BIG IDEAS LEARNING BIG IDEAS MATH ALGEBRA 1, GEOMETRY, ALGEBRA 2 © 2015

I. Materials align to PA Core Standards for Mathematics

Big Ideas Math Algebra 1, Geometry, Algebra 2 © 2015 (Big Ideas Math AGA) for high school from Big Ideas Learning is a research-based curriculum that specifically addresses the Common Core State Standards (CCSS) through its unique combination of discovery and direct instruction. Students gain a deeper understanding of math concepts by narrowing their focus to fewer topics. They master content through inductive reasoning opportunities, engaging activities that provide deeper understanding, concise stepped-out examples, rich and thought-provoking exercises, and a continual development of what has been previously taught. The program, with the Standards of Mathematical Practice at its foundation, provides opportunities for students to explore real-world application problems, manipulatives, and modeling in each chapter.

The Common Core State Standards for Mathematical Content and Practice, which have been adopted by Pennsylvania, are built into every chapter of the program. Full-text correlations to the CCSS are provided in the student and teacher materials, and lesson-specific CCSS citations appear on the pages of the lessons. A *Common Core Progression* appears at the beginning of each chapter to connect current lesson standards to previous lesson standards and math practices. The *Chapter Summary* tracks the coverage of the CCSS.

The *Big Ideas Math* program's authors, Dr. Ron Larson and Dr. Laurie Boswell, have packed the *Teacher Edition* with robust support that guides teachers to deliver superior levels of standards-based instruction. At the chapter and lesson levels, *Laurie's Notes*, written by coauthor, Laurie Boswell, provide *Connecting to Next Step* and *Motivate* prompts that engage students and help them make connections. *Overview* and *Exploration Notes* provide information about the connections between and among the skills and chapters.

At the start of each chapter, teachers are provided with a *Chapter Summary* and *Maintaining Mathematical Proficiency* notes, which include:

- Targeted Common Core State Standards
- Summary of students' previous instruction



- Mathematical Practices
- Common Errors
- Questioning in the Classroom

Laurie's Notes also include:

- Section Overviews
- Formative Assessment Tips
- Pacing Suggestions
- Differentiated Instruction
- Dynamic Teaching Tools
- Teacher Actions
- Exploration Notes
- Tips for English Language Learners
- Turn and Talk and Think-Pair-Share prompts
- Closure
- Answer keys

The *Big Ideas Math* program's technology components enhance the teaching and learning of standards-based content. Suggestions and guidance for incorporating technology pieces in the classroom can be found in the *Teaching Edition* through *Laurie's Notes*. Laurie Boswell draws from her decades of classroom experience and shares her expertise for incorporating technology throughout the program. The strong correlation between the *Big Ideas Math* print curriculum and its supporting technology resources makes it easy for teachers to incorporate technology when teaching the program.

II. Material

A. Foundational Skills

Standards: Coherence

The *Big Ideas Math* content is consistent with the learning progressions in the standards, and content is spiraled both vertically and horizontally. Concepts and skills are built gradually over lessons, units, and grade-level courses. A *Common Core Progression* table is provided for each



chapter, and a *Chapter Summary* tracks the coverage of the CCSS. Explanations of connections are provided in student and teacher materials, and the content has been designed to stimulate cognitive connections.

Big Ideas Math AGA includes problems and activities that involve multiple clusters/domains. With the program's emphasis on the real-world mathematical applications, problems and activities reflect the reality of math. In reality, scenarios involving math involve multiple clusters/domains, instead of one area in isolation.

As students progress through the curriculum, they repeatedly use skills from other mathematical clusters and domains along with their current learning. For example, *Performance Tasks* challenge students to integrate other disciplines, think strategically and logically, do research, and communicate (verbally and in writing) about their solutions and rationale. These real-world exercises not only reinforce the mathematical concepts, they also help students to closely read and systematically write.

B. Text Complexity

Standards: Focus

The curriculum has been designed to provide full coverage of the standards at each grade level. **Big Ideas Math AGA** focuses on the critical areas of instruction for the Common Core State

Standards for Mathematics, and all instruction and assessment is aligned to the standards. **Big Ideas Math AGA** exemplifies the core grade-level goals, the Standards for Mathematical

Practice, and the CCSS learning progressions. A correlation of the Common Core State

Standards to the lessons in **Big Ideas Math AGA** is in the front matter of the **Teaching Edition**.

Standards: Rigor - Application

Big Ideas Math AGA uses engagement strategies that promote mathematical thinking and conceptual understanding. The **Big Ideas Math AGA** program follows a balanced instructional approach. The program balances conceptual understanding with procedural fluency, as research shows that students benefit from equal exposure to discovery learning and direct instruction. Questions and activities are at a variety of levels and address thought-provoking, real-world scenarios that allow students to make connections outside the classroom. High



school students are of a generation of digital natives, and therefore, find the program's strategically designed technology appealing and motivating.

Real-world applications of mathematics are at the heart of the *Big Ideas Math AGA* program. Learner-centered discussions about the *Essential Question*, topics in the *Real-Life STEM Videos*, thought-provoking examples and questions, and *Performance Tasks* highlight the real-world connections to mathematics. For example, *Performance Tasks* provide opportunities to assess students' understanding through rich multi-step, real-world problems. As they work on the *Performance Tasks*, students are often asked to include the research, illustrations, and supplemental information that support their final product.

The content of *Big Ideas Math AGA* uses topics that are relevant and interesting to high school students. As a result, students find connections with the topics and are better able to understand what is being examined. This deeper understanding is demonstrated by exercises, which require students to use reasoning to arrive at a conclusion.

Throughout each step of the balanced instructional approach, the authentic content is presented through methods that support, challenge, and motivate students. Students are engaged through Real-Life STEM Videos that connect key concepts to everyday settings. Guiding Essential Questions are discussed at the start of each lesson to set the focus and are revisited following the lesson's Explorations. Explorations are included in each lesson to encourage discovery learning and partner work. Students are asked to explain what they've learned in Communicate Your Answer following the Explorations. Dynamic Investigations, powered by Desmos[®] and GeoGebra[®], allow students to explore lesson concepts through online tools. Direct instruction through stepped-out examples provide a clear path for understanding lesson concepts. Lesson Tutorial Videos in English and Spanish provide support for examples in the text. Monitoring Progress and Modeling with Mathematics problems allow students the opportunity to elaborate and develop conceptual and procedural fluency as they explain their thinking. The Student Journal, available in print and online, lets students elaborate as they take notes and internalize new concepts by expressing their findings in their own words. Students apply their knowledge through Monitoring Progress and Modeling with Mathematics exercise sets, which include a wide variety of problem types to meet the rigor of CCSS. Convenient point-of-use Mini-Assessments in the Teaching Edition can be projected from the *Dynamic Classroom*. The Dynamic Assessment System and the ExamView Assessment Suite provide solid evaluation



opportunities.

Standards: Rigor – Procedural Skill and Fluency

The *Big Ideas Math AGA* program includes step-by-step instruction, models, and problem sets that strengthen students' procedural fluency. Direct instruction and scaffolded support helps students build the procedural skills and fluency needed for mathematical success. Skill-building in the *Student Edition* includes *Exercises*, which strengthen procedural fluency and critical thinking skills like reasoning, analysis, conjecturing, and modeling. The *Exercises* allow students the opportunity to elaborate and develop conceptual and procedural fluency as they explain their thinking. Practice sets include spaced practice so students sharpen and maintain procedural fluency. The *Student Journal* has a mix of exercises that strengthen procedural fluency and writing about mathematical problem-solving and reasoning. When students need practice beyond the *Student Edition*, teachers can assign supplemental resources, such as the *Practice* worksheets, *Enrichment and Extension* activities, *Puzzle Time* worksheets, *Game Closet* games, and *Skills Review Handbook* pages. Teachers can also assign customized homework and assignments on the online *Dynamic Assessment System*.

C. Quality Questioning

Woven throughout the lessons are thought-provoking question prompts that spark strategic, analytical, and critical thinking. The differentiation suggestions help teachers deliver varied prompts to optimize challenge for different cognitive levels. Possible answers to all prompts are provided.

Discussion and analysis of the topic allows students to further their understanding of the mathematical concept being taught. Through the practice and problem-solving in the exercises, students are able to use the processes and procedures developed in the lesson to take the newly learned math concepts deeper. Because these concepts and procedures are used repeatedly throughout the lessons and text, students are able to use the concepts in different contexts, allowing them to both deepen and master their understanding.

Problem-solving appears in every lesson in the *Big Ideas Math AGA* program. Starting with *Explorations*, students use higher-level thinking and communicate the procedures, processes, interpretation, and proof integral to the concept. Problems have been written using topics that



are relevant and interesting to high school students. As a result, students find connections with the topics and are better able to understand what is being examined. This deeper understanding is demonstrated by exercises, which require students to use reasoning to arrive at a conclusion. Other exercises require students to defend their answers to a problem. Students begin to understand that the very analysis they used in solving a problem can be used to explain and defend an answer. The lessons also provide a variety of approaches to problem-solving, which employ reasoning, explanations, comparisons, and alternative strategies, among other procedures.

These approaches open doors to abstract thought, reasoning, and inquiry as students persevere to answer the *Essential Questions* that drive instruction. Clear stepped-out examples complete the lesson and provide students with the precise language and structure necessary to build mathematical understanding and proficiency. The guiding questions in the *Teaching Edition* spark high-level critical thinking and promote rich discourse. *Laurie's Notes* offer teachers suggestions, strategies, and support for elevating levels of thought, challenge, and performance in the classroom. Instructional guidance also offers comments and questions to include in discussions during instructional time, as well as *Common Errors* students may make, motivational techniques, and suggestions for *Closure*.

The *Big Ideas Math* AGA program also includes questions that prepare students for the format and question types on high-stakes assessments. A *Cumulative Assessment* is at the end of every chapter and includes a variety of question types. *Performance Tasks* challenge students to integrate other disciplines, think strategically and logically, do research, and communicate (verbally and in writing) about their solutions and rationale. *Performance Tasks* provide real-world applications for multiple standards. These tasks/assessments not only reinforce the mathematical concepts, they also help students to closely read and systematically write. *Big Ideas Math AGA* prepares students for the task types found in high-stakes assessments. These tasks include: tasks assessing concepts, skills, and procedures; tasks assessing expressing mathematical reasoning; and tasks assessing modeling applications.

D. Writing



In the *Big Ideas Math AGA* program, students use writing to communicate their problem-solving methods, observations, and reasoning during collaborative activities, in *Student Edition Exercises*, and in the *Student Journal* writing entries. The *Student Journal* has a mix of exercises that strengthen procedural fluency and writing about mathematical problem-solving and reasoning. Within each lesson, students are asked to write open-ended responses and compose their own math problems, thus exercising literacy skills in the writing strand. Reading and writing are also fully integrated in the various projects and cross-curricular tasks in *Big Ideas Math AGA*.

E. Speaking and Listening

Thought-provoking question prompts that spark strategic, analytical, and critical thinking are woven throughout every phase of the lessons. Students' speaking and listening skills are exercised with the *Big Ideas Math AGA* program's class-wide, small-group, and paired interactions and discussion, such as the collaborative learning activities and performance-based projects. With *Performance Tasks* and other projects, students are often asked to present to the class.

Digital components with audio capabilities engage students' listening skills and boost cognitive focus and comprehension. The online *Student Dynamic eBook* includes English and Spanish audio. *Lesson Tutorial Videos* are also available with Spanish audio.

III. Differentiation of instruction offers opportunities for all to participate

Big Ideas Math AGA provides print and digital resources for differentiated approaches so all learners reach their goals. From Lesson Tutorial Videos to complete Response to Intervention (RTI) support, the Big Ideas Math AGA program offers robust differentiated instruction for English Language Learners (ELLs), struggling learners, students in the three tiers of RTI, and advanced learners. Program components feature a classic and clean design that universally appeals to students and keeps them focused and engaged in high-interest math problems. Research-based instruction, strategies, and tools engage, challenge, and motivate each student and provide the supports necessary to succeed. Teachers will find suggestions for tailoring instruction, activities, and assessments in both the Teaching Edition and at



www.bigideasmath.com.

Differentiation for All Learners:

- The Student Dynamic eBook provides students with embedded learning resources, making it easier for them to directly interact with mathematics. Students use digital resources like engaging Lesson Tutorial Videos, interactive manipulatives, Dynamic Investigations, flash cards, and vocabulary support to enhance their learning. To increase comprehension and engagement, the eBook includes English and Spanish audio.
- Differentiating the Lesson plans are included for every lesson in the program, and strategies, tips, and activities for differentiation appear at point-of-instruction in the Teaching Edition.
- Lesson Tutorial Videos help students review conceptual and procedural information with step-by-step problem-solving and explanations that connect to problems in the text.
- The Game Closet delivers engaging and fun skill-builders.
- To aid comprehension and problem-solving, Graphic Organizers and Math Tool Paper enable students to visually represent mathematics and content-area vocabulary in an organized and memorable way.
- Study Skills, Common Error, and other instructional support pop-outs in the text help students develop the habits of mind that beget success in mathematics.
- Leveled and customizable assignments allow teachers to provide appropriate levels of support and challenge for every student.
- Activities in the Teaching Edition labeled with learning styles (visual, kinesthetic, etc.)
 engage students in multisensory learning, which enhances engagement and retention of content.
- The Exercises and Skills Review Handbook give students opportunities for practice and skill-building.
- Dynamic Investigations, powered by Desmos[®] and GeoGebra[®], correspond to the Explorations' discovery learning and promote conceptual learning with mathematical tools.
- Real-Life STEM Videos engage students and show the real-world connections between the Big Ideas Math AGA program and areas of science, technology, and engineering.
- The ExamView Assessment Suite allows teachers to create unlimited online customized



tests and practice sets with the robust *ExamView* test bank. Assessments can be taken on paper or online. Teachers can generate several types of reports that help drive instructional decisions.

The Dynamic Assessment System lets teachers create customized, leveled assignments
that align to the CCSS and the Big Ideas Math AGA content. The system features
adaptive testing capabilities, response analysis reports, and embedded remediation
resources.

Response to Intervention and Remediation:

- Differentiated instruction strategies and activities in the Teaching Edition
- Complete RTI plans, activities, and resources for all levels
- Vocabulary Flash Cards
- Skills Review Handbook
- Game Closet
- Dynamic Assessment System
- Lesson Tutorial Videos
- Leveled homework includes a basic level

English Language Learners:

- Differentiated instruction strategies and activities, including support for ELLs at different levels of proficiency, in the *Teaching Edition*
- Focus on vocabulary development and language with supporting visuals and graphic organizers
- Vocabulary and Core Concept Checks and Vocabulary Flash Cards
- Multi-Language Glossary with fourteen languages
- English and Spanish audio in the Student Dynamic eBook
- Lesson Tutorial Videos available with Spanish audio
- Spanish Student Edition
- Spanish version of the Student Journal
- Spanish Chapter Reviews
- Family Communication Letters in English and Spanish



Advanced Learners:

- Enrichment and Extension
- Critical Thinking
- Leveled homework includes an advanced level

Woven throughout *Big Ideas Math AGA* are opportunities to assess and monitor students' development and learning in real-time and virtually. The program provides assessment for all standards and offers prescriptive, data-based recommendations for remediation/intervention. The *Big Ideas Math AGA Teaching Edition* provides item analysis information, so teachers can identify student strengths and needs and the next steps for instruction, including options for intervention and enrichment. The *Dynamic Assessment System* also provides information about students' areas of strength and need. With the tool's reporting capabilities, teachers have access to the detailed data that helps them determine the next-steps for instruction.

IV. Technology for Instructional Supports

The technology and multimedia components of *Big Ideas Math AGA* enhance and complement instruction. With the program's technology, the multiple modes for representation, engagement, and response increase accessibility for all students and generate stronger connections to the content. In this age of tech-savvy students, *Big Ideas Math AGA* addresses modern learning preferences by providing downloadable, offline options. Students and teachers can access the text, bold simulations and animations, visual demonstrations, resource materials, assessments, and labs from desktops, laptops, and mobile devices. The program's content is also available on Common Cartridge, which can be exported to Learning Management Systems (LMS). The *Big Ideas Math AGA* technology invites students to become immersed in their learning and motivates them to persevere and reach their goals.

• The Big Ideas Math AGA Student Dynamic eBook web-reader and eBook App is a complete electronic version of the Student Edition that includes interactive digital resources with English and Spanish audio. With this app, students can navigate through the book, highlight, add notes, and bookmark pages. The embedded enhancements, including the English and Spanish audio support, Dynamic Investigations, and Lesson



Tutorial Videos, are accessible with a data or internet connection. If there is not a data or internet connection, students can use the digital eBook without the web-based enhancements after downloading the content. The eBook is available as a downloadable app for tablets (iOS® and Android™) and desktops/laptops (PC and Mac®). The Student Dynamic eBook is also available to download in an ePub format.

- The Big Ideas Math AGA online Teaching Edition (PDF) is organized by chapter and lesson and easily launched from the Big Ideas Math online platform. The full-color pages can be downloaded and saved. The online Teaching Edition is compatible with Apple and Android tablets, laptops/desktops, and mobile devices.
- The Big Ideas Math AGA Dynamic Classroom is a teacher presentation resource available on the Big Ideas Math online platform at the book, chapter, and section levels.
 The following features are available through the Dynamic Classroom:
 - Start Thinking gives students a real-life situation that prepares them for the lesson ahead.
 - Warm Up (with answers) appears at the beginning of each section in a chapter and provides click-by-click questions with answers.
 - The Student Journal is available in downloadable/printable PDF format for each lesson.
 - The Examples resource gives examples with step-by-step directions to solve problems.
 - Monitoring Progress (with answers) delivers extra example exercises. The answers appear when the screen is clicked.
 - Mini-Assessments (with answers) provide click-by-click questions with answers.
 - Closures (with answers) close the chapter's section with at least one review exercise, and the answer appears when the screen is clicked.
 - The Answer Presentation Tool delivers answers for exercises at the book, chapter, and section levels.
- The Big Ideas Math AGA Common Cartridge allows content to be ingested into and
 used in any LMS that supports Common Cartridge. Each course (Algebra 1, Geometry,
 and Algebra 2) is represented with two common cartridges, one designed for the
 teacher and one for the students.



- Dynamic Investigations, powered by Desmos® and GeoGebra®, challenge and motivate students with exploratory activities. Teachers and students can integrate these investigations into their discovery learning to interact with the mathematical content in the **Big Ideas Math AGA** program's Explorations. The Dynamic Investigations can be found in the teacher Dynamic Classroom on the Big Ideas Math online platform and as embedded links in the Student Dynamic eBook app.
- Teacher resources include online, printable PDF versions of Lesson Plans and Differentiating the Lesson plans and resources, including materials for all three tiers of Response to Intervention.
- Remediation resources include, but are not limited to, the Lesson Tutorial Videos and the Skills Review Handbook at point-of-use.
- Interactive virtual manipulatives, calculators, and tools are embedded in the Student Dynamic eBook.
- The **Big Ideas Math** online learning platform also houses:
 - Skills Review Handbook and answers (downloadable)
 - Lesson Tutorial Videos
 - Whiteboard Lessons
 - Spanish Student Edition
 - Teaching Edition
 - Student Dynamic eBook
 - Game Closet

- Graphic Organizers (PDF o Math Tool Paper and Word)
- Multi-Language Glossary
- Worked-Out Solutions Key
- Apps
- ExamView Installer and Question Banks
- Vocabulary Flash Cards
- Chapter at a Glance

- (downloadable)
- Lesson planning tools
- Resources by Chapter (downloadable)
- Pacing Guides
- STEM Videos
- Complete Materials List
- Student Journal
- The question banks within the ExamView® Assessment Suite directly align to the Big Ideas Math AGA program and let teachers create unlimited customized tests and practice sets for students. *ExamView* includes robust test banks aligned to the CCSS,



automatic grading, progress monitoring, and reporting by student and/or class and by assessment or the standards. There are a variety of question types and formats. The difficulty levels of questions are provided for teachers, and question weights can be chosen.

 The Dynamic Assessment System is a powerful and prescriptive tool that provides teachers with robust assessment creation and delivery, progress monitoring, and remediation resources. The tool includes customizable reporting, a user-friendly interface, standards-based content, and adaptive testing capabilities.

The *Dynamic Assessment System* is a complete, state-of-the-art assessment experience, with homework, quizzes, and tests. The assessments will include technology-enhanced questions and auto-scoring.

Within the *Dynamic Assessment System*, homework can be customized to fit the needs of all students. When selecting exercises to assign, teachers can choose from presets of the odd or even exercises, as well as the basic, average, and advanced exercises that come from the *Assignment Guide* in the *Teaching Edition*. Teachers can also start with a preset assignment and then customize it for the whole class or for individual students.

As students complete exercises in the homework, they are offered access to *Lesson Tutorial Videos* and the lesson pages about the specific skill. Students will also be able to use an online chat tutor for selected problems. With the *Need Help* feature enabled, students have the ability to click *Check Answer* and receive a "Need help?" prompt if they incorrectly answer a question. When clicked, a remediation panel opens and delivers support in the form of videos and lesson pages. If a student incorrectly answers a second time, the *Live Tutor* button appears. If the student clicks the *Live Tutor* button, a chat feature appears, and the Big Ideas Learning tutor communicates directly with the student and provides the help needed.

The *Dynamic Assessment System* makes it possible for teachers to assign the same or randomized quizzes and tests to students. Adaptive *Progression Benchmark Tests* are included in the tool. The teacher reports for all assessments include prescriptive remediation options.



V. Assessment

Big Ideas Math AGA includes a full suite of print and digital assessment resources to measure student learning and collect data. The program includes a variety of diagnostic, formative, and summative assessments that allow students to demonstrate their knowledge and skills, produce answers and solutions, arguments and explanations, diagrams, mathematical models, and other means. Big Ideas Math AGA provides flexible assessment options and continuous preparation for high-stakes tests with the Assessment Book, the Dynamic Assessment System, and the ExamView Assessment Suite. Performance-based assessments, modified assessments, and editable assessment are also included in the program.

Students are given a variety of opportunities to present evidence of their understanding. *Big Ideas Math AGA* includes print and digital assessments that feature many question types — multiple choice, drag-and-drop, short-answer, extended response, and illustration-based responses. The program also includes performance-based assessments that provide real-world applications that cover multiple standards. Students' written responses in notebooks and journals can also produce meaningful data for the teacher. Portfolios, in print or digital form, can be created, and the text encourages students to choose their own pieces to include.

Big Ideas Math AGA includes a variety of diagnostic, formative, and summative assessments for students to demonstrate their knowledge and skills, produce answers and solutions, arguments and explanations, diagrams, and mathematical models.

Program Assessments

- Prerequisite Skills Tests
- Pre-Course Tests
- Chapter Reviews
- Quizzes
- Tests
- Mini-Assessments
- Cumulative Assessments
- Alternative Assessments



- Performance Tasks
- Post Course Tests

Assessment Technology

- Online versions of assessments (as listed above)
- Dynamic Assessment System
 - Create customized assignments
 - Assessment creation and scheduling
 - Assessment delivery
 - Virtual manipulatives
 - Automatic grading; students also receive immediate feedback and can access remediation when necessary
 - Progress monitoring by student and/or class and by assessment or CCSS
- ExamView Assessment Suite
 - Teachers can create unlimited online customized tests and practice sets for students
 - Includes robust test banks
 - Aligned to Common Core State Standards and Big Ideas Math AGA
 - Questions modeled after high-stakes assessments

VI. Parent Connections

The *Big Ideas Math AGA* program's *Family Communication Letters*, which are available in English and Spanish, seek to engage students' family members and extend their real-world math experiences. The communication pieces keep families informed of the content students are learning, and they encourage families to access the program's digital resources, have concept-based discussions with their children, and connect the *Big Ideas Math AGA* content to life in the home and community.

Big Ideas Learning recognizes the importance of family connections in students' educational journey. **Big Ideas Learning** offers the *Parent University Session* for family members and



educators. The *Parent University Session* helps spark lasting partnerships that boost students' success. The 2-to 3-hourlong workshop strengthens the teamwork approach and enhances learning opportunities at home. The workshop builds a common language and understanding of students' experiences with *Big Ideas Math*, initiates a system of open communication, and explores some of the best ways to support learning at home and on-the-go.