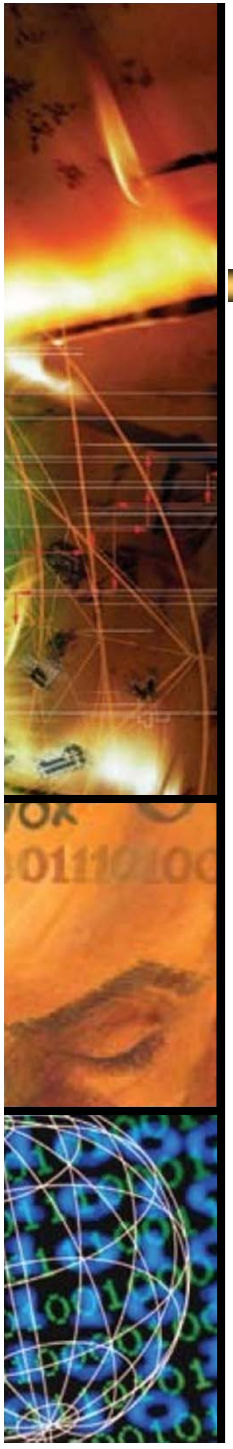
All boundaries run directly North-South or East-West, except for the western boundary of Adams County.

Diane J. Briars, April 2013



Task Sets Clarify Expectations

- Range of content
- Depth of knowledge
- Type of reasoning and evidence of it
- Types of applications



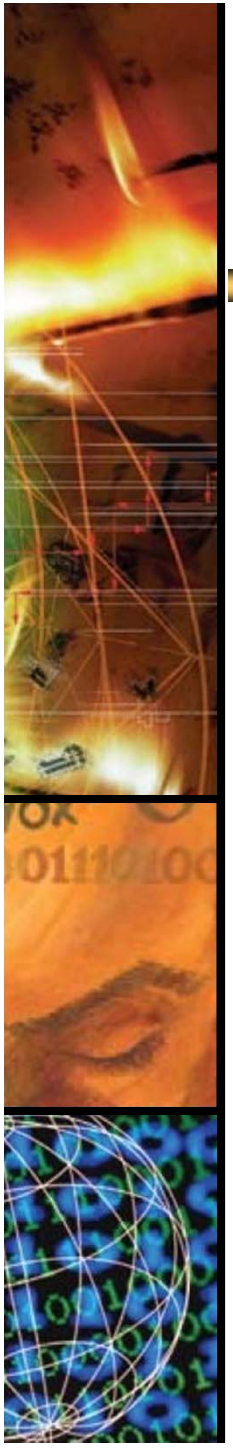
Assessment: A Collaborative Team Activity

End-of-unit assessments:

1. The team designs and implements agreed-on common assessment instruments based on high quality exam designs. The collaborative team designs all unit exams, unit quizzes, final exams, writing assignments, and projects for the course.
2. The team designs and implements agreed-on common assessment instrument scoring rubrics for each assessment in advance of the exam.
3. The team designs and implements agreed-on common scoring and grading feedback (level of specificity to the feedback) of the assessment instruments to students.

Tools to Support Assessment and Instruction

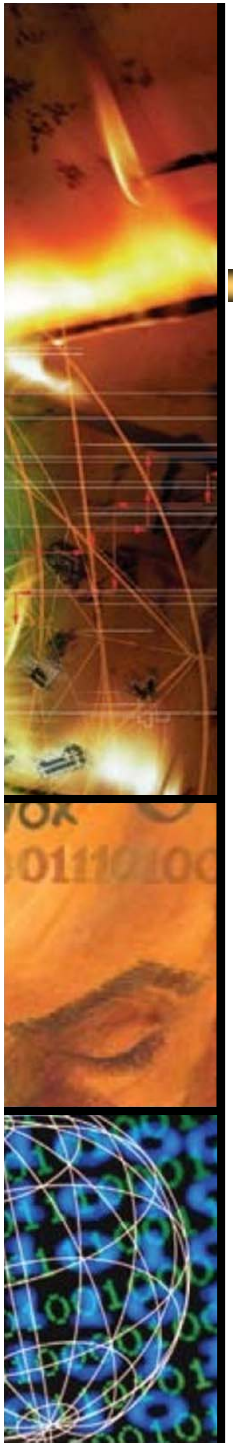
- Model task "sets" that illustrate expected proficiency for Grades K-12
  - Associated with model curricula units
  - Associated with clusters and/or standards
- Special attention to how to assess:
  - Standards for Mathematical Practice
  - Conceptual understanding



Understanding a Concept

- Explain it to someone else
- Represent it in multiple ways
- Apply it to solve simple and complex problems
- Compare and contrast it to other concepts

New Standards Project



Prototype Tasks Clarify Expectations

PARCC

"[The prototypes] are designed to shine a light on important elements of the CCSS . . . "

SBAC

"The sample items and tasks illustrate the knowledge and skills students will be expected to demonstrate on the Smarter Balanced assessments, giving educators clear benchmarks to inform their instruction."

Prototype Tasks

PARCC Grade 3

Fluency

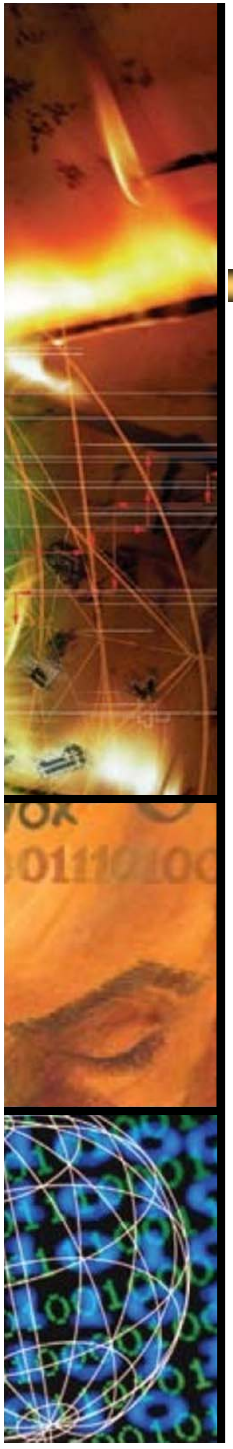
Click on all the equations that are true.

- ☐ 8 x 9 = 81
- ☐ 54 ÷ 9 = 24 ÷ 6
- ☐ 7 x 5 = 25
- ☐ 8 x 3 = 4 x 6
- ☐ 49 ÷ 7 = 56 ÷ 8

SBAC Grade 4

Rectangle 2

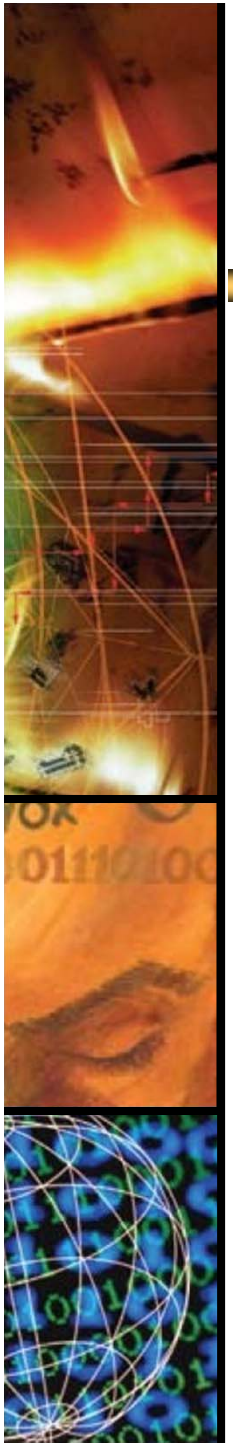
A rectangle is 6 feet long and has a perimeter of 20 1/3 feet. What is the width of this rectangle? Explain how you solved this problem.



Collaborative Team Formative Assessment Actions

The team designs and implements agreed-on

- Adjustments to instruction and intentional student support based on both the results of daily formative classroom assessments and unit or chapter assessments.
- Levels of rigor for daily in-class prompts and common high-cognitive-demand tasks used to assess student understanding of various mathematical concepts and skills.
- Methods to teach students to self-assess and set goals. Self-assessment includes students using teacher feedback, feedback from other students, or their own self-assessments to identify what they need to work on and to set goals for future learning.



Using Assessment Formatively

Shift in focus:

- Answers → Students' thinking and understanding

Tools:

- Tasks that are designed to reveal students' understanding and thinking.
- Student work samples
- Commentary and analysis
- Suggestions for intervention

Buying a Television

Seung is saving money to buy a television. He starts saving by putting $40 in an envelope.

Each week Seung adds the same amount of money to the envelope. He does not take any money out of the envelope.

The table below shows the amount of money in the envelope at the end of each week for Seung's first four weeks of saving.

Amount of Money at End of Week

Week	Amount of Money
1	$50
2	$60
3	$70
4	$80

1. What is the amount of money, in dollars, in the envelope at the end of week 8? _____

Show or explain how you got your answer.

2. Write an algebraic expression that could be used to find the amount of money in the envelope at the end of n weeks.

3. What is the amount of money, in dollars, in the envelope at the end of week 28? _____

Show or explain how you got your answer.

4. Determine the number of weeks it will take for the amount of money in the envelope to be exactly $500.

_____

Show or explain how you got your answer.

Buying a Television

S3

Seung is saving money to buy a television. He starts saving by putting $40 in an envelope.

Each week Seung adds the same amount of money to the envelope. He does not take any money out of the envelope.

The table below shows the amount of money in the envelope at the end of each week for Seung's first four weeks of saving.

Amount of Money at End of Week

Week	Amount of Money
1	$50
2	$60
3	$70
4	$80

He adds 10 every week.

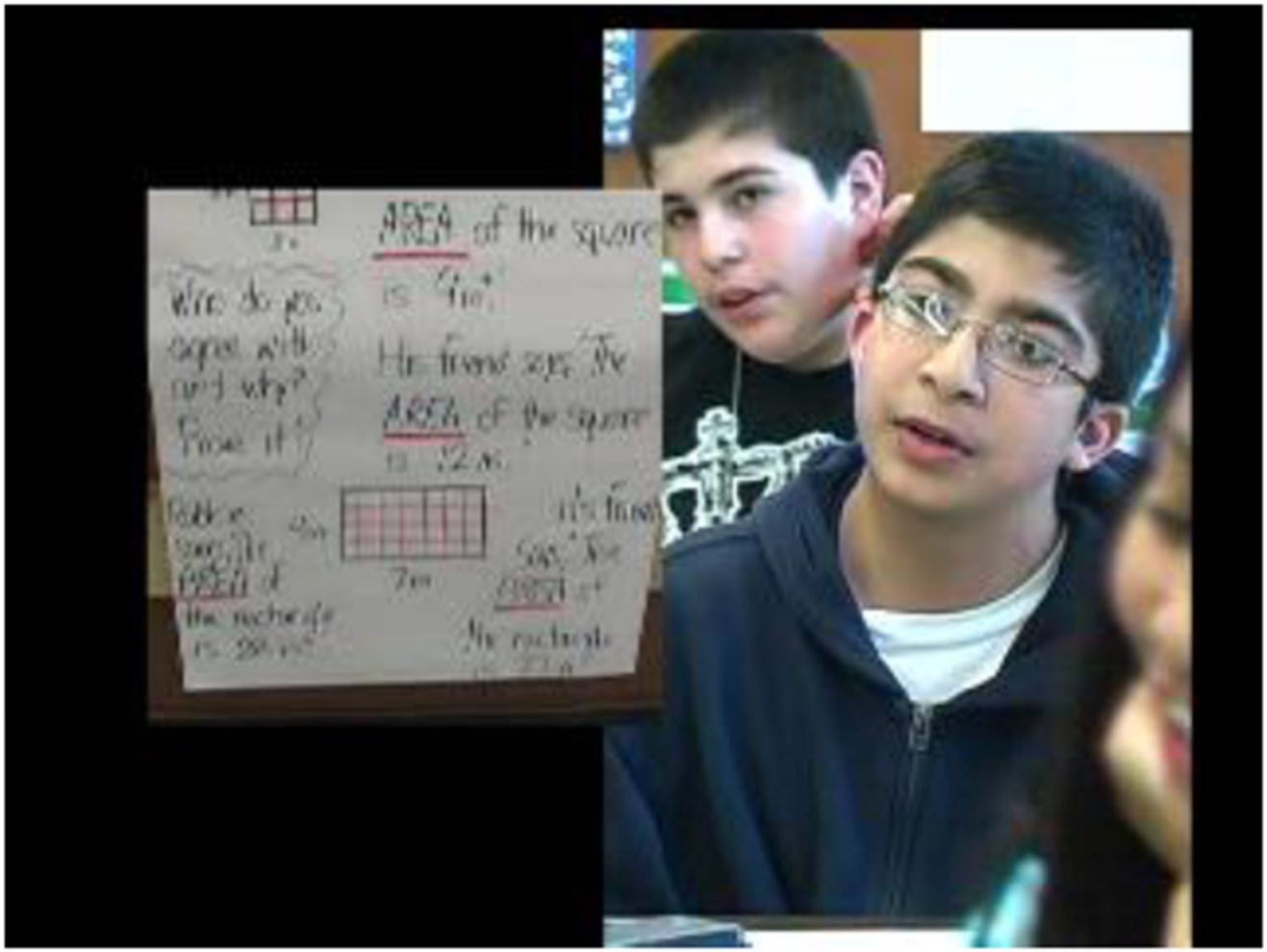
1. What is the amount of money, in dollars, in the envelope at the end of week 8? 160

   Show or explain how you got your answer.

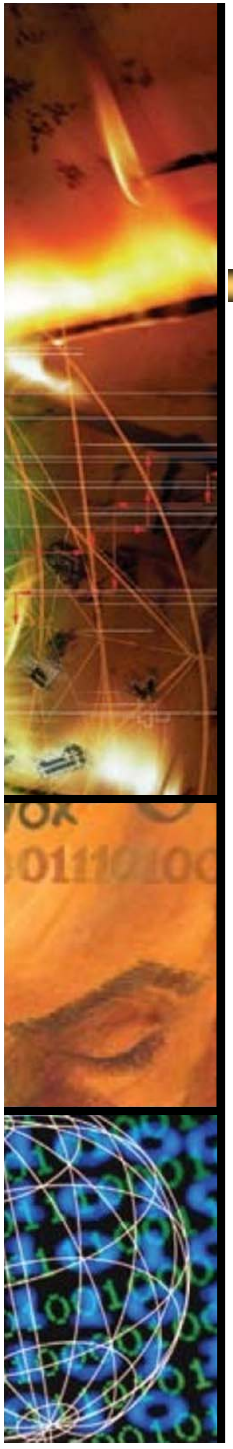
80 at week 4 its 80
+80 so just
160 double it

Re-engagement:

Completing the Formative Assessment Cycle



David Foster, 2010



Re-teaching vs. Re-engagement

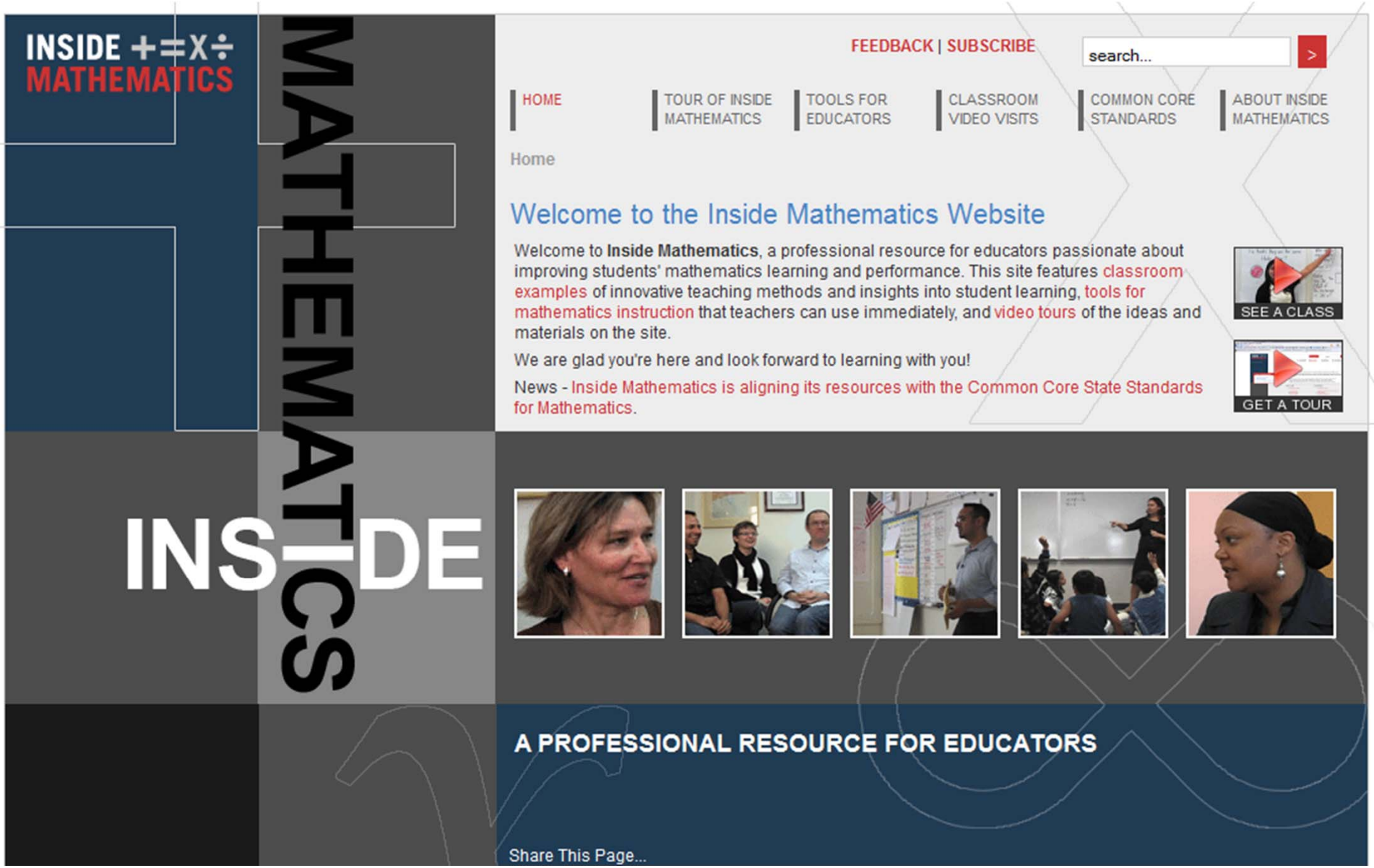
- Teach the unit again.
- Address basic skills that are missing
- Do the same or similar problems over
- Practice more to make sure that students learn the procedures
- Focus mostly on underachievers
- Cognitive level is usually lower

- Revisit student thinking
- Address conceptual understanding
- Examine task from different perspective(s)
- Critique student approaches/solutions to make connections
- The entire class is engaged in the math

Diane J. Briars, April 2013

David Foster, 2010

Insidemathematics.org



Mathematics Assessment Project (MAP)
http://map.mathshell.org.uk/materials

Mathematics Assessment Project
ASSESSING 21ST CENTURY MATH
Welcome to the Mathematics Assessment Project

MARS Mathematics Assessment Resource Service

Home | MAP Overview | Lessons | Tasks | Tests | Professional Development | Standards | Instructions | Log In

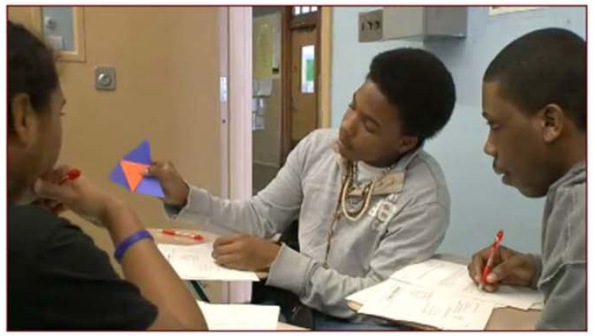
MAP Home

- Project goals
- Products
- The Team
- What's on this site?
- Who can use the MAP materials?

The Mathematics Assessment Project

"And I'm calling on our nation's governors and state education chiefs to develop standards and assessments that don't simply measure whether students can fill in a bubble on a test, but whether they possess 21st Century skills like problem solving and critical thinking and entrepreneurship and creativity."

President Obama, 1 March 2009.



Project goals

The project is working to design and develop well-engineered assessment tools to support US schools in implementing the Common Core State Standards for Mathematics (CCSSM).

Products

Tools for formative and summative assessment that make knowledge and reasoning visible, and help teachers to guide students in how to improve, and monitor their progress. These tools comprise:

- **Classroom Challenges:** lessons for formative assessment, some focused on developing math concepts, others on non-routine problem solving.
- **Professional Development Modules:** to help teachers with the new pedagogical challenges that formative assessment presents.

Math Reasoning Inventory™

Sign Up Log In

Home | About the Assessments | Resources | MRI Manager | About Us | Support | Contact Us

ABOUT THE ASSESSMENT

- Overview

INTERVIEWS

- Overview
- Watch Interviews
- Guidelines for Interviewing
- Selecting Student Explanations
- Practice Selecting Student Explanations
- Choosing Students to Interview
- Video Tutorials

REPORTS

- Overview
- Individual Report
- Group Report
- Item Analysis
- Assessment Review
- Video Tutorials

Overview: About the Assessments

MRI is an online formative assessment tool designed to make teachers' classroom instruction more effective. The MRI questions focus on number and operations and are based on content from the Common Core State Standards for Mathematics prior to sixth grade. They are questions that we expect…and hope…all middle school students to answer successfully.

There are three assessments in MRI—Whole Numbers, Decimals, and Fractions. Each assessment has two sections—the Interview and the Written Computation sections. The Interview (10–12 questions), done face-to-face, focuses on core reasoning strategies and understandings. We ask students questions, give them time to think, and listen to them explain. The Written Computation section is completed independently by students.

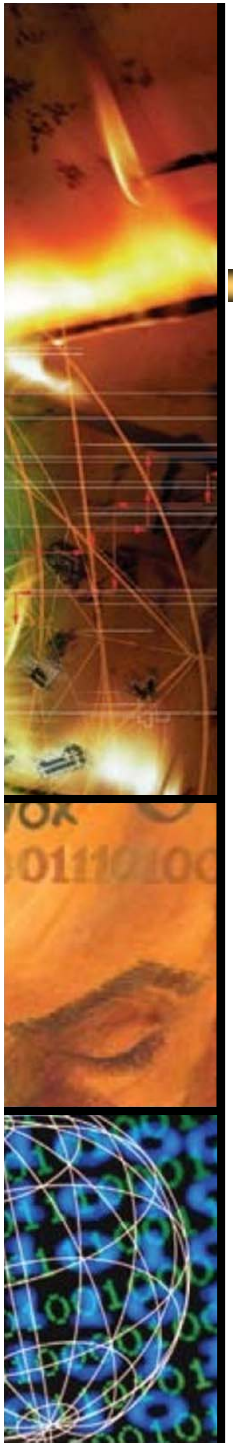
MRI reveals how students think and reason

Watch examples of students demonstrating appropriate reasoning strategies:

Monica: 15 × 12
Loading the video player …

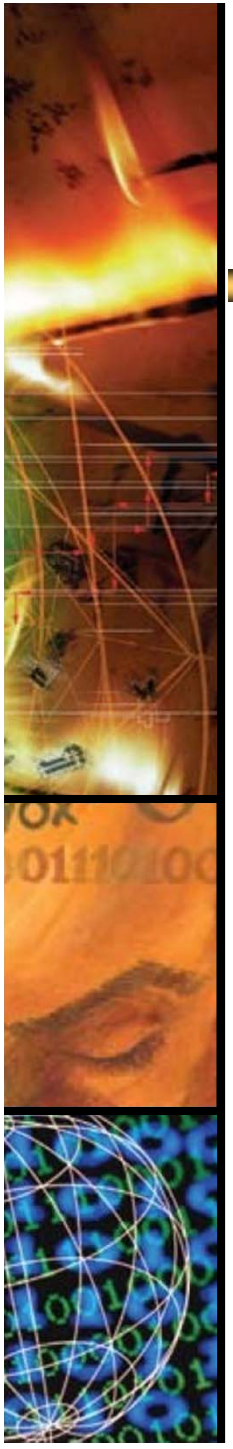
Amir: Compare $\frac{3}{8}$ and $\frac{5}{6}$
Loading the video player …

Watch examples of students demonstrating lack of understanding:



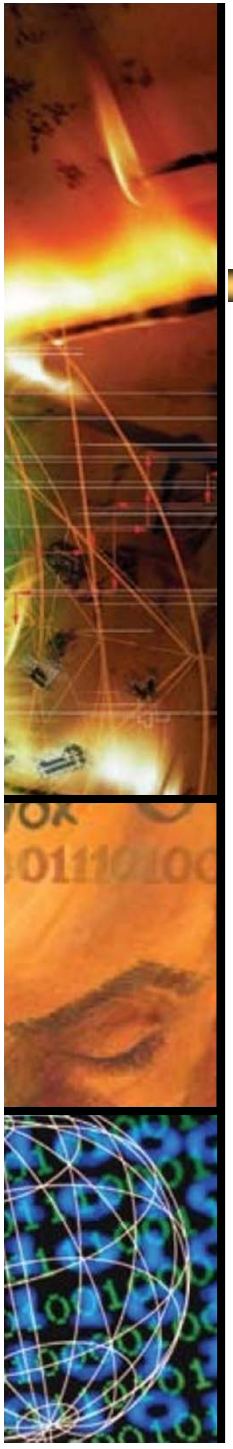
Supporting High Quality Classroom Assessment

- Access to tools
- Establish a PLC culture and engage ***all*** teachers in working in collaborative teams
  - Provide time for regular grade-level and cross-level collaborative planning
  - Set explicit expectations about how to use this planning time, as well as what products should result
  - Monitor the collaborative work
- Professional development as an ongoing collaborative activity; not only periodic events



Concerns

- Expectation that all teachers, teacher leaders, and district leaders will be assessment developers
- Potential lack of support for K-2 teachers
- What is proficiency on PARCC and SBAC?
  - "Basic" problems?
  - Problems that discriminate?



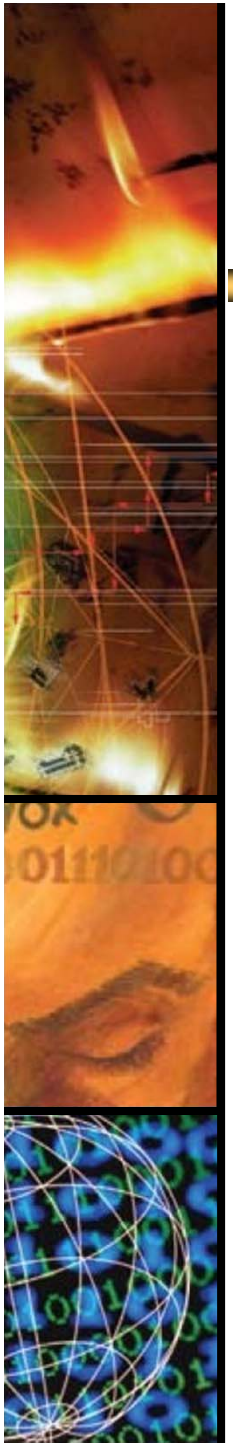
Algebra 1 Proficiency Test Item

At the school carnival, Carmen sold 3 times as many hot dogs as Shawn. The two of them sold 152 hot dogs altogether. How many hot dogs did Carmen sell?

38?

114?

Diane J. Briars, April 2013



Algebra 1 Proficiency Test Item

At the school carnival, Carmen sold 3 times as many hot dogs as Shawn. The two of them sold 152 hot dogs altogether.

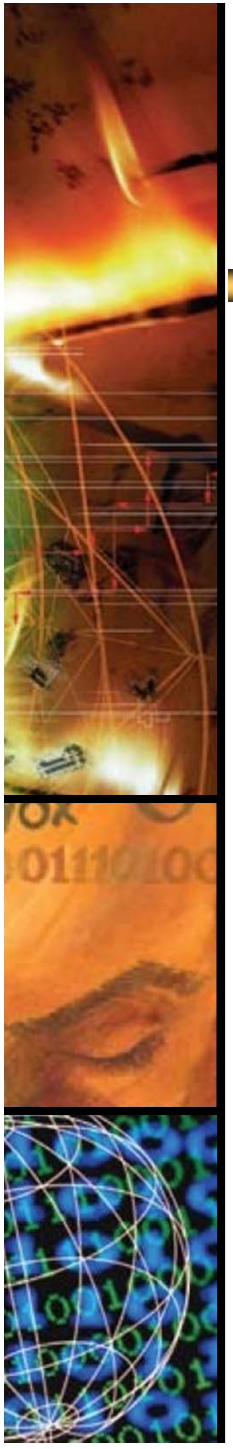
1. How many hot dogs did Shawn sell?

a. 13 b. 38 c. 51 d. 114 e. 148

2. How many hot dogs did Carmen sell?

a. 13 b. 38 c. 51 d. 114 e. 148

Diane J. Briars, April 2013



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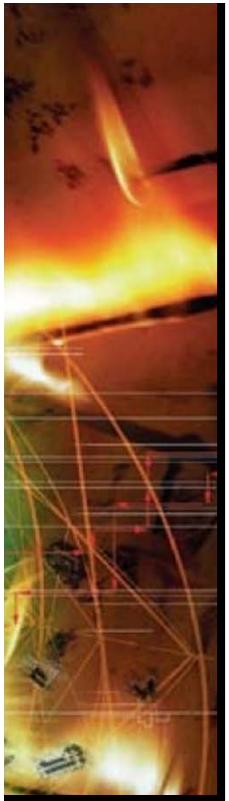
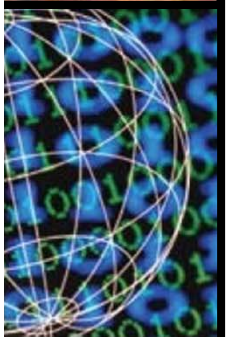




=4 legs

T1

=2 legs

Sheep and Ducks

The farmer raises sheep and ducks.

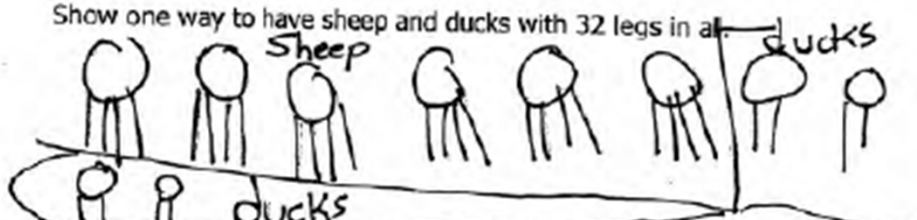
1. How many legs on one duck? 2
2. How many legs on 4 ducks? 8
3. How many legs on 5 sheep? 20

4. Next to the barn is a pen with 2 sheep and 3 ducks. How many legs altogether? 14

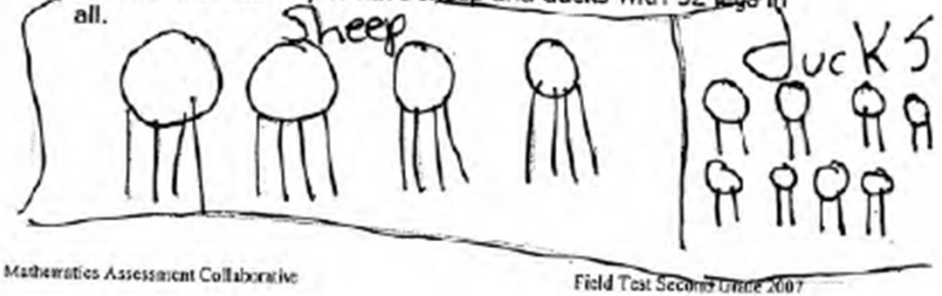
   Show how you know your answer is correct.

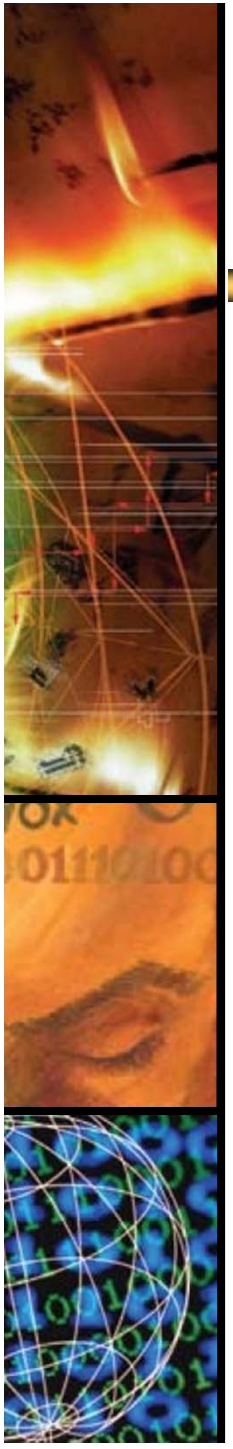
5. One of the farmer's pens has a high fence around it. He can see 32 legs under the fence. How many sheep and ducks are in this pen?

   Show one way to have sheep and ducks with 32 legs in all.



   Show a different way to have sheep and ducks with 32 legs in all.





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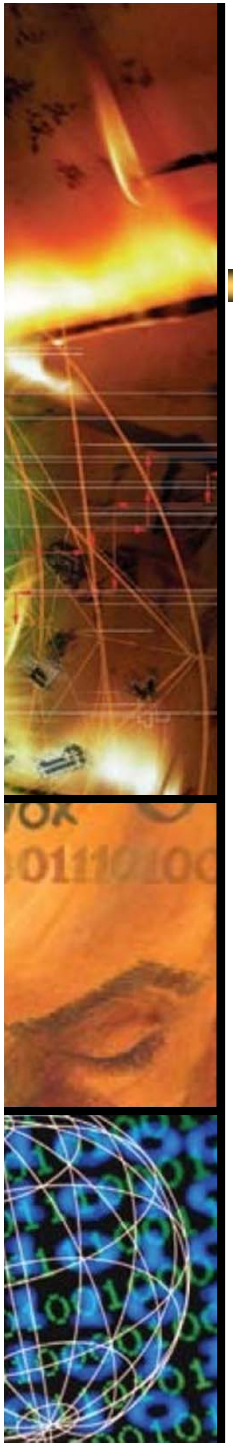
Using assessment as a lever to improve instruction and student achievement is possible . . . . .

. . . . . Because we've already done it.

New Standards Reference Exam

1992 – 2004?

State Assessments: MD, VT

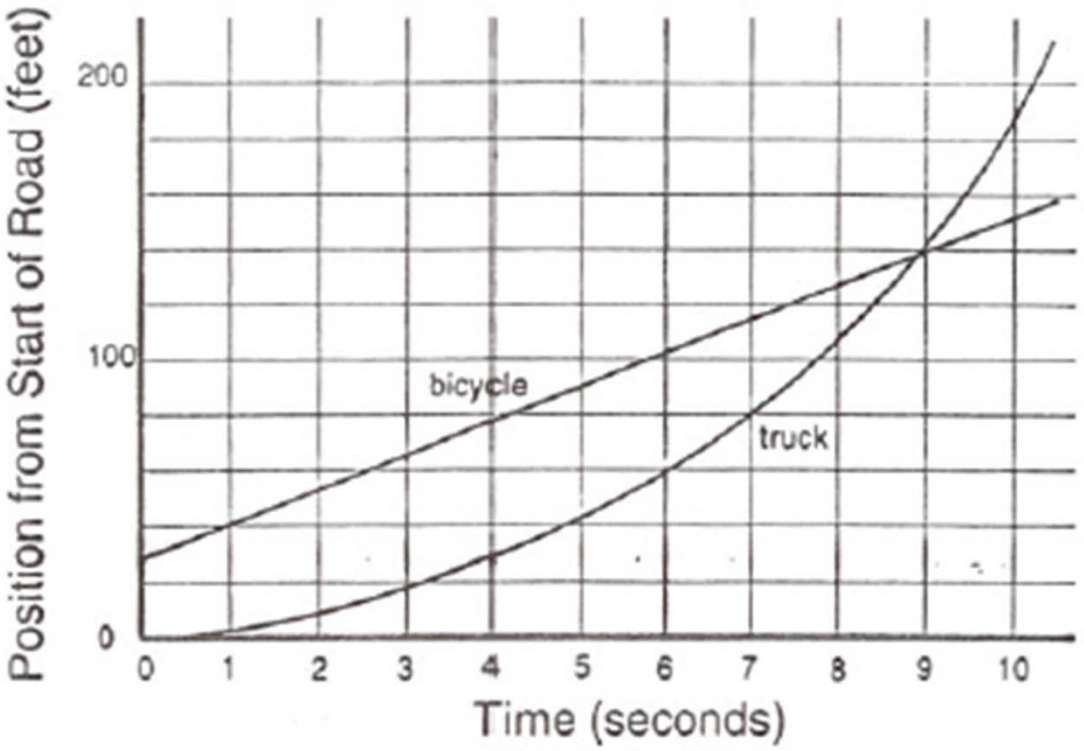


New Standards Reference Exam

- Grades 4, 8 and 10
- Assessed Skills, Concepts, Problem Solving
- 3 1-hour sessions
- 20 multiple choice items; rest performance tasks
- Pittsburgh Public Schools, Rhode Island

Bike and truck

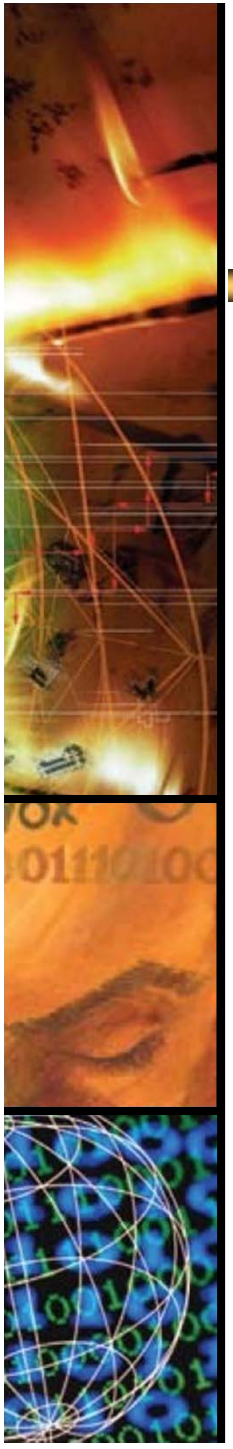
A bicycle and a truck are going along a road in the same direction.
The graph below shows their positions as a function of time:



1. After how many seconds, roughly, does the truck overtake the bike?

2. What is the speed of the bicycle?
   Show how you arrived at your answer.

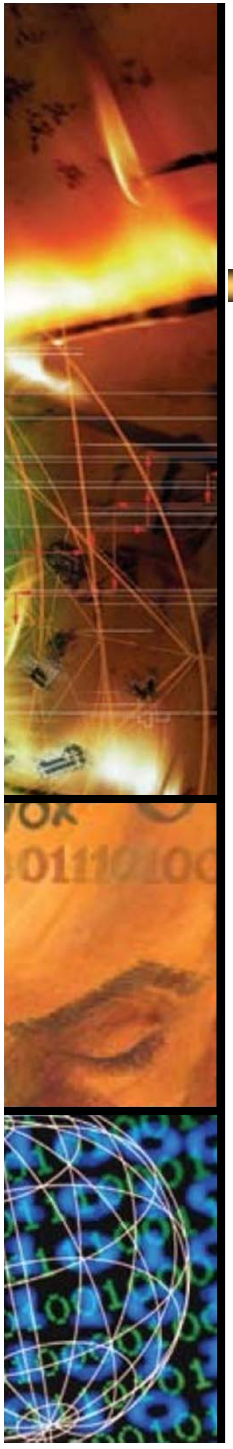
3. When is the truck going roughly the same speed as the bike?
   Describe briefly how you know.



Immediate Actions

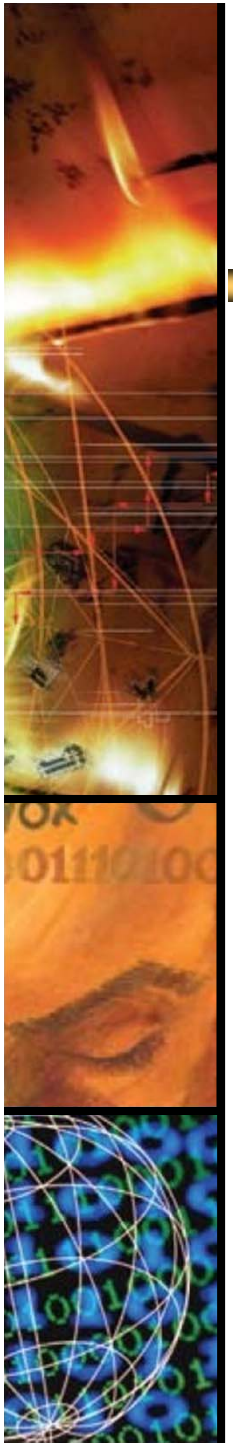
Schools/Districts

- Establish collaborative teams in every school; focus on assessment, then instruction.
- Embed professional development into collaborative team work.
- Systemically incorporate tasks that assess conceptual understanding and the Standards for Mathematical Practice into:
  - School assessments
  - District assessments



Challenges

- Policies that undermine, rather than support, high quality assessment and instruction.
  - NCLB pros and cons
  - Teacher evaluation systems
- Longstanding beliefs about assessment and how to improve student performance.
  - Test Prep
  - Coverage
- Beliefs about students and their capabilities
- Culture of teacher as independent contactor
- Failure to sustain direction/work long enough to realize benefits.



Immediate Actions

This community--

- Tools to support teachers' work
  - Task sets that illustrate proficiency
  - Tasks that support formative assessment
- Mechanisms to form and sustain collaboration
- What else might you do to support this work?
- What challenges do you face?