

DIGGING DEEPER INTO CONTENT AREAS

Questions at the District/School and Teacher Level:



Mathematics Grades 3-5, 6-8, Keystone Algebra I

COMPREHENSIVE VERSION



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Digging Deeper into Content Areas: Mathematics

Reflection questions are offered at two levels:

1. District and school level, for system-wide reflection, appropriate for district administrators, building principals, department chairs, content leaders, coaches
2. Teacher level, appropriate for individual teachers in considering their data/information

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Disclaimer: *This document was developed with feedback from individuals with expertise in the specific content area. However, if you find any errors or information of concern, please let us know as this is the first version of these content specific questions. Email pdepvaas@iu13.org.*

Digging Deeper into Content Areas: District/School and Teacher Level Questions

As an individual teacher, a school or district administrator, and/or a member of a school-wide team, how do I use PVAAS data, along with other data, to analyze professional practices and engage in continuous improvement?

The Digging Deeper into Content Areas documents are available in the three core subjects, ELA, Math, and Science. These documents are designed to help teachers and administrators move from the initial step of identifying strengths, weaknesses, and patterns in data to determining the “root cause”—or the “why”—in order to plan for improvement and enhancements leading to continuous growth for all students.

This document focuses on mathematics, including questions at the Grade 3-5 level, the Grade 6-8 level, and for Keystone Algebra I. By looking at various contributing factors, *Digging Deeper into Mathematics* goes beyond the general questioning we might ask ourselves to the pertinent variables that must be addressed in analyzing data in this specific content area. Because data only tells us “what” is going on, not “why,” digging more deeply into a core subject area has great potential for improving student results!

It is widely acknowledged that self-reflection is key to improving one’s practices. However, teachers may ask, “What exactly should I reflect ON?” or, “What can I learn from the data?” or, “I analyzed the data, now what?” The teacher specific questions can help guide that process. Likewise, the questions may help administrators, both at the district and the school level, as well as school-wide teams to determine why they may be seeing patterns in school-wide data.

Using these questions effectively has the potential to take what might be a random process to a level of organization that encourages strategic discussion and probing in the specific core subject area being examined.

How to Use this Resource

1. Review the entire document first to become familiar with the format and the scope of questions offered for discussion and probing.
2. Decide whether you are beginning with the district/school level questions or the teacher level questions.
 - a. Note: If you are a district level administrator, there are questions included that allow for a systems-level perspective. Many of these questions fall in the *School/District-Curriculum* section, as that area is typically addressed as an entire system.
3. Determine if there is one area on which you need to focus (Curriculum, Instruction, Assessment, or Organization), or if the issues may be dispersed across the four areas.
4. Carefully read and reflect on the areas you are targeting and star/flag those questions that you (or the data team) believes to be worth further “digging,” discussion, and reflection.
5. Consider other data and determine the EVIDENCE to support your reflection and analyses.
6. Choose one or more areas for goal setting and focus to apply to the current group of students in your classroom or school.

Remember, this is not a checklist or sequenced in any specific order to be simply handed to the school-wide team or individual teacher. Rather, it a listing of issues to explore more deeply. The document requires discussion about evidence of practice and honest reflection, along with careful selection of where to start and how deeply to probe. The focus and starting point is dependent on the school’s current status and needs, as well as the needs of individual teachers. Each question is to be considered and answered with solid evidence.

Resources and Evidence: Mathematics Grades 3-5, Grades 6-8, Keystone Algebra I

To dig more deeply in math education, it is beneficial to focus on these major sources of information. Evidence for reflection on each question may come from knowledge of information in one or more of these resources.

PA Standards Aligned System

<http://www.pdesas.org>



Math Core Standards

<http://static.pdesas.org/content/documents/PA%20Core%20Standards%20Mathematics%20PreK-12%20March%202014.pdf>

Academic Standards for Mathematics

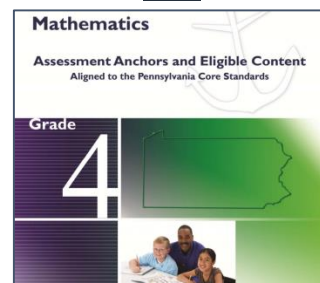


Grades Pre K - High School
March 1, 2014

Pennsylvania Department of Education

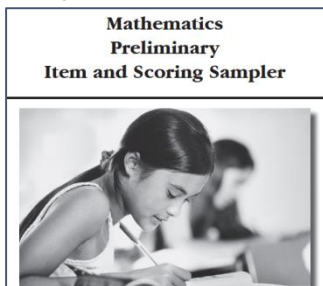
Math Assessment Anchors and Eligible Content

<http://www.pdesas.org/Standard/AnchorsDowloads>



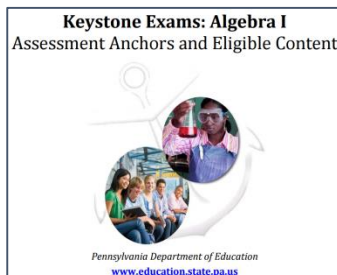
Math Item Sampler

<http://www.education.pa.gov/K-12/Assessment%20and%20Accountability/PSSA/Pages/default.aspx#.VYhKbflVhHw>



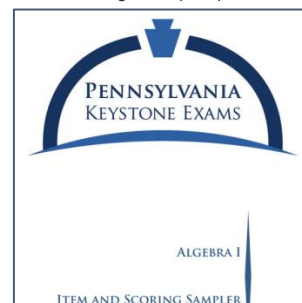
Keystone Algebra I Assessment Anchors and Eligible Content

<http://www.pdesas.org/standard/KeystoneDownloads>



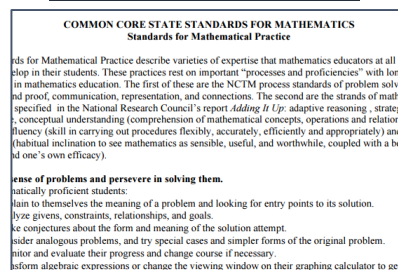
Keystone Algebra I Item Sampler

http://static.pdesas.org/Content/Documents/Keystone_Algebra_I_Feb_2011_Item_and_Scoring_Sampler.pdf



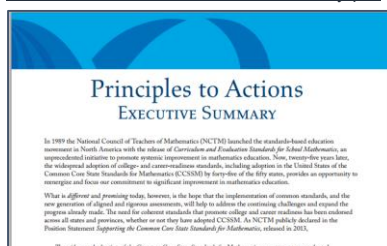
Standards for Mathematical Practice

http://static.pdesas.org/content/documents/Bulletted_Mathematical_Practices.pdf



Principles to Actions

<https://www.nctm.org/uploadedFiles/StandardsandPositions/PAExecutiveSummary.pdf>



Hess' Cognitive Matrix/Webb's Depth of Knowledge

http://static.pdesas.org/content/documents/M2-Activity_2_Handout.pdf

Hess' Cognitive Rigor Matrix & Curricular Examples: Applying Webb's		
Revised Bloom's Taxonomy	Webb's DOK Level 1 Recall & Reproduction	Webb's DOK Level 2 Skills & Concepts
Remember Retrieve knowledge from long-term memory, recognize, recall, locate, identify	- Recall, observe, & recognize facts, principles, properties - Recall/identify conversions among representations or numbers (e.g., customary and metric measures)	
Understand Construct meaning, clarify, paraphrase, represent, model, illustrate, etc.	- Evaluate an expression - Locate points on a grid or number on number line - Solve a one-step problem	- Specify and explain (e.g., non-exam cause-effect) - Make and record

Math Grades 3-5: System Level Questions (District/School)

How might our system structures and practices at the district and school level related to Curriculum, Instruction, Assessment, and Organization contribute to our achievement and growth outcomes in mathematics?

These questions are offered as a vehicle to guide purposeful reflection, and should be considered and answered with clear evidence. This list is not exhaustive and is not a checklist. The questions do not need to be asked in the order in which they are numbered. (Numbers are provided only as a reference for use.) Rather, it is intended to help generate thinking specific to the district/building level math program. Through the information provided by PVAAS, along with other assessment data, this document is intended to assist in determining potential root causes leading to plans of action (looking back and looking forward). Building level administrators, math coordinators, and building level coaches may find these reflection questions helpful in analyzing data at a system level for the school. Additionally, questions are included that allow for a broader system level perspective, and district level administrators may find the questions helpful in analyzing the K-12 math program across the LEA/district.

**Each question indicates the related domain(s) from The Framework for Teaching:*

PP= Planning and Preparation

CE=Classroom Environment

I= Instruction

PR= Professional Responsibilities

C-1. Is the Grade 3-5 math written curriculum tightly aligned to the PA Core Standards? (PP)

District/School: Math Gr 3-5

CURRICULUM



- How frequently is the written curriculum reviewed/revised through analysis of student data?
- Is the curriculum both “guaranteed and viable”? (Marzano)
 - Guaranteed: equal access to the written curriculum for all students
 - Viable: adequate time for teachers to teach content and for students to learn it.
- Has an alignment been done that shows where certain skills/concepts are missing? Which concepts/skills need to be enhanced? Which concepts and skills are not included? Which concepts and skills lack a sufficient amount of practice embedded in the curriculum? Have lessons been developed to fill identified gaps?
- Were the Math Emphasis Guides used to develop the written curriculum?
- Do unit maps exist to guide lesson planning and instruction? Are they reviewed periodically and revised to address students’ needs, as identified through data analysis?

C-2. Does the written curriculum connect concepts and skills vertically, showing the progression of skills necessary for students to acquire deep understanding and to build upon prior knowledge? (PP)

Example: Does the written curriculum connect basic facts to computational procedures to algebraic manipulation of variables and constants? Does the written curriculum connect the progression from whole numbers to integers to rational number to real numbers in concept and operations?

- How does this year’s curriculum build on students’ prior knowledge and experiences from the previous year?

- How will the math content for this year lay the foundation for topics the students will explore in the next grade or upper-level grades?
- Do teachers engage in dialogue with teachers in grade levels above and below to examine the strengths and weaknesses of the overall program and prioritize needs of students?
- Are there opportunities for teacher collaboration on the vertical articulation of the K-5 written curriculum with the 6-8 Math written curriculum?

C-3. Does the written curriculum provide the appropriate balance of conceptual understanding, procedural skills and fluency, and application? (PP)

- Is there a school-wide program in place to address fact fluency?
- Does conceptual understanding build the foundation for procedural fluency?
- Does the written curriculum address procedural fluency?
- Does the written curriculum address the reciprocal relationship that exists between teaching mathematical concepts and procedures?

C-4. Does the written curriculum require students to respond in writing to tasks and problems to explain their thinking? (PP)

C-5. Is the math series analyzed to determine the alignment to the PA Core Standards as well as alignment to the Standards for Mathematical Practice? (PP)

- Has an alignment to the PA Core Standards, grades 3-5, been done to check:
 - Need for using other materials and resources along with the core math series?
 - Appropriate balance on specific skills and concepts?
 - Use of appropriate materials and resources to engage students at DOK levels 2 and 3?

C-6. Does the written curriculum in mathematics address the appropriate level of rigor (Webb's Depth of Knowledge/DOK)? (PP)

- Is the concept of rigor understood as different from difficulty level?
- Does the level of rigor in the curriculum match the rigor of each standard?
- Is there a balance of DOK levels 1, 2, and 3?
- Are there opportunities for DOK level 4 tasks?

C-7. Are the Standards for Mathematical Practice included in the written curriculum? (PP)

- Do unit maps and lesson plans address the Standards for Mathematical Practice?
- Are all the Standards for Mathematical Practice addressed during the course of the year? Are they appropriately weighted and balanced (e.g., is Practice 3 addressed more often than Practice 6)?
- Does the written curriculum emphasize reasoning abstractly and quantitatively? (Standards for Mathematical Practice, #5: Use appropriate tools strategically.)
- Does the written curriculum focus on structures and patterns, extending the process of patterning to more complicated concepts and relationships and introduce algebraic patterns? (Standards for Mathematical Practice, #7: Look for and make use of structure.)
- Does the curriculum include activities that require reasoning? (Standards for Mathematical Practice, #2: Reason abstractly and quantitatively.)
- Is the curriculum organized to incorporate the generalization and applications of mathematical processes through rich tasks appropriate to each grade band and curricular area? (Standards for Mathematical Practice, #8: Look for and express regularity in repeated reasoning.)

- Does the written curriculum include specific activities that require students to construct viable arguments and critique the arguments of others? (Standards for Mathematical Practice, #3: Construct viable arguments and critique the reasoning of others.)
- Does the curriculum provide opportunities for teachers to incorporate productive struggle and perseverance in problem solving within their lessons? (Standards for Mathematical Practice, #1: Make sense of problems and persevere in solving them.)
- Does the curriculum provide opportunities for students to model numerical relationships in a variety of ways? (Standards for Mathematical Practice, #4: Model with mathematics.)
- Does the written curriculum address mathematical terms and critical content vocabulary in a direct and explicit manner? Is it addressed in a manner that entails active engagement and goes beyond knowledge of the definition? Are vocabulary terms identified at each grade level? Does the written curriculum emphasize the connections among precise vocabulary, fluent processes, and symbolic representations? (Standards for Mathematical Practice, #6: Attend to precision.)

C-8. Are teachers aware of the resources on the PDE SAS Portal (pdesas.org) in mathematics? (PP, PR)



I-1. Do all students receive instruction on grade level PA Core Standards? (PP, CE, I)

District/School: Math Gr 3-5

- Is the delivery of grade level instruction equitable across all students/all student groups?
- Are the appropriate scaffolds in place to allow at-risk students to access and benefit from the core math curriculum?

INSTRUCTION



I-2. Is there an observable alignment between the written, taught, and assessed curriculum? (PP, CE, I)

- Does daily instruction in all classrooms follow the written curriculum?
- Is there a process in place to monitor that there is alignment between what is written, what is taught, and what is tested?

I-3. Are unit and lesson objectives/essential questions/learning intentions clear to students? (I)

- Are lesson objectives communicated clearly in written and oral form?
- Are lesson objectives aligned to PA Core Standards?
- Are lesson objectives inclusive of Standards for Mathematical Practices?
- Are lesson objectives aligned with the LEA/district mathematics written curriculum?

I-4. Are students provided with a variety of tasks that address all levels of Webb's Depth of Knowledge (DOK)? (I)

- Are all teachers using effective questioning techniques, including but not limited to wait time, student name placement in questioning, random and strategic calling on students, high level questioning mixed with appropriate lower level questions (DOK)?
- Are discussions facilitated through guided questions and representations? (Standards for Mathematical Practice, #2: Reason abstractly and quantitatively.)

I-5. Are teachers using (and trained/supported in how to use) the CRA (concrete to representational to abstract) approach? (I)

I-6. Is both academic and content specific vocabulary purposely addressed through evidence based techniques and strategies? (I)

Standards for Mathematical Practice, #6: Attend to precision.

- Are all teachers delivering direct and explicit instruction on key content vocabulary terms?
- Are evidence-based strategies used in all classrooms for the teaching of vocabulary?
- Is content specific mathematics vocabulary used consistently across all teachers within a grade level and vertically across grade levels?
- Is precision required in the use of mathematical terms?

I-7. Is independent work purposeful, and directly related to building deep mathematical understanding of concepts consistently across all classrooms? (I)

I-8. Does instruction support productive struggle and growth mindset (the belief that the right strategies from teachers can positively impact a student's mathematical performance through the student's hard work, practice, and effort) in learning mathematics? (I)

I-9. Are tools/manipulatives available in all classrooms and used appropriately and effectively by all students? Are all students instructed in the appropriate use of tools? (I)

- Are all teachers using manipulatives within the CRA (concrete to representational to abstract) model?
- Does the written curriculum include tasks that encourage students to determine the appropriate mathematical tool for a given problem?
- Is technology used to enhance students' understanding of mathematical concepts?
- Do all teachers and students have access to technology?

I-10. Is instruction differentiated to allow for various avenues to process and practice skills? (I)

- Are teachers trained and supported in how to differentiate instruction specific to learning objectives/targets in math?
- Is differentiation of instruction an expectation, as supported/documented in district written curriculum?
- Are small groups/flexible groups used to provide differentiation within the math classroom?
- Are extension tasks provided for those students who are demonstrating mastery at the expected level?

I-11. Are students who receive tiered intervention supports provided specific instruction targeted to skill deficits? (I)

- Are all students closely monitored for progress?

I-12. Is patterning used as a tool to facilitate students' development of conceptual understanding and procedural proficiency through rich tasks? (I)

Standards for Mathematical Practice, #7: Look for and make use of structure.

- Does the instruction to facilitate the students' development of conceptual understanding and procedural proficiency through rich tasks promote searching for patterns?

I-13. Do teachers routinely demonstrate modeling in their discussions with students and encourage students to model? (I)

Standards for Mathematical Practice, #4: Model with mathematics.

I-14. Do all teachers require students to use precise terminology in the discussion of math topics as well as encourage accuracy in computations and manipulations? (I)

Standards for Mathematical Practice, #6: Attend to precision.

I-15. Does the instruction at all levels include opportunities for inductive reasoning investigations that will lead to the creation and testing of hypotheses? (I)

Standards for Mathematical Practice, #8: Look for and express regularity in repeated reasoning.

I-16. Do teachers help students to make sense of problems and persevere in solving them? (I)

Standards for Mathematical Practice, #1: Make sense of problems and persevere in solving them.

- Are tasks assigned at the appropriate level of difficulty to challenge but not frustrate students?
- Do teachers circulate to provide scaffolding through questioning and descriptive feedback?
- Are teachers serving as facilitators providing guidance, not giving answers?
- Does instruction support productive struggle and a growth mindset in learning mathematics?

I-17. Do instructional tasks require students to justify their answers and engage in discourse with their peers? (PP, I, CE)

Standards for Mathematical Practice, #3: Construct viable arguments and critique the reasoning of others.

- Is there evidence that all teachers believe reasoning is as important as a correct answer?



A-1. Is there a district/building assessment plan/calendar/map accessible to all teachers? (I)

- Are valid and reliable assessment measures in place to screen, diagnose, monitor, and evaluate mathematical outcomes for all students?
- Has the range of assessments been evaluated for their purposes to ensure that there is no unnecessary redundancy/overlap and important skill areas missing?
- Do all teachers have access to this map and follow it, administering all required assessments in a timely manner, as per the schedule?
- Have assessments available through the math series/program been integrated as one component of a comprehensive assessment system that includes a variety of assessment methods and evaluation sources?

District/School: Math Gr 3-5

ASSESSMENT



- Are additional data/information on mathematics available at the classroom and individual student level and how is this additional information analyzed along with PVAAS reporting? (For example, what information from the CDT can be integrated for analysis with PVAAS data?)
- Is the data from each given assessment used to modify and guide instruction?

A-2. Are formative and summative assessments established and used by all teachers? (I)

- Are common summative assessments in place, and used by all teachers?
- Are the assessments valid?
- Do all teachers have strong assessment literacy skills?

A-3. Are students assessed at the appropriate level of Webb's Depth of Knowledge (performance assessments, objective assessments, and oral questioning)? (I)

- Are assessment items reflective of the rigor of the standards being assessed?

A-4. Are teachers aware of students' math skills through a universal screening process in place at the building level? (PP, I)

- Does universal screening occur early in the school year to effectively inform instruction?
- Is the universal screening considered along with PVAAS student projections on individual students? Are PVAAS student projections a key component of the universal screening process?

A-5. Are benchmark assessments used to monitor progress of students along the way within a given grade level year? (I)

A-6. Are diagnostic assessments in place to inform instruction at Tier 1 as well as Tiers 2/3 (MTSS/RtII)? (I)

A-7. Are progress monitoring measures in place and conducted by classroom teachers, support teachers, intervention teachers? (I)

- Are students at moderate and high-risk levels progress monitored with appropriate frequency?
- Is student progress closely monitored to ensure that students who are falling behind are provided proactive support through differentiation/multi-tiered system (MTSS/RtII)?
- Is there a structure in place that ensures this monitoring occurs on a prescribed basis?

A-8. Are assessments varied to address the Standards of Mathematical Practice? (I)

- Do assessments allow for varied solutions and representations?
- Do the assessments evaluate the ability of the students to explore patterns and make generalizations based on those patterns?
- Do assessments allow for students to use a variety of models while solving and justifying problems?
- Do assessments require students to use precision in terminology/vocabulary, in computation, and in symbol manipulation?
- Do assessment tasks require students to construct arguments?
- Does the assessment system evaluate students' ability to generalize mathematical processes and apply them to new tasks?
- Do assessments regularly include open-ended, rich and cognitively challenging tasks in order to teach students to make sense of problems and persevere in solving them?
- Do assessments allow for students to use a variety of mathematical tools?

- Are students given extended tasks on assessments that mirror instructional activities, in order to assess students' ability to solve problems with perseverance?
- Are all teachers requiring students to show their work and/or justify their answers?

A-9. Are there school-wide/grade level data meetings established for teachers to collaborate on analysis of data and action planning? (I, PR)

- Do protocols exist for analysis of data?
- Are key data team members identified and trained?
- How frequently is data analyzed, and groupings/instruction changed as result of data analysis?



O-1. Are teachers provided on-going professional development in math standards and best practices? (PR)

District/School: Math Gr 3-5

ORGANIZATION



- Are teachers provided professional development on mathematical concepts and skills to strengthen their understanding of math?
- Are teachers provided professional development on mathematical pedagogy to help all students?
- Are new and veteran teachers provided professional development in the following areas:
 - Designing tasks with rigor?
 - Integrating the Standards for Mathematical Practice?
 - Teaching mathematics for conceptual understanding and solving rich and authentic problems?
- Are teachers provided professional development on how to use math tools effectively?
- Are new teachers trained to deliver the math curriculum?
- Is professional development provided to experienced teachers who are new to the content area or grade level?
- Are teachers aware of resources and most relevant research on best practices in the teaching of math?

O-2. Does the master schedule include the appropriate time for math instruction? (PP, I)

Standards for Mathematical Practice, #1: Make sense of problems and persevere in solving them.
Example: one hour of math instruction at elementary level

- Do all teachers adhere to the master schedule? Is there a check between allocated time on the master schedule and actual instructional time in the classroom?
- Is this time protected from meeting time, assemblies, and other interruptions?
- Is time allotted for students to productively struggle with problems in order to teach students to make sense of problems and persevere in solving them?

O-3. Has a multi-tiered system of supports (MTSS/RtII) been established to provide additional supports (Tiers 2 and 3)? (PP, I)

O-4. Is there a system ensuring students do not miss instructional time in order to receive tiered support in a particular skill? (PP, I)

- Are intervention group sizes appropriate to the level of support needed (i.e., MTSS, Tiers 2/3)?

- Are the core program and intervention program materials/approaches aligned and coordinated for students receiving both core and tiered intervention support?

O-5. Has a database been established (and is it used) to collect & summarize school-level and student-level math data, with immediate and easy access for all teachers? (I, PR)

O-6. Does the master schedule allow for professional learning community (PLC) time/data meeting time for collaboration and planning? (PP, PR)

- If so, is the frequency appropriate to the needs?

O-7. Do all teachers engage in regular conversations regarding how to connect skills and concepts horizontally as well as vertically from grade to grade? (PP, I)

- Is there knowledge and planning for vertical progression of skills?

Math Grades 3-5: Teacher Level Questions

How might my practices and knowledge level related to Curriculum, Instruction, Assessment, and Organization contribute to the achievement and growth results of my students?

These questions are offered as a vehicle for individual teachers to guide self-reflection in a purposeful and systematic manner. Each question/probe should be thoughtfully considered and answered with clear evidence.

Teachers: As you consider each question/probe, ask yourself, “What is my evidence?”

This list is not exhaustive and is not a checklist. The questions do not need to be asked in the order in which they are numbered. (Numbers are provided only as a reference for use.) Rather, it is intended to help generate thinking as a teacher considers his/her PVAAS teacher specific report on an annual basis. These questions, when considered through the lens of data available through PVAAS and other assessments, are intended to guide the self-reflection process and to assist in identifying root causes and developing action plans for the current group of students.

**Each question also indicates the related domain(s) from The Framework for Teaching*

PP= Planning and Preparation

CE= Classroom Environment

I= Instruction

PR= Professional Responsibilities

C-1. Am I knowledgeable about the PA Core Standards in Mathematics at my grade level (assessment anchors, eligible content, etc.)? (PP)

- Do I have a firm understanding of the math concepts and skills at the grade level in order to teach students at a deep level?
- Am I familiar with resources available to me on SAS (pdesas.org)?
- Do I have strong knowledge of the PA Core Standards, assessment anchors, and eligible content and plan accordingly?
- Do I understand the importance of the Standards for Mathematical Practice and do my lesson plans embed those standards along with the content focus?

Teacher: Math Gr 3-5

CURRICULUM



C-2. Do I have the necessary conceptual understanding to teach mathematics to a deep level of understanding, i.e., in non-procedural/rote ways? (PP, I, PR)

- Am I able to identify student misconceptions related to the concepts?

C-3. Am I using the district written curriculum and core math program, following prescribed protocols and procedures for math instruction? (PP)

C-4. Am I using additional materials, along with the math core program as intended, if and when needed? (PP)

C-5. Am I implementing all of the components of the core math program as intended? (PP, I)

C-6. Am I accessing and applying the most current research on mathematics education? (PP, I, PR)

- Am I aware of and using key resources?



I-1. Am I providing all students with instruction on grade level PA Core Standards? (PP)

- Am I providing at-risk students with scaffolds in order to access the core math curriculum?

Teacher: Math Gr 3-5

INSTRUCTION



I-2. Am I embedding instruction on the Standards for Mathematical Practice? (I)

- If asked, would my students be able to identify the mathematical practices targeted during specific lessons?
- Am I routinely demonstrating modeling in my instruction?
- Do I teach students to identify and use patterns to solve problems?
- Have I provided tasks that require students to apply generalizations from many tasks to investigate, create, and test hypotheses?
- Am I helping students to make sense of problems and persevere in solving them?
 - Am I circulating to ensure that students are getting directive and supportive feedback through questioning to persevere?
 - Am I providing tasks at the appropriate level of challenge?
- Do I provide students access to a variety of tools and model how to use them appropriately?
- Am I guiding discussions through questions and representations in order to teach students to reason abstractly and quantitatively?
- Am I requiring students to justify their answers and engage in discourse with their peers?

I-3. Do I demonstrate personal confidence in my mathematical abilities and enthusiasm for using math in the real world? (CE, PR)

I-4. Am I clear with students on each lesson's learning target(s)? (I)

- Are lesson objectives/essential questions (EQ) posted and communicated?
- Do lesson plans clearly delineate the lesson objectives/essential questions/learning intentions?
- Am I including both content standards and Standards for Mathematical Practice in my objectives? Is this clear to students?
- Are students able to articulate the learning target for the lesson?

I-5. Am I knowledgeable about Webb's Depth of Knowledge, and therefore providing tasks and questions at Levels 1, 2, 3, and 4 for all students? (PP, I, CE)

I-6. Am I using effective questioning techniques, including but not limited to wait time, student name placement in questioning, random and strategic calling on students, high level questioning mixed with appropriate lower level questions? (I)

I-7. Am I providing timely feedback to all students? (CE, I)

- Am I using questioning to provide feedback to guide students in helping them address misconceptions, improve their work, and/or guide their thinking?

I-8. Am I teaching math vocabulary in an explicit manner, using evidence-based strategies? (I)

Standards for Mathematical Practice, #6: Attend to precision

- Am I knowledgeable about the latest research on high leverage vocabulary instruction strategies?
- Am I providing direct instruction on specific content vocabulary that adheres to what are known to be best practices in teaching content vocabulary (Beck, Marzano, etc.)?
- Am I emphasizing precision in both vocabulary/terminology usage as well as accuracy in computations and manipulations?

I-9. Am I implementing cognitively challenging tasks in a way that promotes student thinking? (I)

- Am I presenting problem situations, engaging the students in the analysis of the context and the problem and brainstorming necessary information and possible strategies as the first component of problem solving activities?
- Am I presenting topics of interest to the students and facilitating the students to craft questions that they believe should be explored for this topic?
- Do the math tasks allow students to engage in active inquiry and exploration or encourage students to use procedures in ways that are meaningfully connected with concepts and understanding?
- Do the mathematics tasks provide students with the opportunity to engage actively in reasoning, sense making, and problem solving so students develop a deep understanding of mathematics?
- Do tasks allow for multiple entry points and varied solution strategies?

I-10. Am I using the allocated math block time effectively and efficiently? (CE, I)

Standards for Mathematical Practice, #2: Reason abstractly and quantitatively.

- Are there smooth transitions between whole group and small group instruction?
- Am I strategically using the allocated time for students, individually and in small groups, to develop reasoning skills?
- Is my pace of direct instruction appropriate to students' needs?
- Am I prepared for each small group so as to maximize allocated small group time?

I-11. Am I identifying students who are in need of additional supports and providing that differentiation in the regular classroom? (CE, I)

- Am I using small, flexible grouping within my classroom to differentiate?
- Do I monitor student progress within flexible groups and change groups as needed?

- Am I identifying students who are in need of additional supports and providing that differentiation in the regular classroom?

I-12. Am I using math tools to create a deep understanding of mathematical concepts? (I)

- Am I confident in my use of math tools?
- Am I using tools in the concrete, representational, and abstract learning cycle?

I-13. Is the independent work that I am providing clearly targeting skills and practices that facilitate math growth? (PP, I)

I-14. Am I motivating students through goal setting, monitoring and/or graphing their own progress? (CE, I)

I-15. Am I using the established building level universal screening process to provide selected students with supplemental supports (Tiers 2/3) before they begin to struggle/fail? (PP, I)



A-1. Am I assessing students with the agreed upon common assessments (benchmark, diagnostic, summative, formative), as per the district or building assessment plan? (I)

Teacher: Math Gr 3-5

ASSESSMENT



A-2. Am I considering all available achievement and growth assessment data on students as I plan and deliver instruction? (PP, I)

Example: PVAAS teacher specific report, PVAAS value-added and performance/quintile diagnostic reports, PVAAS student projection data, and PSSA, AIMSWEB, DIBELS, CDT, CBM, PSSA, G-MADE, STAR, etc.

A-3. Am I using assessments that include open-ended items and opportunities for short and long responses from students? (I)

A-4. Am I monitoring the progress of all students through evidence-based assessments and practices? (I, PR)

A-5. Am I using the established building level universal screening process to inform instruction and grouping, including identifying students in need of supplemental supports? (PP, I)

- Am I using the PVAAS student projection score for individual students in my classroom to assist in grouping decisions and the degree/frequency of progress monitoring needed?
- Am I using the PVAAS student projection score to assist in determining needs for tiered interventions?

A-6. Am I able to interpret the results of benchmark assessments being used (e.g., Study Island, MAPS, AIMSweb Math)? (I, PR)

- Am I monitoring the progress of all students through benchmark assessments to determine who is at risk as well as the level of risk, and then providing related instruction?

A-7. Am I able to use diagnostic assessments to determine individual students' needs? (PP, I)

Example: CDT

A-8. Am I identifying students who are in need of additional supports and providing that differentiation in the core content classroom? (I)

- Am I using flexible grouping?
- Am I providing additional time allocated to guided/independent practice?

A-9. Am I designing assessments that evaluate students' skills and abilities related to the Standards for Mathematical Practice? (PP, I)

- Do I require my students to demonstrate their understanding by constructing models?
- Are students required to explain their solution methods, both orally and in writing?
- Do I require students to show their work and/or justify their answers?
- Am I designing assessments that require students to demonstrate precision in both terminology and computation?
- Am I designing assessments that require students to construct arguments?
- Am I designing assessments that allow students to use a variety of mathematical tools?
- Am I designing assessments that evaluate students' ability to generalize and apply mathematical processes?
- Do I provide assessments that include extended tasks that mirror instructional activities, assessing students' ability to persevere to solve problems?
- Am I assessing students' abilities to identify and use patterns in solving problems?
- Do my assessments regularly include open-ended, rich, and cognitively challenging tasks in order to help students make sense of problems and persevere in solving them?
- Do my assessments require precision in vocabulary and accuracy in computation and symbol manipulation?



O-1. Do I have the appropriate amount of time allocated for math instruction? (PP, I)

- Are there smooth transitions between whole group and small group instruction?
- Am I prepared for each small group so as to maximize allocated small group time?
- Are procedures smooth and efficient to maximize time available?

Teacher: Math Gr 3-5

ORGANIZATION



O-2. Am I using flexible grouping/small groups to provide direct instruction to students based on their targeted skill needs? (PP, CE, I)

- Do I monitor student progress within small/flexible groups and change groups as needed?

O-3. Do I collaborate with other teachers on my team in analysis of data and integration of mathematics assessments? (PP, PR)

O-4. Am I using PVAAS student projection reports (Custom Student Reports) to assist in organizing groups, informing instruction, and identifying those students in need of supplemental supports (MTSS/RtII)? (PP, I, PR)

O-5. Am I using my PVAAS growth reports to examine past patterns and then using that information to inform instruction for my current group of students? (PP, I, PR)

O-6. Am I communicating with the intervention teacher(s) to coordinate instruction, providing purposeful and consistent instruction that reinforces skills taught in the core math classroom? (I, PR)

Math Grades 6-8: System Level Questions (District/School)

How might our system structures and practices at the district and school level related to Curriculum, Instruction, Assessment, and Organization contribute to our achievement and growth outcomes in math?

These questions are offered as a vehicle to guide purposeful reflection, and should be considered and answered with clear evidence. This list is not exhaustive and is not a checklist. The questions do not need to be asked in the order in which they are numbered. (Numbers are provided only as a reference for use.) Rather, it is intended to help generate thinking specific to the district/building level math program. Through the information provided by PVAAS, along with other assessment data, this document is intended to assist in determining potential root causes leading to plans of action (looking back and looking forward). Building level administrators, math coordinators, and building level coaches may find these reflection questions helpful in analyzing data at a system level for the school. Additionally, questions are included that allow for a broader system level perspective, and district level administrators may find the questions helpful in analyzing the K-12 math program across the LEA/district.

**Each question indicates the related domain(s) from The Framework for Teaching:*

PP= Planning and Preparation

CE=Classroom Environment

I= Instruction

PR= Professional Responsibilities

C-1. Is the Grade 6-8 mathematics written curriculum tightly aligned to the PA Core Standards? (PP)

- How frequently is the written curriculum reviewed/revised through analysis of student data?
- Is the curriculum both “guaranteed and viable”? (Marzano)
 - Guaranteed: equal access to the written curriculum for all students
 - Viable: adequate time for teachers to teach content and for students to learn it.
- Has an alignment been done that shows where certain skills/concepts are missing? Which concepts/skills need to be enhanced? Which concepts and skills are not included? Which concepts and skills lack a sufficient amount of practice embedded in the curriculum? Have lessons been developed to fill identified gaps?
- Were the Math Emphasis Guides used to develop the written curriculum?
- Do unit maps exist to guide lesson planning and instruction? Are they reviewed periodically and revised to address students’ needs, as identified through data analysis?

District/School: Math Gr 6-8

CURRICULUM



C-2. Are students enrolled in Keystone Algebra I in Grade 8 receiving instruction aligned to grade 8 PA Core Standards? (PP, I)

C-3. Does the written curriculum connect concepts and skills vertically, showing the progression of skills necessary for students to acquire deep understanding and to build upon prior knowledge? (PP)

Examples: Does the written curriculum connect basic facts to computational procedures to algebraic manipulation of variables and constants? Does the written curriculum connect the progression from whole numbers to integers to rational number to real numbers in concept and operations?

- Are there opportunities for both vertical and horizontal articulation of the curriculum, K-12?
- How does this year's curriculum build on students' prior knowledge and experiences from the previous year?
- How will the math content for this year lay the foundation for topics the students will explore in the next grade or upper-level grades?
- Do teachers engage in dialogue with teachers in grade levels above and below to examine the strengths and weaknesses of the overall program and prioritize needs of students?

C-4. Does the written curriculum provide the appropriate balance and emphasis of conceptual understanding, procedural skills and fluency, and application? (PP)

- Is there a school-wide program in place to address fact fluency?
- Does conceptual understanding build the foundation for procedural fluency?
- Does the written curriculum address procedural fluency?
- Does the written curriculum address the reciprocal relationship that exists between teaching mathematical concepts and procedures?

C-6. Does the written curriculum provide students with opportunities to demonstrate mathematical concepts with models? (PP)

Standards for Mathematical Practice, #4: Model with mathematics

C-7. Does the written curriculum in mathematics address the appropriate level of rigor (Webb's Depth of Knowledge/DOK)? (PP)

- Is the concept of rigor understood as different from difficulty level?
- Does the level of rigor in the curriculum match the rigor of each standard?
- Is there a balance of DOK levels 1, 2, and 3?
- Are there opportunities for DOK level 4 tasks?

C-8. Does the written curriculum require students to respond in writing to tasks and problems to explain their thinking? (PP)

C-9. Is the math series analyzed to determine the alignment to the PA Core Standards? (PP)

- Has an alignment to the PA Core Standards, grades 6-8, been done to check:
 - Need for using other materials and resources along with the core math series?
 - Appropriate balance on specific skills and concepts?
 - Use of appropriate materials and resources to engage students at DOK levels 2 and 3?
 - Do the materials and resources engage students at DOK levels 2 and 3?
- Has the textbook/core math series been investigated to determine the inclusion of examples and activities that address the Standards of Mathematical Practice?

C-10. Are the Standards for Mathematical Practice included in the written curriculum? (PP)

- Do unit maps and lesson plans address the Standards for Mathematical Practice?
- Are all the Standards for Mathematical Practice addressed during the course of the year? Are they appropriately weighted and balanced (e.g., is Practice 3 addressed more often than Practice 6)?
- Does the written curriculum provide opportunities to use algebra to model non-traditional problems? (Standards for Mathematical Practice, #4: Model with mathematics.)
- Does the written curriculum include problems for investigation and discussions of solution paths? (Standards for Mathematical Practice, #1: Make sense of problems and persevere in solving them.)
- Does the written curriculum focus on structures and patterns, extending the process of patterning to more complicated concepts and relationships and introduce algebraic patterns? (Standards for Mathematical Practice, #7: Look for and make use of structure.)
- Does the written curriculum emphasize reasoning abstractly and quantitatively? Does the curriculum include activities that require estimation as a quantitative reasoning technique? (Standards for Mathematical Practice, #2: Reason abstractly and quantitatively.)
- Does the written curriculum include specific activities that require students to construct viable arguments and critique the arguments of others? (Standards for Mathematical Practice, #3: Construct viable arguments and critique the reasoning of others.)
- Is the curriculum organized to incorporate the generalization and application of mathematical processes through rich tasks appropriate to each grade band and curricular area? (Standards for Mathematical Practice, #8: Look for and express regularity in repeated reasoning.)
- Does the written curriculum address mathematical terms and critical content vocabulary in a direct and explicit manner? Is it addressed in a manner that entails active engagement and goes beyond knowledge of the definition? Are vocabulary terms identified at each grade level? Does the written curriculum emphasize the connections among precise vocabulary, fluent processes, and symbolic representations? (Standards for Mathematical Practice, #6: Attend to precision.)

C-11. Are teachers aware of the resources on the PDE SAS Portal (pdesas.org) in mathematics? (PP, PR)**I-1. Do all students receive instruction on grade level PA Core Standards? (PP, CE, I)***District/School: Math Gr 6-8***INSTRUCTION**

- Is the delivery of grade level instruction equitable across all students/all student groups?
- Are the appropriate scaffolds in place to allow at-risk students to access and benefit from the core math curriculum?

**I-2. Is there an observable alignment between the written, taught, and assessed curriculum? (PP, CE, I)**

- Does daily instruction in all classrooms follow the written curriculum?
- Is there an alignment between what's written, taught, and tested? Is there a process in place to monitor this?

I-3. Are unit and lesson objectives/essential questions and learning intentions clear to students? (I)

- Are lesson objectives communicated clearly in written and oral form?
- Are lesson objectives aligned to PA Core Standards?
- Are lesson objectives inclusive of Standards for Mathematical Practices?
- Are lesson objectives aligned with the LEA/district mathematics written curriculum?

I-4. Do all teachers engage in regular conversations regarding the vertical connections of skills and concepts from grade to grade? (I, PR)

- Is there knowledge and planning for vertical progression of skills?

I-5. Is sufficient time allocated in the master schedule for math instruction at all grade levels? (PP)

- Are teachers adhering to the allocated time block for math?
- Is there sufficient time provided for students, individually and in groups, to develop reasoning skills?

I-6. Is instruction differentiated to allow for various avenues to process and practice skills? (I)

- Are teachers trained and supported in how to differentiate instruction specific to learning objectives/targets in math?
- Is differentiation of instruction an expectation, as supported/documented in district written curriculum?
- Are small groups/flexible groups used to provide differentiation within the math classroom?
- Are extension tasks provided for those students who are demonstrating mastery at the expected level?

I-7. Are students provided with a variety of tasks that address all levels of Webb's Depth of Knowledge (DOK)? (I)

- Are all teachers using effective questioning techniques, including but not limited to wait time, student name placement in questioning, random and strategic calling on students, high level questioning mixed with appropriate lower level questions (DOK)?
- Are discussions facilitated through guided questions and representations? (Standards for Mathematical Practice, #2: Reason abstractly and quantitatively.)

I-8. Are both academic and content specific vocabulary purposely addressed through evidence based techniques and strategies? (I)

Standards for Mathematical Practice, #6: Attend to precision.

- Are all teachers delivering direct and explicit instruction on key content vocabulary terms?
- Are evidence-based strategies used in all classrooms for the teaching of vocabulary?
- Is content specific mathematics vocabulary used consistently across all teachers within a grade level and vertically across grade levels?
- Is precision required in the use of mathematical terms?

I-9. Is independent work purposeful, and directly related to building deep mathematical understanding of concepts consistently across all classrooms? (I)

I-10. Are teachers using (and trained/supported in how to use) the CRA (concrete to representational to abstract) approach? (I)

I-11. Are tools/manipulatives available in all classrooms and used appropriately and effectively by all students? Are all students instructed on the appropriate use of tools? (I)

- Are all teachers using manipulatives within the CRA (concrete to representational to abstract) model?
- Does the written curriculum include tasks that encourage students to determine the appropriate mathematical tool for a given problem?
- Is technology used to enhance students' understanding of mathematical concepts?
- Do all teachers and students have access to technology?

I-12. Does instruction support productive struggle and growth mindset (the belief that the right strategies from teachers can positively impact a student's mathematical performance through the student's hard work, practice, and effort) in learning mathematics? (I)

I-13. Are students who receive tiered intervention supports closely monitored and provided specific instruction targeted to skill deficits? (I)

I-14. Is modeling taught as a critical mathematical process that utilizes algebra and are students provided opportunities to model algebra? (I)

Standards for Mathematical Practice, #4: Model with mathematics.

I-15. Do instructional tasks require students to justify their answers and engage in discourse with their peers? (PP, I, CE)

Standards for Mathematical Practice, #3: Construct viable arguments and critique the reasoning of others.

- Is there evidence that all teachers believe reasoning is as important as a correct answer?

I-16. Does the instruction at all levels include opportunities for inductive reasoning investigations that will lead to the creation and testing of hypotheses? (I)

Standards for Mathematical Practice, #8: Look for and express regularity in repeated reasoning.

I-17. Do teachers help students to make sense of problems and persevere in solving them? (I)

Standards for Mathematical Practice, #1: Make sense of problems and persevere in solving them.

- Are tasks assigned at the appropriate level of difficulty to challenge but not frustrate students?
- Do teachers circulate to provide scaffolding through questioning and descriptive feedback?
- Are teachers serving as facilitators providing guidance, not giving answers?
- Does instruction support productive struggle and a growth mindset in learning mathematics?

A-1. Is there a district/building assessment plan/calendar/map accessible to all teachers? (PP, I)

District/School: Math Gr 6-8

ASSESSMENT



- Are valid and reliable assessment measures in place to screen, diagnose, monitor, and evaluate mathematical outcomes for all students?
- Has the range of assessments been evaluated for their purposes to ensure that there is no unnecessary redundancy/overlap and important skill areas missing?
- Do all teachers have access to this map and follow it, administering all required assessments in a timely manner, as per the schedule?
- Have assessments available through the math series/program been integrated as one component of a comprehensive assessment system that includes a variety of assessment methods and evaluation sources?
- Are additional data/information on mathematics available at the classroom and individual student level and how is this additional information analyzed along with PVAAS reporting? (For example, what information from the CDT can be integrated for analysis with PVAAS data?)
- Is the data from each given assessment used to modify and guide instruction?

A-2. Are additional data/information on mathematics available at the classroom and individual student level and how is this additional information analyzed along with PVAAS reporting? (I)

Example: What information from the CDT can be integrated for analysis along with PVAAS data? How are formative and common summative assessment data used along with PVAAS data to inform instruction?

A-3. Are formative and summative assessments in place? (I)

- Are common summative assessments in place and used by all teachers?
- Are the assessments valid?
- Do all teachers have strong assessment literacy skills?

A-4. Are students assessed at the appropriate level of Webb's Depth of Knowledge (DOK)? (I)

- Are assessment items reflective of the rigor of the standards being assessed?

A-5. Are teachers aware of students' math skills through universal screening processes in place at building level? (I)

- Does universal screening occur early in school year to effectively inform instruction?
- Is the universal screening considered along with PVAAS student projection scores on individual students? Are PVAAS student projections a key component of the universal screening process?

A-6. Are benchmark assessments used to monitor progress of students along the way within a given grade level year? (I)

A-7. Are diagnostic assessments in place (e.g., CDT) to inform instruction at Tier 1 as well as Tiers 2/3 (MTSS/RtII)? (I)

A-8. Are progress monitoring measures in place and conducted by classroom teachers, support teachers, and intervention teachers (e.g. AIMSWEB, CBM, STAR)? (I)

- Is student progress closely monitored to ensure that students who are falling behind are provided proactive support through differentiation/multi-tiered system of supports (MTSS/RtII)?
- Is there a structure in place that ensures this monitoring occurs on a prescribed basis?

A-9. Are assessments varied to address the Standards of Mathematical Practice? (I)

- Do assessments allow for varied solutions and representations?
- Do the assessments evaluate the ability of the students to explore patterns and make generalizations based on those patterns?
- Do assessments allow for students to use a variety of models while solving and justifying problems?
- Do assessments require students to use precision in terminology/vocabulary, in computation, and in symbol manipulation?
- Do assessment tasks require students to construct arguments?
- Does the assessment system evaluate students' ability to generalize mathematical processes and apply them to new tasks?
- Are students given extended tasks on assessments that mirror instructional activities, in order to assess students' ability to solve problems with perseverance?
- Do assessments allow for students to use a variety of mathematical tools?
- Are all teachers requiring students to show their work and/or justify their answers?

A-10. Are there school-wide/grade level data meetings established for teachers to collaborate on analysis of data and action planning? (I, PR)

- Do protocols exist for analysis of data?
- Are key data team members identified and trained?
- How frequently is data analyzed, and groupings/instruction changed as result of data analysis?



O-1. Are teachers provided on-going professional development in math standards and best practices? (PR)

- Are teachers provided professional development on mathematical concepts and skills to strengthen their understanding of math?
- Are teachers provided professional development on mathematical pedagogy to help all students?
- Are new and veteran teachers provided professional development provided in the following areas:
 - Designing tasks with rigor?
 - Integrating the Standards for Mathematical Practice?
 - Teaching mathematics for conceptual understanding and solving rich and authentic problems?

District/School: Math Gr 6-8

ORGANIZATION



- Are teachers provided professional development on how to use math tools effectively?
- Are new teachers trained to deliver the math curriculum?
- Is professional development provided to experienced teachers who are new to the content area or grade level?
- Are teachers aware of resources and most relevant research on best practices in the teaching of math?

O-3. Does the master schedule include the appropriate amount of time for math instruction? (PP, I)

- Do all teachers adhere to the master schedule? Is there a check between allocated time on the master schedule and actual instructional time in the classroom?
- Is this time protected from meeting time, assemblies, and other interruptions?
- Is time allotted for students to productively struggle with problems in order to teach students to make sense of problems and persevere in solving them?

O-4. Does the master schedule allow for PLC (professional learning community) time/data meeting time for collaboration and planning? (PP, I)

- If so, is the frequency appropriate to the needs?

O-5. Has a multi-tiered system of supports (MTSS/RtII) been established to provide additional supports (Tiers 2 and 3)? (PP, I)

- Is there a system ensuring students do not miss instructional time in order to receive tiered support in a particular skill?
- Are the core program and intervention program materials/approaches aligned and coordinated for students receiving both core and tiered intervention support?
- Are intervention group sizes appropriate to the level of support needed (i.e., MTSS, Tiers 2/3)?

O-6. Has a database been established (and is it used) to collect and summarize school-level and student-level math data, with immediate and easy access for all teachers? (PR)

Math Grades 6-8: Teacher Level Questions

How might my practices and knowledge level related to Curriculum, Instruction, Assessment, and Organization contribute to the achievement and growth results of my students?

These questions are offered as a vehicle for individual teachers to guide self-reflection in a purposeful and systematic manner. Each question/probe should be thoughtfully considered and answered with clear evidence.

Teachers: As you consider each question/probe, ask yourself, “What is my evidence?”

This list is not exhaustive and is not a checklist. The questions do not need to be asked in the order in which they are numbered. (Numbers are provided only as a reference for use.) Rather, it is intended to help generate thinking as a teacher considers his/her PVAAS teacher specific report on an annual basis. These questions, when considered through the lens of data available through PVAAS and other assessments, are intended to guide the self-reflection process and to assist in identifying root causes and developing action plans for the current group of students.

**Each question also indicates the related domain(s) from The Framework for Teaching*

PP= Planning and Preparation

CE= Classroom Environment

I= Instruction

PR= Professional Responsibilities

C-1. Am I knowledgeable about the PA Core Standards at my grade level (assessment anchors, eligible content, etc.)? (PP)

- Do I have a firm understanding of the math concepts and skills at the grade level in order to teach students at a deep level?
- Am I familiar with resources available to me on SAS (pdesas.org)?
- Do I have strong knowledge of the PA Core Standards, assessment anchors, and eligible content and plan accordingly?
- Do I understand the importance of the Standards for Mathematical Practice and do my lesson plans embed those standards along with the content focus?

Teacher: Math Gr 6-8

CURRICULUM



C-2. Am I using the district-written curriculum and following protocols and procedures for math instruction? (PP)

C-3. Am I using additional materials, along with the math core program as intended, if and when needed? (PP)

C-4. Am I accessing and applying the most current research in mathematics? Am I aware of and using resources available to me? (PP, I, PR)

I-1. Am I providing all students with instruction on grade level PA Core Standards? (I)

Teacher: Math Gr 6-8

INSTRUCTION

- Am I providing at-risk students with scaffolds in order to access the core math curriculum?

I-2. Am I clear with students on each lesson's learning target(s)? (I)

- Are lesson objectives/essential questions (EQ) posted and communicated?
- Do lesson plans clearly delineate the lesson objectives/essential questions/learning intentions?
- Am I including both content standards and Standards for Mathematical Practice in my objectives? Is this clear to students?
- Are students able to articulate the learning target for the lesson?

I-3. Am I implementing cognitively challenging tasks in a way that promotes student thinking? (I)

- Am I presenting problem situations, engaging the students in the analysis of the context and the problem and brainstorming necessary information and possible strategies as the first component of problem solving activities?
- Am I presenting topics of interest to the students and facilitating the students to craft questions that they believe should be explored for this topic?
- Do the math tasks allow students to engage in active inquiry and exploration or encourage students to use procedures in ways that are meaningfully connected with concepts and understanding?
- Do the mathematics tasks provide students with the opportunity to engage actively in reasoning, sense making, and problem solving so students develop a deep understanding of mathematics?
- Do tasks allow for multiple entry points and varied solution strategies?

I-4. Am I using the allocated math block time effectively and efficiently? (CE, I)

- Are there smooth transitions between whole group and small group instruction?
- Am I strategically using the allocated time for students, individually and in small groups, to develop reasoning skills?
- Is my pace of direct instruction appropriate to students' needs?
- Am I prepared for each small group so as to maximize allocated small group time?
- Do I design my class period so that there is ample time for discussion?

I-5. Am I teaching math vocabulary in an explicit manner, using evidence-based strategies? (I)

I-6. Am I providing timely feedback immediately to all students? (CE, I)

I-7. Am I using math tools to create a deep understanding of mathematical concepts? (I)

- Am I confident in my use of math tools?
- Am I using tools in the concrete, representational, and abstract learning cycle?

I-8. Is the independent work that I am providing clearly targeting skills and practices that facilitate math growth? (PP, I)

I-9. Am I using effective questioning techniques, including but not limited to wait time, student name placement in questioning, random and strategic calling on students, high level questioning mixed with appropriate lower level questions? (I)

I-10. Do I demonstrate personal confidence in my mathematical abilities and enthusiasm for using math in the real world? (CE, PR)

I-11. Am I motivating students through goal setting, monitoring and/or graphing their own progress? (CE, I)

I-12. Am I identifying students who are in need of additional supports and providing that differentiation in the regular classroom? (CE, I)

- Am I using small, flexible grouping within my classroom to differentiate?
- Do I monitor student progress within flexible groups and change groups as needed?
- Am I identifying students who are in need of additional supports and providing that differentiation in the regular classroom?

I-13. Am I using the established building level universal screening process to provide selected students with supplemental supports (Tiers 2/3) before they begin to struggle/fail? (PP, I)

I-14. Am I embedding instruction on the Standards for Mathematical Practice? (I)

- If asked, would my students be able to identify the mathematical practices targeted during specific lessons?
- Do I provide guidance to students, rather than always give answers (in order to teach students to make sense of problems and persevere)?
- Am I teaching in such a way that students understand that reasoning is just as important getting the correct answer?
- Am I instructing students on the use of a variety of mathematical tools?
- Am I requiring students to justify their answers and engage in discourse with their peers?
- Do I use modeling as an instructional process?
- Do I encourage precision in students' use of vocabulary/terminology as well as accuracy in computations and manipulations?
- Have I provided tasks that require students to apply mathematical concepts in new, grade-level appropriate ways?
- Do I provide instructional opportunities for students to identify and use patterns to solve problems?

I-15. Am I using technology to enhance students' mastery of mathematical concepts and skills? (PP, I)

A-1. Am I assessing students with the agreed upon common assessments (benchmark, diagnostic, summative, formative), as per the district or building assessment plan? (I)

Teacher: Math Gr 6-8

ASSESSMENT



A-2. Am I considering all available achievement and growth assessment data on students as I plan and deliver instruction? (PP, I)

Example: PVAAS teacher specific report, PVAAS value added and performance/quintile diagnostic, PVAAS student projection data, and PSSA, AIMSweb, MAPS, CDT, CBM, PSSA, G-MADE, STAR, etc.

A-3. Am I using assessments that include open-ended items and opportunities for short and long responses from students? (I)

A-4. Am I monitoring the progress of all students through evidence-based assessments and practices? (I, PR)

A-5. Am I using the established building level universal screening process to inform instruction and grouping, including identifying students in need of supplemental supports? (PP, I)

- Am I using the PVAAS student projection score for individual students in my classroom to assist in grouping decisions and the degree/frequency of progress monitoring needed?
- Am I using the PVAAS student projection score to assist in determining needs for tiered interventions?

A-6. Am I able to interpret the results of benchmark assessments being used (e.g., Study Island, MAPS, AIMSweb Math)? (I, PR)

- Am I monitoring the progress of all students through benchmark assessments to determine who is at risk as well as the level of risk, and then providing related instruction?

A-7. Am I able to use diagnostic assessments to determine individual students' needs? (PP, I)

Example: CDT

A-8. Am I identifying students who are in need of additional supports and providing that differentiation in the core content classroom? (I)

- Am I using flexible grouping?
- Am I providing additional time allocated to guided/independent practice?

A-9. Am I designing assessments that evaluate students' skills and abilities related to the Standards for Mathematical Practice? (PP, I)

- Do I require my students to demonstrate their understanding by constructing models?
- Are students required to explain their solution methods, both orally and in writing?
- Do I require students to show their work and/or justify their answers?

- Am I designing assessments that require students to demonstrate precision in both terminology and computation?
- Am I designing assessments that require students to construct arguments?
- Am I designing assessments that allow students to use a variety of mathematical tools?
- Am I designing assessments that evaluate students' ability to generalize and apply mathematical processes?
- Do I provide assessments that include extended tasks that mirror instructional activities, assessing students' ability to persevere to solve problems?
- Am I assessing students' abilities to identify and use patterns in solving problems?
- Do my assessments regularly include open-ended, rich, and cognitively challenging tasks in order to help students make sense of problems and persevere in solving them?
- Do my assessments require precision in vocabulary and accuracy in computation and symbol manipulation?



O-1. Am I using the allocated time within each period efficiently? (CE, I)

- Are there smooth transitions between activities?
- Are procedures smooth and efficient so as to maximize time allotted?
- Do I start instruction on time? Do I use the full period allotted for instruction?
- Do I collect and review homework efficiently?

Teacher: Math Gr 6-8

ORGANIZATION



O-2. Am I using flexible grouping/small groups to provide direct instruction to students based on their targeted skill needs? (PP, CE, I)

- Do I monitor student progress within small/flexible groups and change groups as needed?

O-3. Am I using PVAAS student projection reports (Custom Student Reports) to assist in organizing groups, informing instruction, and identifying those students in need of supplemental supports (MTSS/RtII)? (PP, I, PR)

O-4. Am I using my PVAAS growth reports to examine past patterns and then using that information to inform instruction for my current group of students? (PP, I, PR)

O-5. Am I communicating with the intervention teacher(s) to coordinate instruction, providing purposeful and consistent instruction that reinforces skills taught in the core math classroom? (PR)

O-6. Do I collaborate with other teachers on my team in analysis of data and integration of mathematics assessments? (PP, PR)

Keystone Algebra I: System Level Questions (District/School)

How might our system structures and practices at the district and school level related to Curriculum, Instruction, Assessment, and Organization contribute to our achievement and growth outcomes in math?

These questions are offered as a vehicle to guide purposeful reflection, and should be considered and answered with clear evidence. This list is not exhaustive and is not a checklist. The questions do not need to be asked in the order in which they are numbered. (Numbers are provided only as a reference for use.) Rather, it is intended to help generate thinking specific to the Keystone Algebra I course. Through the information provided by PVAAS, along with other assessment data, this document is intended to assist in determining potential root causes leading to plans of action (looking back and looking forward). Building level administrators, math coordinators, and building level coaches may find these reflection questions helpful in analyzing data at a system level for the school. Additionally, questions are included that allow for a broader system level perspective, and district level administrators may find the questions helpful in analyzing the K-12 math program across the LEA/district.

**Each question indicates the related domain(s) from The Framework for Teaching:*

PP= Planning and Preparation

CE=Classroom Environment

I= Instruction

PR= Professional Responsibilities

C-1. Is the written curriculum for the Algebra I course aligned to the Keystone Algebra I assessment anchors and eligible content? (PP)

- Has an alignment been done that shows where certain skills/concepts are missing? Which concepts/skills need to be enhanced? Which concepts and skills are not included with a sufficient amount of practice embedded?
- How frequently is the written curriculum reviewed/revised through analysis of student data?
- Is the curriculum both “guaranteed and viable”? (Marzano)
 - Guaranteed: equal access to the written curriculum for all students
 - Viable: adequate time for teachers to teach content and for students to learn it.
- How is the Keystone Algebra written curriculum made accessible to teachers?
- Has the textbook/texts for the course been examined for degree of alignment to the PA Core Standards/Keystone Exam eligible content?
- Is there a written map that provides a crosswalk between the course approved textbook and the PA Core Standards?
- Does the curriculum focus on the priorities addressed in the Math Emphasis Guides?

*District/School:
Keystone Algebra I*

CURRICULUM



C-2. Do unit and lesson plans include objectives for the explicit teaching of key vocabulary? (PP)

- Are key content vocabulary terms included in the written curriculum?

C-3. Does the written curriculum emphasize connections among precise vocabulary, fluent processes and symbolic representations? (PP)

C-4. Are there appropriate course sequencing options for students prior to placement in Keystone Algebra I course? (PP)

- Has an appropriate vertical course sequence been established for all students prior to placement in the Keystone Algebra course?

C-5. Are appropriate materials and resources used in the instruction of Algebra I? (PP)

- Is the textbook considered a resource for instruction rather than the curriculum?
- Has the textbook for the course been examined for degree of alignment to the Keystone exam eligible content?

C-6. Does the Algebra curriculum emphasize and extend the concept of patterns? (PP)

Standards for Mathematical Practice, #7: Look for and make use of structure.

C-7. Is the curriculum organized so that regularity in applications and solution processes can be noticed, documented, and generalized in the performance of open-ended, rich, and cognitively challenging tasks appropriate to each grade band and curricular area? (PP)

Standards for Mathematical Practice, #8: Look for and express regularity in repeated reasoning.

C-8. Does the Algebra I curriculum provide opportunities for students to engage in rich performance tasks to construct viable arguments? (PP)

Standards for Mathematical Practice, #3: Construct viable arguments and critique the reasoning of others.

C-9. Does the written curriculum have an appropriate emphasis on both abstract and quantitative reasoning? (PP)

Standards for Mathematical Practice, #2: Reason abstractly and quantitatively.

C-10. Does the written curriculum allow students to use appropriate tools (calculator, computer and/or other tools) to facilitate the acquisition of algebraic concepts and procedural proficiency? (PP)

Standards for Mathematical Practice, #5: Use appropriate tools strategically.

C-11. Are teachers aware of the resources on the PDE SAS Portal (pdesas.org) for Keystone Algebra I? (PP, PR)



I-1. Are all teachers adhering to the written curriculum for the Algebra I course (i.e., taught curriculum matches the written curriculum)? (I)

I-2. Are research supported materials and resources used to address Algebra I content? (PP, I)

District/School:
Keystone Algebra I

INSTRUCTION



I-3. Are students required to respond in writing to explain their reasoning or justify answers/solutions? (PP)

I-4. Are teachers adapting instruction for those who need differentiated instruction? (I)

I-5. Are teachers providing enrichment for those students whose rate of learning exceeds the average pace? (I)

I-6. Are all teachers delivering the curriculum at a pace in response to the needs of their students? (I)

I-7. Are teachers teaching the Standards of Mathematical Practice through context? (I)

- Are all teachers providing instruction that uses patterning and multiple representations to facilitate the students' development of conceptual understanding and procedural proficiency through performance rich tasks?
- Are students provided continuous opportunities to reason and make sense of mathematics?
- Are teachers requiring students to use precision in terminology as well as accuracy in computations and manipulations?
- Does the instruction at all levels include opportunities for inductive reasoning investigations that will lead to the creation and testing of hypotheses?
- Do all teachers provide performance rich tasks that require students to justify answers and methods?
- Do all teachers provide instruction on the appropriate use of technology tools and provide opportunities for students to select and use tools as appropriate?

I-8. Is available technology used to differentiate instruction and provide additional practice on targeted skill areas? (I)



A-1. Are formative and summative assessments in place to provide consistency for all students across courses/sections/teachers? (PP, I)

- Are the assessments valid?
- Do all teachers have strong assessment literacy skills?
- Are common summative assessments in place?
 - Unit assessments?
 - Mid-terms and finals?
 - Other?
- Are assessments analyzed for cognitive thinking levels (Webb's Depth of Knowledge)?

District/School:
Keystone Algebra I

ASSESSMENT



A-2. Are formative and summative assessments truly assessing the intended learning targets? (I)

- Are formative assessments used daily, with immediate feedback to students?

A-3. Is there a match between the written, taught, and tested curriculum? (PP, I)

- Is there a process in place to monitor this?

A-4. Do Keystone Algebra I teachers conduct item analysis on common assessments to revise curriculum and instruction as indicated? (I, PR)

A-5. Is there a universal screening process in place to determine which students may be in need of additional support prior to and/or during enrollment in the Keystone Algebra I course? (PP, I)

- Does this include using PVAAS student projection reports, available from Grade 5 forward?

A-6. Is available data used, including PVAAS student projections, to inform decisions about course scheduling for students? (For example, when should students be scheduled for Keystone Algebra I?) (PP)

A-7. Are PVAAS growth reports and PVAAS student projection reports used to reflect on past practices and apply information to the future? (PP, I)

- Are PVAAS reports used:
 - During the curriculum review/revision process?
 - In planning and delivery of instruction?
 - During planning for (proactive) intervention supports?
 - For secondary math course design and sequence?
 - For placement of students?

A-8. Do assessment tasks evaluate students' skills and abilities relative to the Standards for Mathematical Practice? (I)

- Do assessments include tasks that require strategic thinking, thereby assessing students' ability to persevere to solve problems?
- Do the assessments evaluate the ability of the students to explore patterns and generalize hypotheses based on those patterns?
- Do classroom assessments demonstrate the value of quantitative reasoning along with procedural proficiency?
- Is justification valued as highly as procedural proficiency and accuracy of answers?
- Do some assessments require students to use an appropriate technology tool?
- Does the assessment system evaluate students' ability to generalize mathematical processes and apply them to new tasks?

O-1. Are supplemental supports available to students who are at risk during the Keystone Algebra I course enrollment? (PP)

O-2. Have teachers participated in professional development on the topic of assessment literacy? (PR)

O-3. Are there opportunities for Algebra I teachers to collaboratively plan, prepare, and analyze common assessment data? (I, PR)

*District/School:
Keystone Algebra I*

ORGANIZATION



O-4. Are students provided sufficient time to solve rich tasks that require them to struggle productively and persevere? (PP, I)

Standards for Mathematical Practice, #1: Make sense of problems and persevere in solving them.

O-5. Are remediation courses/supports available to students who have not achieved proficiency on the Keystone exam? (PP)

- Targeted to individual students' needs, as indicated by data

Keystone Algebra I: Teacher Level Questions

How might my practices and knowledge level related to Curriculum, Instruction, Assessment, and Organization contribute to the achievement and growth results of my students?

These questions are offered as a vehicle for individual teachers to guide self-reflection in a purposeful and systematic manner. Each question should be thoughtfully considered and answered with clear evidence.

This list is not exhaustive and is not a checklist. . The questions do not need to be asked in the order in which they are numbered. (Numbers are provided only as a reference for use.) Rather, it is intended to help generate thinking as a teacher considers his/her PVAAS teacher specific report on an annual basis. These questions, when considered through the lens of data available through PVAAS and other assessments, are intended to guide the self-reflection process and to assist in identifying root causes and developing action plans for the current group of students.

Teachers: As you consider each question/probe, ask yourself,
“What is my evidence?”

**Each question also indicates the related domain(s) from The Framework for Teaching*

PP= Planning and Preparation

CE= Classroom Environment

I= Instruction

PR= Professional Responsibilities

C-1. Do I have deep knowledge of the PA Core Standards and the Keystone Algebra I assessment anchors and eligible content? Do I use that knowledge in my planning? (PP)

Teacher: Keystone Algebra I

CURRICULUM



C-2. Am I using the written curriculum to plan my units and lessons? (PP)

- Do my lesson plans clearly delineate the lesson target(s)?

C-3. Am I planning lessons to address the targeted vocabulary and terminology identified in the written curriculum? (PP)

C-4. Do I have access to and use the materials and resources identified in the written curriculum? (PP, I)

C-5. Am I planning lessons that require students to use writing to explain and justify answers and solutions? (PP)



I-1. How well do I know the eligible content for the Keystone Algebra I exam and use my knowledge in the planning and delivery of instruction? (PP, PR)

Teacher: Keystone Algebra I

INSTRUCTION



I-2. Am I using the appropriate materials and resources in my instruction, using the textbook appropriately, along with other resources as needed, to meet the Keystone Algebra I eligible content? (PP, I)

I-3. Do I act as a facilitator (providing guidance and not giving answers), and promote students' ability to solve problems and persevere? (I)
Standards for Mathematical Practice, #1: Make sense of problems and persevere in solving them.

I-4. Am I differentiating instruction to meet the needs of all students in the course? (CE, I)

I-5. Have I provided evidence-based instruction on vocabulary terms and their application? (PP, I)

I-6. Am I using effective questioning techniques, with purposeful planning to address levels of thinking as defined in Webb's Depth of Knowledge (DOK)? (PP, I)

- Do I know and understand Webb's DOK as it pertains to instructional tasks?
- Have I received professional development necessary to develop good questions and tasks at DOK levels 2 and 3?

I-7. Is my instruction reflecting the importance of reasoning and not just the right answer? (I)
Standards for Mathematical Practice, #2: Reason abstractly and quantitatively.

I-8. Have I provided tasks that require students to apply generalizations from many tasks to investigate, create, and test hypotheses? (I)
Standards for Mathematical Practice, #8: Look for and express regularity in repeated reasoning.

I-9. Am I instructing students on the appropriate use of technology tools? (I)
Standards for Mathematical Practice, #5: Use appropriate tools strategically.

I-10. Is modeling used as an instructional strategy to support the development of algebraic concepts and are students provided opportunities to model mathematically? (I)
Standards for Mathematical Practice, #4: Model with mathematics.

I-11. Am I providing timely feedback to students on a daily basis? (I)



A-1. Am I using formative and summative assessments throughout the course (“along the way”) to inform my instruction? (I)

- Do I have strong assessment literacy?
- Are the assessments valid?
- Are the assessments aligned to the standards intended to be assessed?
- Are the assessment items developed to the rigorous level of the standards?

Teacher: Keystone Algebra I

ASSESSMENT



A-2. Am I using PVAAS student projection data available on students in my current course to inform my instruction, including differentiation within the course, and/or identifying students at risk at start of course? (PP, I)

A-3. Am I using diagnostic data (e.g., CDT) to inform my instruction? (I)

A-4. Am I monitoring my instruction through the use of formative assessments? (CE, I)

- Am I adjusting the pacing of my instruction through formative assessment?

A-5. Am I identifying students for supplemental/tiered support prior to or during enrollment in the Keystone Algebra I course (prior to the Keystone exam)? (PP, I)

- Am I using PVAAS student projection data to the Keystone exam, available for students last tested in Grade 5?

A-6. Am I working with colleagues to analyze common assessment data? (PR)

A-7. Do my assessments provide me with insight into students’ skills and abilities related to the Standards for Mathematical Practice? (PP, I)

- Do my assessments require strategic thinking, and motivate students to solve problems and persevere?
- Am I designing assessments that evaluate students’ ability to look for and express regularity in repeated reasoning?
- Am I designing classroom assessments that require quantitative reasoning as well as procedural fluency?
- Am I designing assessments that require students to include models and opportunities for multiple representations?
- Am I designing assessments to include some tasks that require the use of technology?

A-8. Do students’ grades/marks in my class accurately reflect their academic achievement and proficiency levels? Am I providing accurate and relevant grades to students to reflect their progress along the way? (I)



O-1. Based on assessment data, am I following the established procedures and protocols to identify students for supplemental/tiered support? (PP, CE, I)

Teacher: Keystone Algebra I

ORGANIZATION

O-2. Am I collaborating with other Algebra teachers to plan instruction and analyze student outcomes? (PP, PR)



O-3. Am I attending professional development opportunities to enhance my content knowledge and pedagogical skills? (PP, CE, PR)

O-4. Am I using the allocated time for instruction effectively and efficiently? (PP, CE, I)

- Am I starting the class on time?
- Am I using the full period/time block for instruction?
- Am I using efficient procedures to check homework, etc.?