day/year. Job-embedded professional learning includes collaborative team planning focused on the development of common assessment instruments and scoring tools (Kanold et al., 2015).

Effective mathematics professional development is sustained and embedded within professional learning communities (Kanold-McIntyre et al., 2014). High-quality professional learning is only successful if it is acquired in such a fashion that it can then be readily implemented in the classroom. Sustained professional learning is focused and on-going. Professional learning for highly-skilled mathematics teachers should be similar to the components of effective professional development utilized with the Elementary School Model. These components include:

1. Professional learning is focused on a specific content or pedagogy topic
2. Preferred delivery of professional learning occurs through release of teaching duties
3. Content tool, book, and/or needed resource is provided with professional learning
4. Professional learning features intentional follow-up opportunities

Professional learning can be shared through a variety of means to ensure that teachers can access it at a convenient time and place. These include:

- learning modules developed by content offices and delivered through Canvas.
- face-to-face training led by content specialists after hours.
- "a la carte" course offerings through partnerships with local institutions (e.g., UMBC, McDaniel, MSDE, Towson).
- increased time for in-school professional learning.

Schools must work to create time structures, including dedicated blocks of grade or course-level collaborative planning time, embedded in the professional work week to ensure meaningful collaborative and professional learning practices are taking place.

The skills and knowledge developed through professional learning must be implemented in the classroom in order to positively impact student success in mathematics. Implementation accountability can be recognized and measured through:

- classroom observations.
- follow-up consultations with content specialists.
- student performance data.

In order to ensure that mathematics teachers develop the expertise to engage students in meaningful learning through individual and collaborative experiences that promote the ability to make sense of mathematical ideas and reason mathematically through highly-effective professional learning opportunities, the HCPSS will ensure school-based instructional staff:

1. Make the eight Mathematics Teaching Practices (NCTM, 2014) a focus and communicate that is expected for all mathematics classrooms to strengthen learning and teaching for all students.
2. Provide professional learning that makes the implementation of the Mathematics Teaching Practices a priority.
3. Observe lessons or engage in classroom walkthroughs, using the Mathematics Teaching Practices (teachers) and Standards for Mathematical Practice (students) as the focus.

Content sessions focus on the mathematics content in the Maryland College and Career-Ready Standards domains. Content sessions also feature the progression of skills and concepts and the correction of misconceptions. Possible content and pedagogy professional learning sessions would include:

Content Professional Learning	**Pedagogy Professional Learning**
Number Concepts and Relationships (counting, place value, comparison)	Identifying and Using Rigorous Tasks
Whole Number Computation (addition, subtraction, basic fact recall, multi-digit computation)	Questioning and Purposeful Discourse
Whole Number Computation #2 (multiplication, division, basic fact recall, multi-digit computation)	Implementing Standards for Mathematical Practice
Fractions (fractions as numbers and computation with fractions)	Differentiating Mathematics Content
Measurement and Data (linear measurement, area, perimeter, volume, graphing, line plots)	Routine, Retention, and Growth Mindset
Geometry	Formative Assessment and Meaningful Feedback
Ratios and Proportional Relationships	Mathematics Leadership
Expressions and Equations	Fostering Professional Learning Communities
The Number System	Developing High-Quality Assessments
Statistics and Probability	Planning with Learning Targets in Mind
Functions	
Modeling	

Professional learning focuses on acquiring and implementing in three levels.

- Level 1 – Attended Content/Pedagogy Professional Learning
- Level 2 – Implemented Content/Pedagogy Professional Learning
- Level 3 – Sustained Implementation of Content/Professional Learning

Professional Learning Plan

Program Implementation Period (PIP) time can be leveraged in various ways to support teacher learning of mathematics content and pedagogy. PIP topics are aligned with the School Improvement Plan and supported with input from school administration. PIP time can be structured as a collection of fully programmed modules developed collaboratively with curriculum and instruction offices. These 30-45 minute modules should be offered in series so that professional learning is developed over longer periods of time giving teachers ample opportunity to acquire, apply, and reflect on content and pedagogical learning.

HCPSS will also make use of the Canvas Learning Management System to support professional learning. An initial strategy is to embed professional learning video clips or vignettes within grade level courses. These resources can support teachers' understanding of the mathematics content, concept progressions, and effective teaching practices.

Recognition for Professional Learning

Highly-skilled mathematics teachers access professional learning opportunities and implement what they have learned with their students. They are engaged, motivated, and recognized for their work. This recognition may be:

- used to signify more attractive candidates for Mathematics Support Teacher and coach positions
- used to signify instructional leadership for other positions including tutoring and summer school
- recorded as artifacts for Domains 1a (Demonstrates Knowledge of Content & Pedagogy) and 4e (Growing and Developing Professionally)
- leveraged for CPD credits during certificate renewal.

Leadership

School-based administrators also need professional learning to allow them to support high leverage mathematics instruction. Administrators should have discussions about the mathematics program at their school and the strengths and needs of the instructional staff. A key element of developing leadership for school based administrators has been the Principals' Curriculum and Instruction Meeting. This fall, principals and assistant principals received professional learning on student and teacher mathematics practices.

Highly-skilled mathematics teachers must be developed and supported by mathematics leaders. Mathematics leaders include support teachers, coaches, and Instructional Team Leaders (ITLs).

The role of the elementary Mathematics Support Teacher (MST) or secondary Mathematics Instructional Support Teacher (MIST) is to:

- provide professional learning for classroom teachers and school-based administrators
- support mathematics planning
- coach instructional staff on best practices
- support data collection, review, and conversations
- supervise mathematics interventions including tutoring at the elementary level.

The role of the site-based mathematics ITL is to:

- support instruction
- attend professional learning
- act as a liaison between the mathematics office and classroom teachers in buildings without a MST, MIST, or Coach
- participate in unique learning opportunities to develop leadership and content capacity.

Accountability

Efforts to develop and support highly-skilled teachers include high quality monitoring of instruction through self-reflection, peer-reflection, and the informal and formal observation processes. Highly-skilled teachers crave specific and timely formative feedback about instructional practice (Reeves, 2011). This feedback, coupled with resulting changes, improves the quality of instruction and positively impacts student achievement.

In order to support structures of high quality feedback, curriculum offices, school administrators, Math Support Teachers, Math Instructional Support Teachers, Instructional Mentors, and teachers should:

- Engage in collaborative, informal observations focused on one of the 8 Math Teaching Practices (NCTM, 2014) or one of the 8 Standards for Math Practices (CCSS, 2010).
- Engage in self-reflection or peer-reflection during collaborative team planning time using recorded lessons.
- Engage in the following Top Ten High Leverage Collaborative Team Actions (HLTA, Kanold, et al, 2015)
    - Agree on the expectations and intent of the common essential learning standards and process standards (mathematical practices) for the unit.
    - Identify and discuss student use of high-cognitive-demand tasks as part of the instruction during the unit.
    - Develop high quality common assessment instruments (tests) for the unit.
    - Develop accurate scoring rubrics and proficiency targets for the common assessment instruments.
    - Develop high-quality, common unit homework assignments and protocols.

- Develop student proficiency in each CCSS Mathematical Practice through in-class, high-cognitive-demand mathematical tasks.
- Use in-class formative assessment processes effectively.
- Use a lesson-design process for lesson planning and collective team inquiry.
- Ensure evidence-based student goal setting and action for the next unit of study.
- Ensure evidence-based adult goal setting and action for the next unit of study.

Hiring highly-skilled teachers and providing them with ongoing opportunities for high-quality professional learning to improve first instruction will ensure that most students achieve mathematics success in the classroom. However, a small subset of students will still require additional interventions to fully develop mathematics knowledge and skills.

Differentiated Support

For those students needing additional support, HCPSS-identified, research-based interventions are selected, implemented, and monitored by a highly-skilled teacher. Curriculum leaders will set clearly defined entrance and exit criteria and provide intense professional learning for intervention teachers. Seminars/interventions are taught by someone certified in the content area of the seminar/intervention. A variety of intervention models are being developed to support the differentiated needs of students. Intervention models include seminar classes, before/after school intervention classes, summer school academic intervention, and self-paced or hybrid online modules built in Canvas. Ensuring that instructional staff and administrators are able to use student-level data to match a learner's strengths and needs to an effective intervention is crucial for intervention success. Teachers and administrators examine a variety of data to determine which interventions are most appropriate for students. Data points include MAP performance data, classroom performance, and PARCC performance data. Students are assessed formally and informally as they receive the interventions to monitor performance and to determine when students are ready to exit.

The three-part professional learning plan will:

1. understand how to effectively use evidence from MAP and formative assessment techniques
2. develop rich understanding of mathematics content progressions and misconceptions so that instructional response is most effective
3. improve capacity to use data, NWEA's Learning Continuum, and math learner profiles to identify student strengths and needs for personalized learning.

Enhanced Understanding and Development Assessment Tools

Understanding of assessment tools is critical for effective use. Understanding of these tools includes the purpose of the assessment, how it functions, how it is aligned to curriculum content, the reporting options, and procedures for implementing.

- Foundational understanding of assessment tools and the purpose of formative assessment will be provided through Canvas courses. Face-to-face follow-ups will also be available.
- The courses will provide foundational understanding of MAP and mathematics formative tasks.
- The courses will provide understanding about the reports generated by these tools.
- Engage in the following Top Ten High Leverage Collaborative Team Actions (Kanold, et al, 2015)
    - Develop high quality common assessment instruments (tests) for the unit.
    - Develop accurate scoring rubrics and proficiency targets for the common assessment instruments.
    - Develop high-quality, common unit homework assignments and protocols.

Professional learning will also support the development of common, team-developed assessments and common, district-created assessment items. Participating in item development reinforces essential adult learning during the planning process (DuFour & Eaker 1998). Professional learning also supports the collaborative development of common scoring instruments and item diversity across the DOK levels.

Mathematics Content Progressions and Misconceptions

Mathematics concepts are interconnected. One has to understand counting, addition, skip-counting, and repeated addition before working with multiplication. An individual also needs to understand the many representations and problem situations of multiplication before working with multi-digit multiplication, multiplication with fractions, or multiplication with decimals. Understanding of concept progressions is critical to building upon previous learning and connecting mathematics ideas for long-term retention.

Formative assessment yields information about a student's progress through the progression. It identifies what a student knows as well as the ideas that are needed to move the student forward. It identifies the prerequisite skills and concepts students need to learn the targeted standard (comparing numbers to 1,000 with relational symbols). This standard is developed by understanding how to compare numbers to 100, then 199 using relational symbols. Students then develop comparison with models and representations before moving to the comparison of numbers to 1,000 with symbols.

Teachers must understand the misconceptions that students have and how to address them. Students may not be able to overcome misconceptions that are inadvertently reinforced or simply addressed with "more of the same" instruction.

Professional learning for content progressions and misconceptions will:

- incorporate LMS courses and face-to-face sessions
- feature sessions that focus on content progressions so that differentiation is intentional and aligned with student understanding
- describe mathematics misconceptions, why they occur, and how they are corrected..

Interventions

When utilizing data to match student strengths and needs to a successful intervention, instructional staff and administrators must consider the following:

- What are the interventions already in place?

The HCPSS has established a variety of intervention programs for students struggling with mathematics. At the elementary level, students in 16 elementary schools have access to beyond school day math tutoring overseen by the Elementary Mathematics Office. At 10 elementary schools, students can also receive beyond school day academic interventions through the 21st Century Community Learning Center grant-funded Bridges programs. Students at all elementary schools are also eligible for selection for Academic Intervention Summer School, based on academic underperformance and/or extended school year time in their IEPs. Students can also attend the BSAP Math Academy on Saturdays to receive additional assistance strengthening their skills and becoming more confident of their mathematical abilities.

Students at all middle schools may also be chosen for the Academic Intervention Summer School program if they are showing mathematical underperformance. Parents concerned about summer slide, the effect that students often lose some academic knowledge and skills over the summer, can also opt for the Comprehensive Summer School K-9 Summer Institute and High School programs, which can provide additional academic instruction during the summer months. Unlike Academic Intervention Summer School, these programs are not free, but tuition reduction and scholarships are available. Students at all middle schools and high schools can also attend the Academic Intervention Beyond School Day program and receive additional assistance in mathematics and/or reading/English language arts. Middle school students underperforming in mathematics can also receive additional instruction through mathematics seminars, in addition to their on grade level mathematics courses. Additionally, all schools are encouraged to use technology and differentiated staffing to personalize instruction for students struggling in mathematics.

In deciding which interventions are appropriate for which students, instructional leaders and administrators need to review student-level data to determine the student's strengths and needs and balance the benefits of additional instructional time with the possible negative impact of redundant interventions and loss of other instructional time. It is important to look at the whole child and all possible approaches to strengthening their mathematics skills and knowledge. Some students benefit more from beyond school day interventions, while others would do better with more personalized instruction, making use of technology to independently practice skills to develop mathematical fluency.

- What should intervention look like?

There are some features that are common to all successful mathematical interventions, whether administered during or beyond the school day. They should be based on student-level data. One size does not fit all. Some students lack conceptual understanding, while others need to develop greater fluency with mathematical practices. The student needs to be invested in their success. Teachers need to set performance goals with their students and track progress to make visible the connection between perseverance, practice, and performance. Interventions should be focused on major elements of mathematics instruction and content needs to be consistent and cohesive between the classroom instruction and the interventions. Student progress needs to be monitored both to underscore the importance of growth mindsets but also to determine if a different approach might produce greater or faster gains. Interventions must address mathematical concepts, procedures, and real-world applications so that students can learn how to choose the right tools to tackle mathematics-based problems. Perhaps most importantly, interventions need to be provided by a highly-effective teacher who has a solid mathematics foundation and a wide repertoire of instructional approaches to help all types of learners.

- What measures will we use to assess the effectiveness of interventions?

Evidence gathered from formative and summative assessments focused on measuring the specific knowledge and skills taught can provide the most immediate feedback about the success of mathematics interventions. The goal of such interventions, however, is to produce sustained growth in mathematical understanding and skills. The MAP and PARCC assessments are important tools for gauging student growth over longer periods of time and with more complicated mathematical tasks. It is also important to capture the student's perceptions of their own growth and whether they feel more confident on their abilities and motivated to continue to challenge themselves with more difficult mathematical content.

- How do we ensure consistency?

The Elementary and Secondary Mathematics Offices utilize central office and school-based staff (MSTs, MISTs, Math Coaches) to ensure that consistent expectations are communicated across the HCPSS, both for first instruction and interventions. Mathematics curricular staff also work with other curricular offices and school administration to ensure that the appropriate level of rigor is present in all mathematics programs.

Students enrolled in the Academic Intervention and other mathematics programs, such as the BSAP Saturday Math Academy, receive mathematics support that is aligned to research-informed best practices and instruction aligned to state curriculum.

The Elementary and Secondary Offices of Mathematics, working collaboratively with all special support programs (BSAP, Summer School, Academic Intervention, Bridges) align all curriculum resources to ensure that those programs support mathematics teaching and learning with fidelity. Professional learning must be provided to staff supporting these programs and mathematics leaders must monitor interventions and assist staff where adjustments are necessary. Procuring existing and developing resources is necessary to improve upon teacher knowledge.

A highly-skilled mathematics teacher should provide instruction in these special support programs and all interventions. In the absence of such a staff member, other supports and interventions must be considered. Additionally, Learnzillion, an innovative instructional resource for PreK-8, may be used to increase access to rigorous tasks, personalized learning opportunities, flipped classroom opportunities, and compacted coursework.

Access

Central office and school-based staff need to collaborate to identify, develop, support, and communicate to all stakeholders College and Career-Ready Pathways that provide access to two years of college-level mathematics or prepare students for apprenticeships and other entry-level career opportunities prior to high school graduation. In order to achieve this goal of multiple pathways to college-level mathematics courses, HCPSS will need to create opportunities for curriculum condensing, enhance communication with all stakeholders (including strengthening articulation practices with fidelity), and design multiple on-ramps with appropriate supports (e.g., what to do to account for skipping content).

To reach this target without additional supports, students will need to take Algebra I in middle school. At the elementary level, students need to be enrolled in above-level or G/T mathematics instruction by fifth grade. While 78% of HCPSS graduates entering college are ready for credit-bearing mathematics coursework, not all student groups show such high levels of mathematics readiness.

Student placement into grade 4 grade mathematics courses is a strong predictor of access to college-level mathematics by the end of high school. Students placed in "on grade level" course progressions in grade 4 are less likely to graduate having successfully completed two college-level courses. There is an overrepresentation of students who are African-American, Hispanic, eligible for free and reduced-price meal services (FARMs), or receiving special education services in "on grade level" 4th grade courses and an underrepresentation of the same student groups in Advanced Placement mathematics courses in high school. Student performance on nationally normed assessments (MAP, SAT, ACT, and PARCC) reflects significant gaps in achievement, resulting in the perpetuation of opportunity gaps.

Defining HCPSS College-Level Mathematics Courses

College level mathematics courses offered in our current program of study include:

Trigonometry (Honors)	Mathematical Analysis (Honors)	Pre-Calculus (GT)[1]	AP Statistics[2]
AP Calculus A/B[3]	AP Calculus B/C	Discrete Math (GT)	Differential Equations (GT)
Business Calculus (GT)			

[1] Pre-Calculus (GT) combines Trigonometry and Mathematical Analysis

[2] AP Statistics will likely satisfy a prerequisite for business and social science majors

[3] AP Calculus is a prerequisite for most STEM field majors

Accessing College-level Mathematics

Currently, "on grade level" refers to the mathematics course progression defined by MSDE and validated by the American Mathematics Association, the National Council of Teachers of Mathematics, the National Council of Supervisors of Mathematics, and the Council of Chief State School Officers. This progression includes the K-8 grade-specific courses (Math 4, Math 5, Math 6, etc.) followed by Algebra I, Geometry, and Algebra II in grades 9-11. COMAR regulations are undergoing revisions to define college-level mathematics courses as the rigorous math courses that students access after Algebra II (in grade 12 for students following the on grade level pathway). Currently, students on the on grade level progression are usually able to take only one college-level mathematics class before graduating, in grade 12.

Students enrolled in the "above grade level" course trajectory access course content one or more grade levels above the state standard and are likely to successfully complete two years of college level mathematics prior to high school graduation. Students in this course trajectory are typically one year ahead of their peers following the on grade level pathway (e.g., a student would take

grade 5 mathematics in grade 4, Algebra I by grade 8, and Algebra II by grade 10). In order to make this pathway available to all students, there are a number of strategies for increasing early access to trajectory benchmarks. In this instance, trajectory benchmarks are defined as a) above grade level by the end of grade 5 (Grade 6 Math), b) above grade level by the end of grade 8 (Algebra I), or c) above grade level by the end of grade 12 (two college level courses).

Accessing Apprenticeships and Other Pathways to Careers
Students in a career pathway will focus on career preparation and refine their plan for employment, education, and training beyond high school high school. Identifying these pathways is a critical first step.

MSDE, in partnership with statewide industry advisory groups, has identified Career Clusters that represent core business functions across broad industry areas in Maryland. These clusters include: Arts, Media, and Communications, Business Management and Finance, Construction and Development, Consumer Services, Hospitality, and Tourism, Health and Biosciences, Human Resources Services, Information Technology, Manufacturing, Engineering, and Technology and Transportation Technologies.

The Howard County Public School System offers twenty different Career Academies across the Career Clusters. The HCPSS Career Academies help students plan for and pursue further education and careers. Each high school student has the opportunity to enroll in an academy and to earn four or five credits while studying the career field in-depth. Enrolling in an academy allows a student the opportunity to explore a wide range of career options and to apply both academic and technical skills in a career area. Each HCPSS Career Academy incorporates the Standards for Mathematical Practice as the students apply their mathematics knowledge, skills and abilities to solve real-world problems. From the engineering academies, to the computer programming academy, to the construction academy, to the science/health academies, students apply mathematical practices to authentic projects while using critical thinking and creative problem solving.

Using Data, Math Learner Profiles, and Student Goal Setting
Across the mathematics program, additional professional learning for grading must take place. Elementary mathematics teachers will improve upon the following process:

- Collect and record AOB data
- Improve AOB identification process
- Revise elementary math learner profile
- Use learner profiles to identify specific needs and learning behaviors
- Calibrate data discussion process.

Secondary mathematics teachers will improve upon the following processes:

- Collect and record AOB data
- Improve AOB identification process
- Improve quality and consistency of assessment scoring
- Calibrate data discussion process

Monitoring the following measures will be essential to see the impact of the recommendations:

1. Successful participation in "above grade level" trajectories at the end of grade levels
2. Performance on MAP, SAT, ACT, PARCC, AP
3. Enrollment in AP courses
4. Students graduating college ready
5. Effectiveness of professional learning efforts
6. Quality of classroom instruction
7. Effectiveness of improved placement and articulation practices
8. Student and family feedback.

Engaging students effectively in goal-setting processes through the use of formative feedback "literally double[s] the speed of learning" (Popham, 2008). In PreK-12 mathematics, highly-skilled teachers support students' setting of goals and recording progress towards those goals. Administrators must be well-versed in facilitating data discussions focused on growth in mathematics programming. School learning targets must focus on both student growth and the reduction of achievement and opportunity gaps.

Intervention and Acceleration Opportunities

Pathway development of strategic opportunities for intervention and acceleration for students is crucial. The Offices of Elementary and Secondary Mathematics must develop personalized curriculum resources to enable teachers to accelerate instruction so that students can successfully complete course trajectories leading to the ability to take two college-level mathematics courses before graduating from an HCPSS high school.

In the elementary grades, there are not always separate sections to accommodate students who are working above grade level in mathematics. Often, students are provided with some differentiated support as part of heterogeneous mathematics instruction. It will be essential to meet learners where they are rather than by the class into which they are placed.

In the middle grades, efforts to maintain mathematics instruction by grade level cohorts, rather than course level cohorts, limit opportunities for differentiation. In middle school, there are too few opportunities for students wishing to accelerate mathematics learning. To remedy this, online learning modules must be developed so that students wishing to accelerate can receive

access to content as soon as the student is ready, instead of waiting for summer school or other instructional opportunities. Additionally, the default mathematics course sequence for middle school students could be altered so that students take an accelerated math 7 that would provide them with the mathematical basis to access Algebra I by grade 8. A smaller subset of students needing additional support could enroll in Math 8 (on-grade level), if they were not ready for Algebra. Schedules featuring concurrent course offerings could provide for ongoing flexible grouping of students.

Outreach and Advocacy for Students and Families

Communication is an essential element of ensuring students are college and career ready. HCPSS must communicate information in a user-friendly fashion to internal stakeholders, as well as to families, and the community. Families should be acutely aware of the mathematics course projections and staff and administrator efforts to engage families in placement discussions should take place annually.

Differentiated professional learning for teachers, counselors, and leaders (school-based and central office) should be enhanced so that all stakeholders understand and promote a common vision for mathematics instruction. School student services offices must be well versed in articulation practices and mathematics course progressions while serving as catalyst for acceleration once students present as ready. Next steps include:

1. Enhance articulation procedures within schools and between secondary schools and their feeders
2. Correct instructional level placements for students with learner profiles that suggest an opportunity for acceleration. Expanded review for primary grades
3. Design parent communication components

Enhanced, evidence-based articulation practices must be developed to guide the placement of students into subsequent mathematics courses, both for current students and those new to the school Improved tools and resources to support accurate instructional placements for students, placements supported by math learner profiles and clearly articulated course content progressions, must be developed and implemented with fidelity. Articulation practices should be standardized with specific goals written to reduce the variance of placement.

On-ramps and Opportunities

Providing students access to advanced mathematics courses supports the goal to ensure that students graduate college and career ready. It is essential that students have access to on-ramps and instructional opportunities for acceleration. The table below shows potential actions to support student acceleration into more advanced mathematics courses:

Actions for Acceleration	• Placement in highly-skilled mathematics classrooms that feature small group instruction • Systems exist to empower parents as advocates for student acceleration • Before and After School Tutoring • Saturday Academies • Summer School • Curriculum Compactions • Personalized learning options (LMS courses, DreamBox, Learnzillion, etc.) • Math Mentors for Elementary School Students
Acceleration Non-negotiables	• Taught by highly-skilled teachers • Targets critical mathematics concepts and major content strands (number, computation, fractions)

Conclusion

The Howard County Public School System is committed to ensuring that every student achieves academic excellence in an inspiring, engaging, and supportive environment. To achieve this, there must be effective, consistent, and impactful implementation of the Maryland College and Career-Ready Standards for Mathematics with fidelity, and at the intended level of rigor. Through the steps detailed above in the areas of first instruction, intervention, and access, equitable mathematics instruction can address the strengths and needs of all learners and provide a solid foundation of knowledge and skills that will support future success in college and careers.

Elementary Mathematics Classroom Look For Tool

Domain 2: Classroom Environment

2a Creating an Environment of Respect and Rapport ❑ Builds classroom community ❑ Provides opportunities for student collaboration ❑ Shows rapport and understanding of each student as an individual	Comment:
2b Establishing a Culture for Learning ❑ Supports students in exploring tasks without taking over student thinking[2] ❑ Gives students time for productive struggle[7] ❑ Helps students realize that confusion and errors are a natural part of learning[7] ❑ Praises students for their efforts and perseverance rather than the right answer[7]	Comment:
2c Managing Classroom Procedures ❑ Establishes routines and procedures for mathematics ❑ Establishes opening number routines ❑ Establishes a structure for small group instruction ❑ Establishes procedures for closure ❑ Promotes effective and efficient transitions that build student independence	Comment:
2d Managing Student Behavior ❑ Establishes expectations for the classroom community ❑ Develops expectations with students for cooperative group instruction ❑ Creates opportunities for students to self-evaluate their participation	Comment:
2e Organizing Physical Space ❑ Organizes the classroom space for collaborative and independent learning ❑ Ensures students have familiarity with and access to tools for math ❑ Provides activities and space for independent time and early finishers	Comment:

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Superscripts identify mathematics teaching practices. Principles to Actions: Ensuring Mathematical Success for All (NCTM, 2004)
Distributed 9.29.15 Principals' Curriculum and Instruction Meeting

Elementary Mathematics Classroom Look For Tool

Domain 3: Instruction

3a Communicating with Students ❑ Uses varied representations[6] ❑ Communicates mathematical purpose[1] ❑ Makes explicit connections[4] ❑ Uses accurate mathematics vocabulary	Comment:
3b Using Questioning and Discussion Techniques ❑ Asks questions that build understanding[5] ❑ Asks students to use representations to explain their thinking[3] ❑ Asks students to explain why their procedures worked[6] ❑ Engages students sharing of mathematical reasoning[4] ❑ Selects and sequenced student strategies[4] ❑ Allows for sufficient wait time[5]	Comment:
3c Engaging Students in Learning ❑ Uses rich tasks with multiple entry points, varied tools, representations[2] ❑ Encourages students to use varied strategies[2] ❑ Provides students with opportunities to use their own reasoning[6] ❑ Provides opportunities for practice of procedures[6]	Comment:
3d Using Assessment in Instruction ❑ Gathers evidence of student understanding during instruction[8] ❑ Interprets student thinking to assess mathematical understanding, reasoning, and methods[8] ❑ Makes in-the-moment decisions on how to respond to students with questions that probe, scaffold, and extend[8]	Comment:
3e Demonstrating Flexibility and Responsiveness ❑ Adjusts pacing and structure of lesson as needed ❑ Adjusts representations, tools, and/or tasks during instruction ❑ Provides support for students working with below grade level mathematics	Comment:

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Superscripts identify mathematics teaching practices. Principles to Actions: Ensuring Mathematical Success for All (NCTM, 2004)
Distributed 9.29.15 Principals' Curriculum and Instruction Meeting

Appendix B: HCPSS' Mathematics "Look-Fors" – Secondary

Department of School Improvement and Curricular Programs
Principals' Curriculum and Instruction – September 29, 2015
HCPSS Mathematics "Look-Fors"

School _____ Teacher(s) _____ Course/Period _____

[illegible]	[illegible]
[illegible]	
[illegible]	
[illegible]	
[illegible]	
[illegible]	
[illegible]	
[illegible]	

☐ [redacted]	
[redacted] ☐ [redacted] ☐ [redacted]	☐

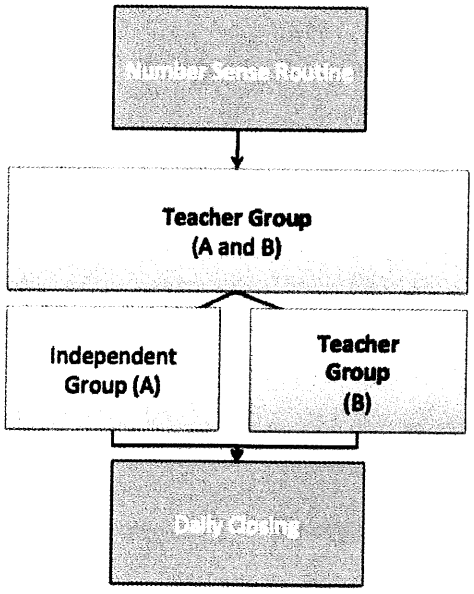
Additional Comments:

Non-evaluative Visitor _____ Date _____

Appendix C: Instructional Models (Elementary)

Small-Group Rotation Model A

This instructional model is for the 75-minute mathematics class. Model A is preferred for teachers without assistants or co-teachers. Instructional resources for each specific component of the model are provided on Canvas.



Number Sense Routine (15 minutes): Each mathematics class begins with a routine to develop our students' number sense. They are focused on major number concepts from the grade level including number relationships, computation, and fractions. These routines are engaging and student-centered. They make use of quantitative reasoning (SMP 1), viable arguments (SMP 3), using tools strategically (SMP 4), and precision (SMP 6).

Teacher Group (25 minutes): After the routine, the teacher shifts instruction to content focus of the day. The lesson makes use of a high-quality task (TP 2) that develops student understanding of the mathematics relative to conceptual understanding, procedural fluency, or application. During this group, the teacher launches the task, students engage in the task, and then the group is brought back together to debrief their learning. The teacher monitors student progress and makes decisions about students who need additional instruction, independent practice, or enrichment.

Independent Group (25 minutes, concurrent with below): Students who demonstrate understanding of the instructional focus work independently to practice the skill or concept. They may also be working with review or extension of previously learned concepts.

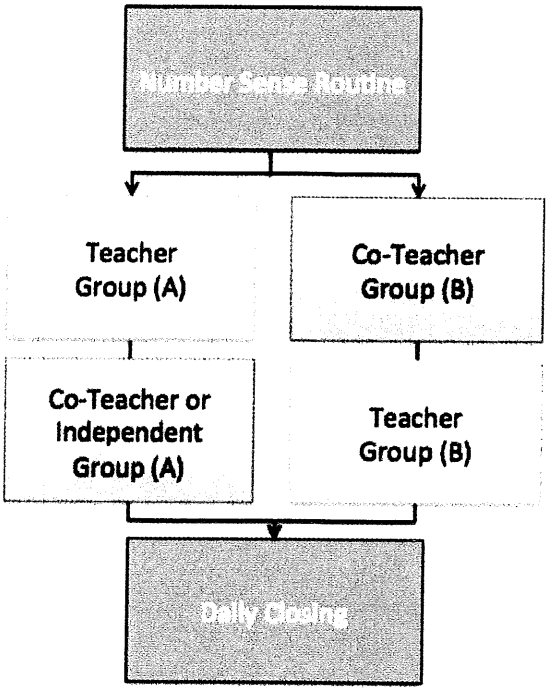
Teacher Group (25 minutes, concurrent with above): Students who demonstrate incomplete understanding or misconceptions about the instructional focus work with the teacher for additional instruction.

Closing (10 minutes): The daily closing is an opportunity for the class to come together to debrief the learning for the day. It is an opportunity for discussion and assessment. Teachers can make use of different strategies for closing including independent reflection activities such as journaling.

Appendix C: Instructional Models (Elementary)

Small-Group Rotation Model B

This instructional model is for the 75-minute mathematics class. Model B is preferred for classrooms with one or more staff members though single-teacher classrooms can also make use of the model. In these cases, the second group is entirely independent. Instructional resources for each specific component of the model are provided on Canvas.



Number Sense Routine (15 minutes): Each mathematics class begins with a routine to develop our students' number sense. They are focused on major number concepts from the grade level including number relationships, computation, and fractions. These routines are engaging and student-centered. They make use of quantitative reasoning (SMP 1), viable arguments (SMP 3), using tools strategically (SMP 4), and precision (SMP 6).

Teacher Group A (25 minutes): After the routine, the teacher shifts instruction to content focus of the day. The teacher group lesson makes use of a high-quality task (TP 2) that develops student understanding of the mathematics relative to conceptual understanding, procedural fluency, or application. During this group, the teacher launches the task, students engage in the task, and then the group debriefs their learning. The teacher monitors student progress and makes decisions about students who need additional instruction, independent practice, or enrichment. Students in this group will rotate to the other group after 25 minutes.

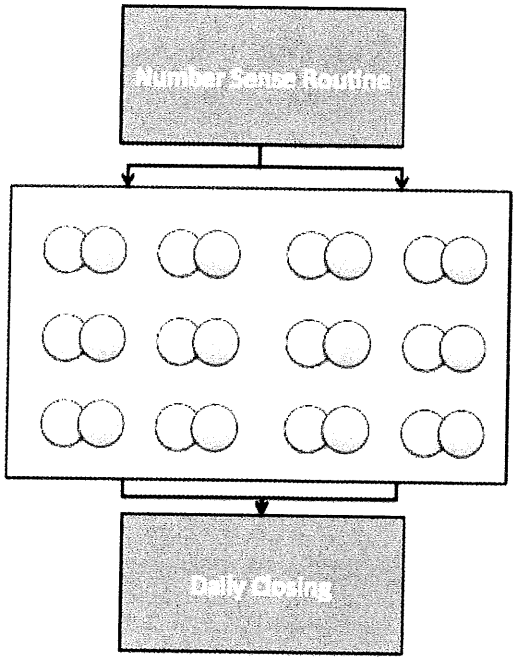
Teacher Group B (25 minutes): After the routine, approximately half of the class proceeds to this group. In this group, students work on related skills and concepts. It may be an opportunity for reteaching or enrichment. This group may focus on a major concept from the grade level such as basic fact acquisition, problem solving, or communicating one's reasoning. After 25 minutes, these students rotate to the teacher leading group A. This group may be independent if it is a single-teacher classroom.

Closing (10 minutes): The daily closing is an opportunity for the class to come together to debrief the learning for the day. It is an opportunity for discussion and assessment. Teachers can make use of different strategies for closing including independent reflection activities such as journaling.

Appendix C: Instructional Models (Elementary)

Collaborative Model

This instructional model is for the 75-minute mathematics class. This model makes use of small group (2-4 students) collaborations. Instructional resources for each specific component of the model are provided on Canvas.



Number Sense Routine (15 minutes): Each mathematics class begins with a routine to develop our students' number sense. They are focused on major number concepts from the grade level including number relationships, computation, and fractions. These routines are engaging and student-centered. They make use of quantitative reasoning (SMP 1), viable arguments (SMP 3), using tools strategically (SMP 4), and precision (SMP 6).

Collaborative Exploration (50 minutes): After the routine, the teacher shifts instruction to content focus of the day. In this model, students will work with a rich problem or investigation. Students work with one or two partners after the teacher sets the stage and gives directions for the task. Students then explore the problem to develop and apply their strategies for solving it. During this time, the teacher circulates to gather evidence of student learning and understanding. The teacher may choose to work with one or two students on a related concept or to provide differentiated support for the task. The class comes together to share strategies and solutions for the problem. In some cases, this sharing and debriefing is the closing for the lesson. In other cases, students may work with similar tasks to practice and apply the newly attained concept. After this practice, the lesson then moves to closing.

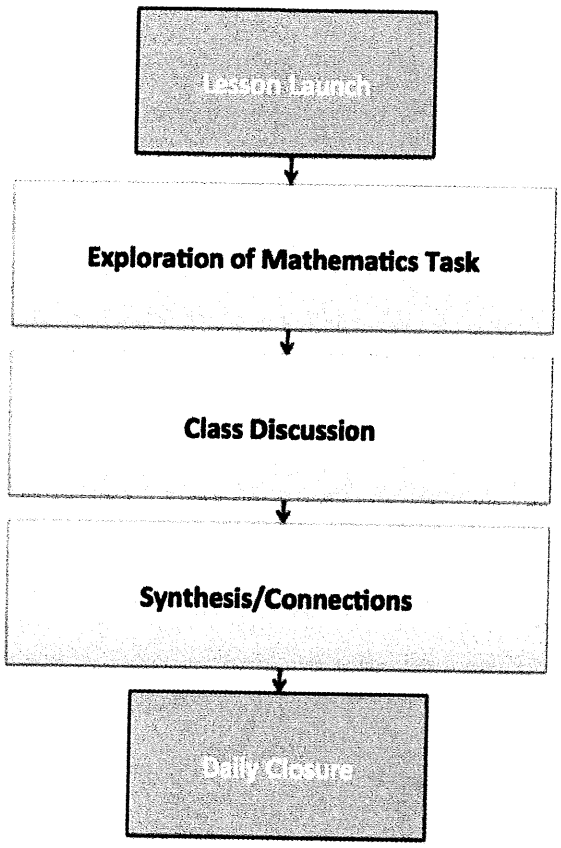
Closing (10 minutes): The daily closing is an opportunity for the class to come together to debrief the learning for the day. It is an opportunity for discussion and assessment. Teachers can make use of different strategies for closing including independent reflection activities such as journaling.

Appendix D: Instructional Models (Secondary)

Model 1: Task-Focused Lesson

Lesson Launch

Teacher sets the stage for learning. Students engage with pre-requisite learning or are introduced to a task and/or key question, aligned with a measureable objective(s) and planned learning target(s) (TP.1).



Exploration of Math Task

Students make sense of the task independently and then work in small groups to begin to develop and communicate problem solving strategies (TP.2, TP. 3, TP.7). The teacher monitors student work (TP.8), selects and sequences strategies and key questions for whole group discussion (TP.5).

Class Discussion

Students share strategies and question/critique reasoning of others (TP.4). In this stage, the teacher structures discussions to address misconceptions using probing questions, gallery walks, flexible grouping, etc. (TP.4, TP. 5, TP.6, TP.7, TP.8) Students may be given opportunities to revisit their own work to improve/enhance work once initial strategies are discussed.

Synthesis/Connections

Students generate resolution for the task and make connections to the underlying mathematics (TP.3, TP.4, TP.6, TP.8). Students are able to make connections between various strategies (TP.3, TP.6).

Daily Closure

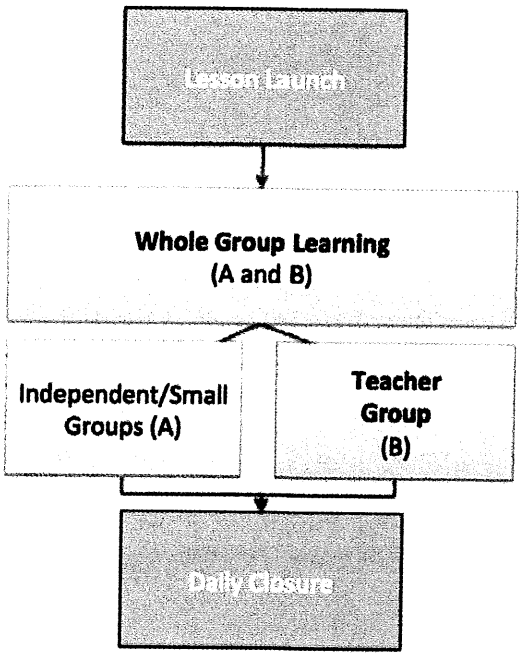
Students summarize their current understanding and reflect on their learning.(TP.5,TP 8)

Appendix D: Instructional Models (Secondary)

Model 2: Whole Group to Small Group Lesson

Lesson Launch

Teacher sets the stage for learning. Students engage with pre-requisite learning or are introduced to a task/key question, which is aligned with a measureable objective(s) and planned learning target(s) (TP.1).



Whole Group Learning

Students engage in new learning as a whole group. Teacher provides opportunities for independent thinking, pair or small group reflection and formative assessment. (TP.4, TP.5 TP.6, TP.8)

Independent/Small Groups and Teacher Group

Teacher uses formative assessment data to strategically group students. Teacher works closely with targeted students to address misconceptions and/or support pre-requisite knowledge. Independent/small groups engage in tasks that promote reasoning and problem-solving. (TP.2, TP.7, TP.8)

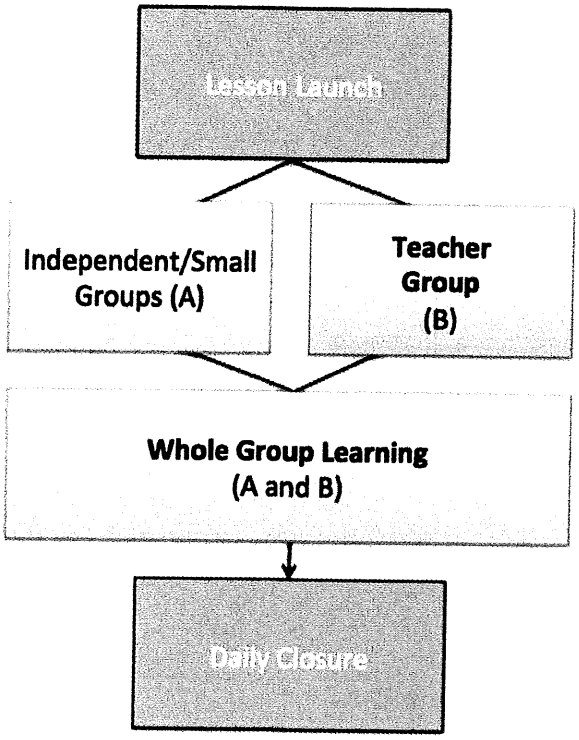
Daily Closure

Students summarize their current understanding and reflect on their learning.(TP.5,TP.8)

Model 3: Small Group to Whole Group Lesson

Lesson Launch

Teacher sets the stage for learning. Students engage with pre-requisite learning or are introduced to a task/key question, which is aligned with a measureable objective(s) and planned learning target(s) (TP.1).



Independent/Small Group and Teacher Group

Teacher uses formative assessment data to strategically group students. Teacher works closely with targeted students to address misconceptions and/or support pre-requisite knowledge.

Independent/small groups engage in tasks that promote reasoning and problem-solving. (TP.2, TP.7, TP.8)

Whole Group Learning

Students engage in new learning as a whole group. Teacher provides opportunities for independent thinking, pair or small group reflection and formative assessment. (TP.4, TP.5 TP.6, TP.8)

Daily Closure

Students summarize their current understanding and reflect on their learning.(TP.5,TP 8)

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