PA Core Standards: Mathematics

The most effective and equitable way to support students in their learning is to ensure that the vast majority of time is spent engaging with grade-level content, remediating with precision and accelerating as needed. It is entirely possible to hold high expectations for all students while addressing unfinished learning in the context of grade-level work. Since time is a scarce commodity in classroom, strategic instructional and assessment choices are critical.[1]

Instruction

It is vitally important that educators are supported to make deliberate instructional choices that allow all students to effectively engage with grade-level work. Instruction must be aligned to a coherent set of learning outcomes, indicating what students should know and be able to do. Dimensions for consideration when planning for instruction include the following:

- ***Delivery*** is differentiated relative to explicitness through modeling, systematic instruction with appropriate scaffolding and pacing, and provision of immediate corrective feedback to students with sufficient opportunities to respond.
- ***Grouping*** includes whole group, homogeneous small group, partners, heterogeneous mixed ability small group, independent, and one-to-one.
- ***Time*** varies relative to a particular area of content, small group instruction versus whole group instruction, and opportunities for students to interact or work independently.
- ***Materials*** should be evidence-based and adjusted to meet the needs of students and the purpose of the lesson/activity.
- ***Learning Environment*** must be positive and safe and have clearly defined consistent expectations.

Assessment

A highly developed assessment system includes a balanced approach to using formal and informal assessments, classroom-based evidence showing growth over time, and involving students in the evaluation of their own work. The adoption of a systemic approach enhances the use of assessment data to inform teaching and learning practices. This system should include assessment tools that are congruent with the district's goals and curriculum. Assessments can be done in sync with daily instruction through intentional activities that can collect data to support instructional goals.

This guidance document is designed to identify areas of focus in Mathematics instruction, grade by grade. Each grade level guidance document defines high level focus of instruction, supported by PA Academic Standards. Note that while all standards deserve a defined level of instruction, neglecting key concepts may result in learning gaps in student skill and understanding and may leave students unprepared for the challenges of a later grade. Not all content in a given grade is emphasized equally in the standards. Some focus areas require greater emphasis then others based on the depth of the ideas, the time taken to master, and/or their importance to the future mathematics grade levels. More time in these areas is also necessary for students to meet the Standards for Mathematical Practice.

Highlights of Focus Work, K-12

Grade K-2: Addition and subtraction – concepts, skills, and problem solving; place value	Grade 7: Ratios and proportional relationships; arithmetic of rational numbers
Grade 3-5: Multiplication and division of whole numbers and fractions - concepts, skills, and problem solving	Grade 8: Linear Algebra and functions
Grade 6: Ratios and proportional relationships; early expressions and equations	Grade HS: Course specific content area work

For additional support and resources, contact PDE or your local Intermediate Unit.
The resources listed below are provided as options and examples. Pennsylvania does not require, recommend, or endorse any specific program or product. All curricular and instructional decisions are made at the local level.

[1] Adapted from 2020–21 Priority Instructional Content in English Language Arts/literacy and Mathematics, Student Achievement Partners/Achieve the Core. May 2020

GRADE 4 ACADEMIC STRATEGIES (2022)

This guidance document is designed to identify key strategies with focus on Mathematics instruction and assessment to support PA Academic Standards. This document is in support of the PDE's Accelerated Learning information and PA Roadmap: Focus on Effective Instruction.

Focus of Instruction: Numbers and Operations

Place value properties of operations: Demonstrate an understanding of multi-digit whole numbers. Compare and round multi-digit numbers. Perform multi-digit arithmetic.
Fractions & decimals: Demonstrate an understanding of fraction equivalence. Compare and order fractions. Solve problems involving fractions and mixed numbers. Use decimal notation for decimal fractions. Compare decimals and decimal fractions.

Focus of Instruction: Algebraic Concepts

Represent and solve problems, number theory, patterns: Represent and solve problems verbally as equations. Use factors to represent numbers in various ways. Recognize that a whole number is a multiple of each of its factors. Generate and analyze patterns that follow a single rule.

Focus of Instruction: Geometry

Geometric shapes and figures: Draw and identify lines and angles. Classify shapes by properties of their lines and angles.

Focus of Instruction: Measurement, Data and Probability

Measurement, data displays: Solve problems involving measurements. Convert larger unit to smaller unit. Translate one type of data display to another. Represent and interpret data involving fractions.

Classroom/Time Management

Set the tone, establish a positive environment, & build relationships.
Establish procedures, routines, daily agenda, & call-and-response patterns.
Create a classroom management plan with student input.
Prepare students for a substitute & teach flexibility for an interrupted routine.
Model ideal behavior, demonstrate good & bad choices.
Use positive language, teacher proximity, & nonverbal communication.
Encourage initiative, maintain student attention, & offer praise.
Provide suitable work (diagnostic and prescriptive).
Provide visual reminders (anchor charts).
Make positive phone calls and send positive notes.
Understand trauma-informed care.

Instructional Resources

SAS Online Resources for Instruction
Mathematics Menu of Best Practices and Strategies
SAS Search Standards (Assessment, Continuum of Activities, Materials & Resources)
Pennsylvania's Learning Standards for Early Childhood
Teaching Math to Young Children
Formative Re-engaging Lessons
Math Teaching Strategies Videos
10 Key Mathematics Practices for All Elementary Schools
The Learning Classroom: Theory into Practice (video series)
Early Childhood Math: Six Ways to teach Math Throughout the Day
Evidence-Based Specially Designed Instruction In Mathematics

Assessment Resources

Pennsylvania Classroom Diagnostic Tools (CDT) Resources
SAS Assessment Builder
PDE's Assessment Data Protocol Process
Early Learning Outcomes Reporting
Guiding Principles to Early Childhood Assessment
Basics on Assessments Systems
FORMATIVE ASSESSMENT: 10 Key Questions
Depth of Knowledge with Karin Hess (video 23:16)

Standards for Mathematics Practices

PA Core Standards, Standards for Mathematical Practice
Mathematical Practice Standards

Classroom/Time Management Resources

Effective Lesson Planning, Delivery Techniques & Classroom Management Suggestions
5 Classroom Management Tips That Seem Counterintuitive
Effective Classroom Management Strategies to Achieve Your Daily Goals
20 Classroom Management Strategies and Techniques
27 Classroom Management Strategies
Classroom Management Strategies
Fourth Grade Classroom Management Ideas Will Make Your Teacher Life Easier