Success in Secondary Mathematics Using Data to Inform a Systems Approach (Grades 6-12)

April 2020

COMMONWEALTH OF PENNSYLVANIA
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Acknowledgement

Jim Bohan, Ed.D.

A special thank you to Dr. Jim Bohan for consulting with the PVAAS Statewide Team for PDE on the design and development of this guide. Over the years, Jim has shared his knowledge and experience with LEAs across Pennsylvania by providing guidance on the use of PVAAS, as well as other data, in making decisions around mathematics programming. He has provided assessment expertise and data services to LEAs/districts and schools across Pennsylvania. As a former member of the PVAAS Statewide Team for PDE, Jim has provided extensive professional development and direct work with districts/schools over the years on the content focus of this guide. This resource serves as an additional way to disseminate the content and processes shared across Pennsylvania.

Jim is a 38 year veteran of high school mathematics teaching and has served as a K-12 mathematics coordinator in two school systems. He has been an adjunct instructor of mathematics and statistics at several colleges and universities in Illinois and Pennsylvania. He has been a presenter at National Council of Teachers of Mathematics and National Council of Supervisors of Mathematics annual conferences. Jim has published numerous articles dealing with issues of mathematics and statistics education, data-informed decision-making, assessment, and other topics.

Jim holds an M.A. in mathematics from Loyola University in Chicago, an M.S. in applied statistics from Villanova University and his doctorate in educational leadership from Immaculata University.

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Introduction

This guide provides LEA/district, school, and mathematics content leaders with a structured, data-informed process to assist in the design and/or re-design of specific components of the secondary (Grades 6-12) mathematics program within an LEA/district. Specifically, this guide addresses the following components:

1. Design of secondary math pathways, i.e., a sequence of math courses, which address the needs of all students leading up to and including Algebra I
2. Development of criteria for student course placement in the pathway up to and including Algebra I

The design/redesign of the Grades 6-12 math course pathways and placement decision criteria rests on the analysis and evaluation of the current secondary mathematics program, and therefore, that is also addressed in this guide. The use of PVAAS data, along with other data sources, is fundamental in making these decisions through a data-informed process.

District leaders, math supervisors, school leaders, and teacher leaders may use this guide in whole or part. The Appendix section includes "fillable" templates you may complete as you work through the process included in this guide.

The guide is not meant to be an inclusive document in the design of a successful secondary mathematics program. There are other important variables beyond what is addressed here, including instructional and assessment strategies, alignment between curriculum, instruction, and assessment, rigor, curriculum compacting, etc.

Overview of the Process
You may follow the process in its entirety or depending on the needs of your LEA/district or school(s) at the time, you and your team may choose to focus on specific steps.

Learn more!

Recorded Webinar:

Lead with the Guide! A "How-To" Session for Using the *Success in Secondary Math Guide*

Access Videos & Recordings
(recordings listed alphabetically)

Overview of the Process	
1. Prep Your Team	▪ Form a system-wide math team/committee to address specific components of an effective secondary mathematics program ▪ Build shared beliefs & knowledge base about Algebra I ▪ Confirm shared understanding of types of data and measures of student learning assessments ▪ Analyze your current achievement and growth data
2. Organize & Create Your Data Profile	▪ Analyze types of data relevant to mathematics decision-making ▪ Develop comprehensive assessment map for secondary math decision-making
3. Develop Your System of Pathways	▪ Plot and analyze current math course pathways/course offerings ▪ Design or re-design secondary mathematics pathway
4. Define Your Decision Protocol for Course Placement	▪ Choose data sources & targets for placement criteria ▪ Detail & critique your existing placement & decision protocols ▪ Design or re-design your decision criteria ▪ Test your decision protocol
5. Bring It All Together!	▪ Merge your revised mathematics pathway with your revised decision criterion

Step 1: Prep Your Team

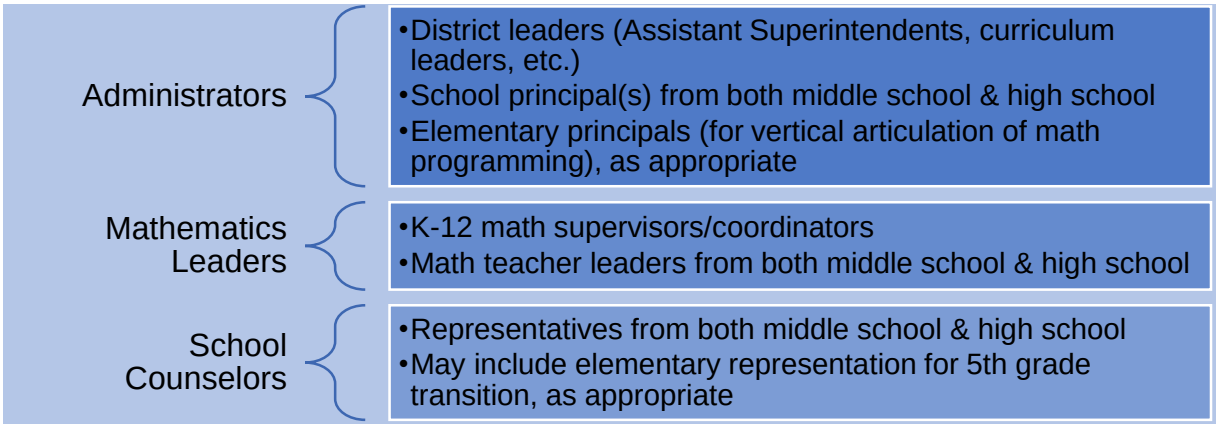
Four components are involved in this initial step:

1. Form a system-wide math team/committee
2. Build shared beliefs and knowledge base about Algebra I
3. Confirm shared understanding of types of data and measures of student learning assessments
4. Analyze current achievement and growth data

1.1 Form a System-Wide Math Team/Committee

The work involved in the development and enhancement of processes for a secondary mathematics pathway and placement criteria involves many stakeholders, spanning a range of grade levels. Typically, this process is orchestrated at the LEA/district office level, because of the need for a system-level perspective, as the decisions often begin as early as grade 5 and follow into the high school level. A lead person on the team must be identified to steer the work over time and to ensure that all the necessary stakeholders are involved, providing input at appropriate points along the way.

In addressing the process, whole or part, it is recommended that the following roles be considered as members on this Math Committee.



Process and Facilitation of Team

The work described in this guide is a process. This process could span an entire school year. This will vary by LEA/district based on the current mathematics program, the openness of the team to evaluate the program, the experience of the team with data, as well as other factors. An LEA/district may choose to have an external facilitator, such as an IU consultant, facilitate the work of the LEA district team through some or all of this process.

1.2 Build Shared Beliefs and Knowledge Base Regarding Algebra I Programming

It is important that the LEA/district mathematics committee have clarity on the outcomes they plan to achieve and how this guide can be used to inform the work. The committee leader or team facilitator may take the following steps to ensure common understanding and consensus of purpose and mission among the team members.

1. All team members **review this Guide** to familiarize themselves with the purpose and use of the Guide to facilitate the work

2. Team members collaboratively determine the areas of **focus** for their work and outcomes to achieve:
    a. Design or re-design the secondary math pathways?
    b. Develop or enhance the placement criteria/decision-making for individual students?
    c. Both?
3. Establish a **meeting schedule**, with short- and long-term action steps delineated
4. Outline **roles and responsibilities of team members**
5. Develop **protocols** for the work, documentation, and communication plans
6. Establish **common beliefs** about Algebra Readiness

Beliefs about Algebra I
There are varying beliefs about the nature of an effective Algebra program, as well as the preparedness needed for timing of placement in an Algebra course sequence. Providing an opportunity to assess beliefs about students and Algebra, discussing and coming to consensus among at least the Math committee/team is an early step in preparing for the work.

The team leader may consider using the questions below as a team activity. The questions are designed to engage committee members in a discussion about Algebra, exploring various beliefs and practices, and coming to consensus in order to ground the team in common language and understandings for the purpose of the rest of the work. Some may spark lively, but important, discussions. Also remember that you may have data to add to these discussions!

Algebra I Discussion Questions
1. Is there one, single Algebra program that is effective for all students?
2. Are all of our students ready to study a full course in Algebra at the same grade level, just not at the same time?
3. Should proficiency in computation be a requirement for success in Algebra?
4. Will a student be successful in Algebra I if they are skilled in memorizing procedures?
5. Are boys ready for Algebra at a younger age than girls?
6. Should a student's level of reading and writing skills be considered in evaluating the student's readiness to pursue the challenges of Algebra I?
7. Does Algebra readiness include variables such as organizational skills and perseverance?

Your Turn: Algebra I Discussion Questions
See the Appendix (Workbook) for a table you may complete during your team discussion, with space for comments about each question.

1.3 Confirm Shared Understanding of Types of Data & Measures of Student Learning Assessments

This section offers background information as well as frameworks for the organization of data by the team. The data discussed either currently exists within the district/LEA or may represent data that is important to these decisions.

Categories of Data

In the revision or creation of a mathematics data profile, confirming that committee members demonstrate a shared understanding of the types and categories of data is a necessary initial step in making decisions regarding course sequencing and course placement.

Categorizing data helps users make decisions on where to find information, how to process and display it, and how to understand the reliability and usefulness of the information.

Bernhardt (1998) offers four categories of data available to schools, identified as Multiple Measures of Data. Each of these categories include information helpful in the design of a secondary mathematics program, specifically in creating a course pathway and developing effective decision-making criteria for placement within the math pathway.

Using Bernhardt's categories of data below is an application of this multiple measures model applied specifically to the subject of mathematics.

Multiple Measures

Demographic Data *(Manifested in variables such as ethnicity, socioeconomic status, enrollment, gender, native language, etc.)* ▪ Age ▪ Grade ▪ Race ▪ Ethnicity ▪ IEP ▪ Economically Disadvantaged ▪ Migrant ▪ Homeless ▪ 504 ▪ English Learners	**Perception Data** ▪ Students' impressions about teacher instruction ▪ Students' beliefs about their mathematical abilities ▪ Beliefs held by community, parents, and stakeholders in general (typically gathered through conversations, surveys and observations) ▪ Beliefs among administrators and teachers about Algebra programming *(See Appendix A for Algebra I Discussion Questions)*
Process Data ▪ Curriculum ▪ Instructional delivery ▪ Assessment ▪ Structures/routines in the school	**Student Learning Data** *(Typically refers to "standardized results, grade point averages, standards assessments and authentic assessments" - Bernhardt)* ▪ Summative ▪ Formative ▪ Diagnostic ▪ Benchmark

All of these categories of data provide information to the team useful in the design or re-design of a successful secondary math program.

Focusing on Student Learning Data
Student learning data includes these four types of assessment: Summative, Formative, Diagnostic and Benchmark, all of which focus on student achievement (PDE SAS). Additionally, and of equal importance is **PVAAS data**. While some background information on PVAAS is included here, readers are encouraged to access the PVAAS website for resources and information to fully understand the role of PVAAS in this process (PVAAS Login Page).

The following are some **examples** of Student Learning Data:

Student Learning Data	
Summative Measure: PVAAS Data	• Growth Data • Projection Data
Summative Assessments	• PSSA • Keystone Exams • Finals/Midterms • Unit/Chapter tests • Course Grades
Formative Assessments	• Progress monitoring (formal curriculum-based measures) • Formative assessment strategies: exit tickets, questioning strategies
Benchmark Assessments	• Edmentum/Study Island • DIBELS • AIMSweb
Diagnostic Assessments	• CDT (Classroom Diagnostic Tool)

As can be seen in the table, it is critical to include PVAAS growth data and PVAAS projection data within the category of "student learning data," as it expands that category to include information paramount to the measurement of student learning outcomes. While PVAAS is not another assessment, it provides annual, summative measures for schools/districts.

What is PVAAS?
PVAAS provides growth data and projection data, i.e., data that looks back and data that looks forward.

Both looking back (at previous students) and looking forward (to current students) promotes reflective practices which allow educators to analyze what worked, what didn't, and what actions need to be taken to address the planning needs of the currently enrolled students in the current year and years ahead.

Growth data, looking back at the growth of previous students, when combined with achievement data, provides a more complete picture of student learning data. Projection data, looking forward, provides information on levels of risk for current students – all of which is necessary

information in the continuous process of designing or redesigning math course pathways and placement criteria.

PVAAS provides the mathematics team with a variety of reports that facilitate discussion in addressing the math pathways and course placement decisions. Information gleaned from PVAAS reports can help answer the following potential questions:

1. Is our mathematics program working for all students (in a particular grade/subject)?
2. Is our mathematics program working for all students with varying achievement histories (in a particular grade/subject)? Across student groups?
3. What percentage of our students are on a trajectory to reach at least proficient or beyond on the next mathematics state assessment (PSSA Math, Algebra Keystone Exam)?
4. What percentage of our students are on a trajectory to reaching benchmarks set in regard to AP exams, ACT, SAT, and PSAT?
5. Is a specific intervention working for a targeted group of students?

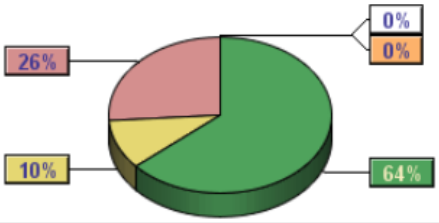
The answers to these questions provide the planning/design team with PVAAS data to inform decisions.

While there are many reports in PVAAS that can be helpful in answering questions such as those above, two reports are key for the committee to examine: (1) **District Launchpad** and (2) **District Projection Summary**. Additionally, the **Child Success Summary** allows educators to view the data on individual students, including past achievement history, projections to future PSSA/Keystones, and projections to AP exams.

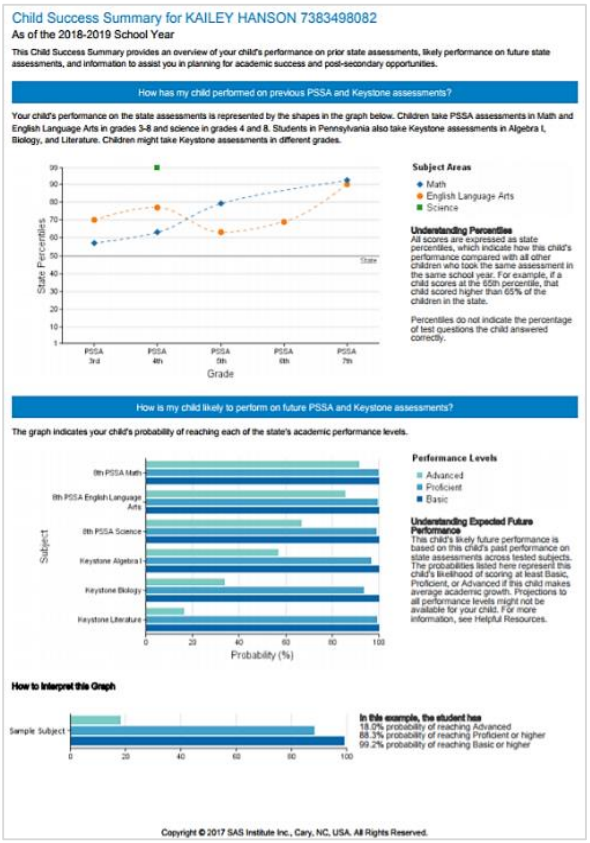
PVAAS District Launchpad

PVAAS District Projection Summary

Enrolled 8th Grade Projected to Keystone Algebra I (Proficient)		
Probability of Proficient or Above	Nr of Students	Percentage
Greater than or equal to 70%	509	64%
Between 40% and 70%	82	10%
Less than or equal to 40%	209	26%
Students who lack sufficient data	0	0%
Students at or above proficiency	0	0%



Child Success Summary



Child Success Summary for KAILEY HANSON 7383498082

As of the 2018-2019 School Year

This Child Success Summary provides an overview of your child's performance on prior state assessments, likely performance on future state assessments, and information to assist you in planning for academic success and post-secondary opportunities.

How has my child performed on previous PSSA and Keystone assessments?

Your child's performance on the state assessments is represented by the shapes in the graph below. Children take PSSA assessments in Math and English Language Arts in grades 3-8 and science in grades 4 and 8. Students in Pennsylvania also take Keystone assessments in Algebra I, Biology, and Literature. Children might take Keystone assessments in different grades.

State Percentiles

PSSA 3rd · PSSA 4th · PSSA 5th · PSSA 6th · PSSA 7th

Grade

Subject Areas
- Math
- English Language Arts
- Science

Understanding Percentiles
All scores are expressed as state percentiles, which indicate how this child's performance compared with all other children who took the same assessment in the same school year. For example, if a child scores at the 65th percentile, that child scored higher than 65% of the children in the state.

Percentiles do not indicate the percentage of test questions the child answered correctly.

How is my child likely to perform on future PSSA and Keystone assessments?

The graph indicates your child's probability of reaching each of the state's academic performance levels.

Subject

8th PSSA Math · 8th PSSA English Language Arts · 8th PSSA Science · Keystone Algebra I · Keystone Biology · Keystone Literature

Probability (%)

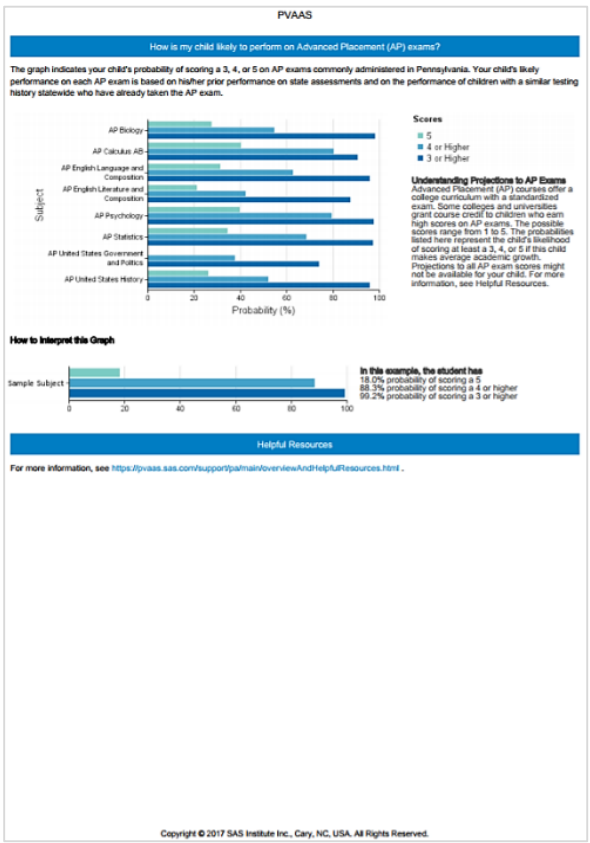
Performance Levels
- Advanced
- Proficient
- Basic

Understanding Expected Future Performance
This child's likely future performance is based on this child's past performance on state assessments across tested subjects. The probabilities listed here represent this child's likelihood of scoring at least Basic, Proficient, or Advanced if this child makes average academic growth. Projections to all performance levels might not be available for your child. For more information, see Helpful Resources.

How to Interpret this Graph

Sample Subject

In this example, the student has
18.0% probability of reaching Advanced
88.3% probability of reaching Proficient or higher
99.2% probability of reaching Basic or higher



PVAAS

How is my child likely to perform on Advanced Placement (AP) exams?

The graph indicates your child's probability of scoring a 3, 4, or 5 on AP exams commonly administered in Pennsylvania. Your child's likely performance on each AP exam is based on his/her prior performance on state assessments and on the performance of children with a similar testing history statewide who have already taken the AP exam.

Subject

AP Biology · AP Calculus AB · AP English Language and Composition · AP English Literature and Composition · AP Psychology · AP Statistics · AP United States Government and Politics · AP United States History

Probability (%)

Scores
- 5
- 4 or Higher
- 3 or Higher

Understanding Projections to AP Exams
Advanced Placement (AP) courses offer a college curriculum with a standardized exam. Some colleges and universities grant course credit to children who earn high scores on AP exams. The possible scores range from 1 to 5. The probabilities listed here represent the child's likelihood of scoring at least a 3, 4, or 5 if this child makes average academic growth. Projections to all AP exam scores might not be available for your child. For more information, see Helpful Resources.

How to Interpret this Graph

Sample Subject

In this example, the student has
18.0% probability of scoring a 5
88.3% probability of scoring a 4 or higher
99.2% probability of scoring a 3 or higher

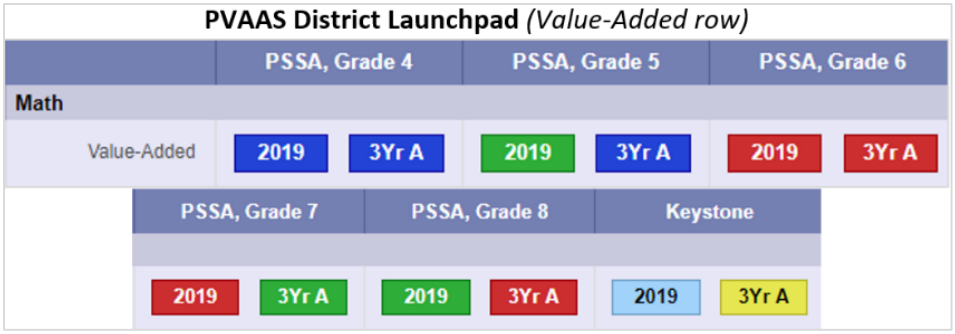
Helpful Resources

For more information, see https://pvaas.sas.com/support/pa/main/overviewAndHelpfulResources.html .

1.4 Analyze Current Achievement and Growth Data

Before beginning the work to design or re-design your math pathway and develop placement criteria, it's necessary to first evaluate the effectiveness of the current mathematics program, considering both growth and achievement data.

Carefully analyzing achievement and growth data will help the team identify areas of strength and need. The example table below illustrates the data that may be recorded in this step. The PVAAS Value-Added data was entered using the sample PVAAS District Launchpad.



Example Achievement & Growth Data (Table completed with sample data in italics)

PSSA/Keystone (%Prof/Adv)				PVAAS Value Added *(refer to District Launchpad; specify color)*	
Grade/Course:	**Year:** *2015*	**Year:** *2016*	**Year:** *2017*	**Most recent Year**	**3-year average**
Gr 5 Math	*55.1*	*61.0*	*62.6*	*Green (maintained)*	*Blue (gained)*
Gr 6 Math	*59.6*	*58.0*	*60.2*	*Red (fell behind)*	*Red (fell behind)*
Gr 7 Math	*51.6*	*59.6*	*62.5*	*Red (fell behind)*	*Green (maintained)*
Gr 8 Math	*45.0*	*47.5*	*59.5*	*Green (maintained)*	*Red (fell behind)*
Keystone Algebra I	*71.7*	*75.2*	*71.7*	*Blue (gained)*	*Yellow (fell behind)*

Your Turn: Your LEA/District's Achievement & Growth Data

Document & analyze current achievement and growth data. See the Appendix (Workbook) for a fillable template your team may complete. This information will be helpful as you enter the design stages of your math pathways. Knowing the growth and achievement history and patterns will assist the team in making decisions that take past history into account in planning for current and future students.

Step 2: Organize and Create a Data Profile for Secondary Mathematics

The next step for the team is to organize and revise or create a 6-12 data profile representing mathematics data necessary to inform effective decision-making later in the process.

2.1 Analyze Types of Data Relevant to Mathematics Decision-Making

To create a mathematics data profile, first document the data sources currently being used in the decision-making process of your grades 6-12 math programming. This requires the team members to reflect on data currently used in the multiple measure categories (process, perceptions, demographic, and student learning—which includes PVAAS growth and projection data), specifically used to develop the math course pathway and to make placement decisions.

As there may be differences from school to school within the system, the team must be sure to document an inclusive list of all data sources being used within the LEA. The questions below may help stimulate the thinking of the team, as you work to identify and list all current data sources.

Questions to consider regarding Perception Data:

1. Are teachers asked for recommendations and feedback regarding course placement? Where or when?
2. Are teachers asked for recommendations about math course scope and sequence (i.e., math pathways)?
3. Are students surveyed as to their beliefs about their success in mathematics/Algebra I? What do students believe about their mathematical abilities?
4. What do parents believe and understand about the timing and importance of Algebra I?

Questions to consider regarding Process Data:

1. Are the math curriculum, instruction, and assessment practices aligned?
2. Are course grades used in decisions about math?
3. Are common assessments aligned to PA Core Standards?

Questions to consider regarding Demographic Data:

1. Is achievement and growth data disaggregated in any way, e.g., by gender, ethnicity, socioeconomic status, etc.? If so, how is that used in decision-making?
2. How does attendance data play a role in decision-making?
3. How does discipline data play a role in decision-making?

Questions to consider regarding Student Learning Data:

Achievement

1. What assessments are used (summative, formative, diagnostic, and benchmark)?
2. What assessments are common across grades/schools that are used in decision-making?

PVAAS Growth Data

1. Is PVAAS growth data used? How, and for what purposes?

PVAAS Student Projection Data

1. Is PVAAS student projection data used? How, and for what purposes?

Below is an example of how your team might complete the data chart, through discussion of the sample questions offered above. It represents SOME data sources, not all, that might be typical in a district/LEA – **this is provided only as an illustration of what a completed chart might look like.**

Multiple Measures		Current Data Used to Inform Math Pathways & Placement Decisions Be specific about data sources!
Perception Data		*Teachers are asked at scheduling time to complete a math course placement form for each student. Recommendation on form asks teachers to comment on work habits and motivation of student, using a rubric along with their recommendation for next math course student should take.*
Process Data		*Grades in previous math courses are used as part of decision-making criteria. Students must have an "A or B" in previous math course(s) to progress to next highest course level.*
Demographic Data		*PVAAS Growth of Student Groups report is used to identify patterns in growth of specific student groups. That data is shared at math department meetings on an annual basis.* *Teachers have the option to document and comment on attendance and/or discipline issues on the student course recommendation form, but this is not required data to be used in decision-making*
Student Learning Data	**Achievement**	*Final exam grade used. A or B grade is considered acceptable for taking next highest-level course in the Math pathway. PSSA score (last Math score available) and CDT individual score, end of year*
	PVAAS Growth Data	*Teachers are asked at scheduling time to complete a math course placement form for each student. Recommendation on form asks teachers to comment on work habits and motivation of students, using a rubric along with their recommendation for next math course student should take.*
	PVAAS Student Projection Data	*PVAAS Child Success Summary (and/or individual PVAAS Student Projection report) for individual student decisions*

Your Turn: Current Data Sources Used to Inform Placement & Programming Decisions

See the Appendix (Workbook) for a blank Data Sources chart your team may complete.
Note: the team should discuss and document all data used in decisions about math programming, even if the use is not system-wide and even if team members aren't in agreement with using those particular data sources.

2.2 Develop Comprehensive Assessment Map for Secondary Math Decision-Making

Once your team has listed all data sources currently being used, next discuss more specifically *how* each of the data sources is being used.

How are each of the data sources used? Is the data currently being used to:

1. Evaluate the current mathematics program's effectiveness?
2. Design/re-design the math pathways (the course offerings)?
3. Make individual student placement decisions?

The sample table below provides an example of how the chart might be completed by your team.

Multiple Measures		Current Data Used for Math (be specific by naming the measure)	Used for Evaluation of Current Program Effectiveness?	Used for Math Course Pathways Design Decisions?	Used for Placement Criteria Decisions?
Perception Data		*Teacher Recommendation*			X
Process Data		*Student Final Grades in most recent Math course*			X
Demographic Data		*Growth of Student Groups (PVAAS)* *Attendance/Discipline*	X	X	 X
Student Learning Data	Achievement	*PSSA* *CDT*	X	X	X X
	PVAAS Growth Data	*District/School Launchpad (PVAAS)*	X	X	
	PVAAS Projection Data	*Child Success Summary (PVAAS)*			X

Your Turn: Current Data Sources & How They Are Used

See the Appendix (Workbook) to continue working on your LEA/district's data profile, by indicating how you are currently using the data sources identified in the previous activity.

Analyze Your Data Sources Chart

The final part of this step is to analyze your data profile, and determine what areas warrant revisions and enhancements.

For example:

1. Are PVAAS individual student projection data included? If not, the team may choose to add that to the chart, recognizing the importance of this data.
2. Are you "missing" a diagnostic assessment (e.g., CDT)? What do you need to add to your data profile?
3. Is there an absence of data used to evaluate the effectiveness of your current program?

The information offered below provides rationale for including some key data sources.

Student Learning Data - Achievement

1. PSSA
   a. Patterns in percentages of students Proficient/Advanced provides information about effectiveness of the math program/course
   b. Individual student's achievement history is one piece of information helpful in determining course/pathway selection

2. Classroom Diagnostic Test
   a. Provides information on achievement patterns

Student Learning Data – PVAAS

1. PVAAS Projection Data (Projection Summary, Individual Student Projections, Child Success Summary)
   a. Projection Summary reports provide "big picture" of risk levels which help with decisions about math pathways
   b. Individual student projections are more reliable even 2 years out than a single PSSA score, assisting in placement decisions
2. PVAAS Growth Data (District/School Launchpad)
   a. Value-Added measures on Launchpad provides evidence as to effectiveness of mathematics program; growth along with achievement provides a more total picture of program/course effectiveness
   b. Diagnostic report on Launchpad provides data on whether program is working for all students and for students with specific achievement histories

Perception Data

1. Teacher Recommendation
   a. Individual teacher recommendations provide perceptual data re: individual student course placement

Demographic Data

1. Attendance
   a. Attendance data provides information to be combined with achievement and projection data that may impact on an individual student's success

Your Turn: Analyze your data chart/profile and revise/enhance or recreate as needed, using the information above and collective knowledge of the team!

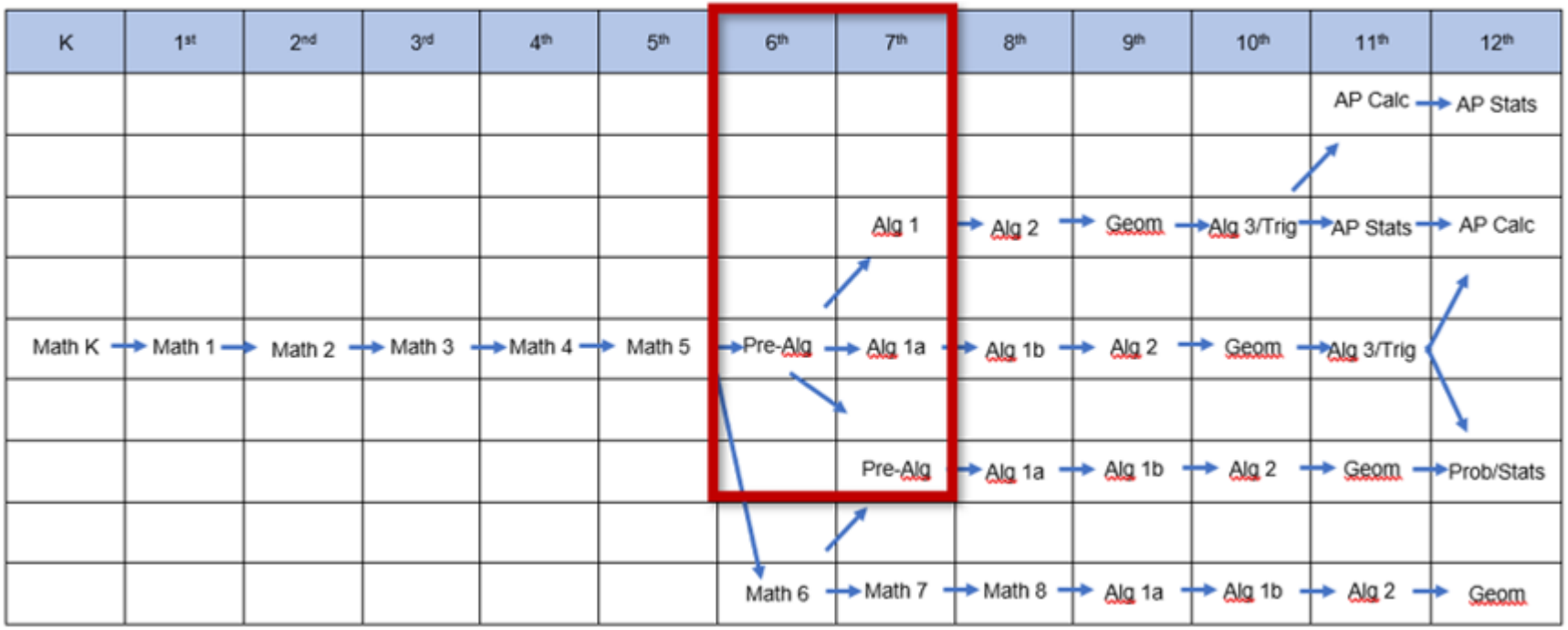
See the Appendix (Workbook). Revise the data chart you created earlier on page 36. Or, you may create a new chart if you prefer, on page 37.

Step 3: Develop Your System of Math Pathways

3.1 Plot and Analyze Your Current Pathway

Now that the team has identified and developed a grade 6-12 math data profile, the next step is to create a math pathway that allows for options in course placement in meeting the needs of a diverse student population. **First**, map out/display your current program. **Then**, analyze it to assess how well your current program meets the needs of your students.

In order to develop your mathematics pathways, it is helpful to graphically display the sequences in your current program and the directions of progress through each sequence. The value in having this type of display is that one can quickly determine the options for each student at a particular level in a sequence. For example, if a student is currently enrolled in 6th grade Pre-Algebra (see highlight in the sample sequence below), it is clear that the students has three possible placements in 7th grade: Algebra 1, Algebra 1a, or Pre-Algebra.



Your Turn: Plot Your Current Pathway

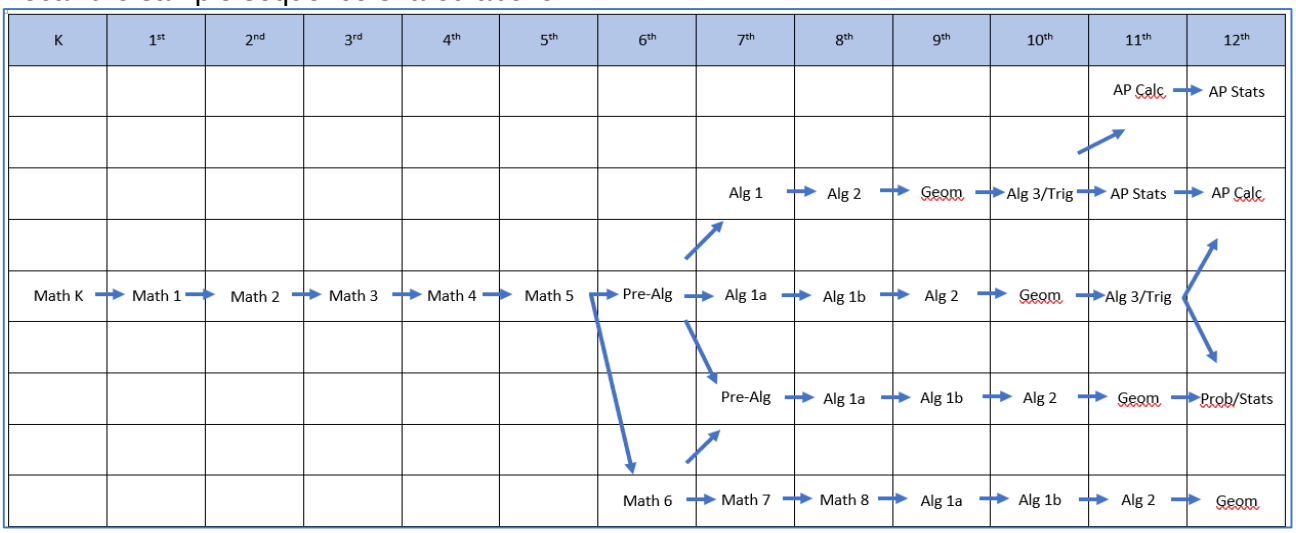
Detail graphically how your students proceed through your mathematics education system. See Appendix (Workbook) for a template your team may complete. Be sure to include indications of progression (arrows) through courses/grades based on level of success or lack of success.

Analyze Your Program

Now that the team has mapped out the existing pathways, you'll next analyze those pathways. Discuss these four basic questions during your analysis:

1. Are the pathways designed to allow students to advance from one pathway to another?
2. Are the pathways designed to provide opportunities for students to change pathways if they are not successful in their original placement?
3. What is the grade in which the *first placement* of students in separate math pathways occurs?
4. Is there consensus among your team that your current sequence addresses the needs of your students and is consistent with the district resources available?

Recall the sample sequence shared above:



Below are foundational questions that could be addressed for the sequence above. Note this is only meant to provide an example.

1. **Are the pathways designed to allow appropriate students to advance from one pathway to another?**

   Answer: The arrows directed upward indicate that high performing students have the opportunity to move to a more challenging sequence. For example, the students in Pre-Algebra in Grade 6 can advance to Algebra I in Grade 7. Students in Math 6 can advance to Pre-Algebra in Grade 7.

   Do these opportunities work throughout the pathway? Are changes needed? The staff in this system may want to consider even more opportunities than presently exist. For example, in this example, a student who is very successful in Math Grade 8 does not have the opportunity to take Algebra I in Grade 9.

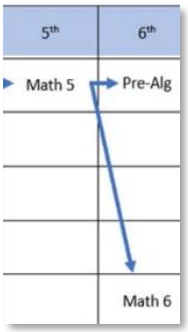
   Likewise, a student highly successful I Algebra 2 in Grade 9 only has the opportunity to take Geometry in Grade 10.

2. **Are the pathways designed to provide opportunities for appropriate students to change pathways who are not successful in their original placement?**

   Answer: The arrows directed downward indicate that students who are struggling can be moved to less challenging pathways. For example, students in Grade 6 Pre-Algebra may take Pre-Algebra again in Grade 7.

   Do these opportunities work for all students throughout the pathway? For example, in this example, what are the course pathway opportunities for the student not successful in Grade 9 Algebra 2, other than repeating Algebra 2? The staff in this system may want to consider more opportunities than presently exist.

3. **What is the grade in which the first placement of students in separate math pathways occurs? Answer:**
   a. ***Grade Level:*** *FIFTH (see screenshot below)* (The team should address additional questions here in analysis of the existing pathway.)



   b. How is this placement decision into the separate math pathways made? In this example, what determines where the first-time split occurs?

Data Considered	Criteria	When the decision is made?
PSSA Math 4th Gr	*Adv*	*March 5th Grade*
PSSA Reading 4th Gr	*Prof or Adv*	
Math Midterm 5th Gr	*Minimum of B+*	Who makes the decision?
Teacher recommendation		*Principal and School Counselor*

   c. **Is this choice of grade level designation and the data considered appropriate for all students or not appropriate for all students?** Care must be taken to consider all students in this process.
   Answer: The use of PVAAS, midterm grade, and teacher recommendation does identify highest performers. However, the PSSA performance requirements may exclude students with a high likelihood of success in math. Therefore, individual student PVAAS projections should be included in the decision-making as they provide highly reliable insight into future performance, adding to the decision-making criteria.

4. **Is there consensus among your team that your current sequence addresses the needs of your students and is consistent with the district resources available?**
   Answer: Yes, team members all agree that the existing math sequence addresses the needs – or – No, team members agree that additional opportunities are needed for highest achieving students.

Your Turn: Analyze Your Current Pathway

Use your pathway map and answer the questions provided in Appendix (Workbook).

3.2 Revise Your Current Math Pathway

So far, in this step, you have mapped out your current math pathway (course offerings, scope of courses and sequencing of courses). Then, you have analyzed that using the suggested questions in this guide.

The final part of this step is to revise your current mathematics pathways based on your analysis. You may choose to create a new chart (using sample chart in Appendix) or simply revise the one created through the previous steps.

Your Turn: Revise or Re-Design Your Current Math Pathway (as needed)

See Appendix (Workbook). Revise the pathway you created earlier on page 38. Create/re-design a new chart on page 40.

Step 4: Define Your Decision Protocol for Course Placement

Now that the committee has analyzed and refined the math course pathway, including the point at which course decisions "split off," it is now time to establish criteria for movement through the pathway of courses. In other words, "what criteria will be used for course placement decisions for students?" Decisions are necessary at each course selection step "along the way" to effectively make decisions for each student based on vetted criteria.

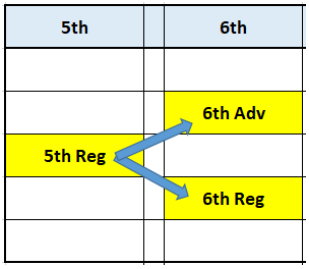
There are three actions in this step:

1. Choose the data sources and the target for each data source to be considered
2. Determine the decision criterion that determines the recommendation
3. Test and evaluate the process with "live" data.

Each of these three actions is outlined below.

4.1 Choose Data Sources & Targets for Placement Criteria

For the sake of uniformity in this activity, let's assume that your course pathways for 6th grade looks like this:



Successful implementation of this decision requires two ingredients:

1. Appropriate placement criteria
2. Appropriate differences in curriculum, assessment and instruction in each of the 6th grade options

Note: If your decision process involves more choices (e.g., an option for 6th Basic, then the activities detailed below will need to be replicated for all options.

You may document your decision criteria in a table. Review the example below.

Criteria for Placement into ***6th Advanced Math***	
Data Source	Criteria for Each Data Source (Target)
PSSA Math – 4th Gr	*High Proficient - Scale Score ≥ 1090*
PSSA ELA – 4th Gr	*High Proficient - Scale Score ≥ 1050*
PVAAS Proj to 5th Gr Math (Proficient)	*Probability ≥ 70%*
PVAAS Proj to 6th Gr Math (Proficient)	*Probability ≥ 70%*
District Common 4th Gr Math Test	*B – or better*
Class Grade – Midterm 5th Gr	*B – or better*
Attendance	*Consistent attendance*

NOTE: LEAs will want to check the scores for high proficient/advanced with PDE cut scores to ensure the use of the appropriate score.

Some notes regarding the sample criteria:

- Scale scores rather than performance levels are suggested since they are more consistent than performance levels and more flexible. However, keep in mind that there is standard error around the scale scores, and they are therefore considered guidelines. The specific values in the template can be chosen by considering performance category cutoffs but can be adjusted within cut point boundaries based on local data team experience with their students. For example, if the current cut scores for Proficient are 1000 and 1107 for 8th grade mathematics, the team may choose a scale score of 1090 so that students scoring in the High Proficient range can meet the stated requirement.
    - Refer to PSSA Cut Scores
- PVAAS projections provide the likelihood that a student will achieve the specified performance category on a future test and are more reliable than a single test score even 3 years into the future.
- Local assessments included with the assumption that they are common for all candidates for 6th grade Advanced Mathematics.

Your Turn: Criteria for Placement: Data Sources & Targets

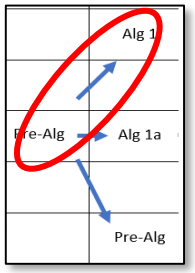
See the Appendix (Workbook) to complete the Criteria for Placement Table. Complete this table for EACH option in your sequence. (Several templates are provided for your convenience.)

4.2 Detail and Critique Your Existing Placement and Decision Protocols

The next task is to detail and critique your decision protocols at each decision-making point within the math pathway. The following example illustrates this process.

Consider the highlighted decision in our pathways from our sample sequence. (Remember, you should have similar table for each decision.)

In the table, you should identify courses from which and to which the student is being considered to move. In our example, the student is being considered for a move from 6th Pre-Algebra to 7th Algebra. (The other options would be for the student to move from Pre-Algebra in Grade 6 to Algebra 1A or repeat Pre-Algebra in Grade 7.)



Pathway Decision: *Placement from 6th Pre-Algebra to 7th Algebra 1*		
DATA SOURCE	**CRITERIA**	**CONSIDERATIONS**
PVAAS Projection – 6th to Keystone Algebra	Prob of Proficient ≥70%	May provide most informative data and insight into future performance
PVAAS Projection – 5th to 7th Math	Prob of Proficient ≥70%	May be too high – don't want to exclude borderline students
PVAAS Projection – 5th to 7th ELA	Prob of Proficient ≥70%	Reading is necessary but possibly not at this probability level.
PSSA 5th Math	Advanced or Proficient	Informative
PSSA 5th Reading	Advanced or Proficient	Reading is necessary but possibly not at this Achievement level.
Teacher Recommendation	Algebra 1	Informative
District Midyear Benchmark	Above grade level	Informative

In order to complete the *Considerations* column, the committee should discuss the following questions. The sample answers provided here reflect the completed chart *Considerations* column, shown above.

1. **Do the achievement and growth reports of the students who are currently placed in Algebra I indicate that the placement was appropriate? Are all of the students performing and growing as your placement process anticipated?**
   Answer: *It is recommended that you consider the performance of currently placed students in relation to the data indicators listed in your table. For example, you could find that several students whose PVAAS probabilities of being proficient on 5th grade to 7th grade PSSA Math test were in the 60%-65% level are doing very well in their current course placement. Similarly, all other sources should be investigated utilizing students who have been placed in the selected course.*

2. **Are you considering all data that is available and may be helpful in the placement process? If not, what other data are available?**
   Answer: May like to include more specific non-academic data, in addition to the teacher recommendation (e.g., attendance, discipline, organizational skills)

3. **What are the changes in the course placement decision protocol that are recommended for implementation?**
   - *An analysis of the placement decisions of current successful and current unsuccessful students could indicate that this scheme appears to be appropriate for students who are higher achievers, but not working for students who are lower achieving.*
   - *A concern has been noted that there are several students who were placed in Algebra IA that could have been successful in Algebra I. These students are performing at a high level and appear not be substantially challenged by the demands of Algebra IA. There appears to be a need for reconsideration of the data sources and criteria.*

Your Turn: Detail and Critique Your Existing Placement and Decision Protocols

The team is now ready to critique their current decision-making criteria, using the template provided in the appendix. This should be done for every course placement decision throughout the pathway. Doing this work will establish the consensus needed to revise or refine your LEA/school's current decision protocols. Remember: this section is merely to provide a forum for discussion of your current criteria. Step 4 will be the step where the placement decision protocols will be confirmed and finalized.

4.3 Design or Re-Design Your Decision Criterion Protocols

At this point in the process, the team has documented and considered the current course decision protocols for each of the decision points along the way. It is likely that your team has identified areas where the decision criterion may need revised or re-designed in total! The following information offers suggestions for "tightening" your decision-making protocols relative to pathway decisions for students.

There are many ways to use the data to determine the recommendation for or against advancement. This guide provides three methods for consideration in enhancing your protocol development to include quantifiable measures. After studying the examples, your team should then discuss and make a tentative choice of methods to use in your LEA/district. Please note that these are examples only, and not intended to be required criteria. LEAs/districts make these determinations. Placement into 6th Advanced Math is ONLY used as an example to illustrate the three methods for criteria.

The following examples are using the table on page 23 to illustrate each of the three method options below.

Criteria for Placement into *6th Advanced Math*	
Data Source	Criteria for Each Data Source (Target)
PSSA Math – 4th Gr	High Proficient - Scale Score ≥ 1090
PSSA ELA – 4th Gr	High Proficient - Scale Score ≥ 1050
PVAAS Projection to 5th Gr Math *(Proficient)*	Probability ≥ 70%
PVAAS Projection to 6th Gr Math *(Proficient)*	Probability ≥ 70%
District Common 4th Gr Math Test	B – or better
Class Grade – Midterm 5th Gr	B – or better
Attendance	Consistent Attendance

NOTE: LEAs will want to check the scores for high proficient/advanced with PDE cut scores to ensure the use of the appropriate score.

Method 1: Decision based on Total Number of Targets

Criteria for Placement into 6th Advanced Math Student: _____			
Data Source	Target for Each Data Source	Yes	No
PVAAS Projection to 5th Gr Math *(Proficient)*	Probability ≥ 70%		
PVAAS Projection to 6th Gr Math *(Proficient)*	Probability ≥ 70%		
PSSA Math – 4th Gr	High Proficient - Scale Score ≥ 1090		
PSSA ELA – 4th Gr	High Proficient - Scale Score ≥ 1050		
District Uniform 4th Gr Math Test	B – or better		
Class Grade – Midterm 5th Gr	B – or better		
Attendance	Consistent attendance (LEA decision to establish specific criteria)		
	Totals		
Criterion: minimum of 4 Yes's (example only)	**Decision:**		

NOTE: LEAs will want to check the scores for high proficient/advanced with PDE cut scores to ensure the use of the appropriate score.

Method 1: This method totals the number of target values that met by the candidate. This total is next compared to the criteria that is set in advance by the LEA/district team.
Advantage: Very simple to tabulate
Disadvantage: Categories considered of equal weight

Method 2: Decision based on Total Weighting of Targets

Criteria for Placement into 6th Advanced Math			
Student: _____			
Data Source	Target for Each Data Source	Weight	Achieved
PVAAS Projection to 5th Gr Math *(Proficient)*	Probability ≥ 70%		
PVAAS Projection to 6th Gr Math *(Proficient)*	Probability ≥ 70%		
PSSA Math – 4th Gr	High Proficient - Scale Score ≥ 1090		
PSSA ELA – 4th Gr	High Proficient - Scale Score ≥ 1050		
Class Grade – Midterm 5th Gr	B – or better		
Attendance	Consistent attendance (LEA decision to establish specific criteria)		
	Totals	100%	
Criterion: minimum of 70% Achieved (example only)	**Decision:**		

NOTE: LEAs will want to check the scores for high proficient/advanced with PDE cut scores to ensure the use of the appropriate score.

Method 2: This method requires that each category be assigned a weight in advance. The candidate is evaluated in each category and an achievement level is indicated. The level values achieved in each category are totaled and that total is compared to the criteria that is set in advance by the administrative team.
Advantage: Categories can have different possible values; all categories are evaluated with achievement level designations.
Disadvantage: Students either achieve the target or they don't.

Method 3: Decision based on Weighted Point Values

Criteria for Placement into 6th Advanced Math				
Student:				
Data Source	**Possible Values**	**Points**	**Weights**	**Weighted Score**
PSSA Math – 4th Gr	Advanced = 10 Basic = 4 Proficient = 7 Below Basic = 0		.15	
PSSA Read – 4th Gr	Advanced = 10 Basic = 4 Proficient = 7 Below Basic = 0		.15	
PVAAS Projection to 5th Gr Math *(Proficient)*	Between 70-100%= 10 Between 40-50% = 5 Between 0-40% = 0		.20	
PVAAS Projection to 6th Gr Math *(Proficient)*	Between 70-100% = 10 Between 40-50% = 5 Between 0-40% = 0		.20	
Class Grade – Midterm 5th Gr	A = 10 B = 7 C = 4 D = 0 F = 0		.20	
Attendance	Consistent Attendance (LEA decision to establish specific criteria)		.10	
	Totals		100%	
Criterion: Minimum Points Achieved = *(Example only)*	**Decision:**			

Method 3: This method requires that the weight of each target data element be assigned in advance. The product of the value and weight in each category are totaled and that total is compared to the criteria that is set in advance by the administrative team.
Advantage: Categories can have different values and weights
Disadvantage: Best implemented with technology, such as Excel. Detailed process required.

Your Turn: Individual Student Templates
In Appendix (Workbook), blank templates for all three decision methods are included. Your team should determine which of the options work best in your setting and enhance your earlier decision-making protocol using one of these methods.

4.4 Test Your Decision Protocol

At this point, you have developed decision-making protocols for each of the course/pathway decision points along the way. Testing your decision protocols is a helpful next step in evaluating the usefulness and even accuracy of your protocols.

How do we test our decision protocols?

The key to testing and refining your Decision Protocol is to evaluate the decision that would have been made in the cases of students who have already completed the course.

> ***NOTE: Test both successful and unsuccessful students to see if the protocol will filter students appropriately!***

Also, expect that the protocols that are determined will undoubtedly have to be adjusted each year as more information becomes available and as the qualifications and achievement histories of students' changes. For example, if your elementary program shows increased student outcomes (changes in proficiency levels) at some point in the future, criteria for placement in advanced middle school options may need to be adjusted.

It should also be understood that these protocols, no matter how carefully designed, should be considered ONLY AS A RECOMMENDATION. Placement of students is a very complex process and should never be determined ONLY on the basis of a data-based protocol. The educational professionals ultimately must take responsibility for the decisions; however, protocols provide the best information to inform the educators' decisions.

Case Studies

The following two case studies exemplify the point of the last paragraph. Placement of students is not an exact science and any profile based only on numerical data should never be considered automatic. Data provide recommendations ONLY.

Case 1

Student Current in Grade 5			**Decision Time: Spring**
Schedule Decision? *6th Grade Accelerated (Placement)*			
Source	Criteria	Student Data	Evaluation
PSSA 4th Grade Math	Scaled Score ≥ 1090	Scaled Score = 1097	+
PVAAS Projection (Adv) • 5th to 6th Math	Prob > 90%	85%	–
Math Class Grade	A- or better	C	–
5th Gr Math Teacher	Positive Rec	No	–
Student must meet 3 of 4 criteria			

NOTE: LEAs will want to check the scores for high proficient/advanced with PDE cut scores to ensure the use of the appropriate score.

Considerations:

1. This student has met the criterion of performance on the 4th grade PSSA Math test.
2. The PVAAS projection to Advanced from 5th grade to 6th grade is a bit weaker that the standard chosen for that data. It is relatively close.

3. The Math Class Grade is well below the stated criteria. It may be useful to determine how well the overall average of C reflects the student's current level of understanding. This student may have experienced significant issues in the beginning of the year that have been addressed and overcome.
4. It is always suggested to have teachers supply reasons for their recommendation. It is very valuable to have qualities of perseverance, organizational skills, attitudes, etc. considered in the decision process, made as objective as possible through the use of a rubric for those evaluative judgements.

What about this student/case 1? Let's take a closer look.

According to the criteria needed, this student doesn't meet the evaluation criteria for entering 6th Accelerated Math. However, the ultimate decision is to place the student in 6th Accelerated. Why? What might the thinking be to make an exception in this student's case?

1. School team acknowledges that their grading practices are not uniform as to what goes into the final grade – notes that they currently have significant differences in grading practices between the 5th grade teachers.
2. Upon digging deeper, this student's C grade was impacted by a first marking period of a low D average, and grades improved throughout the year, but the averaging resulted in a high C regardless of improvement.
3. Teacher recommendation is NO, but upon further discussion this teacher indicated that she said "NO" based on this student's belief that he was "not good in math". However, achievement history of advanced and 85% probability, along with very strong ELA skills prompted the decision to place in accelerated math, with close monitoring.

Clearly these decisions are not automatic! These decisions require professional discussions.

Case 2

Student Current in 7th Pre-Algebra		**Decision Time: Spring**	
Schedule Decision? *8th Algebra I*			
Source	Criteria	Student Data	Evaluation
PSSA Math	Scaled Score > 1000	Scaled Score = 1105	+
PVAAS Project (Prof) • 6th to 8th Math • 6th to Algebra I	Prob > 60% Prob > 40%	55% 50%	– +
District Midterm Exam Grade	A- or better	B+	–
7th Gr Math Teacher	Positive Rec	No	–
Student must meet 3 of 5 criteria			

NOTE: LEAs will want to check the scores for high proficient/advanced with PDE cut scores to ensure the use of the appropriate score.

This example poses a substantial challenge that may not be uncommon in your LEA/district. The student misses the required number of positive indicators by only one category of the established criteria. However, notice that the student is only 5% below the criteria for the PVAAS projection from 6th to 8th Math and the student's District Midterm Exam Grade is slightly below the minimum level. This situation suggests that perhaps more investigation should occur before a decision is made.

Note: this procedure should be repeated regularly (at least once each year) as the profile of the student is quite variable over time. Both achievement, measured by state and local assessments, as well as the robust PVAAS projections for each student and each target change based on new information.

Your Turn: Case Study Review and Discussion

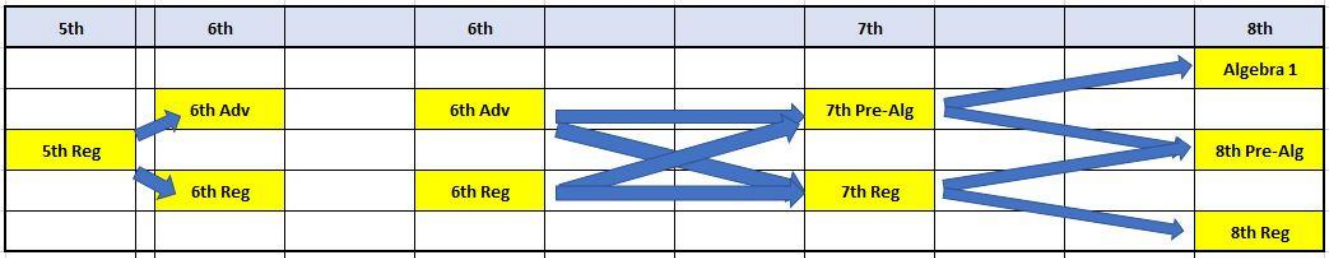
Your committee may choose to spend time discussing these two case studies in order to establish a common understanding of the importance of flexibility in the decision-making process, even with well-established protocols in place. See the Appendix (Workbook) for space to make notes during your discussion.

Step 5: Bring It All Together!

Merge your math pathways with your decision criteria

The last step in the process of articulating a data-informed sequence and placement organization is to merge sequences in your pathways to the placement protocols you develop for each course. Below is a sample of such a merge for middle school mathematics pathways leading to Algebra I. The process can and should be duplicated for all courses.

Sequence Placement Criteria Template



5th to 6th	
Data	Reg to Adv
5 Proj to 5 Math	Be > 70% Likelihood ADV
5 Proj to 6 Math	Be > 70% Likelihood PROF
5th Mid Grade	A or A-
4th PSSA Math	Advanced
4th PSSA Read	Proficient
5th CDT	Blue
Teacher Rec	ADV
Rule	5 of 7
Otherwise	6th Reg

6th to 7th		
Data	Adv to Pre-Alg	Reg to Pre-Alg
6 Proj to 6 Math	Be > 70% Likelihood Adv	Be > 70% Likelihood ADV
6 Proj to 7 Math	Be > 70% Likelihood PROF	Be > 70% Likelihood PROF
6 Proj to Alg 1	Be > 70% Likelihood PROF	Be > 70% Likelihood PROF
6th Mid Grade	A or A-	A
5th PSSA Math	Advanced	Advanced
5th PSSA Read	Proficient	Proficient
6th CDT	Blue	Blue
Teacher Rec	Pre-Alge	Pre-Alg
Rule	6 of 8	6 of 8
Otherwise	7th Reg	7th Reg

7th to 8th		
Data	Pre-Alg to Alg 1	Reg to Pre-Alg
7 Proj to 7 Math	Be > 70% Likelihood ADV	Be > 70% Likelihood PROF
7 Proj to 8 Math	Be > 70% Likelihood PROF	Be > 70% Likelihood PROF
7 Proj to Alg 1	Be > 70% Likelihood PROF	Be > 70% Likelihood PROF
7th Mid Grade	A or A-	Above C+
6th PSSA Math	Advanced	Proficient
6th PSSA Read	Proficient	Proficient
7h CDT	Blue	Green
Teacher Rec	Algebra	Pre-Alg
Rule	6 of 8	6 of 8
Otherwise	8th Pre-Alg	8th Reg

In this sample, note that all decisions are documented: data sources are listed with targets; decision rules and outcomes if criteria are not met are also listed at the bottom of each decision table.

Your Turn: Complete the Sequence Placement Criteria Template

Document and communicate your decision-making sequence and placement decision-making criteria using the templates in the Appendix (Workbook)

Appendix: Success in Secondary Mathematics Workbook

Step 1: Build Your Team

Algebra I Discussion Questions

(1.2 - Build shared beliefs and knowledge base about Algebra I)

Question	Comment
Is there one, single Algebra program that is effective for all students?	
Are all of our students ready to study a full course in Algebra at the same grade level, just not at the same time?	
Should proficiency in computation be a requirement for success in Algebra?	
Will a student be successful in Algebra I if they are skilled in memorizing procedures?	
Are boys ready for Algebra at a younger age than girls?	
Should a student's level of reading and writing skills be considered in evaluating the student's readiness to pursue the challenges of Algebra I?	
Does Algebra readiness include variables such as organizational skills and perseverance?	

Your LEA/District's Achievement & Growth Data

(1.4 - Analyze current achievement and growth data)

Complete with your district's/school's data. (Use the Value-Added row of the PVAAS Launchpad to complete the PVAAS portion of the table.)

PSSA/Keystone (% Prof/Adv)				PVAAS Value-Added *(refer to District Launchpad; specify color)*	
Grade/Course:	**Year:**	**Year:**	**Year:**	**Most Recent Year**	**3-year average**
Gr 5 Math					
Gr 6 Math					
Gr 7 Math					
Gr 8 Math					
Keystone Algebra I					

Step 2: Organize & Create a Data Profile for Secondary Math

Current Data Sources to Inform Placement & Programming Decisions

Multiple Measures		Current Data Used for Math (be specific by naming the measure)
Perceptions Data		
Process Data		
Demographic Data		
Student Learning Data	Achievement	
	PVAAS Growth Data	
	PVAAS Projection Data	

Current Data Sources & How They Are Used

Multiple Measures		Current Data Used for Math (be specific by naming the measure)	*Used for Evaluation of Current Program Effectiveness?*	*Used for Math Course Pathways Decisions?*	*Used for Placement Criteria Decisions?*
Perceptions Data					
Process Data					
Demographic Data					
Student Learning Data	Achievement				
	PVAAS Growth Data				
	PVAAS Projection Data				

Re-Create Your Current Data Sources & How They Are Used (if Applicable)

Multiple Measures		Current Data Used for Math (be specific by naming the measure)	*Used for Evaluation of Current Program Effectiveness?*	*Used for Math Course Pathways Decisions?*	*Used for Placement Criteria Decisions?*
Perceptions Data					
Process Data					
Demographic Data					
Student Learning Data	Achievement				
	PVAAS Growth Data				
	PVAAS Projection Data				

Step 3: Develop Your System of Math Pathways

Plot Your Current Pathway

Detail graphically how your students proceed through your mathematics education system.

- If possible, include your math content/department chair, and others involved with scheduling (such as school counselors) as you work through this task
- Include indications of progression (arrows) through courses/grades based on level of success or lack of success
- Include all optional pathways through each sequence in your programs and any opportunities for changing sequences

K	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th

If you are using Adobe Reader to complete this chart electronically, you may open the Drawing menu to draw arrows. (Depending on which version you are using, this may be under the "Comment" tool. Click "View", then "Tools", then "Comment", and "Open.")

Analyze Your Current Pathway

Answer the following questions and add any comment for your sequence.

1. Are the pathways designed to allow students to advance from one pathway to another?

2. Are the pathways designed to provide opportunities for students to change pathways if they are not successful in their original placement?

3. What is the grade in which the first placement of students in separate math pathways occurs?

   a. Grade Level: _____

   b. How is this placement decision into the separate math pathways made?

Data considered?	Criteria?	When the decision is made?
		Who makes the decision?

   c. Is this choice of grade level designation and the data considered appropriate for all students or not appropriate for all students? Care must be taken to consider all students in this process.

4. Is there consensus among your team that your current sequence addresses the needs of your students and is consistent with the district resources available?

Revise or Re-design Your Pathway (as needed)

You may revise the pathway chart you created earlier (see page 38) or create a new one below.

Detail graphically how your students proceed through your mathematics education system.

- If possible, include your math content/department chair, and others involved with scheduling (such as school counselors) as you work through this task
- Include indications of progression (arrows) through courses/grades based on level of success or lack of success
- Include all optional pathways through each sequence in your programs and any opportunities for changing sequences

K	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th

If you are using Adobe Reader to complete this chart electronically, you may open the Drawing menu to draw arrows. (Depending on which version you are using, this may be under the "Comment" tool. Click "View", then "Tools", then "Comment", and "Open.")

Step 4: Define Your Decision Protocol for Course Placement

Criteria for Placement: Data Sources & Targets

Complete a table for EACH option in your sequence.

Note: LEAs will want to check the scores for high proficient/advanced with PDE cut scores to ensure the use of the appropriate score.

Criteria for Placement into:	
Data Source	Criteria for Each Data Source (Target)

Criteria for Placement into:	
Data Source	Criteria for Each Data Source (Target)

Criteria for Placement into:	
Data Source	Criteria for Each Data Source (Target)

Detail and Critique Your Existing Placement and Decision Protocols

Earlier in the process, you listed your current mathematics pathways. Below please list and consider the basis of ONE of the decisions that are implemented currently.

Pathway Decision:		
DATA SOURCE	CRITERIA	CONSIDERATIONS

NOTE: LEAs will want to check the scores for high proficient/advanced with PDE cut scores to ensure the use of the appropriate score.

Next, respond to the following questions regarding this decision process.

1. Do the achievement and growth reports of the students who were placed in these courses indicated that the placement was appropriate? Are all of the students performing and growing as your placement process anticipated?

2. Are you considering all data that is available and may be helpful in the placement process? If not, what other data are available?

3. What are the changes in the course placement decision protocol that are recommended for implementation?

Individual Student Decision Templates

These templates are provided as options for your use in choosing or designing a process in your setting. The committee may choose to develop a unique one that addresses your needs specifically.

Method 1: Decision based on Total Number of Targets

Criteria for Placement/Continuation into:			
Student:			
Data Source	**Target for Each Data Source**	**Yes**	**No**
	Totals		
Criterion: minimum of ____ Yes's	**Decision:**		

NOTE: LEAs will want to check the scores for high proficient/advanced with PDE cut scores to ensure the use of the appropriate score.

Method 2: Decision based on Total Weighting of Targets

Criteria for Placement/Continuation into:			
Student:			
Data Source	**Target for Each Data Source**	**Weight**	**Achieved**
	Totals	100%	
Criterion: minimum of _____% Achieved	**Decision:**		

NOTE: LEAs will want to check the scores for high proficient/advanced with PDE cut scores to ensure the use of the appropriate score.

Method 3: Decision based on a Holistic Evaluation of Target Points

Criteria for Placement into:			
Student:			
Data Source	**Possible Values**	**Weights**	**Points Achieved**
PSSA Gr___ Math	Advanced = ☐ Proficient = ☐ Basic = ☐ Below Basic = ☐		
PSSA Gr___ ELA	Advanced = ☐ Proficient = ☐ Basic = ☐ Below Basic = ☐		
PVAAS Projection to Gr ___ Math *(Proficient)*	Probability >70% = ☐ Probability 40-70% = ☐ Probability < 40% = ☐		
PVAAS Projection to Gr ___ Math *(Proficient)*	Probability >70% = ☐ Probability 40-70% = ☐ Probability < 40% = ☐		
Class Grade	A = ☐ B = ☐ C = ☐ D = ☐ F = ☐		
Attendance			
	Totals	100%	
Criterion: Minimum Points Achieved =	**Decision:**		

NOTE: LEAs will want to check the scores for high proficient/advanced with PDE cut scores to ensure the use of the appropriate score.

Test Your Decision Protocol – Case Study Discussion

Review and discuss the two Case Studies on pages 29-31. This task is designed to establish a common understanding of the importance of flexibility in the decision-making process, even with well-established protocols in place.

Case Study 1 – Discussion Notes

Case Study 2 – Discussion Notes

Step 5: Bring It All Together!

Merge your math pathways with your decision criteria

Mathematics Pathway

K	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th

If you are using Adobe Reader to complete this chart electronically, you may open the Drawing menu to draw arrows. (Depending on which version you are using, this may be under the "Comment" tool. Click "View", then "Tools", then "Comment", and "Open.")

Sequence Placement Criteria Templates

_____ to _____		
Data		
Rule		
Otherwise		

NOTE: LEAs will want to check the scores for high proficient/advanced with PDE cut scores to ensure the use of the appropriate score.

_____ to _____		
Data		
Rule		
Otherwise		

NOTE: LEAs will want to check the scores for high proficient/advanced with PDE cut scores to ensure the use of the appropriate score.

Resources

1. Education for the Future: edforthefuture.com
2. Hess' Cognitive Matrix/Webb's Depth of Knowledge: static.pdesas.org/content/documents/M2-Activity_2_Handout.pdf
3. Keystone Algebra I Assessment Anchors and Eligible Content: education.pa.gov/K-12/Assessment%20and%20Accountability/Pages/K-AAEC.aspx
4. Keystone Algebra I Item Sampler: education.pa.gov/K-12/Assessment%20and%20Accountability/Pages/K-ISS.aspx
5. Math Assessment Anchors and Eligible Content: pdesas.org/Page?pageId=12
6. Math Core Standards: static.pdesas.org/content/documents/PA%20Core%20Standards%20Mathematics%20PreK-12%20March%202014.pdf
7. Math Item Sampler: education.pa.gov/K-12/Assessment%20and%20Accountability/PSSA/Pages/Mathematics.aspx
8. *Multiple Measures*, by Victoria L. Bernhardt: nces.ed.gov/pubs2007/curriculum/pdf/multiple_measures.pdf
9. National Council of Teachers of Mathematics: nctm.org
10. PA Standards Aligned System (SAS) Portal: pdesas.org
11. Principles to Actions Executive Summary: nctm.org/uploadedFiles/Standards_and_Positions/PtAExecutiveSummary.pdf
12. PVAAS Reporting Site: pvaas.sas.com
13. Standards for Mathematical Practice: static.pdesas.org/content/documents/Bulleted_Mathematical_Practices.pdf