

Digging Deeper into Content Areas Questions at the District/School and Teacher Level: Science Grades 4 & 8, Keystone Biology

May 2019



**COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF EDUCATION**

333 Market Street
Harrisburg, PA 17126-0333
www.education.pa.gov



Commonwealth of Pennsylvania

Tom Wolf, Governor

Department of Education

Pedro A. Rivera, Secretary

Office of Elementary and Secondary Education

Matthew Stem, Deputy Secretary

Bureau of Curriculum, Assessment, and Instruction

Brian Campbell, Director

Division of Assessment and Accountability

Brian Truesdale, Chief

The Pennsylvania Department of Education (PDE) does not discriminate in its educational programs, activities, or employment practices, based on race, color, national origin, [sex] gender, sexual orientation, disability, age, religion, ancestry, union membership, gender identity or expression, AIDS or HIV status, or any other legally protected category. Announcement of this policy is in accordance with State Law including the Pennsylvania Human Relations Act and with Federal law, including Title VI and Title VII of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, Section 504 of the Rehabilitation Act of 1973, the Age Discrimination in Employment Act of 1967, and the Americans with Disabilities Act of 1990.

The following persons have been designated to handle inquiries regarding the Pennsylvania Department of Education's nondiscrimination policies:

For Inquiries Concerning Nondiscrimination in Employment:

Pennsylvania Department of Education
Equal Employment Opportunity Representative
Bureau of Human Resources
Voice Telephone: (717) 783-5446

For Inquiries Concerning Nondiscrimination in All Other Pennsylvania Department of Education Programs and Activities:

Pennsylvania Department of Education
School Services Unit Director
333 Market Street, 5th Floor, Harrisburg, PA 17126-0333
Voice Telephone: (717) 783-3750, Fax: (717) 783-6802

If you have any questions about this publication or for additional copies, contact:

[Pennsylvania Department of Education](#)

Bureau of Curriculum, Assessment, and Instruction
333 Market Street, 5th Floor, Harrisburg, PA 17126-0333
Voice: (717) 787-8913

All Media Requests/Inquiries: Contact the Office of Press & Communications at (717) 783-9802

Sincere thanks to the following individuals who gave their time to review and provide feedback on this document

Drue Feilmeier, Former Director of Curriculum, Hempfield School District

Michael Floreck, K-12 Science Supervisor, Cumberland Valley School District

Cindy Goldsworthy, Ed.D., Consultant, Evidence to Action: K-12 Consulting Services

Sarah Kelly, Educational Consultant, Capital Area Intermediate Unit 15

Judd Pittman, Educational Consultant, PaTTAN – Harrisburg

Joey Rider-Bertrand, Program Director of Curriculum & Instruction,
Lancaster-Lebanon Intermediate Unit 13

Douglas Womelsdorf, Science Curriculum Specialist,
Northeastern Educational Intermediate Unit 19

Table of Contents

Digging Deeper into Content Areas: Science	5
Digging Deeper into Content Areas: School/District (System) and Teacher Level Questions	5
How to Use this Resource	6
Resources and Evidence: Science Education.....	7
Science Grade 4: System Level Questions (District/School)	8
CURRICULUM	8
INSTRUCTION.....	10
ASSESSMENT	12
ORGANIZATION	14
Science Grade 4: Teacher Level Questions	15
CURRICULUM	15
INSTRUCTION.....	16
ASSESSMENT	18
ORGANIZATION	18
Science Grade 8: System Level Questions (District/School)	20
CURRICULUM	20
INSTRUCTION.....	22
ASSESSMENT	24
ORGANIZATION	25
Science Grade 8: Teacher Level Questions	27
CURRICULUM	27
INSTRUCTION.....	28
ASSESSMENT	30
ORGANIZATION	31
Keystone Biology: System Level Questions (District/School)	32
CURRICULUM	32
INSTRUCTION.....	34
ASSESSMENT	36
ORGANIZATION.....	38
Keystone Biology: Teacher Level Questions	39
CURRICULUM	39
INSTRUCTION.....	40
ASSESSMENT	42
ORGANIZATION	43

Digging Deeper into Content Areas: Science

Reflection questions are offered at two levels:

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

Disclaimer: This document was developed with feedback from individuals with expertise in the specific content area. If you find any errors or information of concern, please let us know. Email pdepvaas@iu13.org.

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

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

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

This document focuses on science, including questions at the Grade 4 level, the Grade 8 level, and for Keystone Biology. By looking at various contributing factors, Digging Deeper into Science goes beyond the general questioning we might ask ourselves to the pertinent variables that must be addressed in analyzing data in this specific content area. Because data only tells us “what” is going on, not “why,” digging more deeply into a core subject area has great potential for improving student results!

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

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

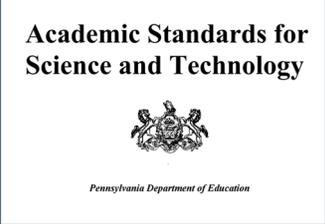
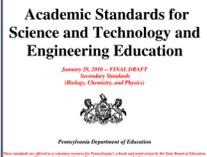
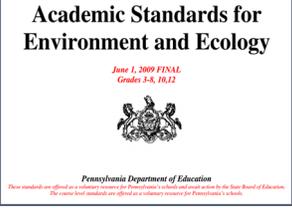
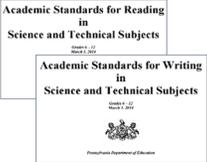
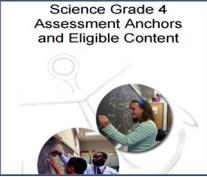
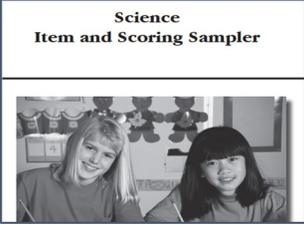
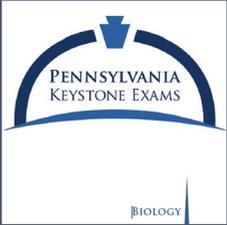
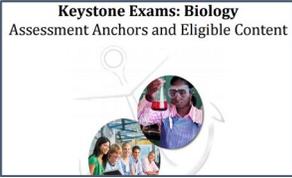
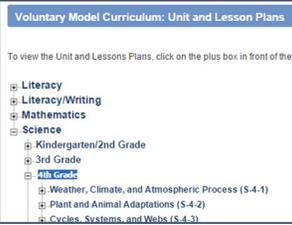
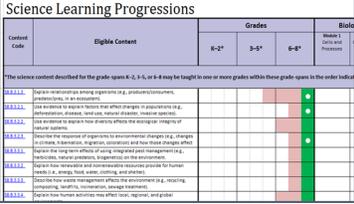
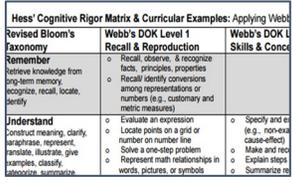
How to Use this Resource

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

Remember, this is neither a checklist nor is it sequenced in any specific order to be simply handed to the school-wide team or individual teacher. Rather, it a listing of issues to explore more deeply. The document requires discussion about evidence of practice and honest reflection, along with careful selection of where to start and how deeply to probe. The focus and starting point is dependent on the school’s current status and needs, as well as the needs of individual teachers. Each question is to be considered and answered with solid evidence.

Resources and Evidence: Science Education

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

<p><u>PA Standards Aligned System</u></p> 	<p><u>Academic Standards for Science and Technology</u></p> 	<p><u>Academic Standards – Science and Technology and Engineering Education</u></p> 
<p><u>Academic Standards – Environment and Ecology</u></p> 	<p><u>Academic Standards – Reading/Writing in Science and Technical Subjects</u></p> 	<p><u>PSSA Science Assessment Anchors and Eligible Content</u></p> 
<p><u>Science Item & Scoring Sampler</u></p> 	<p><u>Keystone Biology Item Sampler</u></p> 	<p><u>Keystone Biology Assessment Anchors and Eligible Content</u></p> 
<p><u>Voluntary Model Curriculum</u></p> 	<p><u>Science Learning Progressions</u></p> 	<p><u>Hess' Cognitive Matrix/ Webb's Depth of Knowledge</u></p> 

Science Grade 4: System Level Questions (District/School)

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

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

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

PP= Planning and Preparation

CE=Classroom Environment

I= Instruction

PR= Professional Responsibilities

CURRICULUM

District/School: Science Gr 4

CURRICULUM



C-1. Is the elementary science curriculum tightly aligned to the PA science standards? (PP)

- 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/taught 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 a sufficient amount of practice?
- d. Does the Grade 4 science curriculum address the Grade 4 eligible content?
- e. Does the Grade K-4 science curriculum address the PA grade level standards appropriately, adhering to the necessary progression of skills?
- f. Does the Grade 5 science curriculum address Grade 5 science standards and represent the necessary vertical alignment of concepts and skills in Grades 5-8?

C-2. Is there appropriate emphasis and balance in the written curriculum on the PA science standards categories: Nature of Science, Biological Sciences, Physical Sciences, Earth and Space Sciences, and Environment and Ecology? (PP)

- a. Does each grade level have instruction that includes each of these disciplines?

C-3. Are the science topics to be addressed appropriately paced, introduced, reinforced, and reviewed at appropriate grade levels? (PP)

C-4. Do all teachers engage in regular conversations regarding how to connect skills and concepts horizontally as well as vertically from grade to grade? (PP, I)

- a. Is there knowledge and planning for vertical progression of skills?
- b. Example: What does “analyzing data” look, sound, and feel like in Grades 4 and 8?

C-5. Does the written curriculum provide sufficient multiple and varied opportunities for students to ask and evaluate questions and define problems, analyze and interpret data, and engage in argument from evidence? (PP)

- a. Does the written curriculum provide for opportunities for students to learn about science by:
 - Engaging in scientific thought/process?
 - Designing/evaluating an experiment?
 - Supporting/refuting an argument based on data collected and used as evidence?
 - Analyzing multiple sources of information (text or experimental)?
 - Applying to a real world content?

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

- a. Is the concept of rigor understood as different from difficulty level?
- b. Do all teachers understand that the level of DOK is not defined by the verb, but is instead defined by the level of thinking required to understand the concept and/or perform the learning task?
- c. Does the written curriculum provide opportunities for students to engage in investigations and interpret data to learn the concepts and core ideas of science?
- d. Does the written curriculum build the scientific literacy of students?

C-7. Does a pacing guide exist for Grade 4 Science, and is it appropriately aligned and timed for teaching eligible content prior to the PSSA? (PP)

- a. Do all grade levels have pacing guides which facilitate that all students receive the intended written curriculum, allowing for adjustments in differentiated pacing to meet the needs of students?
- b. Do pacing guides build in time to reteach or address misconceptions?

C-8. Does the written curriculum require students to respond orally and in writing? (PP)

C-9. Does the written curriculum clearly identify resources and materials necessary to teach the identified concepts and skills? (PP)

C-10. Is the critical content vocabulary identified in the written curriculum? (PP)

- a. Do unit maps and lesson plans indicate that all important vocabulary terms are taught in an explicit and evidence-based manner?
- b. Are the terms found in the [PSSA science glossary/Keystone glossary](#) systematically included in the written curriculum (at appropriate grade levels) and included in unit maps/lesson plans?
- c. Are academic vocabulary terms to be learned identified at each grade level?
- d. Is there a building wide vocabulary system in place that identifies tiered vocabulary terms?
- e. Are the Academic Standards for Reading/Writing in Science and Technical Subjects embedded in planned activities for the students?

C-11. Are teachers aware of the resources on the PDE SAS Portal (pdesas.org) in science? Are teachers aware of the resources available and the Science and Technology Education Learning Communities? (PP)

INSTRUCTION

District/School: Science Gr 4

INSTRUCTION



I-1. Do all students receive instruction on grade level PA science standards? (I)

- a. Do all students have equal access to the instruction?
- b. Is science instruction considered “protected” time for all students?
- c. Are all students, including those who are at risk in literacy and math, appropriately engaged in science instruction with the necessary scaffolding and accommodations?

I-2. Is there a process in place to ensure that there is a match between the written, taught, and assessed curriculum in all classrooms? (I)

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

- a. Are the objectives communicated clearly in written and oral form?
- b. Are the objectives aligned to the PA science standards?
- c. Are the objectives aligned with district written curriculum?
- d. Are students able to state/communicate the learning targets?
- e. Are success criteria made clear to students?

I-4. Does instruction focus on evidence-based practices which delineate how students should learn science? (I)

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

- a. Are teachers adhering to the allocated time block for science instruction?
- b. Is sufficient review and practice provided on concepts and skills taught in earlier grades but necessary for proficiency on the PSSA?
- c. Is this time protected for all students?

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

I-7. Is flexible grouping used to provide small group practice at tiered levels of practice? (I)

I-8. Are extension tasks provided for those students who are demonstrating mastery at the expected level? (I)

I-9. Are both academic and content specific vocabulary purposely addressed through evidence based techniques and strategies? (I)

- a. Are all teachers delivering direct and explicit instruction on key content vocabulary terms?
- b. Are evidence-based strategies used in all classrooms for the teaching of vocabulary?
- c. Is content specific science vocabulary used consistently across all teachers within a grade level and vertically across grade levels?

I-10. Are students provided with investigations at Webb's Depth of Knowledge (DOK) levels 3 and 4, embedding DOK levels 1 and 2 within the instruction? (I)

- a. Are effective questioning techniques utilized, 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-11. Is technology used to enhance students' understanding of science concepts? (I)

- a. Do all teachers and students have access to technology?
- b. To what degree is technology used in all classrooms?
- c. Do teachers have access to online simulations and lab experiences for students?

I-12. Are students actively involved in first-hand exploration and investigation? (I)

- a. Do teachers facilitate learning experiences that teach students the processes of scientific inquiry, discovery, analysis, and communication of findings?
- b. Do all teachers model inquiry skills in the delivery of instruction?
- c. Are students learning science by doing science?

I-13. Do all teachers demonstrate positive attitudes about science? (CE)

I-14. Do all teachers demonstrate the ability to connect science instruction to real-world problems and contexts? (I)

- a. Are students engaged in real-world problems that motivate and stimulate their interest in science/STEM?
- b. Are students using the school grounds and building for real-world application of science/STEM concepts?
- c. Are students building their scientific literacy skills to engage in a science and technology driven society?
- d. Are students engaging in citizen science projects?

I-15. Is background knowledge in science built through planned instruction? Are students provided with hands-on experiences which allow them to build background knowledge that is then reinforced through the use of informational text in ELA? (PP, I)

- a. Do all teachers use informational text to support science instruction following hands-on experiences in order to build students' understanding of science concepts?
- b. Are teachers making the connection between ELA skills (predicting, inferring, and analyzing) to those same scientific literacy skills needed to engage with complex science informational or non-fiction text?

I-16. Do all teachers have the necessary resources, materials, and supplies in order to effectively implement the planned instruction? (I)

ASSESSMENT

District/School: Science Gr 4

ASSESSMENT



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

- a. Are valid and reliable assessment measures in place to screen, diagnose, monitor, and evaluate science outcomes for all students?
- b. Have the range of assessments been evaluated for their purposes to ensure that there is no unnecessary redundancy/overlap, or important skill areas missing?
- c. Do all teachers have access to this map and follow it, administering all required assessments in a timely manner, as per schedule?

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

- a. Do common summative and formative assessments address concept application, inquiry, and process skills as well as facts/declarative knowledge?
- b. Are all teachers aware of the PSSA Science Test Design (test blueprint) and planning formative and summative assessments accordingly?
- c. Test Design and Scoring Guidelines and Formula Sheets can be accessed at this [website](#).

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

A-4. Are rubrics used to assess performance tasks? (I)

A-5. Are there school-wide/grade level data meetings established for teachers to collaborate on analysis of data and action planning? (I, PR)

- a. Do protocols exist for analysis of data?
- b. How frequently is data analyzed, and groupings/instruction changed as a result of data analysis?
- c. Do teachers collaborate in grade band teams (K-4, 5-8, 8-12)?
- d. Is student-specific data examined longitudinally to determine if individual students require intervention through a multi-tiered model (MTSS/RtII)?

A-6. In addition to PVAAS data, are additional data/information available to all teachers at the classroom and individual student level? How is this additional information analyzed along with PVAAS reporting? (I)

- a. What information from the local assessments can be integrated for analysis along with PVAAS data?

A-7. Are PVAAS projection reports used to plan and deliver instructional programs/instruction for all students? (I)

A-8. Are students routinely assessed through multiple choice, constructed responses, and performance tasks? (I)

ORGANIZATION

School: Science Gr 4

ORGANIZATION



O-1. Are teachers provided on-going professional development in science and science education research? (PR)

- a. Are teachers provided professional development on science concepts and skills to strengthen their understanding of science?
- b. Are teachers provided professional development on how to teach science to students of varying levels?

O-2. Has a database been established, and is it used, to collect & summarize school-level and student-level science data, with immediate and easy access for all teachers? (PR, I)

O-3. Does the master schedule include the appropriate time for science instruction? (I)

- a. Do all teachers adhere to the master schedule?
- b. Is this time protected from meeting time, assemblies, intervention supports, and other interruptions?
- c. Is sufficient time available in the master schedule for inquiry-based investigations, labs, experimentation, and fieldwork?

O-4. Does the master schedule allow for Professional Learning Community (PLC) time/data meeting time for collaboration and planning? (PP, PR)

O-5. Do all teachers have access to science equipment and materials, including safety equipment? (PP, CE, I)

Science Grade 4: Teacher Level Questions

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

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

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

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

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

PP= Planning and Preparation

CE= Classroom Environment

I= Instruction

PR= Professional Responsibilities

CURRICULUM

Teacher: Science Gr 4

CURRICULUM



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

- a. Do I have a firm understanding of the science concepts, practices, and skills at the grade level in order to teach students at a deep level?
- b. Do I have knowledge of prerequisite grade levels skills and concepts as well as skills and concepts in upcoming grades?
- c. Am I familiar with curriculum resources available to me on the SAS portal (pdesas.org)?

- d. Do I know the Webb's Depth of Knowledge level that is the intended level of instruction for each standard?

C-2. Do I have the necessary science (content) knowledge to teach students accurately and to facilitate understanding at a deep level? Are there certain topics in which I may need additional development? (PP, PR)

C-3. Am I using the appropriate and relevant materials, resources, and supplies to plan and deliver my instruction? (I)

C-4. Am I accessing and applying the most current research on science education? (PP, I, PR)

INSTRUCTION

Teacher: Science Gr 4

INSTRUCTION



I-1. Am I providing all students with appropriate grade level instruction based on PA science standards, assessment anchors, and eligible content? (PP)

I-2. Am I providing scaffolded instruction for those students at risk or below grade level? (I)

I-3. Am I facilitating learning experiences for students to ensure mastery of grade level concepts? Do these learning experiences emphasize hands-on learning? (I)

I-4. Am I aware of individual students' levels of risk in literacy as well as mathematics in order to provide any needed scaffolding during science instruction? (I)

I-5. Do I demonstrate confidence in my science knowledge, and enthusiasm for the topics? Do I approach science instruction through an equitable lens so that science education/careers seem attainable to all students? (CE, PR)

I-6. Am I using the allocated science block time effectively and efficiently? (CE, I)

- a. Do I prepare materials in advance in order to avoid wasting science instruction time to do this?
- b. Do I create "kits" of science materials that can be used year-after-year to avoid the need to gather and organize them each year during science instruction?
- c. Do I create a science materials table for students to have easy access to the materials needed for investigation in an efficient manner?

I-7. Am I clear with students on each lesson's learning target(s)/intentions? (I)

- a. Are lesson objectives/essential questions posted?

- b. Do lesson plans clearly delineate the lesson objectives/essential questions/learning intentions?
- c. Do my lesson targets focus on problem solving, inquiry, application, and process skills?
- d. Are my students able to articulate the learning targets?
- e. Does my science instruction link content to real world application?
- f. Am I clear on the success criteria to meet the targets?

I-8. Am I knowledgeable about Webb's Depth of Knowledge (DOK), and therefore providing hands-on investigations and questions at levels 1, 2, 3, and 4 for all students? Am I designing investigations at DOK levels 3 and 4, embedding the DOK level 1 and 2 content in my instruction? (PP, CE, I)

- a. Does my instruction focus on investigations, embedding the factual knowledge within those experiences?
- b. 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-9. Am I teaching scientific literacy skills, including how to communicate as scientists? (I)

- a. Are my students reading non-fiction, conducting research, and engaging in technical writing?

I-10. Am I providing timely feedback immediately to all students? (CE, I)

I-11. Is the independent work I provide clearly targeting skills that facilitate scientific exploration and knowledge development? (I)

I-12. Am I providing students with open-ended problems to solve? (I)

I-13. Am I identifying students who are in need of additional supports and providing that differentiation in the regular classroom? (CE, I)

I-14. Am I using the available resources, supplies, and materials to create a deep understanding of science concepts? (I)

I-15. Am I using technology to enhance student's mastery of scientific concepts, practices, and skills? (I)

ASSESSMENT

Teacher: Science Gr 4

ASSESSMENT



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

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

- a. Am I considering information that can be gleaned from the PVAAS teacher specific report, PVAAS value added and quintile/performance diagnostic report, PVAAS projection data, PSSA results, other local assessments, etc.?
- b. Am I using the PVAAS projection score for individual students in my classroom to assist in the planning and delivery of instruction?
- c. Am I using the PVAAS Custom Student Report to assist in the planning and delivery of my instruction?

A-3. Am I monitoring the progress of all students through evidence-based assessments and practices? (I)

A-4. Do I make use of ELA and math data in order to consider a student's difficulty with skills from these content areas as a possible reason for their difficulty understanding science concepts? (I)

A-5. Am I monitoring the progress of all students through common benchmark assessments to determine who is at risk and at what level of risk, and providing related instruction? (PP, I)

A-6. Am I using assessments that include open-ended items and opportunities for short and long responses from students? (I)

ORGANIZATION

Teacher: Science Gr 4

ORGANIZATION



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

- a. Are procedures smooth and efficient to maximize time available?

- b. Am I organized and prepared with materials for hands-on activities in order to utilize allocated time efficiently?

O-2. Am I using my PVAAS growth reports and examining past patterns to help inform my instruction for my current groups of students? (PP, PR)

O-3. Do I collaborate with other teachers on my team (in my grade level or across grades in grade band teams) in analysis of data and integration of science assessments? (PP, PR)

O-4. Do I adhere to the master schedule of allocated time for science instruction? (I)

Science Grade 8: System Level Questions (District/School)

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

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

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

PP= Planning and Preparation

CE=Classroom Environment

I= Instruction

PR= Professional Responsibilities

CURRICULUM

District/School: Science Gr 8

CURRICULUM



C-1. Is the middle level (Grades 5, 6-8) science curriculum tightly aligned to the PA science standards? (PP)

- 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/taught 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 a sufficient amount of practice?
- d. Does the Grade 8 Science curriculum address the Grade 8 eligible content?
- e. Does the course sequence, up to and including Grade 8 Science, address the necessary skills and concepts, as identified in the standards?

C-2. Is there appropriate emphasis and balance in the written curriculum on the standards categories: Nature of Science, Biological Sciences, Physical Sciences, Earth and Space Sciences, and Environment and Ecology? (PP)

C-3. Are the science topics to be addressed (as per PA standards) appropriately paced, introduced, reinforced, and reviewed at appropriate grade levels? (PP)

C-4. Do all teachers engage in regular conversations regarding how to connect skills and concepts horizontally as well as vertically from grade to grade? (PP, I)

- a. Is there knowledge and planning for vertical progression of skills?
- b. Example: What does “analyzing data” look, sound, and feel like in Grades 4 and 8?

C-5. Does the written curriculum provide sufficient multiple and varied opportunities for students to ask and evaluate questions and define problems, analyze and interpret data, and engage in argument from evidence? (PP)

- a. Does the written curriculum provide for opportunities for students to learn about science by:
 - Engaging in scientific thought/process?
 - Designing/evaluating an experiment?
 - Supporting/refuting an argument based on data collected and used as evidence?
 - Analyzing multiple sources of information (text or experimental)?
 - Applying to a real world content?

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

- a. Is the concept of rigor understood as different from difficulty level?
- b. Do all teachers understand that the level of DOK is not defined by the verb, but is instead defined by the level of thinking required to understand the concept and/or perform the learning task?
- c. Does the written curriculum build scientific literacy?

C-7. Does a pacing guide exist for Grade 8 Science, and is it appropriately aligned and timed for teaching of necessary eligible content prior to the PSSA? (PP)

- a. Do all grade levels have pacing guides which facilitate that all students receive the intended written curriculum, allowing for adjustments in differentiated pacing to meet the needs of students?
- b. Does the pacing guide allow for time to reteach or address misconceptions?

C-8. Does the written curriculum require students to respond orally and in writing? (PP)

- a. Are the Academic Standards for Reading/Writing in Science and Technical Subjects embedded in planned activities for the students?

C-9. Does the written curriculum clearly identify resources and materials necessary to teach the identified concepts and skills? (PP)

C-10. Is the critical content vocabulary identified in the written curriculum? (PP)

- a. Do unit maps and lesson plans indicate that all critical vocabulary terms are taught in an explicit and evidence-based manner?
- b. Are the terms found in the [PSSA science glossary](#) systematically included in the written curriculum (at appropriate grade levels) and included in unit maps/lesson plans?
- c. Are academic vocabulary terms to be learned identified at each grade level?
- d. Is there a building wide vocabulary system in place that identifies tiered vocabulary terms?

C-11. Are teachers aware of the resources on the PDE SAS Portal (pdesas.org) in science? Are teachers aware of the resources found in the resources and the Science and Technology Education Learning Communities? (PP)

INSTRUCTION

District/School: Science Gr 8

INSTRUCTION



I-1. Do all students receive instruction on grade level PA science standards? (I)

- a. Do all students have equal access to the instruction?
- b. Is science instructional time protected for all students?
- c. Are all students, including those who are at risk in literacy and math, appropriately engaged in science instruction with the necessary scaffolding and accommodations?

I-2. Is there a process in place to ensure that there is a match between the written, taught, and assessed curriculum? (I)

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

- a. Are the objectives communicated clearly in written and oral form?
- b. Are the objectives aligned to the PA science standards?
- c. Are the objectives aligned with district written curriculum?
- d. Are students able to state/communicate the learning targets?
- e. Are success criteria made clear to students?

I-4. Is there sufficient time allocated in the master schedule for science instruction at all grade levels? (PP, I)

- a. Are teachers adhering to the allocated time block for science instruction?

- b. Is sufficient review and practice provided on concepts taught in earlier grades but necessary for proficiency on the PSSA?
- c. Is this time protected for all students?

I-5. Is instruction differentiated to allow for various avenues to process and practice skills? (I)

I-6. Is flexible grouping used to provide small group guided practice at tiered levels of practice? (I)

I-7. Does instruction focus on evidence-based practices which delineate how students should learn science? (I)

I-8. Are extension tasks provided for those students who are demonstrating mastery at the expected level? (I)

I-9. Are both academic and content specific vocabulary purposely addressed through evidence based techniques and strategies? (I)

- a. Are all teachers delivering direct and explicit instruction on key content vocabulary terms?
- b. Are evidence-based strategies used in all classrooms for the teaching of vocabulary?
- c. Is content specific science vocabulary used consistently across all teachers within a grade level and vertically across grade levels?

I-10. Are students provided with a variety of tasks that address all levels of Webb's Depth of Knowledge (DOK)? (I)

- a. Are effective questioning techniques utilized, including but not limited to wait time, student name placement in questioning, random and strategic calling on students, high level questioning mixed with appropriate lower level questions?

I-11. Is technology used to enhance students' understanding of science concepts? (I)

- a. Do all teachers and students have access to technology?
- b. To what degree is technology used in all classrooms? Do teachers have access to online simulations and lab experiences for students?

I-12. Are students actively involved in first-hand exploration and investigation? (I)

- a. Do teachers facilitate learning experiences that teach students the processes of scientific inquiry, discovery, analysis, and communication of findings?
- b. Do all teachers model inquiry skills in the delivery of instruction?

I-13. Do all teachers demonstrate positive attitudes about science? (CE)

I-14. Do all teachers demonstrate the ability to connect science instruction to real-world problems and contexts? (CE, I)

- a. Are students engaged in real-world problems that motivate and stimulate their interest in Science/STEM?

- b. Are students using the school grounds and building for real-world application of science/STEM concepts?
- c. Are students building their scientific literacy skills to engage in a science and technology driven society?
- d. Are students engaged in citizen science projects?

I-15. Is background knowledge in science built through planned instruction? Are students provided with hands-on experiences which allow them to build background knowledge that is then reinforced through the use of informational text in ELA? (PP, I)

- a. Do all teachers use text to support science instruction after students have had hands-on experiences to build their understanding of science concepts?

I-16. Are teachers making the connection between ELA skills (predicting, inferring, and analyzing) to those same scientific literacy skills needed to engage with complex science informational or non-fiction text? (I)

I-17. Do all teachers have the necessary resources, materials, and supplies in order to effectively implement the planned instruction? (I)

ASSESSMENT

District/School: Science Gr 8

ASSESSMENT



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

- a. Are valid and reliable assessment measures in place to screen, diagnose, monitor, and evaluate science outcomes for all students?
- b. Have the range of assessments been evaluated for their purposes to ensure that there is no unnecessary redundancy/overlap or important skill areas missing?
- c. Do all teachers have access to this map and follow it, administering all required assessments in a timely manner, as per schedule?

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

- a. Do common summative and formative assessments address concept application, inquiry, and process skills as well as facts/declarative knowledge?
- b. Are all teachers aware of the [PSSA Science Test Design](#) (test blueprint) and planning formative and summative assessments accordingly?

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

A-4. Are there school-wide/grade level data meetings established for teachers to collaborate on analysis of data and action planning? (I, PR)

- a. Do protocols exist for analysis of data?
- b. How frequently is data analyzed, and groupings/instruction changed as result of data analysis?
- c. Do teachers collaborate in grade band teams (K-4, 5-8, 8-12)?
- d. Is student-specific data examined longitudinally to determine if individual students require intervention through a multi-tiered model (MTSS/RtII)?

A-5. In addition to PVAAS data, are additional data/information available to all teachers at the classroom and individual student level? How is this additional information analyzed along with PVAAS reporting? (I)

- a. What information from local assessments can be integrated for analysis along with PVAAS data?

A-6. Are PVAAS projection reports used to plan and deliver instructional programs/instruction for all students?

A-7. Are students routinely assessed through multiple choice constructed responses (text dependent analysis) and performance tasks? (I)

A-8. Are rubrics used to assess performance tasks? (I)

ORGANIZATION

District/School: Science Gr 8

ORGANIZATION



O-1. Are teachers provided on-going professional development in science and science education research? (PR)

- a. Are teachers provided professional development on science concepts and skills to strengthen their knowledge base in science?
- b. Are teachers provided professional development on how to teach science to students of varying levels?

O-2. Has a database been established (and is it used) to collect & summarize school-level and student-level science data, with immediate and easy access for all teachers? (PR, I)

O-3. Does the master schedule include the appropriate time for science instruction and inquiry work? (I)

- a. Do all teachers adhere to the master schedule?

- b. Is this time protected from meeting time, assemblies, intervention time, and other interruptions?
- c. Is sufficient time available in the master schedule for inquiry-based investigations, labs, experimentation, and fieldwork?

O-4. Do all teachers have access to science equipment and materials, including safety equipment? (PP, CE, I)

O-5. Does the master schedule allow for professional learning community (PLC) time/data meeting time for collaboration and planning? (PP, PR)

Science Grade 8: Teacher Level Questions

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

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

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

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

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

PP= Planning and Preparation

CE= Classroom Environment

I= Instruction

PR= Professional Responsibilities

CURRICULUM

Teacher: Science Gr 8

CURRICULUM



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

- a. Do I have a firm understanding of the science concepts, practices and skills at the grade level in order to teach students at a deep level?
- b. Do I have knowledge of prerequisite grade level skills, practices and concepts, as well as skills and concepts in upcoming grades?
- c. Am I familiar with curriculum resources available to me on the SAS portal (pdesas.org)?

d. Do I know the DOK level that is the intended level of instruction for each standard?

C-2. Do I have the necessary knowledge in science to teach students accurately and to a deep level of conceptual understanding? Are there certain topics in which I may need additional development? (PR, PP)

C-3. Am I using the appropriate and relevant materials, resources, and supplies to plan and deliver my instruction? (PP, I)

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

INSTRUCTION

Teacher: Science Gr8

INSTRUCTION



I-1. Am I providing all students with appropriate grade level instruction based on PA science standards, assessment anchors, and eligible content? (PP)

I-2. Am I providing scaffolded instruction for those students at risk or below grade level? (I)

I-3. Am I facilitating learning experiences for students to ensure mastery of grade level concepts and skills? Do these learning experiences emphasize hands-on learning? (I)

I-4. Do I demonstrate confidence in my science knowledge, and enthusiasm for the topics? Do I approach science instruction through an equitable lens so that science education/careers seem attainable to all students? (CE, PR)

I-5. Am I using the allocated science block time/science period effectively and efficiently? (CE, I)

- a. Am I starting on time and using the full period for targeted learning experiences?
- b. Am I prepared and organized for inquiry-based investigations, labs, experimentation, and fieldwork in order to maximize the allocated time?
- c. Do I prepare materials in advance in order to avoid wasting science instruction time to do this?
- d. Do I create “kits” of science materials that can be used year after year to avoid the need to gather and organize them each year during science instruction?
- e. Do I create a science materials table for students to have easy access to the materials needed for investigation in an efficient manner?

I-6. Am I clear with students on each lesson’s learning target(s)? (I)

- a. Are lesson objectives/essential questions posted?

- b. Do lesson plans clearly delineate the lesson objectives/essential questions/learning intentions?
- c. Do my lesson targets focus on problem solving, inquiry, application, and process skills?
- d. Are my students able to articulate the learning targets?
- e. Does my science instruction link content to real world application?
- f. Am I clear on the success criteria to meet the targets?

I-7. Am I knowledgeable about Webb's Depth of Knowledge (DOK), and therefore providing hands-on tasks and questions at levels 1, 2, 3, and 4 for all students? Am I designing investigations at DOK levels 3 and 4, embedding the knowledge at DOK 1 and 2 in the instruction? (PP, CE, I)

- a. Does my instruction focus on investigations, embedding the factual knowledge within those experiences?
- b. 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-8. Am I teaching students scientific literacy skills, including how to communicate as scientists? (I)

- a. Are my students reading non-fiction, conducting research, and engaging in technical writing?

I-9. Am I providing timely feedback to all students? (CE, I)

I-10. Am I aware of each student's level of risk in literacy as well as mathematics in order to provide any needed scaffolding during science instruction? (I)

I-11. Is the independent work and investigation work I provide clearly targeting skills that facilitate scientific exploration and knowledge development? (I)

I-12. Am I providing students with open-ended (text dependent analysis) problems to solve? (I)

I-13. Am I identifying students who are in need of additional supports and providing that differentiation in the regular classroom? (CE, I)

I-14. Am I using the available resources, supplies, and materials to create a deep understanding of science concepts, skills, and practices? (PP, I)

I-15. Am I using technology to enhance student's mastery of scientific concepts and skills? (I)

ASSESSMENT

Teacher: Science Gr8

ASSESSMENT



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

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

- a. Am I considering information that can be gleaned from the PVAAS teacher specific report, PVAAS value added and performance/quintile diagnostic report, PVAAS projection data, PSSA results, Study Island, etc.?
- b. Am I using the PVAAS projection scores for individual students in my classroom to assist in the planning and delivery of instruction?
- c. Am I using the PVAAS Custom Student Report to assist in the planning and delivery of my instruction?

A-3. Am I monitoring the progress of all students through evidence-based assessments and practices? (I)

A-4. Am I identifying students who are in need of additional supports and providing that differentiation in the regular classroom (at Tier 1 level)? (I)

A-5. Do I make use of ELA and math data in order to consider a student's difficulty with skills from these content areas as a possible reason for their difficulty understanding science concepts? (I)

A-6. Am I monitoring the progress of all students through benchmark assessments to determine who is at risk, the level of risk, and then providing related instruction? (PP, I)

A-7. Am I using assessments that include open-ended items and opportunities for short and long responses from students? (I)

ORGANIZATION

Teacher: Science Gr8

ORGANIZATION



O-1. Am I organized for instruction in order to use the allocated time effectively and efficiently? (PP, I)

- a. Are standard operating procedures smooth and efficient to maximize the time available?
- b. Am I organized and prepared with materials for hands-on inquiry-based investigations in order to utilize allocated time efficiently?
- c. Are my students trained in standard operating procedures in order to maximize instructional time and ensure that student safety is prioritized?

O-2. Am I using my PVAAS growth reports and examining past patterns to help inform my instruction for my current groups of students? Am I using the PVAAS custom student reports, bridging back to PVAAS growth reports to plan for my current group of students? (PP, PR)

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

Keystone Biology: System Level Questions (District/School)

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

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

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

PP= Planning and Preparation

CE=Classroom Environment

I= Instruction

PR= Professional Responsibilities

CURRICULUM

*District/School:
Keystone Biology*

CURRICULUM



C-1. Is the Biology curriculum aligned to the Keystone Biology assessment anchors and eligible content? (PP)

- a. How often is the written curriculum revisited and revised through the analysis of data?
- b. Is the written curriculum congruent with the assessment anchors, such that all topics are tightly aligned to the anchors, and time spent on aligned topics is weighted appropriately?
- c. How is the Keystone Biology written curriculum made accessible to teachers?
- d. Is the curriculum both guaranteed and viable (Marzano)?
 - Guaranteed: equal access to the written/taught curriculum for all students
 - Viable: adequate time for teachers to teach content and for students to learn it

C-2. Do teachers have and use appropriate materials and resources to engage students and lead them to proficiency? Are resources and materials used that promote hands-on investigations, laboratory experiences, experimentation, and fieldwork? (PP)

- a. Have all teachers participated in professional learning opportunities that connect them with standards-aligned resources and activities (e.g. SAS, Project WET, Project WILD)?

C-3. Is there appropriate emphasis and balance in the written curriculum on the two modules of the Keystone Biology exam: Cells and Cell Processes, and Continuity and Unity of Life? (PP)

- a. Is there appropriate emphasis and balance across the assessment anchors within each of the two modules?

C-4. Have the textbook and other resources and materials for the course been examined for degree of alignment to the Keystone Biology exam eligible content? (PP)

- a. Is there a written map that provides a crosswalk between the course approved textbook and the Keystone eligible content?
- b. Is the textbook considered a resource rather than the curriculum?
- c. Are the textbook and other resources consistent with a modern understanding of the nature of life?

C-5. Do unit and lesson plans include objectives and evidence-based strategies for the explicit teaching of academic and content vocabulary, aligned to the vocabulary highlighted in the Keystone Biology Exam glossary? (PP)

- a. Have the assessment anchors and eligible content been “unwrapped” to reveal key vocabulary and concepts which are included in unit maps and lesson plans?
- b. Does the curriculum, including unit maps and teachers’ lesson plans, indicate when and how each of these terms should be introduced and assessed?
- c. Are evidence-based instructional practices followed in the teaching of science vocabulary?
- d. Examples: Frayer model, word analysis, semantic mapping, word walls, etc.

C-6. Is writing instruction embedded in the Keystone Biology course curriculum? (PP, I)

- a. Are the Academic Standards for Reading/Writing in Science and Technical Subjects embedded in planned activities for the students?
- b. Are writing prompts, which are consistent with the big ideas and key learnings evident in the assessment anchors and eligible content, frequently included within common assessments?
- c. Does the pacing of the curriculum allow teachers the time to model their thinking as they compose text, and for students to edit and revise their writing?

C-7. Is the voluntary curriculum map (available through the PDE SAS Portal, pdesas.org) used in the design and delivery of the curriculum? (PP, I)

Visit [PDE SAS website](https://pdesas.org) to access the voluntary model curriculum.

C-8. Does the written curriculum address the appropriate level of rigor (Webb's Depth of Knowledge/DOK)? (PP)

- a. Is the concept of rigor understood as different from difficulty level?
- b. Do all teachers understand that the level of DOK is not defined by the verb, but is instead defined by the level of thinking required to understand the concept and/or perform the learning task?
- c. Does the written curriculum provide opportunities for students to engage in investigations and interpret data to learn the concepts and core ideas of science?
- d. Are students offered texts that are written at their instructional level and/or provided with scaffolding and other supports to read complex text?
- e. Does the written curriculum build the scientific literacy of students?

C-9. Does a pacing guide exist for the Keystone Biology course, and is it appropriately aligned and timed for teaching the necessary eligible content prior to the Keystone exam? (PP)

- a. Does the pacing guide facilitate that all students receive the intended written curriculum, allowing for adjustments in differentiated pacing to meet the needs of students?
- b. Does the pacing guide build in time to reteach or address misconceptions?

INSTRUCTION

*District/School:
Keystone Biology*

INSTRUCTION



I-1. Is there a planned process for monitoring to ensure that actual instruction matches the written and assessed curriculum? (I)

- a. Is a curriculum revision cycle in place that calls for frequent adjustments in the scope and sequence of the written curriculum, as indicated by assessment results?
- b. Does the written curriculum specify the use of common assessments which are consistent with the scope and sequence of the curriculum?

I-2. Do teachers use the available materials and resources effectively in their delivery of instruction? (I)

- a. Is the textbook a resource versus used as the curriculum?
- b. Are supplemental resources made available to students in order to support the diversity of learning needs present in a given class, and to provide opportunities for students to increase their understanding?

I-3. Are teachers adapting instruction for those who need differentiated instruction? (I)

- a. Do teachers review relevant sources of data that may indicate potential strengths or needs prior to designing instruction?
- b. Do teachers have access to relevant sources of data that are organized according to their caseloads?
- c. Have teachers been provided professional learning opportunities related to the analysis of data and subsequent use during instructional design and delivery?

I-4. Are teachers providing enrichment for those students whose rate of learning exceeds the intended pace? (I)

- a. Is the enrichment consistent with the scope and sequence of the intended curriculum, such that it extends learning within key areas, as opposed to simply adding additional topics that may lack rigor and relevance?

I-5. Are all teachers pacing through the curriculum at established and appropriate pace, with adjustments as needed to respond to students' needs? (I)

- a. Are teachers using curricular blocks that have been allotted for remediation or enrichment in response to formative assessment data?

I-6. Do all teachers know and use evidence-based practices in the teaching of academic and content vocabulary to all students? (I)

- a. Are all teachers delivering direct and explicit instruction on key content vocabulary terms?
- b. Are evidence-based strategies used in all classrooms for the teaching of vocabulary?
- c. Is content specific science vocabulary used consistently across all teachers within a grade level and vertically across grade levels?
- d. Do teachers model the use of vocabulary terms in context during classroom instruction, and require that students do, as well?

I-7. Are unit and lesson objectives/essential questions /learning intentions clear to students? (PP, I)

- a. Are the objectives communicated clearly in written and oral form?
- b. Are the objectives aligned to the PA science standards?
- c. Are the objectives aligned with district written curriculum?
- d. Are students able to state/communicate the learning targets?
- e. Are success criteria made clear to students?
- f. Are the objectives revisited at the end of each lesson in order to check for understanding?

I-8. Does instruction focus on evidence-based practices which delineate how students should learn science? (I)

I-9. Are students provided with investigations at Webb’s Depth of Knowledge (DOK) levels 3 and 4, embedding DOK 1 and 2 levels within the instruction? (I)

I-10. Is technology used to enhance students’ understanding of science concepts? (I)

- a. Do all teachers and students have access to technology?
- b. To what degree is technology used in all classrooms?
- c. Do teachers have access to online simulations and lab experiences for students?

I-11. Do all teachers provide students with direct instruction and sufficient guided practice in constructed responses to problems and tasks? (I)

- a. Is writing used on a daily basis to help students organize their thinking, and make connections between key concepts?
- b. Are students, or student groups, offered opportunities to work through scenario-style questions, with opportunities to develop responses and then debrief on their accuracy and the inclusion of embedded data from the scenario?

ASSESSMENT

*District/School:
Keystone Biology*

ASSESSMENT



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

- a. Are the assessments valid and reliable?
- b. Do all teachers have strong assessment literacy skills?
- c. Are common summative assessments in place?
- d. Unit assessments?
- e. Mid-terms and finals?
- f. Other?
- g. Are assessments analyzed for cognitive thinking levels (Webb’s Depth of Knowledge)?

A-2. Are common assessments which are consistent with the scope and sequence of the intended curriculum used by all teachers, and are the results analyzed to reveal strengths and needs that can be addressed? (I)

A-3. Are students routinely assessed through multiple choice, constructed responses (text dependent analysis), and performance tasks? (I)

A-4. For purposes of increasing inter-rater reliability, do teachers have opportunities to collaboratively engage in item-specific scoring using the available PSSA Item Sampler and Scoring Guide? (I)

A-5. Is there a universal screening process of multiple measures in place to determine which students may be in need of additional support prior to enrollment in the Biology course? Does this include using PVAAS student projection reports, available from Grade 5 forward? (PP, I)

A-6. Do Keystone course teachers conduct item analysis on common assessments to revise curriculum and instruction as indicated? (I, PR)

- a. Are assessment items aligned to assessment anchors and eligible content?

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

- a. Are PVAAS reports used during the curriculum review/revision process?
- b. Are PVAAS reports used in planning and delivery of instruction?
- c. Are PVAAS reports used during planning for (proactive) intervention supports?
- d. Are PVAAS reports used for secondary science course design and sequence?
- e. Are PVAAS reports used for placement of students?
- f. Are PVAAS reports considered when selecting students for inclusion in SLO groups?

A-8. Are students assessed at the appropriate level of Webb's Depth of Knowledge (performance assessments, objective assessments, and oral questioning)? (I)

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

- a. Do protocols exist for analysis of data?
- b. How frequently is data analyzed, and groupings/instruction changed as result of data analysis?
- c. Do teachers work in grade band teams (K-4, 5-8, 8-12)?
- d. Is student-specific data examined longitudinally to determine if individual students require intervention through a multi-tiered model (MTSS/RtII)?

ORGANIZATION

*District/School:
Keystone Biology*

ORGANIZATION



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

- a. Are support strategies, such as pre-teaching of concepts before regular instruction, additional time, small group instruction, use of leveled text, etc., being used?
- b. Are staff resources used proactively to support students currently enrolled in the course, as opposed to reactively for those who have not met proficiency?

O-2. Is data analyzed on both first-time Keystone Biology test takers separate from those who re-test? How is this information used? (I)

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

O-4. Are remediation courses/supports available to students not achieving proficiency on the Keystone exam? (PP)

- a. How well is the remediation plan working?
- b. Are the supports focused on the concepts with evidence to indicate that the student requires remediation? Is it student-specific and customized/targeted support?
- c. Is there collaboration between the teachers providing remediation and the student's teacher to assist in planning instruction targeted to individual student's needs?

O-5. Is there collaboration between the teachers providing remediation and Keystone Biology course teachers to assist in planning instruction targeted to individual student's needs? (PP, PR)

O-6. Does the building master schedule provide sufficient opportunities for students to engage in remediation? (PP, I)

Keystone Biology: Teacher Level Questions

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

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

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 asked in the order in which they are numbered. (Numbers are provided only as a reference for use.) Rather, it is intended to help generate thinking as a teacher considers his/her PVAAS teacher specific report on an annual basis. These questions, when considered through the lens of data available through PVAAS and other assessments, are intended to guide the self-reflection process and to assist in identifying root causes and developing action plans for the current group of students.

*Each question also indicates the related domain(s) from The Framework for Teaching
PP= Planning and Preparation
CE= Classroom Environment
I= Instruction
PR= Professional Responsibilities

CURRICULUM

Teacher: Keystone Biology

CURRICULUM



C-1. How well do I know the assessment anchors and eligible content for Keystone Biology and use that knowledge in my planning and delivery of instruction? (PP)

- a. Do I have sufficient content knowledge in the areas for which I will provide instruction?

C-2. Am I using appropriate materials and resources to engage students and lead them to proficiency? Do my resources and materials promote hands-on investigations, laboratory experiences, experimentation, and fieldwork? (PP)

- a. Am I using the textbook as a resource, versus using it as my curriculum, and planning accordingly?

C-3. Do my lesson plans include objectives and evidence-based strategies for the explicit teaching of academic and content vocabulary, aligned to the vocabulary highlighted in the Keystone Biology exam glossary? (PP)

- a. Does the curriculum, including unit maps and my lesson plans, indicate when and how each of these terms should be introduced and assessed?
- b. Am I using evidence-based strategies to teach scientific vocabulary?
- c. Examples: Frayer model, word analysis, semantic mapping, word walls, etc.

C-4. Am I embedding writing tasks in my lesson plans? (PP)

- a. Are the Academic Standards for Reading/Writing in Science and Technical Subjects embedded in planned activities for my students?
- b. Do I identify limited focused correction areas for writing assignments that allow me to prioritize my feedback to students (e.g. use of punctuation and end marks, inclusion of text-based support)?
- c. Do I plan lessons which engage students in communicating about science (e.g., technical writing experiences, argumentation)?

INSTRUCTION

Teacher: Keystone Biology

INSTRUCTION



I-1. Am I aware of the terms found in the Keystone exam glossary – and have I provided direct instruction on these terms and their application? (PP, I)

- a. Am I teaching vocabulary using evidence-based practices (e.g., Frayer model, word analysis, semantic mapping, word walls)?
- b. Have I accessed professional development on evidence-based practices to teach vocabulary effectively?

I-2. Am I providing instruction that is hands-on, inquiry-based, with investigations, experimentation, lab experiences and field work? (I)

- a. Am I providing students with real experiences to help them make connections between their personal lives and science?

- b. Am I providing opportunities for students to conduct open-ended investigations, as opposed to investigations with known outcomes?

I-3. Am I using the Biology textbook as a resource, in addition to other relevant materials and resources appropriate to teaching the written curriculum? (PP, I)

- a. Am I using the curriculum to determine “what comes next” as opposed to the subsequent section in my textbook?

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

- a. Am I pre-teaching concepts before regular instruction, providing additional time, using small group or individual instruction, using leveled text, etc. to provide differentiation within my classroom?
- b. Am I providing scaffolded instruction for those students at risk?
- c. Am I using graphic organizers to guide my students’ thinking, when appropriate?

I-5. Am I monitoring my pacing of instruction through frequent checks with the pacing guide/written curriculum? (PP, I)

- a. Am I adjusting pacing to meet the needs of my students?
- b. Do I know the relative priorities of my curricular objectives so that I can make adjustments when time is lost to unforeseen events such as inclement weather?

I-6. Am I knowledgeable about Webb’s Depth of Knowledge (DOK), and therefore providing hands-on tasks and questions at levels 1, 2, 3, and 4 for all students? Am I designing investigations at DOK levels 3 and 4, embedding the knowledge at DOK levels 1 and 2 in the instruction? (PP, CE, I)

- a. Am I using effective questioning techniques, with purposeful planning to address levels of thinking as defined in Webb’s DOK?
- b. Have I planned appropriate blocks of time within my lessons to allow students to develop an appropriate depth of knowledge? Do I know and understand Webb’s DOK as it pertains to inquiry-based experiences?
- c. Have I participated in professional learning opportunities necessary to develop good questions and tasks at DOK levels 2 and 3?

I-7. Am I using PVAAS projection data available on students in my current course to inform my instruction, including differentiation within the course, and/or using this information to identify students at risk at start of course? (PP, I)

I-8. Am I providing timely feedback to students along the way? (CE, I)

I-9. Am I clear with students on each lesson’s learning target(s)? (I)

- a. Are lesson objectives/essential questions posted?
- b. Do lesson plans clearly delineate the lesson objectives/essential questions/learning intentions?

- c. Do my lesson targets focus on problem solving, inquiry, application, and process skills?
- d. Are my students able to articulate the learning targets?
- e. Does my science instruction link content to real world application?
- f. Am I clear on the success criteria to meet the targets?
- g. Do I provide opportunities for my students to reflect on their understanding and identify questions or concerns related to their learning?

I-10. Am I aware of each student's level of risk in literacy as well as mathematics in order to provide any needed scaffolding during science instruction? (I)

ASSESSMENT

Teacher: Keystone Biology

ASSESSMENT



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

- a. Do I use formative assessments on a daily basis to inform my instruction and to provide feedback to students along the way?
- b. Are students provided opportunities to apply the feedback to their learning?
- c. Do I have strong assessment literacy?
- d. Are my assessments valid and reliable?
- e. Are my assessments developed to the rigorous level of the standards?

A-2. Am I identifying students for supplemental/tiered support for students enrolled in the Keystone Biology course? (PP, I)

A-3. Am I considering all available achievement and growth assessment data on students as I plan and deliver instruction? (PP, I)

- a. Am I considering information that can be gleaned from the PVAAS teacher specific report, PVAAS value added and performance/quintile diagnostic report, PVAAS projection data, PSSA results, Study Island, etc.
- b. Am I using the PVAAS projection score for individual students in my classroom to assist in the planning and delivery of instruction?
- c. Am I using the PVAAS Custom Student Report to assist in the planning and delivery of my instruction?

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

A-5. Am I working with colleagues in teams to analyze common assessment data? (PR)

A-6. Do I make use of ELA and math data in order to consider a student's difficulty with skills from these content areas as a possible reason for their difficulty understanding science concepts? (I)

ORGANIZATION

Teacher: Keystone Biology

ORGANIZATION



O-1. Am I identifying students for supplemental/tiered support during the year, prior to the Keystone exam? (PP, CE, I)

O-2. Am I collaborating with Keystone Biology teachers to plan, prepare, and analyze common assessment data during the course? (I, PR)

O-3. Am I using the Biology period efficiently? (I)

- a. Am I starting on time and using the full period?
- b. Am I prepared and organized for inquiry-based investigations, labs, experiments, and fieldwork?
- c. Do I have efficient procedures for homework review and collection?

O-4. Am I using my PVAAS growth reports and examining past patterns to help inform my instruction for my current groups of students? (PP, PR)

O-5. Am I collaborating with remediation teachers to identify effective teaching practices and provide input on the needs of individual students? (PR)