

DIGGING DEEPER

into

Content Areas:

Mathematics

K-2 **3-5** **6-8** **Keystone Algebra**



*Questions at the LEA/District,
School, and Teacher Level*

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Contents

Background	6
Navigating This Guide	6
Alignment	7
PA's Essential Practices for Schools.....	7
PA Observation and Practice Framework (Act 13).....	8
How to Use This Guide	9
Resources & Evidence	10
Math K-2 System-Level Questions	11
Curriculum	11
Instruction	14
Assessment.....	16
Organization.....	18
Math 3-5 System-Level Questions	20
Curriculum	20
Instruction	23
Assessment	25
Organization.....	27
MATH 6-8 System-Level Questions	28
Curriculum	28
Instruction	31
Assessment.....	33
Organization.....	35
Math Keystone Algebra I System-Level Questions	36
Curriculum	36
Instruction	37
Assessment.....	39
Organization.....	40
Math K-2 Teacher-Level Questions	41
Curriculum	42
Instruction	43
Assessment.....	45
Organization.....	47

Math 3-5 Teacher-Level Questions48

- Curriculum 49
- Instruction 50
- Assessment..... 52
- Organization..... 53

Math 6-8 Teacher-Level Questions54

- Curriculum 55
- Instruction 55
- Assessment..... 57
- Organization..... 59

Math Keystone Algebra I Teacher-Level Questions 60

- Curriculum 61
- Instruction 61
- Assessment..... 62
- Organization..... 63

Background

The *Digging Deeper into Content Areas* guides are available in the three content areas: *English Language Arts (ELA)*, *Mathematics*, and *Science*. These guides are designed to help teachers, teacher leaders, school and district/LEA leaders, and data teams move from the initial step of identifying patterns of strengths and needs in their data to determining the “root cause” – or the “why” – to plan for improvements and enhancements leading to continuous growth for all students.

Navigating This Guide

Each of the content area guides are divided into two sections:

- **Variables (questions) at the LEA/School level** – Appropriate for LEA/district administrators, school principals, department chairs, content leaders, teacher leaders, teachers, and data team members.
- **Variables at the teacher level** – Appropriate for use by individual teachers who are engaging in self-reflection of their own data and their own practice.

A divider page between the two sections allows one to refer to their relevant work section.

The questions within each section are organized by grade bands:

- K-2
- 3-5
- 6-8
- Keystone course (Algebra, Biology, Literature)

Within each of the two sections, the variables are also organized under four categories or “buckets”, as follows:

- Curriculum
- Instruction
- Assessment
- Organization

Alignment

Additionally, an alignment coding for each question is provided at each level, illustrating a crosswalk between the items in these guides and other PDE frameworks.

PA's Essential Practices for Schools

The LEA/School level section's variables/questions align with the conditions of **PA's Essential Practices for Schools**. The questions in the guide are coded with the condition number(s) that is the most relevant fit, i.e., EP Condition 1, 2, 3, or 4.

EP Condition 1: Focus on Continuous Improvement of Instruction

- Aligned curriculum, instruction, and assessment
- Collaborative instructional planning
- Variety of assessments to monitor student learning Identify and address individual student learning needs
- Frequent, timely feedback and support on instructional practices

EP Condition 2: Empower Leadership

- Culture of high expectations for success
- Collective vision for teaching and learning
- Empowered staff
- Needs-based organization and allocation of resources
- Continuous monitoring of school improvement plan implementation

EP Condition 3: Provide Student-Centered Supports

- Positive school environment where all members feel welcomed, supported, and safe schoolwide positive behavior interventions and supports
- Multi-tiered system of supports for academics and behavior
- Family engagement to support learning
- Partnerships with local businesses, community organizations, and other agencies

EP Condition 4: Foster Quality Professional Learning

- Professional learning responsive to teacher and student needs
- Multiple professional learning designs
- Evaluating the impact of professional learning

[View more information about PA's Essential Practices for Schools >](#)

PA Observation and Practice Framework (Act 13)

Each teacher-level section's variables/questions align with the **PA Observation and Practice Framework (Act 13)** domains and are coded with initials as shown below.

The Framework for the Evaluation of Classroom Teachers is adapted by the Pennsylvania Department of Education from Charlotte Danielson's 2011 "Framework for Teachers" and adapted by the Pennsylvania Department of Education from Charlotte Danielson's 2020 "Framework for Remote Teaching."

Planning and Preparation (PP)

- Knowledge of content and Pedagogy
- Demonstrating Knowledge of Students
- Setting Instructional Outcomes
- Demonstrating Knowledge of Resources
- Designing Coherent Instruction
- Designing Student Assessment

Classroom Environment (CE)

- Creating an Environment of Respect and Rapport
- Establishing a Culture of Learning
- Managing Classroom Procedures
- Managing Student Behavior Expectations
- Organizing Physical and Digital Space

Instruction (I)

- Communicating with Students
- Questioning and Discussion Techniques
- Engaging Students in Learning Activities and Assignments
- Using Assessment in Instruction
- Demonstrating Flexibility and Responsiveness

Professional Responsibility (PR)

- Reflecting on Teaching
- Maintaining Accurate Records
- Communicating with Families
- Participating in a Professional Community
- Growing and Developing Professionally
- Showing Professionalism

[Learn more about PA's Observation and Practice Framework on the SAS Website >](#)

How to Use This Guide

1. Choose the content area guide most relevant to your needs. Review the entire document first to become familiar with the format and the scope of questions offered for probing and discussion.
2. Decide which section to use based on your purpose: (1) the LEA/school level section or (2) the teacher level section. **When working as a data team, a group of teachers, and/or administrators, use the LEA/school-level section. When working as an individual teacher, use the teacher-level section.**
3. Determine if there is one area on which you need to focus (Curriculum, Instruction, Assessment, or Organization) or if your data patterns suggest looking across all four areas (Curriculum, Instruction, Assessment, or Organization).
4. Carefully read and reflect on the areas you are targeting and star/flag those questions that you (or the data team) believe are worth further “digging,” discussion, and reflection.
5. Consider all relevant data sources and determine the EVIDENCE to support your reflection and analyses.
6. Choose one or more areas for goal setting and focus applicable to the current group of students in the classroom or school.

Remember, this is not a checklist to be distributed to the data team or individual teacher, nor are the questions sequenced in any specific order. Rather, it is a listing of variables to explore more deeply. The document requires discussion about evidence of practice, honest reflection, and careful selection of where to start and how deeply to probe. The focus and starting point depend on the school’s current status and needs, as well as the needs of individual teachers. Each question discussed is to be considered and answered with solid evidence.

Resources & Evidence

Evidence for reflection on each question may come from many sources, including but not limited to the information found in one or more of the resources below. Click on the relevant links below to access more information. Visit <https://bit.ly/DiggingDeeper-Word> for an editable version of this resource.

- [Pennsylvania's Standards Aligned System/SAS Website](https://www.pdesas.org) (PA Early Childhood Standards, K-12 PA Core Standards, Math Assessment Anchors and Eligible Content, Math Item Sampler, Keystone Algebra 1 Item Sampler, Keystone Algebra 1 Assessment Anchors and Eligible Content, Hess' Cognitive Rigor Matrix and Curricular Examples, Standards for Mathematical Practice)

<https://www.pdesas.org>

- [Digging Deeper Resources from the Pennsylvania Department of Education](https://www.education.pa.gov/K-12/Assessment%20and%20Accountability/PVAAS/UsingPVAAS/Pages/DiggingDeeper.aspx)

<https://www.education.pa.gov/K-12/Assessment%20and%20Accountability/PVAAS/UsingPVAAS/Pages/DiggingDeeper.aspx>

- [Principles to Action, Executive Summary](https://www.nctm.org/uploadedFiles/Standards_and_Positions/PtAExecutiveSummary.pdf)

https://www.nctm.org/uploadedFiles/Standards_and_Positions/PtAExecutiveSummary.pdf

From IES:

- [Assisting Students Struggling with Mathematics: Intervention in the Elementary Grades \(2021\)](https://ies.ed.gov/ncee/wwc/Docs/PracticeGuide/WWC2021006-Math-PG.pdf)

<https://ies.ed.gov/ncee/wwc/Docs/PracticeGuide/WWC2021006-Math-PG.pdf>

- [Teaching Math to Young Children, Educator's Practice Guide \(2013\)](https://ies.ed.gov/ncee/wwc/Docs/PracticeGuide/early_math_pg_111313.pdf)

https://ies.ed.gov/ncee/wwc/Docs/PracticeGuide/early_math_pg_111313.pdf

- [Big Ideas of Early Math, Erikson Institute \(2007\)](https://earlymath.erikson.edu/why-early-math-everyday-math/big-ideas-learning-early-mathematics/)

<https://earlymath.erikson.edu/why-early-math-everyday-math/big-ideas-learning-early-mathematics/>

- [NCTM: Mathematics in Early Childhood Learning \(2022\)](https://www.nctm.org/Standards-and-Positions/Position-Statements/Mathematics-in-Early-Childhood-Learning-2146936947/)

<https://www.nctm.org/Standards-and-Positions/Position-Statements/Mathematics-in-Early-Childhood-Learning-2146936947/>

- [PaTTAN Mathematics Initiative](https://sites.google.com/pattan.net/ptnmath)

<https://sites.google.com/pattan.net/ptnmath>

System-Level Questions

(LEA/District and School)

THINK ABOUT: How might our system structures and practices at the LEA/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. Note: The questions do not need to be discussed in the order in which they are numbered; they are numbered to reference specific items and for ease of use.

The questions are intended to help generate thinking specific to the LEA/school level ELA 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). School level administrators, ELA coordinators, teacher leaders, and teachers may find these reflection questions helpful in analyzing data at a system level for the school.

Essential Practice Key:

Each question indicates the related conditions for PA’s Essential Practices for Schools:

EP Condition 1

Focus on Continuous Improvement of Instruction

EP Condition 2

Empower Leadership

EP Condition 3

Provide Student-Centered Supports

EP Condition 4

Foster Quality Professional Learning

CURRICULUM

SYSTEM LEVEL

MATH K-2

C-1. Is the Grade K-2 Mathematics written curriculum tightly aligned to the PA Core Standards?

EP Condition 1

- a. How frequently is the written curriculum reviewed/revised through analysis of student data?
- b. 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
- c. 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 sufficient practice embedded in the curriculum? Have lessons been developed to fill identified gaps?
- d. Were the PDE SAS Math Curriculum Frameworks used to develop the written curriculum?
- e. Were resources and major work documents from national organizations used to develop the written curriculum?

- C-2. Does the written curriculum frequently (at least annually) undergo a formal or informal audit to identify where certain skills/concepts are not included or are not sufficiently emphasized, and/or which concepts/skills need to be enhanced?** *EP Condition 1*
- C-3. Does the written curriculum extensively address foundational mathematics skills leading to and in support of each of the next grade levels?** *EP Condition 1*
- Were the major work documents and resources from national organizations used in the development of the written curriculum?
 - Is there appropriate emphasis at K-2 on foundational skills in numbers and operations? (e.g., counting, patterning, place value)
 - Are numbers and operations taught using a developmental progression of skills?
 - Does the written curriculum include K-2 skills in algebraic concepts (e.g., addition, subtraction, and relationship between the two)
 - Does the written curriculum align with the four key components of math fact fluency: flexibility, appropriate strategy use, efficiency, and accuracy?
 - Does the written curriculum include specificity in K-2 in foundational geometry skills, including but not limited to identification and description of shapes, basic fractions (half, quarters, etc.), and are these skills addressed through an explicit progression?
 - Does the written curriculum identify foundational skills in measurement, data, and probability (e.g., telling time, using charts, working with length, area, etc.)
 - Does the written curriculum include an emphasis on hands-on and visual manipulatives to develop a conceptual understanding of numbers? (e.g., number lines, hundreds charts, etc.)
- C-4. Is there a process in place to engage in vertical articulation of concepts and skills?** *EP Condition 1* *EP Condition 2*
- Does the written curriculum align with the three shifts in mathematics: focus, coherence, and rigor?
 - Does the written curriculum detail key grade level vocabulary?
 - Do teachers have the opportunity to work in collaborative teams to review and use the written curriculum?
- C-5. Does the written curriculum for K-2 emphasize problem solving?** *EP Condition 1*
- C-6. Does the written curriculum specifically address conceptual understanding to build the foundation for procedural fluency?** *EP Condition 1*
- Does the written curriculum align with the four key components of math fact fluency: flexibility, appropriate strategy use, efficiency, and accuracy?
 - Is there a school-wide program in place to address fact fluency, aligned with the three phases of fact fluency: counting, deriving, and mastery?
 - Does the written curriculum build on fact fluency from foundational fact sets to derive fact strategies?
 - Does the written curriculum address the five strands of mathematical proficiency: conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition?
 - Does the written curriculum assess fluency in a variety of different ways, free from timed tests?

- C-7. Does the written curriculum include tasks that encourage students to determine the appropriate mathematical tool for a given problem?** *EP Condition 1*
- Are all teachers using manipulatives within the CRA (concrete, representational, abstract) model?
 - Are students encouraged to choose the appropriate manipulative to help them solve problems?
 - Does the written curriculum include tasks that encourage students to determine the appropriate mathematical tool for a given problem?
- C-8. Is the core math program analyzed to determine the alignment to the PA Core Standards as well as alignment to the Standards for Mathematical Practice?** *EP Condition 1*
- Has the core program been mapped to the PA Core Standards – Grades K-2, to check for alignment?
 - Is there a need for using other materials and resources along with the core math series?
 - Is there an appropriate balance on specific skills and concepts in the core math program?
- C-9. Are the Standards for Mathematical Practice identified and included in the written curriculum?** *EP Condition 1*
- Do unit maps and lesson plans address the Standards for Mathematical Practice?
 - Are all the Standards for Mathematical Practice addressed and spiraled throughout units during the course of the year?
 - 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? (Standards for Mathematical Practice, #6: Attend to precision.)
- C-10. Are teachers aware of the curriculum resources on the PDE SAS Portal (pdesas.org) in mathematics?** *EP Condition 1*

INSTRUCTION

SYSTEM LEVEL

MATH

K-2

- I-1. Do all students receive instruction on K-2 grade level PA Core Standards? *EP Condition 1*
- I-2. Are the appropriate scaffolds in place to allow students not at grade level proficiency to access and benefit from the core math curriculum? *EP Condition 1*
- I-3. Is there an observable alignment between the written, taught, and assessed curriculum? *EP Condition 1*
- I-4. Does daily instruction in all classrooms align to the written curriculum? *EP Condition 1*
- I-5. Are students provided with a variety of tasks that address all levels of Webb’s Depth of Knowledge (DOK)? *EP Condition 1* *EP Condition 2*
 - a. 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, and high-level questioning mixed with appropriate lower-level questioning (DOK)?
 - b. Are discussions facilitated through guided questions and representations?
- I-6. Are unit and lesson objectives, essential questions, and/or learning intentions clear to students? *EP Condition 1*
 - a. Are lesson objectives communicated clearly in written and oral form?
 - b. Are lesson objectives aligned to PA Core Standards?
 - c. Are lesson objectives inclusive of Standards for Mathematical Practices?
 - d. Are lesson objectives aligned with the LEA/district mathematics written curriculum?
- I-7. Do all teachers engage students in discussing how mathematics is used every day (i.e., cooking, counting objects, making decisions, planning a schedule, etc.)? *EP Condition 1*
- I-8. Is a positive mindset regarding the learning of mathematics specifically addressed and reinforced with students in the classroom? *EP Condition 2*
- I-9. Are students encouraged and required to explain and defend their answers? *EP Condition 1*
- I-10. Is sufficient time for Math instruction allocated in the school and classroom schedule at Kindergarten, Grade 1, and Grade 2? *EP Condition 1*
- I-11. Do the actual instructional minutes closely mirror the allocated time on paper? *EP Condition 1*
- I-12. Do all teachers provide whole group, small group, and individual instruction for all students? *EP Condition 1*
- I-13. Are flexible skills groups used to provide targeted instruction at students’ instructional levels and according to identified needs? *EP Condition 1*
- I-14. Are the groups flexible to align with individual students’ needs at appropriate points in time and adjusted based on monitoring of progress? *EP Condition 1*
- I-15. Is there a grade level pacing guide used by all teachers with flexibility to respond to students’ needs? *EP Condition 1*

- I-16. Is the curriculum or LEA core math program implemented with fidelity?** *EP Condition 1*
- Where appropriate, are supplements/revisions/additions to the core math program done with intention and through evidence-based practice?
 - Is this implementation consistent across classrooms?
 - Is there a consistent observation/reflection protocol in use to ensure fidelity?
 - Is there a structured process for determining the use of additional resources and materials?
- I-17. Are timed activities used appropriately?** *EP Condition 1*
- Are timed activities employed only when students have been working on a concept over many lessons, rather than using them to introduce and teach mathematics concepts and operations?
 - Are timed activities paired with feedback in real time?
- I-18. Are students given appropriate time to solve problems?** *EP Condition 1*
- I-19. 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?** *EP Condition 1*
- I-20. Are all teachers using manipulatives within the CRA (concrete, representational, abstract) model?** *EP Condition 1*
- I-21. Is technology used to enhance students' understanding of mathematical concepts? Do all students and teachers have access to technology?** *EP Condition 1*
- I-22. Are students provided with deliberate instruction on word problems and problem solving to deepen understanding and build capacity to apply mathematical ideas?** *EP Condition 1*
- I-23. Is both academic and content specific vocabulary purposely addressed through evidence-based techniques and strategies?** *EP Condition 1*
- Are teachers naturally integrated math vocabulary throughout units and lessons?
 - 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?
 - Are teachers connecting student-created vocabulary definitions to mathematical vocabulary definitions to promote precision and understanding with precise use of mathematical vocabulary?
- I-24. Is independent work purposeful and directly related to building deep mathematical understanding of concepts consistently across all classrooms?** *EP Condition 1*
- Is there evidence that independent work is differentiated based on students' strengths and areas of need?
 - Is independent work based on students' learning data?
- I-25. Is patterning used as a tool to facilitate students' development of conceptual understanding and procedural proficiency through rich tasks? Does it promote searching for patterns?** *EP Condition 1*
- I-26. Do teachers routinely demonstrate modeling in their discussions with students and encourage students to model?** *EP Condition 1*

- I-27. Are open-ended questions used by all teachers to prompt students to apply their math knowledge and encourage math conversations? (e.g., “How can we change this pattern to make a new one?”, “How else can you show this?”) *EP Condition 1*
- I-28. Is instruction differentiated to allow for various avenues to process and practice skills? *EP Condition 1* *EP Condition 3*
- 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 the LEA/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-29. Are students who receive tiered intervention support provided specific instruction targeted to skill deficits? *EP Condition 1* *EP Condition 3*
- Are all students closely monitored for progress?
 - Are intervention programs, resources, and materials evidence-based?

ASSESSMENT SYSTEM LEVEL MATH K-2

- A-1. Is there a district/school assessment map accessible to all teachers? *EP Condition 1* *EP Condition 3*
- Have assessments been reviewed to address level of rigor (Webb’s Depth of Knowledge) and PA’s Core Standards?
 - 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 that no important skill areas are missing?
 - Do all teachers have access to this map and follow it, administering all required assessments in a timely manner according to the schedule?
 - Do all teachers know the differences and purposes of summative, formative, benchmark, and diagnostic assessments?
- A-2. Have assessments available through the core math series/program been integrated with other assessment as one component of a comprehensive mathematics assessment system? *EP Condition 1*
- A-3. Have the assessments available in an LEA’s core mathematics program been analyzed to determine which are to be used as required and common assessments? *EP Condition 1* *EP Condition 3*
- A-4. Will all, some, or none of the assessments in an LEA core mathematics program/package be used by teachers? Will they be used in their entirety, or will just some sections/portions be used? *EP Condition 1* *EP Condition 3*

- A-5. How do these assessments align with other local assessments, such as but not limited to aimsweb, Acadience, STAR, etc.? Is there unnecessary overlap and/or redundancy?**
EP Condition 1 *EP Condition 3*
- A-6. Is there a process to determine which assessments are to be used in common by all teachers? Does this process carefully analyze the type and purpose of each assessment?**
EP Condition 1 *EP Condition 3*
- A-7. Is the data from each assessment triangulated and used to modify and inform instruction?**
EP Condition 1 *EP Condition 3*
- A-8. Are assessments varied to address the Standards of Mathematical Practice?** *EP Condition 1*
EP Condition 3
- 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 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 teachers aware of students' math skills through a universal screening process in place at the school level?** *EP Condition 1* *EP Condition 3*
- Does universal screening occur early in the school year to effectively inform instruction and individual students' needs?
 - Are screening measures used during the school year to identify students falling behind expected level?
- A-10. Is further diagnostic assessment conducted for each student who is evidenced through screening assessments in need of additional support?** *EP Condition 1* *EP Condition 3*
- A-11. Are diagnostic assessments in place to inform instruction at Tier 1 as well as Tiers 2 and 3?**
EP Condition 1 *EP Condition 3*
- A-12. Are benchmark assessments used to monitor progress of students throughout a given grade level/year?** *EP Condition 1* *EP Condition 3*
- Are students not at benchmark monitored closely with the appropriate frequency? Does this occur formally?
 - Does this occur daily, weekly, monthly, or quarterly, using equivalent measures so that comparisons over time can be made?

- A-13. Do all teachers employ a variety of formal and informal formative assessment techniques and use that data to plan instruction? *EP Condition 1* *EP Condition 3*
- A-14. Is student progress closely monitored to ensure that students who are not yet at benchmark provided proactive support through differentiation and a multi-tiered system of support (MTSS), including a structure in place that ensures this monitoring occurs on a prescribed basis and is conducted by the classroom teacher? *EP Condition 1* *EP Condition 3*
- A-15. Are students not at benchmark monitored closely through formal progress monitoring measures with the appropriate frequency? *EP Condition 1* *EP Condition 3*
- A-16. Does monitoring occur daily, weekly, monthly, or quarterly, using equivalent measures so that comparisons over time can be made? *EP Condition 1* *EP Condition 3*
- A-17. Are children identified when not making adequate progress, and are they provided targeted instruction in specific need areas? *EP Condition 1* *EP Condition 3*
- A-18. Do data teams exist at three levels: 1) school level, 2) grade/subject level, and 3) classroom/individual student level? *EP Condition 2* *EP Condition 3*
- Are the purposes of each team clear to all staff?
 - Is the meeting frequency pre-scheduled at appropriate intervals for each of the three levels?
 - Is membership of each data team appropriate to the purpose(s) of the team?
 - Are key data team members identified and trained?
- A-19. Are Math data analyzed at the 1) school, 2) grade/subject, and 3) classroom/individual student levels? *EP Condition 2* *EP Condition 3*
- A-20. Do protocols exist for the analysis of data? Are the protocols specific to the level and purpose of the data team? *EP Condition 2* *EP Condition 3*
- A-21. Are groupings for instruction changed as result of data analysis? *EP Condition 2* *EP Condition 3*
- A-22. Is the data used to inform MTSS/tiered supports? *EP Condition 2* *EP Condition 3*

ORGANIZATION SYSTEM LEVEL MATH K-2

- O-1. Are K-2 new and veteran teachers provided ongoing professional learning on mathematical concepts and skills to strengthen their own understanding of mathematical concepts? *EP Condition 4*
- O-2. Are teachers provided on-going professional learning in PA Mathematical Standards and best practice as it relates to early math development? *EP Condition 4*
- O-3. Are teachers aware of resources and most relevant research on best practices in the teaching of mathematics? *EP Condition 4*
- O-4. Are teachers provided professional learning on mathematical pedagogy and the Standards of Mathematical Practice to help all students? *EP Condition 4*

- O-5. Are teachers provided professional learning on how to use math tools effectively?** *EP Condition 4*
- O-6. Does the overall school schedule include appropriate time for math instruction?** *EP Condition 1* *EP Condition 3*
- a. Is sufficient time allotted to math instruction daily?
 - b. Do all teachers adhere to the school schedule? Is there a check between allocated time on the school schedule and actual instructional time in the classroom?
 - c. Is this time protected from meeting time, assemblies, and other interruptions?
 - d. Is time allotted for students to productively struggle with problems, to teach students to make sense of problems and persevere in solving them?
- O-7. Is math embedded in the daily classroom routines and activities?** *EP Condition 1*
- O-8. Is math integrated across all subject areas?** *EP Condition 1*
- O-9. Has a multi-tiered system of support (MTSS) been established to provide intervention and enrichment supports (Tiers 2 and 3)?** *EP Condition 3*
- a. Are intervention group sizes appropriate to the level of support needed (i.e., MTSS, Tiers 2/3)?
 - b. Are the core program and intervention program materials/approaches aligned and coordinated for students receiving both core and tiered intervention support?
 - c. Is there a system ensuring students do not miss instructional time to receive tiered support in a particular skill?
 - d. Are the core program and intervention program approaches and materials aligned and coordinated for students receiving both core and tiered intervention support?
- O-10. Are staff (general education, special education, remedial/Title I, intervention specialist, paraeducator) utilized in a variety of ways to maximize small group instructional opportunities?** *EP Condition 1* *EP Condition 3*
- O-11. Is there a grade-level pacing guide/schedule in place with flexibility to address students' pacing needs?** *EP Condition 1*
- O-12. Does the school schedule allow for teachers to meet for data meetings, as well as collaboration and planning opportunities?** *EP Condition 1* *EP Condition 4*
- a. If so, what is the frequency? Who is responsible for planning and monitoring the effective use of this time? If not, how can this be built into the school schedule?
 - b. Are there opportunities for teacher collaboration on the vertical articulation of the K-5 written curriculum with the 6-8 written curriculum?

System-Level Questions

(LEA/District and School)

THINK ABOUT: How might our system structures and practices at the LEA/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. Note: The questions do not need to be discussed in the order in which they are numbered; they are numbered to reference specific items and for ease of use.

The questions are intended to help generate thinking specific to the district/school level ELA 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). School level administrators, ELA coordinators, teacher leaders, and teachers may find these reflection questions helpful in analyzing data at a system level for the school.

Essential Practice Key:

Each question indicates the related conditions for PA's Essential Practices for Schools:

EP Condition 1

Focus on Continuous Improvement of Instruction

EP Condition 2

Empower Leadership

EP Condition 3

Provide Student-Centered Supports

EP Condition 4

Foster Quality Professional Learning

CURRICULUM

SYSTEM LEVEL

MATH 3-5

C-1. Is the Grade 3-5 Mathematics written curriculum tightly aligned to the PA Core Standards?

EP Condition 1

- 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 sufficient practice embedded in the curriculum? Have lessons been developed to fill identified gaps?
- Were the PDE SAS Math Curriculum Frameworks used to develop the written curriculum?
- Were resources and major work documents from national organizations used to develop the written curriculum?

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? *EP Condition 1*

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 numbers to real numbers in concept and operations?

- a. Does this year's curriculum build on students' prior knowledge and experiences from the previous year?
- b. Does the written curriculum align with the three shifts in mathematics: focus, coherence, and rigor?
- c. Does the written curriculum detail key grade level vocabulary?
- d. Does the math content for this year lay the foundation for topics the students will explore in the next grade or upper-level grades?
- e. Do teachers engage in dialogue with teachers in grade levels above and below their own, to examine the strengths and weaknesses of the overall program and prioritize needs of students?
- f. Are there opportunities for teacher collaboration on the vertical articulation of the K-5 written curriculum with the Grade 6-8 math written curriculum?

C-3. Does the written curriculum provide the appropriate balance of conceptual understanding, procedural skills and fluency, and application? *EP Condition 1*

- a. Is the written curriculum aligned with the four key components of math fact fluency: flexibility, appropriate strategy use, efficiency, and accuracy?
- b. Is there a school-wide program in place to address fact fluency, aligned with the 3 phases of fact fluency: counting, deriving, and mastery?
- c. Does the written curriculum build on fact fluency from foundational fact sets to derive fact strategies?
- d. Does the written curriculum address the five strands of mathematical proficiency: conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition?
- e. 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? *EP Condition 1*

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? *EP Condition 1*

- a. Has the series been mapped to the PA Core Standards – Grades 3-5 to check for alignment?
- b. Is there a need for using other materials and resources along with the core math series?
- c. Is there an appropriate balance of specific skills and concepts?
- d. Is there an appropriate level of rigor in materials and resources to engage students at Webb's Depth of Knowledge (DOK) levels 2 and 3?
- e. Is the math series aligned with the five strands of mathematical proficiency: conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition?

C-6. Does the written curriculum in mathematics address the appropriate level of rigor as defined in Webb’s Depth of Knowledge (DOK)? *EP Condition 1* *EP Condition 2*

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

C-7. Are the Standards for Mathematical Practice included in the written curriculum? *EP Condition 1*

- a. Do unit maps and lesson plans address the Standards for Mathematical Practice?
- b. Are all the Standards for Mathematical Practice addressed and spiraled throughout units and the year?
- c. Does the written curriculum emphasize reasoning abstractly and quantitatively? (Standards for Mathematical Practice, #5: Use appropriate tools strategically.)
- d. 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.)
- e. Does the curriculum include activities that require reasoning? (Standards for Mathematical Practice, #2: Reason abstractly and quantitatively.)
- f. 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.)
- g. 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.)
- h. 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.)
- i. Does the curriculum provide opportunities for students to model numerical relationships in a variety of ways? (Standards for Mathematical Practice, #4: Model with mathematics.)
- j. 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? (Standards for Mathematical Practice, #6: Attend to precision.)

C-8. Does the written curriculum have appropriate grade-level math vocabulary naturally integrated throughout the curriculum? *EP Condition 1*

C-9. Does the written curriculum emphasize the connections among precise vocabulary, fluent processes, and symbolic representations? *EP Condition 1*

C-10. Are teachers aware of the resources on the PDE SAS Portal (pdesas.org) in mathematics? *EP Condition 1*

INSTRUCTION

SYSTEM LEVEL

MATH

3-5

- I-1. **Is the delivery of grade-level instruction equitable across all students/student groups, and are appropriate scaffolds in place to allow all students/student groups to access and benefit from grade-level math instruction?** *EP Condition 1*
- I-2. **Is there an observable alignment between the written, taught, and assessed curriculum?** *EP Condition 1*
- 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, and/or learning intentions clear to students?** *EP Condition 1*
- 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)?** *EP Condition 1* *EP Condition 2*
- 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 questioning (DOK)?
 - Are discussions facilitated through guided questions and representations?
- I-5. **Are teachers using — and trained/supported in how to use — the CRA (concrete, representational, abstract) approach?** *EP Condition 1* *EP Condition 4*
- I-6. **Is both academic and content specific vocabulary purposely addressed through evidence-based techniques and strategies?** *EP Condition 1*
- Standards for Mathematical Practice, #6: Attend to precision.
- Are teachers naturally integrating math vocabulary throughout units and lessons?
 - 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?
 - Are teachers connecting student-created vocabulary definitions to mathematical vocabulary definitions, to promote precision and understanding with precise use of mathematical vocabulary?
- I-7. **Is independent work purposeful, and directly related to building deep mathematical understanding of concepts consistently across all classrooms, including evidence that the independent work is differentiated based on students’ strengths and areas of need?** *EP Condition 1* *EP Condition 2*

- I-8. 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?** *EP Condition 1*
- Are all teachers using manipulatives within the CRA (concrete, representational, 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-9. Is instruction differentiated to allow for various avenues to process and practice skills?** *EP Condition 1 EP Condition 3*
- 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-10. Are students who receive tiered intervention support provided specific instruction targeted to skill deficits and closely monitored for progress?** *EP Condition 1 EP Condition 3*
- I-11. Are patterning and rich tasks that promote searching for patterns used as a tool to facilitate students' development of conceptual understanding and procedural flexibility?** *EP Condition 1*
- I-12. Do teachers routinely demonstrate modeling in their discussions with students and encourage students to model?** *EP Condition 1*
- I-13. Do all teachers require students to use precise terminology in the discussion of math topics as well as encourage accuracy in computations and manipulations?** *EP Condition 1*
- I-14. Does instruction at all levels include opportunities for inductive reasoning investigations that will lead to the creation and testing of hypotheses?** *EP Condition 1*
- I-15. Do teachers help students to make sense of problems and persevere in solving them?** *EP Condition 1*
- 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-16. Do instructional tasks require students to justify their answers and engage in discourse with their peers, including evidence that all teachers believe reasoning is as important as a correct answer?** *EP Condition 1*

ASSESSMENT

SYSTEM LEVEL

MATH 3-5

- A-1. Is there a district assessment map accessible to all teachers?** *EP Condition 1* *EP Condition 3*
- 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 according to the schedule?
 - Have the math series/program's assessments been integrated as one component of a comprehensive assessment system that includes a variety of assessment methods and evaluation sources?
 - Are math data analyzed at the 1) school, 2) grade/subject, and 3) classroom/individual student levels?
 - 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 inform instruction?
- A-2. Are formative and summative assessments established and used by all teachers?** *EP Condition 1* *EP Condition 3*
- 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), including assessment items reflective of the rigor of the standards being assessed?** *EP Condition 1* *EP Condition 2*
- A-4. Are teachers aware of students' math skills through a universal screening process in place at the school level?** *EP Condition 1* *EP Condition 3*
- 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?** *EP Condition 1* *EP Condition 3*
- A-6. Are diagnostic assessments in place to inform instruction at Tier 1 as well as Tiers 2/3 (MTSS)?** *EP Condition 1* *EP Condition 3*
- A-7. Are progress monitoring measures in place and conducted by classroom teachers, support teachers, intervention teachers?** *EP Condition 1* *EP Condition 3*
- 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)?
 - 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?

EP Condition 1 *EP Condition 3*

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

A-9. Are there data meetings at the 1) school level, 2) grade/subject level, and 3) classroom/individual student levels, in order to collaborate on data analysis and action planning?

EP Condition 2 *EP Condition 3*

- a. Do protocols exist for analysis of data and do they represent the type and purpose of each of the three levels of data meetings?
- b. Are key data team members identified and trained?
- c. How frequently is data analyzed and groupings/instruction changed as result of data analysis?

A-10. Is a grading policy established at the district and school level that uses grades/marks that correspond to students' academic achievement and proficiency levels, including soft skills evaluated separately from academic performance, to indicate a student's true performance on identified concepts and skills? *EP Condition 2*

ORGANIZATION

SYSTEM LEVEL

MATH

3-5

- O-1. Are teachers provided ongoing professional learning in PA Mathematical standards and best practice?** *EP Condition 4*
- Are teachers provided professional learning on mathematical concepts and skills to strengthen their understanding of math?
 - Are teachers provided professional learning on mathematical pedagogy to help all students?
 - Are new and veteran teachers provided professional learning 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 learning on how to use math tools effectively?
 - Are new teachers trained to deliver the math curriculum?
 - Is professional learning provided to experienced teachers who are new to the content area or grade level?
 - Are teachers aware of resources and the most relevant research on best practices in the teaching of math?
- O-2. Does the overall school schedule include the appropriate time for math instruction?** *EP Condition 1* *EP Condition 3*
- Do all teachers adhere to the school schedule? Is there a check between allocated time on the school 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, to teach students to make sense of problems and persevere in solving them?
- O-3. Has a multi-tiered system of supports (MTSS/) been established to provide additional supports (Tiers 2 and 3)?** *EP Condition 3*
- O-4. Is there a system ensuring students do not miss instructional time in order to receive tiered support in a particular skill?** *EP Condition 3*
- 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, grade/subject level, and student-level math data, with immediate and easy access for all teachers?** *EP Condition 1*
- O-6. Does the school schedule allow for professional learning community (PLC) time and/or data meeting time for collaboration and planning, with a frequency appropriate to meet the needs of students?** *EP Condition 1* *EP Condition 4*
- 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?** *EP Condition 1* *EP Condition 4*

System-Level Questions (District/School)

THINK ABOUT: 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; they are numbered to reference specific items and for ease of use.

The questions are intended to help generate thinking specific to the district/school level ELA 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). School level administrators, ELA coordinators, teacher leaders and teachers may find these reflection questions helpful in analyzing data at a system level for the school.

Essential Practice Key:

Each question indicates the related conditions for PA’s Essential Practices for Schools:

EP Condition 1

Focus on Continuous Improvement of Instruction

EP Condition 2

Empower Leadership

EP Condition 3

Provide Student-Centered Supports

EP Condition 4

Foster Quality Professional Learning

CURRICULUM **SYSTEM LEVEL** **MATH** **6-8**

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

EP Condition 1

- a. How frequently is the written curriculum reviewed/revised through analysis of student data?
- b. 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
- c. 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 sufficient practice embedded in the curriculum? Have lessons been developed to fill identified gaps?
- d. Were the PDE SAS Math Curriculum Frameworks used to develop the written curriculum?
- e. Were resources and major work documents from national organizations used to develop the written curriculum?
- f. Have any textbooks/texts used by the LEA/district for the course been examined for degree of alignment to the PA Core Standards/Keystone Exam eligible content?
- g. 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. Are students who are enrolled in Keystone Algebra I in Grade 8 receiving instruction aligned to Grade 8 PA Core Standards? *EP Condition 1*

- a. Are missing skills/concepts from Grade 8 Math identified?
- b. Are lessons to be taught identified and developed, if needed?
- c. Is instruction mapped out to occur prior to PSSA spring testing?

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? *EP Condition 1*

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 numbers to real numbers in concept and operations?

- a. Are there opportunities for both vertical and horizontal articulation of the curriculum, K-12?
- b. Does this year's curriculum build on students' prior knowledge and experiences from the previous year?
- c. Does the math content for this year lay the foundation for topics the students will explore in the next grade or upper-level grades?
- d. Does the written curriculum detail key grade-level vocabulary?
- e. Do teachers engage in dialogue with teachers in grade levels above and below their own, to examine the strengths and weaknesses of the overall program and prioritize needs of students?
- f. Does the written curriculum align with the three shifts in mathematics: focus, coherence, and rigor?

C-4. Does the written curriculum provide the appropriate balance and emphasis of conceptual understanding, procedural skills and fluency, and application? *EP Condition 1*

- a. Is the written curriculum aligned with the four key components of math fact fluency: flexibility, appropriate strategy use, efficiency, and accuracy?
- b. Is there a school-wide program in place to address fact fluency, aligned with the three phases of fact fluency: counting, deriving, and mastery?
- c. Does the written curriculum build on fact fluency from foundational fact sets to derive fact strategies?
- d. Does the written curriculum address the five strands of mathematical proficiency: conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive dispositions?
- e. Does the written curriculum address the reciprocal relationship that exists between teaching mathematical concepts and procedures?

C-5. Does the written curriculum provide students with opportunities to demonstrate mathematical concepts with models? *EP Condition 1*

C-6. Does the written curriculum in mathematics address the appropriate level of rigor as defined in Webb's Depth of Knowledge (DOK)? *EP Condition 1* *EP Condition 2*

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

- C-7. Does the written curriculum require students to respond in writing to tasks and problems to explain their thinking?** *EP Condition 1*
- C-8. Is the math series analyzed to determine the alignment to the PA Core Standards?** *EP Condition 1*
- a. Has an alignment to the PA Core Standards – Grades 6-8 been completed to check for need for other materials and resources along with the core math series, and appropriate balance on specific skills and concepts, and use of appropriate materials and resources to engage students at DOK levels 2 and 3?
 - b. Do the materials and resources engage students at DOK levels 2 and 3?
 - c. Has the textbook/core math series been investigated to determine the inclusion of examples and activities that address the Standards of Mathematical Practice?
 - d. Were resources and major work documents from national organizations used to develop the written curriculum?
 - e. Is the math series aligned with the five strands of mathematical proficiency: conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition?
- C-9. Are the Standards for Mathematical Practice included in the written curriculum?** *EP Condition 1*
- a. Do unit maps and lesson plans address the Standards for Mathematical Practice?
 - b. Are all the Standards for Mathematical Practice addressed throughout the year?
 - c. Does the written curriculum provide opportunities to use algebra to model non-traditional problems?
 - d. Does the written curriculum include problems for investigation and discussions of solution paths?
 - e. Does the written curriculum focus on structures and patterns, extending the process of patterning to more complicated concepts and relationships and introducing algebraic patterns?
 - f. Does the written curriculum emphasize reasoning abstractly and quantitatively? Does the curriculum include activities that require estimation as a quantitative reasoning technique?
 - g. Does the written curriculum include specific activities that require students to construct viable arguments and critique the arguments of others?
 - h. Is the curriculum organized to incorporate the generalization and application of mathematical processes through rich tasks appropriate to each grade band and curricular area?
 - i. Does the written curriculum have appropriate grade-level math vocabulary naturally integrated throughout the curriculum? 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?
- C-10. Are teachers aware of the resources on the PDE SAS Portal (pdesas.org) in mathematics?** *EP Condition 1*

INSTRUCTION

SYSTEM LEVEL

MATH

6-8

- I-1. Do all students receive instruction on grade-level PA Core Standards?** *EP Condition 1*
- Is the delivery of grade-level instruction equitable across all students/student groups?
 - Are the appropriate scaffolds in place to allow students in need of additional support to access and benefit from the core math curriculum?
- I-2. Is there an observable alignment between the written, taught, and assessed curriculum?** *EP Condition 1*
- 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/or learning intentions clear to students?** *EP Condition 1*
- 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, with knowledge and planning for vertical progression of skills?** *EP Condition 1*
- I-5. Is sufficient time allocated in the school schedule for math instruction at all grade levels?** *EP Condition 1*
- Are teachers adhering to the allocated time block for math courses?
 - 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?** *EP Condition 1* *EP Condition 3*
- 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)?** *EP Condition 1* *EP Condition 2*
- 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, and high-level questioning mixed with appropriate lower-level questioning (DOK)?
 - Are discussions facilitated through guided questions and representations?

- I-8. Are both academic and content-specific vocabulary purposely addressed through evidence-based techniques and strategies?** *EP Condition 1*
- Have teachers naturally integrated math vocabulary throughout units and lessons?
 - 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? Are teachers connecting student-created vocabulary definitions to mathematical vocabulary definitions to promote precision and understanding with precise use of mathematical vocabulary?
- I-9. Is independent work purposeful, and directly related to building deep mathematical understanding of concepts consistently across all classrooms, as well as differentiated based on students' strengths and areas of need?** *EP Condition 1* *EP Condition 2*
- I-10. Are teachers using (and trained/supported in how to use) the CRA (concrete, representational, abstract) approach?** *EP Condition 1* *EP Condition 4*
- 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?** *EP Condition 1*
- Are all teachers using manipulatives within the CRA (concrete, representational, 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. Are students who receive tiered intervention supports closely monitored and provided specific instruction targeted to skill deficits?** *EP Condition 1* *EP Condition 3*
- I-13. Is modeling taught as a critical mathematical process that utilizes algebra and are students provided opportunities to model algebra?** *EP Condition 1*
- I-14. Do instructional tasks require students to justify their answers and engage in discourse with their peers, including evidence that all teachers believe reasoning is as important as a correct answer?** *EP Condition 1*
- I-15. Does the instruction at all levels include opportunities for inductive reasoning investigations that will lead to the creation and testing of hypotheses?** *EP Condition 1*
- I-16. Do teachers help students to make sense of problems and persevere in solving them?** *EP Condition 1*
- 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?

ASSESSMENT

SYSTEM LEVEL

MATH 6-8

A-1. Is there a district/school assessment map accessible to all teachers *EP Condition 1* *EP Condition 3*

- a. Are valid and reliable assessment measures in place to screen, diagnose, monitor, and evaluate mathematical outcomes for all students?
- b. Has the range of assessments been evaluated for their purposes to ensure that there is no unnecessary redundancy/overlap and that there are no important skill areas missing?
- c. Do all teachers have access to this map and follow it, administering all required assessments in a timely manner according to the schedule?
- d. Have the math series/program's assessments been integrated as one component of a comprehensive assessment system that includes a variety of assessment methods and evaluation sources?
- e. 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?)
- f. Is the data from each given assessment used to modify and guide instruction?
- g. Are common assessments for use by all teachers documented and communicated to all teachers?

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?

EP Condition 1 *EP Condition 3*

Examples: 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? *EP Condition 1* *EP Condition 3*

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

A-4. Are students assessed at the appropriate level of Webb's Depth of Knowledge (DOK) and reflective of the rigor of the standards being assessed? *EP Condition 1* *EP Condition 2*

A-5. Are teachers aware of students' math skills through universal screening processes in place at school level? *EP Condition 1* *EP Condition 3*

- a. Does universal screening occur early in the school year to effectively inform instruction?
- b. Is the universal screening considered along with PVAAS student projection scores on individual students?
- c. 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? *EP Condition 1* *EP Condition 3*

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

- A-8. Are progress monitoring measures in place and conducted by classroom teachers, support teachers, and intervention teachers for students receiving Tier 2/3 support (e.g., aimsweb, CBM, STAR)?** *EP Condition 1* *EP Condition 3*
- a. Is student progress closely monitored to ensure that students who are not at grade level proficiency are provided proactive support through differentiation/multi-tiered systems of support (MTSS)?
 - b. 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?** *EP Condition 1* *EP Condition 3*
- a. Do assessments allow for varied solutions and representations?
 - b. Do the assessments evaluate the ability of the students to explore patterns and make generalizations based on those patterns?
 - c. Do assessments allow for students to use a variety of models while solving and justifying problems?
 - d. Do assessments require students to use precision in terminology/vocabulary, in computation, and in symbol manipulation?
 - e. Do assessment tasks require students to construct arguments?
 - f. Does the assessment system evaluate students' ability to generalize mathematical processes and apply them to new tasks?
 - g. Are students given extended tasks on assessments that mirror instructional activities, to assess students' ability to solve problems with perseverance?
 - h. Do assessments allow students to use a variety of mathematical tools?
 - i. Are all teachers requiring students to show their work and/or justify their answers?
- A-10. Are there data meetings established for teachers to collaborate on analysis of data and action planning at the 1) school level, 2) grade/subject level, and 3) classroom/individual student level?** *EP Condition 2* *EP Condition 3*
- a. Do protocols exist for analysis of data, and are they designed to align with the type and purpose of the data team?
 - b. Are key data team members identified and trained?
 - c. How frequently is data analyzed and groupings/instruction changed as result of data analysis?
- A-11. Is a grading policy established at the district and school level that uses grades/marks that correspond to students' academic achievement and proficiency levels, including soft skills evaluated separately from academic performance, to indicate a student's true performance on identified concepts and skills?** *EP Condition 2*

O-1. Are teachers provided ongoing professional learning in math standards and best practices?*EP Condition 4*

- a. Are teachers provided professional learning on mathematical concepts and skills to strengthen their understanding of math?
- b. Are teachers provided professional learning on mathematical pedagogy to help all students?
- c. Are new and veteran teachers provided professional learning 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?
- d. Are teachers provided professional learning on how to use math tools effectively?
- e. Are new teachers trained to deliver the math curriculum?
- f. Is professional learning provided to experienced teachers who are new to the content area or grade level?
- g. Are teachers aware of resources and most relevant research on best practices in the teaching of math?

O-2. Does the school schedule of math courses provide for flexibility and differentiation prior to Algebra I enrollment? *EP Condition 1* *EP Condition 3***O-3. Does the school schedule include the appropriate amount of time for math instruction?***EP Condition 1* *EP Condition 3*

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

O-4. Does the school schedule allow for PLC (professional learning community) time and/or data meeting time for collaboration and planning at the appropriate frequency level?*EP Condition 1* *EP Condition 4***O-5. Has a multi-tiered system of supports (MTSS/RtII) been established to provide additional supports (Tiers 2 and 3)?** *EP Condition 3*

- a. Is there a system ensuring students do not miss instructional time to receive tiered support in a particular skill?
- b. Are the core program and intervention program materials/approaches aligned and coordinated for students receiving both core and tiered intervention support?
- c. 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, grade/subject level, and individual student-level math data, with immediate and easy access for all teachers? *EP Condition 1***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, including knowledge and planning for vertical progression of skills?** *EP Condition 1* *EP Condition 4*

MATH KEYSTONE ALGEBRA I

System-Level Questions (District and School)

THINK ABOUT: 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, the numbers are used to reference specific items and for ease of use.

The questions are intended to help generate thinking specific to the district and school level ELA 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). School level administrators, ELA coordinators, teacher leaders, and teachers may find these reflection questions helpful in analyzing data at a system level for the school.

Essential Practice Key:

Each question indicates the related conditions for PA's Essential Practices for Schools:

EP Condition 1

Focus on Continuous Improvement of Instruction

EP Condition 2

Empower Leadership

EP Condition 3

Provide Student-Centered Supports

EP Condition 4

Foster Quality Professional Learning

CURRICULUM SYSTEM LEVEL MATH KEYSTONE ALGEBRA I

C-1. Is the written curriculum for the Algebra I course aligned to the Keystone Algebra I assessment anchors and eligible content? *EP Condition 1*

- a. How frequently is the written curriculum reviewed/revised through analysis of student data?
- b. 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
- c. 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 sufficient practice embedded in the curriculum? Have lessons been developed to fill identified gaps?
- d. Were the PDE SAS Math Curriculum Frameworks used to develop the written curriculum?
- e. Were resources and major work documents from national organizations used to develop the written curriculum?
- f. Have any textbooks/texts used by the LEA/district for the course been examined for degree of alignment to the PA Core Standards/Keystone Exam eligible content?

- C-2.** Does the written curriculum detail key content vocabulary? *EP Condition 1*
- C-3.** Does the written curriculum emphasize connections among precise vocabulary, fluent processes, and symbolic representations? *EP Condition 1*
- C-4.** Are there appropriate course sequencing options for students prior to placement in Keystone Algebra I course, and has an appropriate vertical course sequence been established for all students prior to placement in the Keystone Algebra course? *EP Condition 1* *EP Condition 3*
- C-5.** Are appropriate materials and resources used in the instruction of Algebra I? *EP Condition 1*
- Is the textbook considered to be a resource for instruction, rather than it serving as the curriculum?
 - Has the textbook for the course been examined for degree of alignment to the Keystone exam eligible content?
 - Are multiple resources used to address written curriculum/PA Core Standards?
- C-6.** Does the Algebra curriculum emphasize and extend the concept of patterns? *EP Condition 1*
- 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? *EP Condition 1*
- C-8.** Does the Algebra I curriculum provide opportunities for students to engage in rich performance tasks to construct viable arguments? *EP Condition 1* *EP Condition 2*
- C-9.** Does the written curriculum have an appropriate emphasis on both abstract and quantitative reasoning? *EP Condition 1*
- 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? *EP Condition 1*
- C-11.** Are teachers aware of the resources on the PDE SAS Portal (pdesas.org) for Keystone Algebra I? *EP Condition 1*

INSTRUCTION SYSTEM LEVEL MATH KEYSTONE ALGEBRA I

- I-1.** Are all teachers adhering to the written curriculum for the Algebra I course (i.e., taught curriculum matches the written curriculum)? *EP Condition 1*
- I-2.** Are unit and lesson objectives, essential questions, and/or learning intentions clear to students? *EP Condition 1*
- 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-3. Are students provided with a variety of tasks that address all levels of Webb’s Depth of Knowledge (DOK)?** *EP Condition 1* *EP Condition 2*
- 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, and high-level questioning mixed with appropriate lower-level questioning (DOK)?
 - Are discussions facilitated through guided questions and representations?
- I-4. Are research-supported materials and resources used to address Algebra I content, including the use of multiple and varied resources to address concepts and skills?** *EP Condition 1*
- I-5. Are visual representations used to introduce and explain algebra concepts? Is the CRA (concrete, representational, abstract) approach used by all teachers?** *EP Condition 1*
- I-6. Are students required to respond in writing to explain their reasoning or justify answers/ solutions, and are they taught to approach Algebra problem solving with understanding, rather than rote computation or procedures?** *EP Condition 1*
- I-7. Are teachers using guided math groupings to provide support and instruction targeted to students’ needs?** *EP Condition 1*
- I-8. Are teachers adapting instruction for those who need differentiated instruction?**
EP Condition 1 *EP Condition 3*
- Are teachers moving through the CRA (concrete, representational, abstract) process according to each student’s needs?
 - Are teachers using manipulatives, such as Algebra tiles?
- I-9. Are teachers providing enrichment for those students whose rate of learning exceeds the average pace, including enrichment resources focused on higher-level thinking (not more work)?** *EP Condition 1* *EP Condition 3*
- I-10. Are all teachers delivering the curriculum at a pace that is responsive to the needs of their students, including adhering to the full range/scope of Algebra I concept and skills?** *EP Condition 1*
- I-11. Are teachers teaching the Standards of Mathematical Practice through context?** *EP Condition 1*
- Are all teachers providing instruction that uses patterning and multiple representations to facilitate the students’ development of conceptual understanding and procedural proficiency through performance of 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-12. Is available technology (Desmos, GeoGebra, and/or other technology tools and applications) used to differentiate instruction and provide additional practice for targeted skill areas?**
EP Condition 1

ASSESSMENT

SYSTEM LEVEL

MATH

KEYSTONE ALGEBRA I

- A-1. Are formative and summative assessments in place to provide consistency for all students across courses/sections/teachers?** *EP Condition 1* *EP Condition 3*
- Are the assessments valid?
 - Do all teachers have strong assessment literacy skills?
 - Are common summative assessments in place, such as unit assessments, mid-terms and finals, and other common summative assessments?
 - Are assessments analyzed for cognitive thinking levels (Webb’s Depth of Knowledge)?
- A-2. Are formative and summative assessments truly assessing the intended learning targets?** *EP Condition 1* *EP Condition 3*
- Are formative assessments used daily, with immediate feedback to students?
 - Are pre- and post-assessments for each unit in place and used by all teachers to differentiate and/or to compact the curriculum?
 - Is formative assessment used throughout the instructional period to check for understanding and to adjust instruction “on the spot”?
 - Are formative assessments at the end of each class used to inform instruction for the next day (e.g., warm-up for next day focuses on end-of-period formative assessment)?
- A-3. Is there a match between the written, taught, and tested curriculum, as well as a process in place to monitor for this?** *EP Condition 1*
- A-4. Do Keystone Algebra I teachers conduct item analysis on common assessments to revise curriculum and instruction as indicated?** *EP Condition 1* *EP Condition 3*
- A-5. Is there a universal screening process in place to determine which students may need additional support prior to and/or during enrollment in the Keystone Algebra I course, including the use of PVAAS student projection reports, available from Grade 5 forward?** *EP Condition 1* *EP Condition 3*
- A-6. Is available data, including PVAAS student projections, used to inform decisions about course scheduling for students (e.g., when students should be scheduled for Keystone Algebra I)?** *EP Condition 1* *EP Condition 3*
- Are decisions made at the elementary level that would impact middle school placement?
 - Is the selection criteria/process clear? Is it communicated to all teachers and families?
- A-7. Are PVAAS growth reports and PVAAS student projection reports used to reflect on past practices and apply information to the future?** *EP Condition 1* *EP Condition 3*
- 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? *EP Condition 1* *EP Condition 3*

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

A-9. Is there an appropriate placement/screening process in place for students moving into the LEA/district and school, to determine Algebra/course placement? *EP Condition 1* *EP Condition 3*

ORGANIZATION SYSTEM LEVEL MATH KEYSTONE ALGEBRA I

O-1. Are supplemental supports available as needed to students during Keystone Algebra I course enrollment? *EP Condition 3*

O-2. Have teachers participated in professional development on the topic of assessment literacy? *EP Condition 4*

O-3. Are there opportunities for Algebra I teachers to collaboratively plan, prepare, and analyze common assessment data? *EP Condition 4*

O-4. Are students provided sufficient time to solve rich tasks that require them to struggle productively and persevere? *EP Condition 1*

O-5. Are remediation courses/supports available to students who have not achieved proficiency on the Keystone exam and targeted to individual students? *EP Condition 1* *EP Condition 3*

- a. Are courses/supports available to students who have not achieved proficiency on the Keystone exam?
- b. Does the school schedule allow for changes in individual student schedules early in the school year, based on data?

Teacher-Level Questions (Classroom)

THINK ABOUT: How might my practices and knowledge level related to Curriculum, Instruction, Assessment, and Organization contribute to the growth and achievement 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, reflective of data findings, and answered with clear evidence.

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

This list is not exhaustive, and it is not a checklist. The questions do not need to be discussed in the order in which they are numbered; they are numbered to reference specific items and for ease of use. The questions are intended to help generate thinking as a teacher considers classroom/student level data on an annual basis.

Teachers are encouraged to use all the data available to them, for example, PVAAS teacher-specific reports, attendance data, summative and benchmark data. These questions, when considered through the lens of data available through PVAAS and other assessments, are intended to guide the self-reflection process to assist in identifying root causes and in developing action plans for the current group of students.

Teachers are encouraged to access PDE’s Self-Reflection Guides:

- [Teacher Self-Reflection Guide \(Data Available Teachers\) \(PDF\)](#)
- [Teacher Self-Reflection Guide \(Non-Data Available Teachers\) \(PDF\)](#)

Framework Key:

Each question in the teacher section(s) are coded to show the related domain(s) from [The Observation and Practice Framework, Act 13:](#)

PP

Planning and Preparation

CE

Classroom Environment

I

Instruction

PR

Professional Responsibilities

CURRICULUM

TEACHER LEVEL

MATH K-2

- C-1. Am I knowledgeable about the PA Core Standards at my grade level?** PP PR
- Am I aware of the standards in the grade(s) above and below the grade in which I am teaching?
 - Am I clear on the expected outcomes as documented in the written curriculum for each grade, K-2?
- C-2. Am I highly knowledgeable and do I stay up-to-date on continuing research from national organizations?** PP PR
- Am I able to point to components of the written curriculum that are directly aligned to best practices in mathematics instruction?
 - Do I stay up-to-date by reading the available research on evidenced-based practice?
- C-3. Am I able to contribute to and collaborate on an informal or formal audit of the written curriculum, identifying where enhancements or changes are needed?** PP PR
- Do I understand the importance of the emphasis at K-2 on numbers and operations and am I able to analyze the written curriculum for this emphasis?
 - Do I have a deep understanding of the progression of numbers and operations skills and can I identify those areas in the written curriculum?
 - Can I identify and analyze places in the written curriculum where algebraic concepts are introduced, reinforced, and mastered?
 - Am I able to identify and analyze other foundational areas in the curriculum, including foundational geometry skills, measurement, data and probability skills, etc.?
 - Can I identify specific areas where the written curriculum needs to be enhanced?
- C-4. Do I engage with colleagues in discussion and analysis of the vertical articulation of math concepts and skills? Do I understand the three shifts in mathematics — focus, coherence and rigor — and can I identify those shifts vertically?** PP PR
- C-5. Do I recognize the places in the written curriculum where problem solving is to be emphasized?** PP PR
- C-6. Am I able to interpret and use the written curriculum in my instruction for procedural fluency?** PP PR
- C-7. Am I applying the appropriate mathematical tools to my lessons, as documented in the written curriculum?** PP I
- C-8. Am I confident in my ability to analyze the curriculum/core math program/series for alignment to the PA Core Standards and supplement where necessary?** PP PR
- C-9. Am I knowledgeable about the Standards for Mathematical Practice? Do I fully understand each standard in order to apply it to my instruction at the appropriate times?** PP PR
- C-10. Am I aware of the curriculum resources on the PDE SAS Portal (pdesas.org) as well as resources and the literature from national organizations?** PP PR

INSTRUCTION

TEACHER LEVEL

MATH

K-2

- I-1. Am I providing all students with instruction that is aligned to the PA Core Standards at their grade level? /
- I-2. Am I ensuring that my daily instruction is aligned to my grade-level written curriculum? /
- I-3. Am I ensuring that I am aligning the written, the taught, and the assessed curriculum at my grade level? /
- I-4. Am I providing instruction that scaffolds and differentiates for students who are not at grade level proficiency? /
- I-5. Are my unit and lesson objectives, essential questions, and/or learning targets clear to students? Can my students tell me, in their own words, what they are learning in a given lesson? PP /
- I-6. Am I able to integrate the written curriculum with the curriculum/core math program/series, adjusting and supplementing as informed by student achievement and growth? PP /
- I-7. Do I convey and reinforce a positive mindset regarding the learning of mathematics? Do I clearly convey a positive attitude towards the teaching of mathematics? CE /
- I-8. Do I communicate with students about how math is used, making it clear to students the relevance of math to everyday living? CE /
- I-9. Do I model, encourage, and reinforce students' abilities to explain and defend their answers? /
- I-10. Do I monitor my allocated time for direct math instruction, ensuring that the time is used effectively? Am I following the allocated time at my grade level? /
- I-11. Do I provide whole group, small group, and individual instruction? /
- I-12. Do I use flexible grouping to provide targeted instruction according to identified student needs? Do I adjust the grouping based on student learning data? /
- I-13. Do I monitor my pacing of instruction with the end in mind, using a pacing guide and adjusting as necessary? /
- I-14. Do I implement the curriculum/core math program with fidelity, with an awareness of the needs for supplements, revisions, and additions, as identified through analysis of the core math program as well as ongoing student learning data? /
- I-15. Am I using timed activities appropriately? /
 - a. Do I use timed activities only when students have been working on a concept over many lessons, rather than using them to introduce and teach a math concept and operation?
 - b. Do I provide feedback to students in real time, specific to the timed activity?
- I-16. Am I skilled in the use of tools and manipulatives? /
 - a. Am I knowledgeable about how to teach students how to effectively use tools and manipulatives?
 - b. Do I use tools/manipulatives within the CRA (concrete, representational, abstract) model?

- I-17. Do I provide instruction with the appropriate emphasis on word problems and problem solving to build the capacity of students in applying mathematical ideas? /
- I-18. Do I know the effective instructional strategies to teach math vocabulary? /
- a. Do I integrate math vocabulary naturally throughout units and lessons?
 - b. Am I using evidence-based strategies to introduce vocabulary terms?
 - c. Am I helping students to connect their vocabulary definitions with mathematical definitions to promote precision and understanding of math concepts and operations?
- I-19. Am I purposeful in assigning independent work? /
- a. Do I differentiate independent work based on students' needs?
 - b. Do I differentiate homework, providing opportunities for massed and distributed practice?
- I-20. Do I explicitly teach patterning and promote students searching for patterns? /
- I-21. Do I use modeling as an instructional tool and promote students modeling concepts and skills? /
- I-22. Do I pose open-ended questions to students to promote application of math concepts and encourage math conversations? PP /
- I-23. Do I differentiate instruction within the classroom to process and practice skills? /
- a. Do I use flexible grouping within my classroom, informed by student data?
 - b. Do I provide extension tasks for students who are demonstrating mastery?
 - c. Do I differentiate independent work, including homework?
- I-24. Am I working closely with teachers providing intervention support to my students? / PR
- a. Am I engaged in formal and informal progress monitoring of students receiving Tiers 2/3 support?
 - b. Am I working collaboratively with the intervention teacher(s) to align learning targets, intervention materials, and other resources for a seamless system of support to students?

ASSESSMENT

TEACHER LEVEL

MATH

K-2

- A-1. Am I following the mathematics assessment plan for my school/LEA?** *PP* *I*
- a. Do I administer the required assessments according to prescribed timelines and with the appropriate frequency?
 - b. Do I seek assistance in interpreting assessment results when needed?
- A-2. Do I know and can I explain the differences between the four types of student learning assessments: benchmark, diagnostic, summative, and formative?** *I* *PR*
- a. Do I understand the purpose of benchmark assessments and how to apply the results to my instruction?
 - b. Do I understand the purpose of diagnostic assessments and how to use them as a tool to provide scaffolded and differentiated instruction?
 - c. Do I understand the purpose of summative assessment and can I identify the summative assessments I use in my classroom?
 - d. Do I understand the purpose and need for frequent formative assessment, both informal and formal, and use formative assessments daily and within each lesson?
- A-3. Do I triangulate multiple sources of data to inform my instruction?** *PP* *I*
- A-4. Am I clear on which of the assessments in the curriculum/core math program/series are to used?** *I*
- a. Do I use those assessments to inform my instruction?
 - b. Do I understand whether those assessments are formative, summative, benchmark, or diagnostic?
 - c. Do I use those assessments in combination with other assessments that are also required? (e.g., Acadience, aimsweb, STAR, etc.)
- A-5. Do I know how to interpret and use a universal screening tool to identify students not at benchmark at BOY (beginning of year), MOY (middle of year), and EOY (end of year)?** *I*
- A-6. Do I use the prescribed benchmark assessments as a means of analyzing my instruction and students' progress throughout the year (BOY, MOY, EOY)?** *I*
- A-7. Do I conduct further diagnostic assessments, both formal and informal, for each student who demonstrates through screening and/or benchmark assessments a need for additional support?** *PP* *I*
- A-8. Do I use formal progress monitoring tools on a frequent basis to measure student progress (e.g., STAR, aimsweb, etc.)?** *I*
- A-9. Do I use formative assessments to inform my instruction, as well as modify and adjust based on formative assessment both during and after each lesson?** *I*

A-10. Do I know the Standards of Mathematical Practice and ensure that I am assessing those standards through multiple assessment types? *I PR*

- a. Do my teacher-made and other assessments allow for varied solutions and representations?
- b. Do my assessments evaluate the ability of the students to explore patterns and make generalizations based on those patterns?
- c. Do my assessments allow for students to use a variety of models while solving and justifying problems?
- d. Do my assessments require students to use precision in terminology/vocabulary, in computation, and in symbol manipulation?
- e. Do my assessment tasks require students to construct arguments?
- f. Do my assessments evaluate students' ability to generalize mathematical processes and apply them to new tasks?
- g. Do my 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?
- h. Do my assessments allow for students to use a variety of mathematical tools?
- i. Are my students given extended tasks on assessments that mirror instructional activities, to assess my students' ability to solve problems with perseverance?
- j. Am I requiring students to show their work and/or justify their answers?

A-11. Do I collect and apply knowledge of the four types of data (Bernhardt) and use that data in my classroom? *I PR*

- a. Perceptual data used to elicit students' habits of mind related to math learning?
- b. Process data to assess my instruction and assessment practices?
- c. Demographic data to analyze my data with respect to specific cohorts of students?
- d. Student learning data (referenced in A-6, A-7, A-8, A-9)?

ORGANIZATION

TEACHER LEVEL

MATH

K-2

- O-1. Do I participate in and seek out professional learning specifically in the teaching of mathematics, including but not limited to:** *PR*
- a. Pedagogy as it relates to K-2 students and mathematics?
 - b. Evidence-based practices relative to mathematics, including but not limited to foundational skills, use of tools and manipulatives, etc.?
 - c. Reading and discussing publications from nationally recognized organizations?
 - d. The Standards of Mathematical Practice?
- O-2. Do I use the scheduled time allocated for math instruction in the most effective manner?** *CE I*
- a. Are transitions efficient and smooth?
 - b. Are tools and manipulatives readily accessible to students?
 - c. Is my pace efficient, yet responsive to student needs (as identified through formative assessment before, during, and after a lesson)?
 - d. Are independent learning tasks/centers, etc. meaningful, accessible, organized, and specific to the purpose intended?
 - e. Am I prepared for small-group instruction and rotation of small groups?
- O-3. Do I embed math throughout the day, across structured academic time as well as non-structured time (e.g., lining up to leave the room, recess, etc.)?** *CE I*
- O-4. Do I effectively collaborate with my grade-level colleagues as well as vertical colleagues?** *PR*
- O-5. Do I maintain accurate records and data on my students, using either the schools' data system and/or supplementing with my own system as needed?** *PP PR*
- O-6. Do I engage in self-reflection regarding my own practice, with a continual desire for my own professional growth?** *PR*

Teacher-Level Questions (Classroom)

THINK ABOUT: 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, reflective of data findings, and answered with clear evidence.

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PP

Planning and Preparation

CE

Classroom Environment

I

Instruction

PR

Professional Responsibilities

CURRICULUM

TEACHER LEVEL

MATH

3-5

- C-1. Am I knowledgeable about the PA Core Standards in Mathematics at my grade level (assessment anchors, eligible content, etc.)?** *PP*
- a. 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?
 - b. Am I familiar with resources available to me on the PDE SAS Portal (pdesas.org)?
 - c. Do I have strong knowledge of the PA Core Standards, assessment anchors, and eligible content, and do I plan accordingly?
 - d. Do I understand the importance of the Standards for Mathematical Practice and do my lesson plans embed those standards along with the content focus?
- 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, as well as identify student misconceptions related to concepts?** *PP I PR*
- C-3. Am I using the district written curriculum and/or 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*
- a. Am I aware of and using key resources?
 - b. Were resources and major work documents from national organizations used to develop the written curriculum?

INSTRUCTION

TEACHER LEVEL

MATH

3-5

- I-1. Am I providing all students with instruction on grade-level PA Core Standards, as well as providing scaffolds for students in need of additional support in order to access the core math curriculum? *PP*
- I-2. Am I embedding instruction on the Standards for Mathematical Practice? *I*
- a. If asked, would my students be able to identify the mathematical practices targeted during specific lessons?
 - b. Am I routinely demonstrating modeling in my instruction?
 - c. Do I teach students to identify and use patterns to solve problems?
 - d. Have I provided tasks that require students to apply generalizations from many tasks to investigate, create, and test hypotheses?
 - e. Am I helping students to make sense of problems and persevere in solving them?
 - f. Am I circulating to ensure that students are getting directive and supportive feedback through questioning to persevere?
 - g. Am I providing tasks at the appropriate level of challenge?
 - h. Do I provide students access to a variety of tools and model how to use them appropriately?
 - i. Am I guiding discussions through questions and representations in order to teach students to reason abstractly and quantitatively?
 - j. 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*
- a. Are lesson objectives/essential questions (EQ) posted and communicated?
 - b. Do lesson plans clearly delineate the lesson objectives, essential questions, and/or learning intentions?
 - c. Am I including both content standards and Standards for Mathematical Practice in my objectives? Is this clear to students?
 - d. 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, and high-level questioning mixed with appropriate lower-level questioning? *I*
- I-7. Am I providing timely feedback to all students and using questioning to provide feedback to guide students in addressing misconceptions, improving their work, and/or guiding their thinking? *CE I*

- I-8. Am I teaching math vocabulary in an explicit manner, using evidence-based strategies? /**
- a. Am I knowledgeable about the latest research on high-leverage vocabulary instruction strategies?
 - b. 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.)?
 - c. Am I emphasizing precision in both vocabulary/terminology usage as well as accuracy in computations and manipulations?
 - d. Am I naturally integrating grade-level math vocabulary into lessons/units?
 - e. Am I connecting student-created vocabulary definitions to mathematical vocabulary definitions to promote precision and understanding with precise use of mathematical vocabulary?
- I-9. Am I implementing cognitively challenging tasks in a way that promotes student thinking? /**
- a. 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?
 - b. Am I presenting topics of interest to the students and facilitating the students crafting questions that they believe should be explored for this topic?
 - c. 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?
 - d. Do the mathematics tasks provide students with the opportunity to engage actively in reasoning, sense making, and problem solving so that students develop a deep understanding of mathematics?
 - e. 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 /**
- a. Are there smooth transitions between whole-group and small-group instruction?
 - b. Am I strategically using the allocated time for students, individually and in small groups, to develop reasoning skills?
 - c. Is my pace of direct instruction appropriate to students' needs?
 - d. Am I prepared for each small group so that allocated small-group time is maximized?
- I-11. Am I identifying students who are in need of additional supports and providing that differentiation in the regular classroom? CE /**
- a. Am I using small, flexible grouping within my classroom to differentiate instruction?
 - b. Do I monitor student progress within flexible groups and change groups as needed?
- I-12. Am I differentiating instruction in my core content classroom? /**
- a. Am I using flexible grouping?
 - b. Am I providing additional time for guided/independent practice?
- I-13. Am I using math tools to create a deep understanding of mathematical concepts? /**
- a. Am I confident in my use of math tools?
 - b. Am I using tools in the concrete, representational, and abstract learning cycle?

- I-14. Is the independent work that I am providing clearly targeting skills and practices that facilitate math growth, and is there evidence that the independent work is differentiated based on students' strengths and areas of need? PP I
- I-15. Am I motivating students through goal setting, monitoring, and/or graphing their own progress? CE I

ASSESSMENT TEACHER LEVEL MATH 3-5

- A-1. Am I assessing students with the agreed-upon common assessments (benchmark, diagnostic, summative, formative), according to the district or school assessment plan? I
- A-2. Am I considering all available achievement and growth assessment data on students as I plan and deliver instruction? PP I
 Examples: PVAAS teacher-specific report, PVAAS value-added and performance/quintile diagnostic reports, PVAAS student projection data, and PSSA, aimsweb, CDT, CBM, PSSA, G-MADE, STAR, etc.
- A-3. Am I using assessments that include open-ended items, with 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 school-level universal screening process to inform instruction and grouping, including identifying students in need of supplemental support? PP I
 - a. 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?
 - b. 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 and monitor the progress of all students through benchmark assessments to determine which students are in need of additional supports, and then provide related instruction? I PR
- A-7. Am I able to use diagnostic assessments to determine individual students' needs? PP I
- A-8. Am I using PVAAS student projection reports to assist in organizing groups, and identifying those students in need of supplemental supports (MTSS)? PP I PR
- A-9. Am I using my PVAAS growth reports to examine past growth patterns, and then using that information to inform instruction for my current group of students? PP I PR

A-10. Am I designing assessments that evaluate students' skills and abilities related to the Standards for Mathematical Practice? PP I

- a. Do I require my students to demonstrate their understanding by constructing models?
- b. Are students required to explain their solution methods, both orally and in writing?
- c. Do I require students to show their work and/or justify their answers?
- d. Am I designing assessments that require students to demonstrate precision in both terminology and computation?
- e. Am I designing assessments that require students to construct arguments?
- f. Am I designing assessments that allow students to use a variety of mathematical tools?
- g. Am I designing assessments that evaluate students' ability to generalize and apply mathematical processes?
- h. Do I provide assessments that include extended tasks that mirror instructional activities, assessing students' ability to persevere to solve problems?
- i. Am I assessing students' abilities to identify and use patterns in solving problems?
- j. 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?
- k. Do my assessments require precision in vocabulary and accuracy in computation and symbol manipulation?

ORGANIZATION TEACHER LEVEL MATH 3-5

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

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

O-2. Am I using flexible grouping/small groups to provide direct instruction to students based on their targeted skill needs, as well as monitoring student progress within small/flexible groups and changing groups as needed? PP CE I

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 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

Teacher-Level Questions (Classroom)

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

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PP

Planning and Preparation

CE

Classroom Environment

I

Instruction

PR

Professional Responsibilities

CURRICULUM

TEACHER LEVEL

MATH

6-8

- C-1. Am I knowledgeable about the PA Core Standards at my grade level (i.e., assessment anchors, eligible content, etc.)?** *PP*
- a. Do I have a firm understanding of the math concepts and skills at the grade level to teach students at a deep level?
 - b. Am I familiar with resources available to me on SAS (pdesas.org)?
 - c. Do I have strong knowledge of the PA Core Standards, assessment anchors, and eligible content, and do I plan accordingly?
 - d. Do I understand the importance of the Standards for Mathematical Practice and do my lesson plans embed those standards along with the content focus?
- C-2. Am I using the LEA/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, when needed?** *PP*
- C-4. Am I accessing and applying the most current research in mathematics, aware of and using resources available to me, and aware of and using resources and major work documents from national organizations in my practice?** *PP* | *PR*

INSTRUCTION

TEACHER LEVEL

MATH

6-8

- I-1. Am I providing all students with instruction on grade-level PA Core Standards?** |
- a. Am I providing scaffolds for students in need of additional support to access the core math curriculum?
 - b. Am I aware of and using resources and major work documents from national organizations in my practice?
- I-2. Am I clear with students on each lesson's learning target(s)?** |
- a. Are lesson objectives and/or essential questions (EQ) posted and communicated?
 - b. Do lesson plans clearly delineate the lesson objectives, essential questions, and/or learning intentions?
 - c. Am I including both content standards and Standards for Mathematical Practice in my objectives? Is this clear to students?
 - d. 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?** |
- a. 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?
 - b. Am I presenting topics of interest to the students and facilitating the students crafting questions that they believe should be explored for this topic?
 - c. 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?
 - d. 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?
 - e. 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 the lesson (inquiry-based, problem-based, or direct instruction) appropriate to students' needs?
 - Am I prepared for each small group so that allocated small-group time is maximized?
 - 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, and 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 need 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 need additional support and providing that differentiation in the regular classroom?
- I-13. Am I differentiating instruction in my core content classroom?** I
- Am I using flexible grouping?
 - Am I providing additional time allocated to guided/independent practice?
- I-14. Am I using the established school level universal screening process to provide additional supports (Tiers 2/3) to targeted students in a proactive manner?** PP I

I-15. Am I embedding instruction on the Standards for Mathematical Practice? /

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

I-16. Am I using technology to enhance students' mastery of mathematical concepts and skills? PP /

ASSESSMENT TEACHER LEVEL MATH 6-8

A-1. Am I assessing students with the agreed-upon common assessments (benchmark, diagnostic, summative, formative) according to the district or school assessment plan? /

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

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

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

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

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- A-6. Am I able to interpret the results of benchmark assessments being used?** I PR
- a. Am I monitoring the progress of all students through benchmark assessments to determine students in need of additional support, and then providing related instruction?
- A-7. Am I able to use diagnostic assessments to determine individual students' needs?** PP I
- A-8. Am I using PVAAS student projection reports to assist in organizing groups and identifying those students in need of supplemental supports (MTSS)?** PP I PR
- A-9. Are PVAAS growth reports and PVAAS student projection reports used to reflect on past practices and apply information to the future, including:** PP I
- a. During the curriculum review/revision process?
- b. In planning and delivery of instruction?
- c. During planning for (proactive) intervention supports?
- d. For secondary math course design and sequence?
- e. For placement of students?
- A-10. Am I designing assessments that evaluate students' skills and abilities related to the Standards for Mathematical Practice?** PP I
- a. Do I require my students to demonstrate their understanding by constructing models?
- b. Are students required to explain their solution methods, both orally and in writing?
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- k. Do my assessments require precision in vocabulary and accuracy in computation and symbol manipulation?

ORGANIZATION

TEACHER LEVEL

MATH

6-8

- 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 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?
- O-2. Am I using flexible grouping/small groups to provide support and instruction to students based on their targeted skill needs, as well as monitoring student progress within small/flexible groups and changing groups as needed? PP CE I
- O-3. 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-4. Do I collaborate with other teachers on my team in analysis of data and integration of mathematics assessments? PP PR

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Planning and Preparation

CE

Classroom Environment

I

Instruction

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Professional Responsibilities

CURRICULUM

TEACHER LEVEL

MATH

KEYSTONE ALGEBRA I

- 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*
- a. Do I have a firm understanding of the math concepts and skills at the grade level to teach students at a deep level?
 - b. Do students understand examples and non-examples of key vocabulary?
 - c. Am I familiar with resources available to me on SAS (pdesas.org)?
 - d. Do I have strong knowledge of the Algebra I assessment anchors and eligible content, and do I plan accordingly?
 - e. Do I understand the importance of the Standards for Mathematical Practice and do my lesson plans embed those standards along with the content focus?
- C-2. Am I using the written curriculum to plan my units and lessons and do my lesson plans clearly delineate the lesson target(s)?** *PP*
- 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*

INSTRUCTION

TEACHER LEVEL

MATH

KEYSTONE ALGEBRA I

- I-1. How well do I know the eligible content for the Keystone Algebra I exam and do I use my knowledge in the planning and delivery of instruction?** *PP PR*
- I-2. Am I using appropriate materials and resources in my instruction, including using the textbook appropriately and 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 do I promote students' ability to solve problems and persevere?** *I*
- I-4. Am I using visual representations to introduce and explain algebra concepts?** *I*
- Example: Am I knowledgeable about the CRA (concrete, representational, abstract) approach and do I use it to address individual student's needs?
- I-5. Am I differentiating instruction to meet the needs of all students in the course?** *CE I*
- I-6. Have I provided evidence-based instruction on vocabulary terms and their application?** *PP I*
- a. Am I holding students accountable to use precise vocabulary?
 - b. Do students understand examples and non-examples of key vocabulary?

- I-7. 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?
 - Am I emphasizing to students the importance of reading questions carefully?
 - Do I know how to teach to level of conceptual understanding?
- I-8. Is my instruction reflecting the importance of reasoning and not just the right answer? **I**
- Am I clearly communicating and instructing students to “move beyond the solution” to application and problem solving?
 - Am I asking students to go beyond the answer to respond to what the answer means?
 - Are students given sufficient practice (e.g., word problems that require reasoning and not just the right answer)?
- I-9. Have I provided tasks that require students to apply generalizations from many tasks to investigate, create, and test hypotheses? **I**
- I-10. Am I instructing students on the appropriate use of technology tools (e.g., Desmos, GeoGebra, etc.)? **I**
- I-11. Is modeling used as an instructional strategy to support the development of algebraic concepts and are students provided opportunities to model mathematically? **I**
- I-12. Am I providing timely feedback to students on a daily basis? **I**

ASSESSMENT TEACHER LEVEL MATH KEYSTONE ALGEBRA I

- A-1. Am I using formative and summative assessments throughout the course 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?
 - Am I using all common assessments in place in my school?
- A-2. Am I using PVAAS student projection data available on students in my current course to inform my 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, as well as flexible math grouping? **I**
- A-4. Am I monitoring my instruction using formative assessments? **CE** **I**
- Am I adjusting the pacing of my instruction through formative assessment?
 - Am I using formative assessments at the end of each period to determine instruction for next day?

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

Example: Am I using PVAAS student projection data for 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

- a. Do my assessments require strategic thinking, and motivate students to solve problems and persevere?
- b. Am I designing assessments that evaluate students' ability to look for and express regularity in repeated reasoning?
- c. Am I designing classroom assessments that require quantitative reasoning as well as procedural fluency?
- d. Am I designing assessments that require students to include models and opportunities for multiple representations?
- e. 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

- a. Are soft skills evaluated separately from academic performance to indicate a student's true performance on identified concepts and skills?

ORGANIZATION

TEACHER LEVEL

MATH

KEYSTONE ALGEBRA 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

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, as well as my knowledge about the CRA approach (concrete, representational, abstract)? PP CE PR

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

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



Explore these other

DIGGING DEEPER

Guides & Resources:

Digging Deeper into Content Areas: English Language Arts (ELA)

Grades K-2, 3-5, 6-8, Keystone Algebra I

Digging Deeper into Content Areas: Science

Grades 4 & 8, Keystone Biology

Digging Deeper Resource Guide

**Digging Deeper: Students with a History of
Higher Achievement**

**Digging Deeper: Students with a History of
Lower Achievement**

at education.pa.gov >