CAMS® & STAMS®

Research Summary

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Research Summary

CAMS® Quick-Reference Chart

Strategies and Features	Examples in *CAMS*® series	Research Says
Computational Fluency Computational fluency is having quick recall of number facts and knowledge and ability to apply multiple computational methods.	**Student Book** Problems in the Pretest, Benchmarks, and Post Test reinforce grade appropriate methods for computing.	"Efficient, accurate computational fluency is key to students' success in higher-level mathematics necessary for the workplace." — *National Research Council, 2001*
Data Driven Instruction Data-driven instruction involves instructional decisions that are based on the systematic collection of data that reflects students' understanding.	**Student Book** • 1 Pretest • 4 Benchmarks • 1 Post Test	"Districts and schools that are improving generally show a commitment to the use of student assessment data to diagnose weaknesses and guide improvement efforts. They provide data to teachers and principals in a timely manner, train teachers in how to use these data effectively and give the teachers time to analyze the data." — *U.S. Department of Education, 2010*
Formative Assessments A formative assessment is an assessment tool to guide teacher's instruction by setting an action plan based on a student's performance.	**Entire Series** • 1 Pretest • 4 Benchmarks • 1 Post Test	"Teachers' regular use of formative assessment improves their students' learning, especially if teachers have additional guidance on using the assessment to design and to individualize instruction." — *NMAP, 2008*
Problem Solving The problem solving process standard enables students to build new math knowledge through problem solving and to solve problems using various strategies.	**Entire Series** • 1 Pretest • 4 Benchmarks • 1 Post Test	"Problem solving is an integral part of all mathematics learning. In everyday life and in the workplace, being able to solve problems can lead to great advantages." — *NCTM, 2000*
Progress Monitoring Progress monitoring is a strategy that involves frequent, in-classroom progress checks of student's understanding and mastery of math concepts and skills.	**Student Book** • 1 Pretest • 4 Benchmarks • 1 Post Test	"Teachers' regular use of formative assessments improves their students' learning, especially if teachers have additional guidance on using the assessment results to design and individualize instruction." — *NMAP, 2008*
Test-Taking Practice Selected-response test questions are consistently used on state and national standardized tests.	**Student Book** • 1 Pretest • 4 Benchmarks • 1 Post Test	"The more times one repeats an action (e.g., practice) or recalls the information, the more connections of new memories to old are made, and the more efficient the brain becomes in its ability to retrieve that memory or repeat that action. Eventually, just triggering the beginning of the sequence results in the remaining pieces falling into place." — *Wilis, 2007*

COMPONENTS OF MATH INSTRUCTION

Maths Strategies	Examples in *STAMS*® series	Research Says
Computational Fluency Computational fluency is having quick recall of number facts and knowledge and ability to apply multiple computational methods.	**Student Book** Problems in each lesson part reinforce grade appropriate methods for computing.	"Efficient, accurate computational fluency is key to students' success in higher-level mathematics necessary for the workplace." — *National Research Council, 2001*
Conceptual Understanding Conceptual Understanding Conceptual understanding is the knowledge of why math processes and rules work.	**Student Book** Students develop conceptual understanding in Part One and Part Two and demonstrate their knowledge in Part Three, Part Four, and Part Five.	"Students with conceptual understanding know more than isolated facts and methods. They understand why a mathematical idea is important and the kinds of context problem-solving in which it is useful." — *National Research Council, 2001*
Error Analysis Error analysis is an explanation of the patterns of mistakes students make. It allows teachers to provide targeted instruction that will help correct the errors.	**Student Book** • Part Three: Check **Teacher Guide** • Part One and Part Two: Error Alert feature • Part Three: Answer Analysis • Assessment and Remediation chart	"Research has shown that building upon students' prior knowledge and directly addressing misconceptions can lead to increased learning." — *Swan, 2002; Askew, 2002*
Math Vocabulary Math vocabulary is the group of content-area words, or Tier 3 words, that are most often specific to math text and used rarely in other contexts. **Controlled Vocabulary** Controlled vocabulary is the use of words at a lower reading level. It allows students to learn new concepts without struggling with reading issues.	**Student Book** • Students must use math language in their explanations for solving the extended-response problems in Part Four and Part Five. • Math vocabulary words are boldfaced. • Key terms are defined explicitly. • The Let's Talk activities in Part One and Part Two provide opportunities for students to use math language in context. • Each lesson uses controlled vocabulary to make new math knowledge more accessible and understandable. **Teacher Guide** • Vocabulary Activity • Definitions of key math terms are provided for each lesson.	"Tier Three words should be taught at point of contact, or as they occur in text." — *Beck, McKeown, & Kagan, 2002* "Without a basic knowledge of these terms, students will have difficulty understanding information they read or hear. Knowledge of important terms is critical to understanding any subject." — *Marzano & Pickering, 2005* "Research has demonstrated that vocabulary learning occurs most successfully through instructional environments that are language-rich, actively involve students in using language, require that students both understand spoken or written words and also express that understanding orally and in writing, and require students to use words in multiple ways over extended periods of time." — *CCSSO/NGA, 2010*

COMPONENTS OF MATH INSTRUCTION (*continued*)

Maths Strategies	Examples in *STAMS*® series	Research Says
Meaningful Practice Meaningful practice is problem solving that requires students to apply learned concepts and skills.	**Student Book** • Part One through Part Four: Your Turn • Part Five: Independent practice	"Meaningful practice: to gain deeper understanding of topic — practice that focuses on building conceptual understanding related to skills and procedures." — *Marzano et al, 2000*
Multiple Representations Multiple representations are the ways in which a teacher or student represents a math idea, including spoken, written, symbolic, and concrete formats.	**Student Book** Symbolic, pictorial, spoken, and written methods are used throughout each lesson part to instruct students.	"Each of the different types of representation adds a new layer or a new dimension to the understanding of the concept being represented. Some students find some representations easier to understand than others." — *Mendieta, 2006*
Procedural Knowledge Procedural knowledge is the understanding of when and how to use mathematical procedures effectively. It aids in automatic recall of facts, allowing for further study of new math concepts and skills.	**Student Book** Through scaffolding, students develop procedural knowledge in Part One through Part Four. By Part Five they become independent problem solvers.	"Students need to be efficient and accurate in performing basic computation with whole numbers without having to rely on tables or other aids. They also need to know reasonably efficient and accurate ways to add, subtract, multiply, and divide multi-digit numbers, both mentally and with pencil and paper." — *National Research Council, 2001*

GENERAL INSTRUCTIONAL STRATEGIES

Strategies	Examples in *STAMS*® series	Research Says
Differentiated Instruction Differentiated instruction is an instructional approach that supports students of varying abilities to learn the same content. Various techniques or strategies include grouping students by ability level, pairing students for peer learning, or providing off-level lessons that are parallel to students' abilities.	**Teacher Guide** • The Differentiating Instruction section in the Overview provides suggestions on ways to meet the needs of all students. • Reteaching Activity for students still struggling to learn the skill • Challenge Activity for students who have mastered the skill • Related STAMS ® Lessons that direct teachers to precursor skills	"Although differentiated instruction is not a new idea, the differentiation movement has recently taken center stage as a means of meeting the needs of all students in the classroom. It is an organized, yet flexible way of proactively adjusting teaching and learning to meet students where they are and help all students achieve maximum growth as learners." — *Tomlinson, 1999*
Multiple Representations Multiple representations are the ways in which a teacher or student represents a math idea, including spoken, written, symbolic, and concrete formats.	**Student Book** • Part One and Part Two: Modeled problem solving with scaffolded student participation • Part Three and Part Four: Modeled practice • Part Five: Independent practice **Teacher Guide** • Step by Step provides guidance for teachers to most effectively walk students through a concept.	"Explicit instruction with students who have mathematical difficulties has shown consistently positive effects on performance with word problems and computation. Results are consistent for students with learning disabilities, as well as other students who perform in the lowest third of a typical class." — *NMAP, 2008*

GENERAL INSTRUCTIONAL STRATEGIES (*continued*)

Strategies	Examples in *STAMS*® series	Research Says
Family Engagement Family engagement is a strategy that involves and engages parents, guardians, and other family members in a student's school life, with the goal of boosting student success	**Teacher Guide** • School-Home Connection	"It is well-documented—and plain common sense—that parental involvement in a child's education boosts student learning and improves both behavior and attendance." *— A. Duncan, 2010*
Metacognition Metacognition is "thinking about thinking" to identify what skills or strategies need to be activated or improved to achieve the next learning goal (see also Think Aloud).	**Student Book** • Part One and Part Two: Let's Talk and Think it Through • Part Three: Solve and Check **Teacher Guide** • Throughout the lesson, students answer "why questions" posed by the teacher.	"Individual reflection or interaction with others (both teachers and peers) encourages students to communicate and explain their thinking." — Reys, Suydam, Lindquist, & Smiths, 1998 This reflection moves students beyond simple fact recall into deeper thinking of explaining "how" and "why."
Prior Knowledge Prior knowledge is the previous experience and knowledge that a student has about a topic that aid learning.	**Student Book** • Part One and Part Two: Explore **Teacher Guide** • Prerequisites • Related STAMS® Lessons	"Students learn better when new knowledge is connected to things they already know and understand" *– Hiebert and Carpenter, 1992; Hiebert et al, 1997*
Real-world Connections Real-world connections are links that are made between mathematics concepts and real-life situations.	**Student Book** • Part One through Part Five: Word problem contexts **Teacher Guide** • Real-World Connection • School-Home Connection	"A synthesis of findings from a small number of high-quality studies indicates that if mathematical ideas are taught using 'real-world' contexts, then students' performance on assessments involving similar 'real-world' problems is improved." *– NMAP, 2008*
Scaffolded Instruction Scaffolded instruction is the gradual withdrawal of instructional support as a student learns a new concept, skill, or task.	**Student Book** The instructional design of Part One through Part Five of every lesson provides a gradual release of responsibility from the teacher to the student.	"There is ample evidence that students are more successful in school and find it more satisfying if they are taught in ways that are responsive to their readiness levels." *— Vygotsky, 1986*
Targeted Instruction Targeted instruction is the teaching of focused math concepts and skills that are essential to learning higher-order mathematics.	**Student Book** Lessons in the student book are designed to provide deep instruction of key math concepts and skills. Sixteen key topics for each grade level address NCTM Focal Points and Connections.	"When instruction focuses on a small number of key areas of emphasis, students gain extended experience with core concepts and skills. Such experience can facilitate deep understanding, mathematical fluency, and an ability to generalize." *— NCTM, 2006*

GENERAL INSTRUCTIONAL STRATEGIES (*continued*)

Maths Strategies	Examples in *STAMS*® series	Research Says
Teacher Effectiveness Support Teacher effectiveness support is the inclusion of "best practices" suggestions that allow teachers to maximize their effectiveness and knowledge of mathematics.	**Teacher Guide** • Math Background • ELL Support • Error Alert • Point-of-use tips • Best Practices	Recent federal initiatives, such as the ESEA renewal and Race to the Top grant, have centered around the effectiveness of an individual teacher on student achievement. "The mathematics preparation of elementary and middle school teachers must be strengthened as one means for improving teachers' effectiveness in the classroom." — *NMAP, 2008*
Technology-based Learning Technology-based learning is the use of instructional technology to help improve student achievement.	**Teacher Guide** • Interactive Whiteboard Lessons, available online	"Interactive whiteboards in the classroom result in: increased student engagement and motivation; greater opportunities for participation and collaboration; improved personal and social skills and self-confidence; greater progress in mathematics and science for students in years; accommodation for different learning styles; and improved attainment for students with special needs." — *Mendieta, 2006*
Think Aloud Think aloud is a strategy in which students talk through the decisions they make and the steps they take to solve a problem.	**Student Book** • Part One and Part Two: Let's Talk and Think It Through	"The process of encouraging students to verbalize their thinking—by talking, writing, or drawing the steps they used in solving a problem—was consistently effective." — *NCTM, 2007*

PROCESS STANDARDS

Process Standards	Examples in *STAMS*® series	Research Says
Communication Students use the language of math to accurately express their mathematical ideas to others, and analyze and evaluate the mathematical thinking and strategies of others.	**Student Book** • Part One and Part Two: Let's Talk • Part Three: Check • Part Four and Part Five: Explanation of solution **Teacher Guide** • ELL Support • School-Home Connection • Vocabulary Activity	"Encouraging math talk so that students can clarify their strategies to themselves and others, and compare the benefits and limitations of alternate approaches to problem solving." — *National Research Council, 2001*
Technology-based Learning Students recognize and use connections among mathematical ideas, such as linking knowledge of the subtraction of whole numbers to the subtraction of decimals or fractions. Students also connect math concepts to their daily lives, and to other subjects, such as science.	**Student Book** • Part One and Part Two: Explore, Think, and Connect **Teacher Guide** • Math Background • Real-World Connection	"Interactive whiteboards in the classroom result in: increased student engagement and motivation; greater opportunities for participation and collaboration; improved personal and social skills and self-confidence; greater progress in mathematics and science for students in years; accommodation for different learning styles; and improved attainment for students with special needs." — *Mendieta, 2006*

PROCESS STANDARDS (*continued*)

Process Standards	Examples in *STAMS*® series	Research Says
Problem Solving Students build new math knowledge through problem solving and use various strategies to solve problems in math and in other contexts.	**Student Book** • Part One, Part Two, Part Three, Part Four: Your Turn • Part Five: Independent practice	"Problem solving is an integral part of all mathematics learning. In everyday life and in the workplace, being able to solve problems can lead to great advantages." *— NCTM, 2000*
Reasoning and Proof Students recognize, use, and evaluate various types of reasoning and methods of proof. Reasoning enables students to make sense of new mathematical ideas. Proofs build a logical argument based on known facts.	**Student Book** • Part One and Part Two: Let's Talk and Think It Through • Part Three: Solve and Check • Part Four and Part Five: Explanation of solution	"Knowing particular mathematical ideas and procedures as mere fact or routine is insufficient for using those ideas flexibly in diverse cases. Making mathematics reasonable means making it reasoned and, therefore, known in useful and usable ways." *— NCTM, 2003*
Representations Students communicate, clarify, or extend mathematical ideas through concrete or visual models. A representation may be a number sentence, manipulatives, diagrams or graphs and/or symbols.	**Student Book** • Part One and Part Two: Use of visual models • Part Four and Part Five: Show	"Intervention materials should include opportunities for students to work with visual representations of mathematical ideas and interventionists should be proficient in the use of visual representations of mathematical ideas." *— Gersten et al, 2009*

ASSESSMENT AND INTERVENTION

Process Standards	Examples in *STAMS*® series	Research Says
Communication Students use the language of math to accurately express their mathematical ideas to others, and analyze and evaluate the mathematical thinking and strategies of others.	**Student Book** • Part One and Part Two: Let's Talk • Part Three: Check • Part Four and Part Five: Explanation of solution **Teacher Guide** • ELL Support • School-Home Connection • Vocabulary Activity	"Encouraging math talk so that students can clarify their strategies to themselves and others, and compare the benefits and limitations of alternate approaches to problem solving." *— National Research Council, 2001*

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